BACKGROUND PLATEAU 44-10#230079 8/15/2006

700	165
750	323
800	464
850	519
900	556
950	540
1000	516
1050	507
1100	530
1150	540
1200	579
1250	521
1300	525
1350	582

SOURCE PLATEAU CS-137#019454

700	3758
750	4635
800	5095
850	5232
900	5418
950	5611
1000	5671
1050	5697
1100	5655
1150	5742
1200	5603
1250	5887
1300	5659
1350	5889

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 08/16/2006.
The current time of day is: 07:35:16.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: MP

Comments:

Model 2350 Serial # =	80502.
User I.D. =	
High Voltage =	1050 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	2.748822E-05.
Detector Calibration Constant =	5.866463E+10.
Detector Model =	44-10.
Detector Serial # =	230079.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.1 volts.

DET1 Generated: 08/16/2006 07:34:30.

Model 2350 Serial #80502

H1050$J
Set High Voltage: 1050

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU4$F
Set Readout Units = R

SB2$.
Set Readout Time Base = hr

SM0$3
Set Readout Range Multiplier = auto

SL2.748822E-05$+
Set Dead Time: 2.748822E-05

*SC5.866463E+10$ *
Set Calibration Constant: 5.866463E+10

M44-10$K
Set Detector Model: 44-10

N230079$/
Set Detector Serial #: 230079

J1.000000E+09$V
Set Ratemeter Alarm: 1.000000E+09

K1000000$H
Set Scaler Alarm: 1000000

P1.000000E+09$.
Set Dose Alarm: 1.000000E+09

SP1$7
SAVE PARAMETERS AS D1

INSTRUMENT RESPONSE RANGE CHECK

Meter Model #	L2350	**Date**	6/3/2007
Meter Serial #	126179		
Probe Model #	44-10	**Source Type**	Cs137
Probe Serial #	230079	**Source Serial #**	019457

instrument background 3.815 cpm

location of source on the detector 6 in

Note: All source readings @ contact

	source reading (net response)	(reading - mean)		squared
1	49,042	-254		64312.96
2	48,543	-753		566406.76
3	58,199	8,903		79270531.56
4	48,660	-636		403987.36
5	50,960	1,664		2770227.36
6	48,252	-1,044		1089100.96
7	48,694	-602		361922.56
8	49,105	-191		36328.36
9	48,898	-398		158085.76
10	42,603	-6,693		44790894.76
total	492,956		total	129511798.4
mean	49,296		total divide 9	14390200
			sqrt.	3793

upper range = mean +(1.96)(sqrt) = 56731
lower range = mean - (1.96)(sqrt) = 41860

Technician Jack Mucia

Reviewer CEJ

Duratek™

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 44-10
Contact Name: Thomas Scott		Serial Number: 402
Customer Purchase Order Number: N/A	Work Order Number: 2006-03900	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION			
1) Source Nuclide: Cs^{137}	Serial Number: 019454	Activity: 5μCi nominal	Certification Date: N/A (Used for Plateau Only)
2) Source Nuclide: Cs^{137}	Serial Number: 049711	Activity: Variable	Certification Date: 07/19/06

Scaler Information		Precision Test	mR/Hr (Source #2)
2350-1	#80498	Count 1	2.00
Due Date	11/22/06	Count 2	2.03
Threshold	T=100 (10mV)	Count 3	1.99
Cable Length	5ft.	Average	2.01
D-814: 2551	Temp: 23.1°C	Tolerance ±10%	All counts within ±10% of Average
D-814: 2551	Press: 741mmHg	Pass/Fail	Pass
Humidity	Humidity: 62%		

Low Sample Activity (400uR/hr): Using Source #2 = 59,060	High Sample Activity (2mR/hr) Using Source #2 = 189,221	Dead Time (DT): 2.847917E-05	Calibration Constant (CC): 5.151877E+10

ATTACHMENTS		DETECTOR DATA: DOSE RATE PROBES (mR/Hr)			
Detector Setup Report	YES √ NO	Desired Exposure	Tolerance ±10%	As Found	As Left
Barcode Report	YES √ NO	0.400	0.360-0.440	0.401	0.399
Voltage Plateau:	YES √ NO	1	0.90-1.10	0.965	0.961
High Voltage: 1200V		2	1.8-2.2	2.00	2.00

COMMENTS

Detectors set up with a 2350-1 may be used with any 2350-1 provided that the setup parameters are scanned into the 2350-1 prior to use with that specific detector

Calibrated with 5ft. Cable

STATEMENT OF CERTIFICATION

We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).

Detector Certified By: Mike Paul	Reviewed By: [signature]	Date: 8/16/06
Certification Date: 08/16/06		Certification Due: 08/16/07

BACKGROUND PLATEAU 44-10#402 8/15/2006

700	9
750	24
800	50
850	62
900	104
950	174
1000	263
1050	382
1100	421
1150	506
1200	550
1250	532
1300	751
1350	3651

SOURCE PLATEAU CS-137#019454

700	11
750	32
800	1615
850	2246
900	3040
950	3907
1000	4620
1050	5119
1100	5428
1150	5544
1200	5709
1250	5875
1300	6055
1350	6648

DETECTOR SETUP CHECK LIST REPORT

The following list is stored as detector setup D1 in the Model 2350.
Today's date is 08/16/2006.
The current time of day is: 09:45:58.

I have verified the list below
has NO discrepancies with the DETECTOR SETTINGS TABLE: NP

Comments:

Model 2350 Serial # =	80498.
User I.D. =	
High Voltage =	1200 volts.
Threshold =	100.
Window =	1000,Off.
Overload Current =	40.0 micro amperes.
Scaler Count Time =	12 seconds.
Readout Units =	R.
Readout Time Base =	hr.
Readout Range Multiplier =	auto.
Detector Dead Time =	2.847917E-05.
Detector Calibration Constant =	5.151877E+10.
Detector Model =	44-10DOSE.
Detector Serial # =	402.
Ratemeter Alarm Setting =	1.000000E+09.
Scaler Alarm Setting =	1000000.
Integrated Dose Alarm Setting =	1.000000E+09.
Low Count Alarm Setting =	X.
Operating Battery Voltage =	5.7 volts.

DET1 Generated: 08/16/2006 09:47:28.

Model 2350 Serial #80498

H1200$G
Set High Voltage: 1200

T100$Q
Set Threshold: 100

W1000$WOFF$P
Set Window: 1000,OFF

O400$OOFF$C
Set Overload: 400,OFF

F12$E
Set Scaler Count Time: 12

SU4$F
Set Readout Units = R

SB2$.
Set Readout Time Base = hr

SM0$3
Set Readout Range Multiplier = auto

SL2.847917E-05$3
Set Dead Time: 2.847917E-05

SC5.151877E+10$Y
Set Calibration Constant: 5.151877E+10

M44-10DOSE$D
Set Detector Model: 44-10DOSE

N402$P
Set Detector Serial #: 402

J1.000000E+09$V
Set Ratemeter Alarm: 1.000000E+09

K1000000$H
Set Scaler Alarm: 1000000

P1.000000E+09$.
Set Dose Alarm: 1.000000E+09

SP1$7
SAVE PARAMETERS AS D1

INSTRUMENT RESPONSE RANGE CHECK

Meter Model #	L2350	**Date**	6/3/2007
Meter Serial #	126170		
Probe Model #	44-10	**Source Type**	Cs137
Probe Serial #	402	**Source Serial #**	019457

instrument background 5.0002 cpm

location of source on the detector 6 in

Note: All source readings @ contact

	source reading (net response)	(reading - mean)		squared
1	46,093	681		463624.81
2	43,640	-1,772		3140338.41
3	38,338	-7,074		50042890.81
4	45,125	-287		82426.41
5	43,824	-1,588		2522061.61
6	44,297	-1,115		1243448.01
7	44,625	-787		619526.41
8	51,662	6,250		39061250.01
9	43,906	-1,506		2268337.21
10	52,611	7,199		51824161.21
total	454,121		total	151268064.9
mean	45,412		total divide 9	16807563
			sqrt.	4100

upper range = mean +(1.96)(sqrt) = 53448
lower range = mean - (1.96)(sqrt) = 37377

Technician Jack Mucia

Reviewer

Duratek

Duratek Instrument Services
628 Gallaher Rd.
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-833

PO number:
313037.100.193.0001

Packing List

Date Shipped:
5/22/2007

Workorder ID:
2007-04447

Shipped To:

EnergySolutions
Winnie, TX
Customer Pickup

Winnie TX
Doug Schult

Shipped From:

Riggs, Anthony
Instrument Services Facility

Shipped Via:
Mobile Lab Trailer (Inside)

Line #	Qty	Manufacturer:	Model:	Serial Number:	Description:
1.	1	DCA	0-200mR	7050160 ✓✓	Expire 8-1-07
2.	1	DCA	0-200mR	7065256 ✓✓	
3.	1	DCA	0-200mR	3070720 ✓✓	
4.	1	DCA	0-200mR	1060842 ✓✓	
5.	1	DCA	0-200mR	7070437 ✓✓	
6.	1	VARIOUS	0-200mR	1013076 ✓✓	
7.	1	VARIOUS	0-200mR	1012991 ✓✓	
8.	1	VARIOUS	0-200mR	8011896 ✓✓	
9.	1	VARIOUS	0-200mR	1013038 ✓✓	
10	1	DCA	0-200mR	3071536 ✓	
11	1	DCA	0-200mR	3071672 ✓✓	
12	1	DCA	0-200mR	1090492 ✓✓	
13	1	VARIOUS	0-200mR	1013071 ✓✓	
14	1	DCA	0-200mR	1081948 ✓✓	
15	1	DCA	0-200mR	8022742 ✓✓	
16	1	DCA	910	9810-060 ✓	Charger
17	1	DCA	910	9810-062 ✓	

Everything ✓✓ was returned

Davis®
CALIBRATION LABORATORY

Certificate of Calibration

390238

Instrument Identification

Company ID: DURINS

ENERGY SOLUTIONS
628 GALLAHER RD.
KINGSTON, TN, 37748

PO Number: 17578

Instrument ID: **82525**
Manufacturer: TROEMNER
Description: 5PC WEIGHT SET

ACCURACY: CLASS F

Model Number: FIELD CAL. WTS.
Serial Number: 28629

Certificate Information

Reason For Service: CALIBRATION
Type of Cal: NORMAL
As Found Condition: IN TOLERANCE
As Left Condition: LEFT AS FOUND
Procedure: NIST HBK 145 SOPS FOR MASS CALIBRATION
Remarks: *sop 7*

Technician: MARK AYERS
Cal Date: 11/8/2006
Cal. Due Date: 11/8/2007
Temperature: 19.0 C
Humidity: 34.0 %

The instrument on this certification has been calibrated against standards traceable to the National Institute of Standards and Technology (NIST) or other recognized national metrology institutes, derived from ratio type measurments, or compared to nationally or internationally recognized consensus standards.

A test uncertainty ratio (T.U.R.) of 4:1 [K=2, approx. 95% Confidence Level] was maintained unless otherwise stated.

Davis Inotek Instruments Calibration Laboratory is certified to ISO 9001:2000 by Eagle Registrations (certificate # 3046). Lab Operations meet the requirements of ANSI/NCSL Z540-1-1994, ISO 10012, 10CFR50 AppxB, and 10CFR21.

ISO/IEC 17025-2005 accredited calibrations are per ACLASS certificate # AC-1121 within the scope for which the lab is accredited.
All results contained within this certification relate only to item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the instrument's calibration interval has expired.

This certificate shall not be reproduced except in full and with the written consent of Davis Inotek Instruments Calibration Laboratory.

Approved By: _____
Robert Flack, Lab Manager

Calibration Standards

NIST Traceable#	Inst. ID#	Description	Model	Cal Date	Date Due
117736	01-1211	WEIGHT SET, 01-1211	10KG TO 1MG	01/07/2004	1/7/2008

11-15-06

CALIBRATION LABORATORY

Certificate of Calibration

390238

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max
SEE ATTACHED DATA							
NUMBER OF PAGES	1	0	✓	0	✓	0	0

End of Datasheet

11-15-06

Davis®
CALIBRATION LABORATORY

CALIBRATION DATA

Certificate No.: 390238

Customer:	Energy Solutions	S.O. #:	107512
Model:	FIELD CAL. WTS.	Serial No.:	28629
Date:	11/08/06	I.D. No.:	82525

As Received / As Left Data

Weight ID Test Mass	Nominal Mass gram	Conventional Mass (vs. 8.0 g/cc) Test Mass gram	Process Uncertainty mg	NIST Class F Tolerance mg
	2000	2000.0865717	1.2	200
	1000	1000.0566870	0.20	100
	500	500.0374757	0.12	70
	200	200.0118865	0.088	40
dot	200	200.0120679	0.088	40

JP 11-15-06

Alpha Spectra, Inc.
Scintillation Detectors

800-231-2545 • 970-243-4477 • 970-244-6947 FAX
715 Arrowest Court Grand Junction CO 81505
www.alphaspectra.com

Final Quality Control Data Sheet
Certificate of Compliance

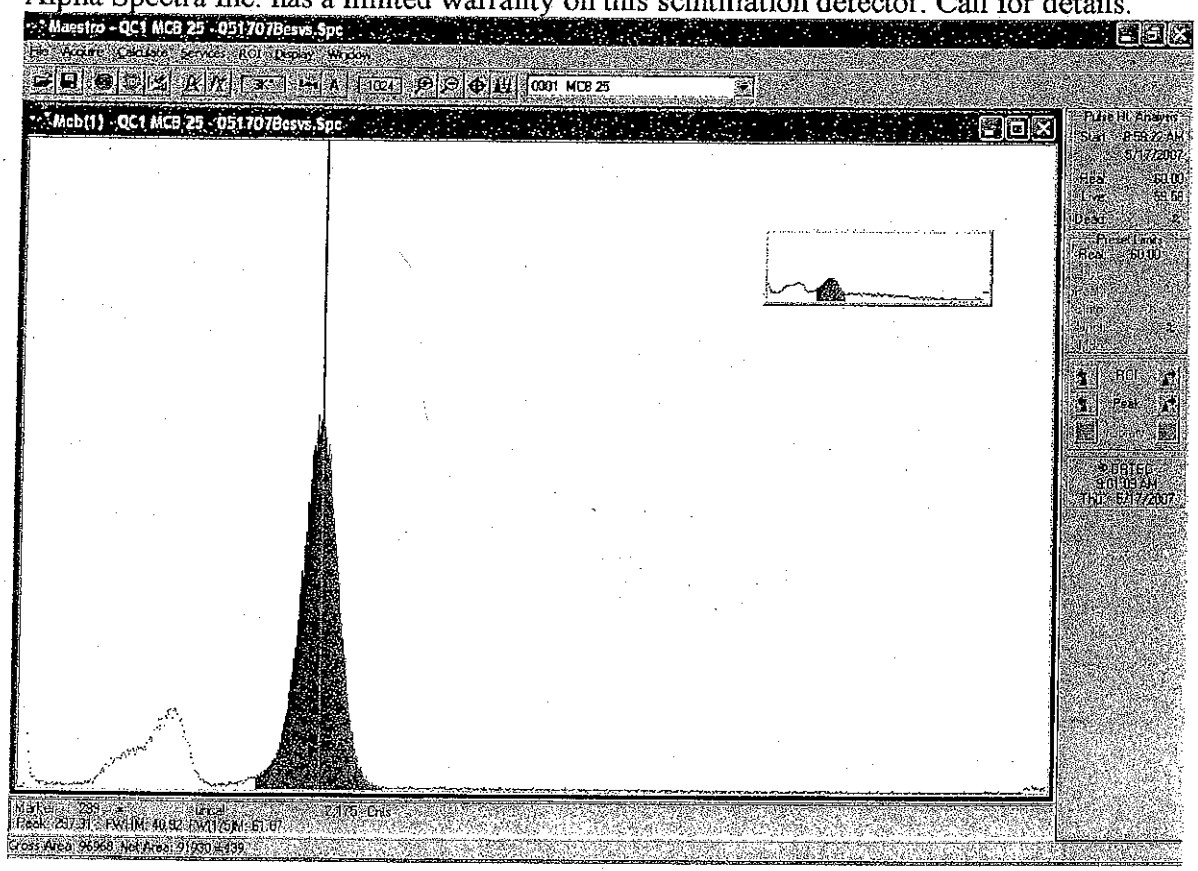
Detector Information
Date: 05-17-07
Customer name: Energy Services
Model Number: 20DT063QB2/5B
Serial Number: 051707B
Crystal Material: NaI(Tl)
PMT: 5.0" B133D01B13 #703546
Resolution: 13.8%

Measurement Data
Source: 1.0 µci Am-241
Source Energy: 60 KeV
Source Position: end on, centered
Source Distance: 1.0 inches
Voltage Setting: 1000 Volt
Time Constant : 2 µsec
Amplifier Gain Setting: 50 x .500

Notes: Solid protective cap and kapton window protective cap included with this detector.

Technician JH

Alpha Spectra Inc. has a limited warranty on this scintillation detector. Call for details.



Aerosol Test Log

Form CP-IN-WI-602-F1
Rev. 0

Date: 5/17/2007

Photometer ID: 10789

Photometer Cal Due Date: 1/10/2008

Date/Time Out: 5/17/2007 1300

Date/Time In: 5/17/2007 1430

Filter Housing/ID 6C-15-DH-9040

Location: MOBILE LAB

Upstream Reading: 100 (X100 scale)

Downstream Reading
Percent Penetration: .02 (X scale)

Efficiency: 99.98 (percent filtration)

Reason for Aerosol Testing (check one):

- ☐ Prior to initial use
- ☒ Every six months
- ☐ Suspect damage/degradation
- ☐ After changeout (partial system replacement)

COPY

☐ Pass ☒ Fail Remarks: _____

If failed, notified: _____ Date/Time: _____

OPS Section Leader (Name)

_____ Date/Time: _____

I&C Leader, or designee (Name)

Tester's Signature: Willard Yuna

Reviewed By: _____ Date: _____

Electronic documents, once printed, are uncontrolled and may become outdated. Refer to the intraweb or the document control authority for the current revision.

Approvals Page

OPERATION AND CALIBRATION CHECK OF DENVER INSTRUMENT MODELS XE3000 AND XE4100 ANALYTICAL BALANCES

Prepared by:	Signature on File Gregory Rice, Project Manager	6/20/03 Date
Reviewed by:	Signature on File Tracy Proctor, Chemistry Supervisor	6/25/03 Date
Approved by:	Signature on File Robert Hornbeck, Operations Manger	6/25/03 Date
Approved by:	Signature on File Richard E. Campbell, Director, ESH/QA	6/30/03 Date

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1.0 SCOPE

1.1 Purpose

This procedure provides instructions for operation, daily QC and monthly range checks (calibration check) of the Denver Instrument Model XE3000 and XE4100 Balances.

1.2 Applicability

This procedure provides instructions for operation, daily QC and monthly range checks (calibration check) of the Denver Instrument Model XE3000 and XE4100 Balances.

1.3 Discussion

1.3.1 The Denver Instrument Company Model XE3000 Balance has a 0.1 g to 3000 gram range. The Denver Instrument Company Model XE4100 Balance has a 0.1 g to 4000 gram range.

1.3.2 The Model XE4100 balance has a calibration button that can be used in conjunction with a 1 kilogram, 2 kilogram, 3 kilogram or 4 kilogram weight to calibrate the XE4100. The Model XE3000 balance does not have a calibration button. There are no external calibration adjustments on the Denver balances. If the range check is unacceptable then the balance will need to be returned to the vendor for adjustment/repair.

2.0 REFERENCES

Denver Instrument Company, XE/XS Series Balances Operating Manual.

3.0 REQUIREMENTS

3.1 Definitions

3.1.1 Aggregate Material - Items or material that by their physical nature do not lend themselves to being effectively surveyed using portable instrumentation and require bulk or composite survey techniques or representative sampling and analysis.

3.1.2 Minimum Detectable Activity (MDA) - The smallest amount or concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. MDA depends upon the type of instrument, the counting geometry, and the radionuclide to be detected. MDA has the same meaning as Lower Limit of Detection (LLD) for radiation survey instruments. (ANSI N13.3-1996)

3.1.3 Unconditional Release - The removal of materials from a Radiologically Controlled Area (RCA) to areas that do not require radiological control of the material by the licensee.

3.2 Responsibilities

3.2.1 The Project Manager or designee is responsible for administering this procedure.

3.2.2 The Project Engineer or Health Physics Technicians are responsible for implementing this procedure.

3.2.3 Health Physics technicians are responsible for operating the Denver Instrument Model XE3000 and XE4100 Balances in accordance with this procedure.

3.3 Tools, Materials, Equipment

The following may be required:

- Sample containers, as required
- NIST traceable weights
- Small level
- Towel, absorbents

3.4 Prerequisites

3.4.1 Ensure the balances have been checked with NIST traceable weights over the instrument's range within 12 months.

3.4.2 Ensure the balances have been checked within the month at a minimum of four (4) points over the usage range within the past month.

3.4.3 Check the balances using NIST traceable weight(s):

- After moving;
- When excessive temperature variations have occurred or;
- Following loss of power.

3.4.4 Perform a QC check using 2000 g weight, or a weight that approximates the normal weighing range, daily or prior to use when instrument is used intermittently.

3.5 Precautions & Limitations

3.5.1 Be careful to handle equipment and package so that damage does not occur during shipment. IF safe packaging requirements are not known, contact the Denver Instrument Company.

3.5.2 Choose a firm horizontal surface with minimal vibration for instrument location; a "slab" is recommended.

3.5.3 Locate the instrument to avoid direct sunlight, extreme temperature variations and drafty conditions.

3.5.4 After connecting power cable to the balance, allow a warm-up period of at least minutes prior to use.

3.5.5 Use gloves and tweezers to handle calibrated weights as appropriate. Oil and dirt from hands can cause the weight to change.

3.5.6 Use care to avoid spilling liquid samples on the balance. If necessary, tare the scale with an absorbent towel.

3.5.7 Use care when weighing thermally hot samples. Recheck the balance if the ambient temperature change is significant (>100F).

4.0 PROCEDURE

NOTE: SECTIONS OF THIS PROCEDURE MAY BE OMITTED OR PERFORMED OUT OF SEQUENCE WITH SPECIFIC APPROVAL.

4.1 Leveling the Balance

4.1.1 Locate balance on a firm horizontal surface with minimal vibration.

4.1.2 Place a small level on the balance and turn leveling feet under the balance to adjust level until the instrument is level.

4.2 Balance Operation

4.2.1 The instrument will turn ON when it is plugged in. The Model XE3000 display will initially show 3000 C and then 0.0 when it is ready for use. The Model XE4100 display will initially show Ver. 1.03 followed by 4100 C and then approximately 0.0 when it is ready for use.

4.2.2 Press and release the Zero key. The display shows: 0.0 g.

4.2.3 IF weighing a sample, THEN perform the following:

- Ensure the balance has been checked with the QC weight within the past 24 hours.

- IF taring an empty sample container, THEN Place the sample container or a representative sample container in the center of the balance and press and release the Zero key. The display should show 0.0 g.

- Place the sample to be weighed in the center of the weighing pan.

4.2.4 WHEN the display stabilizes, THEN record the sample weight.

4.3 Daily QC Check

4.3.1 Press and release the Zero key. The display should show 0.0 g.

4.3.2 Place 1000 g weight on the center of the pan.

4.3.3 WHEN the display stabilizes, THEN record the displayed weight in the balance weighing log (Appendix A). Mark the weighing log indicating the QC check is satisfactory (e.g. SAT QC).

4.3.4 IF the display is not within 0.05% (1 g for the 1000 g weight) THEN mark the weighing log indicating the QC is unsatisfactory (e.g. UNSAT QC) and:

- Press and release the CAL key. The display will indicate Calibrate, CAL-1000, CAL OK.

- Mark the weighing log indicating the QC check is satisfactory (e.g. SAT QC).

4.4 Monthly Range Check

4.4.1 Record the calibration Due Date on the range check record.

4.4.2 Ensure the balance is leveled in accordance with section 4.1 of this procedure.

4.4.3 Obtain a valid calibrated weight set appropriate for the balance range (1 g to 4000 g).

4.4.4 Carefully weigh several calibration weights to check the instrument accuracy through the weighing range and record on Appendix B, Denver Instrument Model XE 3000 and Model XE4100 Range Check. The monthly range check should cover at least four (4) points (weights) over the usage range.

4.4.5 The measured weight should be within the tolerance specified on Appendix B (0.05% for weights greater than 100 grams and 0.1 gram for weights 100 grams or less). If the weight is not within the required tolerance, THEN notify the Project Manager.

4.4.6 Check the tolerance on the weight set being used to be sure the accuracy of the weights is not less than the required tolerance on Appendix B. If the problem cannot be resolved tag the instrument out of service.

4.5 Annual (Calibration) Range Check

4.5.1 The annual range check can be performed by a vendor or using this procedure.

4.5.2 IF a vendor is used to perform the range check THEN the documentation should be reviewed and signed by the Project Manager.

4.5.3 Prior to performing the range check for the XE4100 a calibration should be performed by:

- Press and release the Zero key. The display shows 0.0 g. Place a NIST calibrated weight (either 1000 grams, 2000 grams, 3000 grams or 4000 grams) on the center of the pan.
- Press and release the CAL button and wait for the display to stabilize.
- IF the range check will be performed using this procedure THEN perform the check in accordance with section 5.4 covering all the weights on Appendix B.If each measured weight is within tolerance then place a calibration sticker on the instrument indicating the due date 12 months later.
- IF each measured weight is not within tolerance, then notify the Project Manager and either tag the instrument out of service or place a limited usage sticker on the instrument noting the usable range with direction from the Project Manager.

5.0 RECORDS

5.1 Records shall be maintained per project requirements and / or as directed by the Project Manager.

5.2 Attachments to this procedure are provided as examples only. Equivalent information may be documented in field log books or other project record.

ATTACHMENT B
DENVER MODEL XE 3000 AND MODEL XE4100 RANGE CHECK
(example)

Project ID: _____

Monthly _____ Annual _____

MODEL XE3000 _____ MODEL XE4100 _____

S/N: _____ Cal Due Date: _____

Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	
10 g	9.9 - 10.1	
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	
100 g	99.9 - 100.1	
200 g	199.9 - 200.1	
500 g	499.7 - 500.3	
1 kg	999.5 - 1000.5	
1.5 kg	1499.2 - 1500.8	
2 kg	1999.0 - 2001.0	
2.5 kg	2498.7 - 2501.3	
3 kg	2998.5 - 3001.5	
3.5 kg*	3498.3 - 3501.8	
4 kg*	3998.0 - 4002.0	

Weight Set SN, calibration date, and calibration due date: _____

_____ Acceptable range check _____ Unacceptable/Instrument tagged out of service

Performed By: _____ Date: _____

Reviewed By: _____ Date: _____

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # _____ SN _____

Date/Time		Sample Number/Description	Weight	Tech

Glenn Parkhurst

From: Jeff Dickinson
Sent: Tuesday, July 17, 2007 8:10 AM
To: Glenn Parkhurst; Linda Finn
Cc: Mike Carr
Subject: RE: More info on the detectors

I don't see a significant problem with the information you sent me. The FWHM bounces around a little, but nothing that would cause any problem with the system's performance. I don't even track FWHM with the systems I maintain in our bulk waste assay problem. We only track peak energy (channel number) to ensure the energy calibration remains valid and peak activity to ensure the efficiency calibration remains valid (i.e., if you've correctly identified the energy/nuclide and correctly quantified its activity, you have the correct answer). We have had detectors significantly lose resolution, but the problem also resulted in QC activity measurements falling out of tolerance.

The data sent me for your two detectors shows a 0.15 keV range (i.e., 0.86 to 1.01 keV) for the Canberra detector and a 0.16 keV range (0.94 to 1.10 keV) for the Ortec detector, which is basically the same. The Ortec resolution is slightly higher, but it's not a significant difference. Tracking the FWHM does provide an early warning of a problem with a HPGe detector (and that's why most people track it), but I don't see any problem with an HPGe detector with a 0.95 keV FWHM at 59.5 keV versus one whose FWHM is 1.1 or 1.2 keV (i.e., resolution difference is not significant for most applications). If one of your detectors exhibits a significant trend (e.g., FWHM at 1.2, 1.4, 1.6, and continually rising or a big shift), then the cause should be investigated, but the magnitude of the change shown on the data sent me isn't a problem in my opinion.

Since you've been doing it, I'd recommend that you continue to track FWHM, but I wouldn't enforce any control limits (i.e., track so data's available for trend reviews). As noted above, the critical parameters are the peak energy and peak activity.

Jeff

From: Glenn Parkhurst
Sent: Saturday, July 14, 2007 1:04 PM
To: Jeff Dickinson; Mike Carr
Subject: More info on the detectors

Glenn Parkhurst, RRPT
Project Engineer
Energy Solutions
143 West St.
New Milford, CT 06776
435-224-4364
gparkhurst@energysolutions.com

Glenn Parkhurst

From: Jeff Dickinson
Sent: Monday, July 16, 2007 9:27 AM
To: Glenn Parkhurst; Mike Carr
Cc: Linda Finn; Michael Pries
Subject: RE: Sample result question

Although you want results with as high a precision and accuracy as possible that difference is only about 10% (doesn't seem that bad to me). Remember, this error should be relative (not absolute) so assuming +/- 10%, results at your limit should be about 6.0 +/- 0.6 pCi/g.

Thanks, Jeff

From: Glenn Parkhurst
Sent: Saturday, July 14, 2007 6:25 AM
To: Mike Carr; Jeff Dickinson
Cc: Linda Finn; Michael Pries
Subject: Sample result question

Same sample, 2 detectors, one was 49.136 pCi/g and the other was 54.335 pCi/gm. The concern would be that we are looking for <6 pCi/g to release areas or >6 to dig deeper. If the disparity between the two is that high, we could be releasing high or digging low. Either way, the customer would not be happy. What are your thoughts and what can we do. I don't believe Linda has much confidence in the equipment with differences such as these and now I don't either. On a related question, the detector that has the geometry for water is contaminated enough we can not reach our limit of .02 uCi/ml.

Glenn Parkhurst, RRPT
Project Engineer
Energy Solutions
143 West St.
New Milford, CT 06776
435-224-4364
gparkhurst@energysolutions.com

Energy Solutions, LLC. 82A8045 ATTACHMENT A

INSTRUMENT RESPONSE RANGE CHECK

Meter Model #	M-3	**Date**	7/23/2007
Meter Serial #	**118497**		
Probe Model #	43-5	**Source Type**	Th-230
Probe Serial #		**Source Serial #**	99612

instrument background **0** cpm

location of source on the detector Center, on contact

Note: All source readings @ contact

	source reading (net response)	(reading - mean)		squared
1	2,350	-40		1600
2	2,300	-90		8100
3	2,400	10		100
4	2,600	210		44100
5	2,450	60		3600
6	2,500	110		12100
7	2,350	-40		1600
8	2,250	-140		19600
9	2,400	10		100
10	2,300	-90		8100
total	23,900		**total**	99000
mean	2,390		**total divide 9**	11000
			sqrt.	105

upper range = mean +(1.96)(sqrt) = **2596**
lower range = mean - (1.96)(sqrt) = **2184**

Date	Background	Response

Technician Linda C. Finn

Reviewer [signature]

Duratek

DETECTOR CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		DETECTOR INFORMATION
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum
Address: 628 Gallaher Rd Kingston, TN 37763		Detector Model: 43-5
Contact Name: Tony Riggs		Serial Number: 171284
Customer Purchase Order Number: N/A	Work Order Number: 2006-0	Evaluation Method: Source

DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION			
Source Nuclide	Serial Number: 119709	Activity: 2,442 dpm	Certification Date: 10/14/97
Source Nuclide	Serial Number: 119701	Activity: 19,080 dpm	Certification Date: 09/30/97

Source# 119701	As Found	As Left	Linearity Test	CPM
Gross CPM	1,962	1,962	Count 1 (Heel)	2,038
Background CPM	1.4	1.4	Count 2 (Center)	1,958
Net CPM	1,960.6	1,960.6	Count 3 (Toe)	1,820
Efficiency	10.3%	10.3%	Average	1,938.7
Source# 119709	**As Found**	**As Left**	**Tolerance ±10% of Average (Pass or Fail)**	**PASS**
Gross CPM	292	292		
Background CPM	1.4	1.4		
Net CPM	290.6	290.6		
Efficiency	11.9%	11.9%	10 Minute Background Performed	

Scaler Information			Detector Information		
Model	Serial Number	Due Date	Background	Operating Voltage	Threshold/Input Sens.
12	117173	10/24/2007	1.4 cpm	1000V	10mV

Attachments		Comments
Voltage Plateau:	YES ✓ NO	Cable Length: 5ft.

Dead Time and Cal Constant			
Low Sample Activity Source #	N/A	Dead Time (DT)	N/A
High Sample Activity Source #	N/A	Cal. Constant (CC)	N/A

Statement of Certification

We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).

Detector Certified By:	Reviewed By:	Date: 10/24/07
Certification Date: 10/24/2006		Certification Due: 10/24/2007

BACKGROUND PLATEAU 43-5 #171284 10/24/06

400	0
450	0
500	0
550	0
600	0
650	0
700	0
750	0
800	0
850	0
900	0
950	1
1000	0
1050	0
1100	1
1150	2
1200	2

SOURCE PLATEAU TH-230 #119701 19,080DPM

400	0
450	0
500	0
550	0
600	0
650	1
700	83
750	798
800	1415
850	1579
900	1809
950	1820
1000	1945
1050	1977
1100	1985
1150	1966
1200	1999

Model: 12 Serial Number: 117173

M&TE				Environmental Conditions		
Volt Meter	ID#	88020324	Cal Due: 09/26/07	Barometer	ID# 2816	Cal Due: 05/04/07
Pulser	ID#	120935	Cal Due: 05/27/07	Thermometer	ID# 2816	Cal Due: 05/04/07
Humidity	ID#	958670	Cal Due: 03/29/07	Temp: 21.5 °C	Pressure: 743 mmHg	Humidity: 33%

Special Test

Geotropism	Sat (√) Unsat ( )	F/S Response	Sat (√) Unsat ( )
Audio Check	Sat (√) Unsat ( )	Batt. Ck. (Min. Volt 2.2VDC)	Sat (√) Unsat ( )
Mechanical Zero	Sat (√) Unsat ( )		
Reset	Sat (√) Unsat ( )		
HV Analog Display	Sat (√) Unsat ( )		

High Voltage Calibration (±5%)

Analog Voltage	Tolerance	DVM As Found	DVM As Left				
500	475-525	485	485				
1000	950-1050	1,014	1,014				
1500	1425-1575	1,503	1,503				
2000	1900-2100	2,016	2,016				

DETECTOR EVALUATION INFORMATION

COMMENTS

Limited Use Attached: X1000 Scale for Information only due to no dead time correction.

Calibrated with 5ft cable

Instrument Calibrated By:	Reviewed By: Date: 10/24/06
Calibration Date: 10/24/2006	Calibration Due: 10/24/2007

This is to certify that the herein named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

THIS SHIPPING ORDER must be legibly filled in, in ink, in indelible Pencil or in Carbon and retained by the Agent.

Shipper's No. T071928

Hittman Transport Services (Name of Carrier) Carrier's No. _____ (SCAC)

RECEIVED, subject to the classifications and tariffs in effect on the date of issue of this Bill of Lading.

at Duratek, Inc. / Gallaher Rd. 05/22/2007 From Kingston, TN

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western and Illinois Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classifications or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Consigned to Railroad Commission of TX/Winnie, TX

(Mail or street address of consignee - For purpose of notification only.)

Destination Oak Ridge **State** TN **County** _____ **Delivery Address** * _____

*(To be filled in only when shipper desires and governing tariffs provide for delivery thereat.)

Route MAJOR INTERSTATES AND HIGHWAYS

Delivering Carrier Hittman Transport Services **Car or Vehicle Initials** 314A **Truck #** **Trailer #** **No.** 291494

No. Packages	* HM	Kind of Package, Description of Articles, Special Marks, and Exceptions	**WEIGHT (Subject to Correction)	Class or Rate	Check Column
1		MOBILE LAB	45000	LB	
		CONTAINS BOX # 1 OF CHECK SOURCES			
		019457, 099612, 119657, 119719, 120403			
		DELIVER: 05/23/07 16:00			
		CONTACT: GLENN PARKHURST (435) 224-4364			

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee, without recourse on the consignor the consigner shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor.)

If the charges are to be prepaid, write or stamp here. "To be prepaid."

TO BE PREPAID

Rec'd $ _____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per _____

(The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$ _____

** If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
NOTE - Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

Per

! The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of the Consolidated Freight Classification.

! Shipper's imprint in lieu of stamp; not a part of bill of lading approved by the Interstate Commerce Commission.

Duratek, Inc. / Gallaher Rd.
Kingston, TN **Shipper, Per** _____ **Agent, Per** Hittman Transport Services
Driver _____

Permanent post-office address of shipper: P.O. Box 2530 - 1560 Bear Creek Road - Oak Ridge, TN 37831-2530

* Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations

2

SEALED SOURCE LEAK TEST

1.) MIXED γ + Am-241 #69411-466
2.) Cs-137 # 019457
3.) Th-230 # 099612
4.) Tc-99 # 119719
5.) Tc-99 # 119651

ORIGINAL

SWIPES USED : 1-5
TYPE OF SURVEY : CONTAMINATION ONLY

RWP 078000
DATE : 5-21-07
TIME 1330

RAD INST :
SERIAL # : N/A
CAL DUE :

CON INST :
SERIAL # : N/A
CAL DUE :

LAB INST :
SERIAL # : N/A
CAL DUE :

TECHNICIAN :
SIGN : W. Hoffman
PRINT : W. HOFFMAN

REVIEW BY : B Moore
SIGNATURE : [signature]
DATE : 5/21/07

SEE ATTACHED SHEET FOR CONTAMINATION RESULTS
ALL RESULTS < 1000 DPM/100 cm² β-γ, < 100 DPM/100 cm² α
PAGE 1 of 2

HP-AD-105-F1 Rev 0

ENERGYSOLUTIONS

SMEAR SURVEY RESULT FORM ORIGINAL

Counted by W. HOFFMAN (Print) Signature W. Hoffman Date: 5-21-07

All smears are 100 cm2 unless otherwise noted.

B,γ Counter Type/No.: 2929 Bkg = 38 CPM Eff.= 18.4 Cal Due Date: 3-02-08

α Counter Type/No.: 2929 Bkg= 0 CPM Eff.=28.04 Cal DueDate: 3-02-08

	βγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
1	<1000	<100
2		
3		
4		
5	<1000	<100
6		
7		
8		
9		
10		
11		
12		
13		
14		
15	N	A
16		
17		
18		
19		
20		
21		
22		

	Bγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35	N	A
36		
37		
38		
39		
40		
41		
42		
43		
44		

	Bγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57	N	A
58		
59		
60		
61		
62		
63		
64		
65		
66		

Remarks: N/D = NO DETECTABLE

B MDCR=23.42 MDA= 127 DPM MDCR= 4.39 MDA= 16 DPM

 Signature/Reviewed by: B Moore Date: 5/21/07

Package ID #	Weight (lbs)	Volume (cubic foot)	Total Activity (Curies)
1	4	1	7.1124E-06

Radioactive ?	RQ ?	Limited Quantity Liquid?	Limited Quantity Solid?	DOT Quantity		LSA I	LSA II "Solids and Gases"	LSA II "Liquid"
Radioactive	No	Yes	Yes	TYPE A	-	No	Yes	Yes
	2.15E-04	7.80E-01	7.80E-02	7.80088E-05		1.77E+00	4.30E-04	4.30E-03
Waste Class				Fissile-Excepted < 2 grams (173.453.a)			uCi/cc	
Class A	-	-	-	-	Non Fissile	-	2.51E-04	

2:08 PM5/22/2007

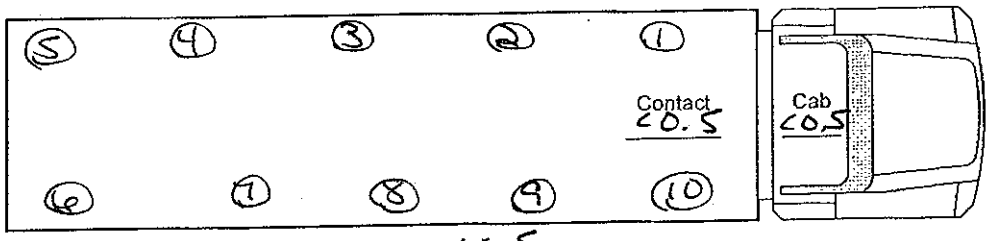
Vehicle Survey Form

Form CP-SR-PR-201-F2
Rev. 3

SURVEY NUMBER: 07 -TRAN- GR 1224

Highest Contact Left Side 2m <0.5 / <0.5

Contact 2m <0.5 / <0.5



Highest Contact Right Side 2m <0.5 / <0.5

Dose Rate Under Trailer <0.5

Dose Rate on Top of Conveyance N/A

All dose rates in mR/Hr

SMEAR RESULTS @ dpm/100cm²		
LOC	BETA/GAMMA	ALPHA
1	<1000	<100
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

RWP # 078300

Date: 5-22-07 Time: 1:45

Shipment Number: T071928

Tractor #: 314A Trailer #: 291494

Incoming: Empty ☐ Outgoing: Empty ☐

Incoming: Full ☐ Outgoing: Full ☑

Trucking Company: HTS

Trailer Type: Flat Ragtop (Van) Tanker Cask Dropdeck Rail Frame

DOSE RATE INSTRUMENT

Type: 14 C

Serial Number: 165658

Cal. Due Date 06/21/07

CONTAMINATION SURVEY INST. – Beta/Gamma

Type: Model 3

Serial Number: 42129

Cal. Due Date 09/20/07

CONTAMINATION SURVEY INST. - Alpha

Type: Model 3

Serial Number: 88206

Cal. Due Date 11/14/07

FLOOR MONITOR or DIRECT FRISK (Info Only)

Type: N/A

Serial Number: N/A

Cal. Due Date N/A

Shipping & Receiving Technician (initials): BH

Reviewed by: D. Wilkes

Electronic documents, once printed, are uncontrolled and may become outdated. Refer to the intraweb or the document control authority for the current revision.

Duratek

Duratek Instrument Services
628 Gallaher Rd.
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-833

PO number:
313037.100.193.0001

Packing List

Date Shipped:
5/22/2007

Workorder ID:
2007-04431

Shipped To:

EnergySolutions
Winnie, TX
Customer Pickup

Winnie TX
Doug Schult

Shipped From:

Jeff, Whitaker
Instrument Services Facility

Shipped Via:

Mobile Lab Trailer (Inside)

Line #	Qty	Manufacturer:	Model:	Serial Number:	Description:
1.	1	EBERLINE	RO-20	1468	
2.	1	LUDLUM	14C	35100	
3.	1	LUDLUM	44-38	075094	
4.	1	LUDLUM	3	118497	
5.	1	LUDLUM	43-5	117588X	
6.	1	EBERLINE	BC-4	337	
7.	1	LUDLUM	43-5 Source Jig	JIG-004	43-5 Response Jig
8.	1	TROEMNER	2KG	28629	
9.	1	F&J SPECIALTY	LV-1	003364	
10	1	F&J SPECIALTY	LV-1	003361	
11	1	LUDLUM	2350-1	126170	
12	1	LUDLUM	2350-1	126179	
13	1	TWO TECH	8045EKR2-1	HH185352	
14	1	TWO TECH	8045EKR-1-GY	HH33256	
15	1	TWO TECH	TT1R2-1	HH198046	
16	1	EBERLINE	SAC-4	1163	
17	1	F&J SPECIALTY	LV-1	003360	
18	1	F&J SPECIALTY	HV-1	866	
19	1	F&J SPECIALTY	HV-1	1686	
20	1	F&J SPECIALTY	HV-1	1671	
21	1	LUDLUM	19	91491	
1	SPARE KEYPAD CABLE				
40	DAILY INSTRUMENT RESPONSE CHECK STICKERS				
15	OUT OF SERVICE TAGS				
1	Cs137 Buttonsource 5uCi #019457				
1	Th230 Check Source #119708 (1nCi)				
1	Th230 Check Source #099612 (10nCi)				
1	Tc99 Check Source #119719 (10nCi)				
1	Tc99 Check Source #119651 (1nCi)				
1	Mixed gamma sand standard #120403				
1	Download Cable				
1	Model 19/RO-20 Response Jig				

not rec'd 8/7

Technician: Linda C. Finn

Date: 8/15/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	No	Not Used	0	N/A	5/14/2008	N/A
*Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2200	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	4uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32	to	0.53	mR/hr	Yes	0.4	5uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	Not Used
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	600	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7889	0.27	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1002	38.7	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	No	Not Used	N/A	60	4/16/2008	Not Used
L-2929 Beta	182585	186558	1282	to	1402	cpm	No	Not Used	N/A	60	4/16/2008	Not Used

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/14/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
*Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2300	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	4uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.4	5uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	500	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7758	0.23	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	989	4	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	No	Not Used	N/A	60	4/16/2008	Not Used
L-2929 Beta	182585	186558	600	to	1402	cpm	No	Not Used	N/A	60	4/16/2008	Not Used

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/13/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
*Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2400	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.4	5uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	550	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	600	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7746	0.23	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	995	37.3	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	No	Not Used	N/A	60	4/16/2008	Not Used
L-2929 Beta	182585	186558	1282	to	1402	cpm	No	Not Used	N/A	60	4/16/2008	Not Used

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/12/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
*Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2200	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.4	4uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	600	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7685	0.18	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	985	44.4	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	No	Not Used	N/A	60	4/16/2008	Not Used
L-2929 Beta	182585	186558	1282	to	1402	cpm	No	Not Used	N/A	60	4/16/2008	Not Used

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/11/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
*Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2200	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.4	4uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	30	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	500	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7677	0.23	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1003	36.7	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7680	0.29	60	4/16/2008	In Service
L-2929 Beta	182585	186558	1282	to	1402	cpm	Yes	1388	40.1	60	4/16/2008	In Service

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/10/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2300	0	N/A	7/27/2008	In Service
*Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2650	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	Yes	0.8	5uR	N/A	4/16/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No	0.9	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.4	4uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	1	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	30	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	500	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7599	0.13	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1006	35.2	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7777	0.13	60	4/16/2008	In Service
L-2929 Beta	182585	186558	1282	to	1402	cpm	Yes	1312	42.4	60	4/16/2008	In Service

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/9/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2400	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2300	0	N/A	7/27/2008	In Service
*Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2600	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	Yes	0.9	5uR	N/A	4/16/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32	to	0.53	mR/hr	Yes	0.4	4uR	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	829840	3954	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	600	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7577	8	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	962	35.8	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7661	0.23	60	4/16/2008	In Service
L-2929 Beta	182585	186558	1282	to	1402	cpm	Yes	1331	41.8	60	4/16/2008	In Service

Note: All source checks are 1 minute in length

* Houston

Technician: Linda C. Finn

Date: 8/8/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2300	0	N/A	7/27/2008	In Service
*Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2600	40	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	7uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
*Model 14C	129671	ES007	0.32		0.53	mR/hr	No	Not Used	N/A	N/A	7/28/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	826797	4530	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	No	Not Used	N/A	N/A	12/12/2007	Not Used
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7576	0.12	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1001	33.5	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7671	0.17	60	4/16/2008	In Service
L-2929 Beta	182585	186558	1282	to	1402	cpm	Yes	1317	44	60	4/16/2008	In Service

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/7/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2300	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	*	uR	N/A	4/16/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
Model 14C	129671	ES007	0.32		0.53	mR/hr	No	*	N/A	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	832445	4129	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	40	N/A	5/14/2008	In Service
*Model 3 w 44-9	92977	113923	380	to	750	cpm	No	*	N/A	N/A	12/12/2007	Not Used
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7589	0.25	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1008	35.2	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7863	0.25	60	4/16/2008	In Service
L-2929 Beta	182585	186558	1282	to	1420	cpm	Yes	1357	49.3	60	4/16/2008	In Service

Note: All source checks are 1 minute in length

* In Houston

Technician: Linda C. Finn

Date: 8/6/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2100	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2600	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	0.327	to	0.456	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
Model 14C	129671	ES007	0.32		0.53	mR/hr	Yes	0.35	0.03	N/A	7/28/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	842585	4592	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
Model 3 w 44-9	92977	113923	380	to	750	cpm	Yes	550	40	N/A	12/12/2007	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7586	0.25	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	980	51.5	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7899	0.27	60	4/16/2008	In Service
L-2929 Beta	182585	100443	1282	to	1420	cpm	Yes	1290	36.6	60	4/17/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 8/5/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497	117588	2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2200	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	Not Used	N/A	NA	10/24/2007	Not Used
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
Model 14C	129671	ES007	3.2		5.3	mR/hr	No	Not Used	N/A	N/A	7/28/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	833186	3925	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7626	0.2	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	960	35.4	60	5/3/2008	In Service
L-2929 Alpha	182585	186558	7603	to	7968	cpm	Yes	7891	0.18	60	4/17/2008	In Service
L-2929 Beta	182585	186558	1282	to	1420	cpm	Yes	1290	56.9	60	4/17/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 8/3/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
Model 12w/43-5	162121	192459	2041	to	2579	cpm	Yes	2200	0	N/A	7/27/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	O.O.S.	N/A	NA	10/24/2007	Returned 8/3
Model 12w/43-5	162107	185412	2203	to	2657	cpm	Yes	2300	0	N/A	7/28/2008	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
Model 14C	129671	ES007	3.2		5.3	mR/hr	No	Not Used	N/A	N/A	7/28/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	838874	3739	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	550	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7798	0.2	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1001	36.3	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	No	O.O.S.	N/A	60	11/22/2007	Returned 8/3
L-2929 Beta	102015	100443	822	to	1102	cpm	No	O.O.S.	N/A	60	11/22/2007	Returned 8/3

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 8/2/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2668	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	uR	NA	5/9/2008	Not Used
Model 14C	129671	ES007	3.2		5.3	mR/hr	No	Not Used	N/A	N/A	7/28/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	838125	4208	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	No	7567	0.2	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	994	35	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	No	O.O.S.	N/A	60	11/22/2007	O.O.S.
L-2929 Beta	102015	100443	822	to	1102	cpm	No	O.O.S.	N/A	60	11/22/2007	O.O.S.

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/31/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2400	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2590	1	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	847940	4113	1	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	Yes	3471	2	1	1/4/2008	In Service
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	Yes	3077	219	1	1/4/2008	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7799	0.13	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1003	33.5	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8112	0.18	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	994	28.7	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/30/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2300	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2674	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	839341	3853	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	185766	199359	3283	to	3658	cpm	No	Not Used	N/A	1	1/4/2008	Not Used
L2360w/43-89 Beta	185766	199359	2964	to	3204	cpm	No	Not Used	N/A	1/1/1900	1/4/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	550	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7684	0.13	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1006	36	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8239	0.27	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	922	33	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/28/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	returned 7/27
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2500	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2708	1	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	Not Used
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7733	0.2	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1002	34	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8080	0.17	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	1002	25	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/27/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	Returned 7/27
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	O.O.S	N/A	NA	10/24/2007	O.O.S.
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	Not Used
Model 19	91491	NA	0.866	to	1.01	mR/hr	No	O.O.S.	N/A	NA	5/8/2008	Returned 7/27
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	844585	4285	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	Returned 7/27
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	Returned 7/27
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	Not Used
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	Not Used
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7827	o.18	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	994	42.7	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8162	0.03	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	860	0.87	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/26/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2400	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2715	N/A	NA	10/24/2007	O.O.S.
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	836912	4407	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7817	0.2	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	998	42.3	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	7986	0.03	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	1092	1.2	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/25/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2717	N/A	NA	10/24/2007	O.O.S.
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	852356	4312	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7842	0.28	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	984	39	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8013	0.02	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	877	0.93	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/24/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 3 w/43-5	118497		2184	to	2596	cpm	Yes	2200	0	N/A	5/14/2008	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	No	O.O.S	N/A	NA	10/24/2007	O.O.S.
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	844585	4285	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7827	o.18	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	994	42.7	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8162	0.03	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	860	0.87	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/23/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 3 w/43-5	149583	172236	2184	to	2556	cpm	No	O.O.S.	N/A	N/A	8/31/2007	O.O.S.
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2700	0	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	853906	4592	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	480	60	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7785	0.07	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1008	50.2	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	8234	0.23	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	847	24.1	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/22/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3 w/43-5	149583	172236	2184	to	2556	cpm	No	Not used	0	N/A	8/31/2007	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2786	1	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	857979	5018	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	460	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7785	0.22	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1008	37.9	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	7976	0.07	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	915	27	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/21/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3 w/43-5	149583	172236	2184	to	2556	cpm	Yes	2200	0		8/31/2007	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2753	1	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	No	Not Used	uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	866220	5943	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used		N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7705	0.16	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1008	35.3	60	5/3/2008	In Service
L-2929 Alpha	102015	100443	7821	to	8253	cpm	Yes	7915	0.03	60	11/22/2007	In Service
L-2929 Beta	102015	100443	822	to	1102	cpm	Yes	932	0.37	60	11/22/2007	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/19/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1800	0	NA	5/14/2008	In Service
Model 3 w/43-5	149583	172236	2184	to	2556	cpm	Yes	2200	0		8/31/2007	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2614	1	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	Yes	0.8	6uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	847609	4271	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	550	60	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7800	0.22	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	996	36.2	60	5/3/2008	In Service
				to								

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/18/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3 w/43-5	149583	172236	2184	to	2556	cpm	Yes	2200	0		8/31/2007	In Service
Model 12w/43-5	117173	171284	2562	to	2800	cpm	Yes	2675	2	NA	10/24/2007	In Service
Model 19	109899	N/A	0.733	to	0.911	mR/hr	Yes	0.75	6uR	N/A	4/16/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	849181	4720	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	Not Used
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	N/A	1/15/2008	O.O.S.
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	O.O.S.
2360w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	60	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7885	0.16	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1001	36.7	60	5/3/2008	In Service
				to								

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/17/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1800	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	852508	4053	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	440	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7869	0.12	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	986	35.9	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/16/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	862542	4112	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	230079	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	402	434	to	631	cpm	Yes	460	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7821	0.23	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	950	36.2	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/15/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1800	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	854860	4436	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7883	0.22	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1004	36.5	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/14/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1800	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	847876	4718	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	460	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7705	0.16	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	963	35.9	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/13/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	890606	4290	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7820	0.18	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	951	35.4	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/12/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	865936	4697	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	No	O.O.S.	N/A	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	No	O.O.S.	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7775	0.17	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	946	35	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/11/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	873570	4356	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
L2360w/43-89 Alpha	193692	199337	3165	to	4033	cpm	Yes	3957	1	1	1/15/2008	In Service
L2360w/43-89 Beta	193692	199337	935	to	1264	cpm	Yes	1041	243	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7786	0.15	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1002	36	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/10/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	O.O.S.
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	829866	3267	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7750	0.08	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1002	34.2	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/9/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1700	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	Yes	820572	3783	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7711	0.18	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	971	34.9	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/7/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	1800	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	383952	3406	NA	5/21/2008	In Service
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7745	0.17	60	5/3/2008	In Service
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	984	34.8	60	5/3/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/6/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No	Not Used	uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No	Not Used	uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7744	0.12	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	956	34.6	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/5/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No			NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No			NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No		uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No		uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No			10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	No			60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	No			60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/4/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No			NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No			NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No		uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No		uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No			10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	No			60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	No			60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/3/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6ur	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7800	0.07	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	946	34.7	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/2/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2300	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	O.O.S.	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7717	0.6	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	962	36.5	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 7/1/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No	Not Used	uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7753	0.1	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	1002	36.6	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/30/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7733	0.08	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	973	36.7	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/29/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	O.O.S	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7865	0.1	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	938	36.4	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/28/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8821	0.15	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	989	36.7	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	No			60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	No			60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/27/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No		5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service
L-2929 Alpha	118407	92751	7571	to	7890	cpm	Yes	7722	0.17	60	5/3/2008	
L-2929 Beta	118407	92751	928	to	1009	cpm	Yes	941	36.8	60	5/3/2008	

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/25/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2450	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	30	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Carl Ingle

Date: 6/23/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No	Not Used	N/A	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No	Not Used	uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/22/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8877	0.68	50	11/14/2007	O.O.S.
BC4	337	NA	935	to	1264	cpm	Yes	1068	25.7	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/21/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9130	0.5	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1101	26	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	600	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/20/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8975	0.06	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1138	21.9	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	50	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Carl Ingle

Date: 6/17/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No	Not Used	N/A	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	4uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	No	Not Used	N/A	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	No	Not Used	N/A	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/19/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2450	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	.N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8934	0.1	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1114	23.1	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda C. Finn

Date: 6/18/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2100	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	Yes	4	0.1	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8932	0.14	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1103	25.2	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Jack Mucia

Date: 6/16/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	4uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8984	0.1	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1062	26.1	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	No	Not Used	N/A	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/15/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2200	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2500	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	0.9	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	1mR/hr	Yes	3.3	0.01	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8846	0.06	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1138	25.6	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	580	40	N/A	5/14/2008	In Service
RO-20	2158	NA	0.352	to	0.738	mR/hr	No	Not Used	N/A	N/A	6/6/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/14/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2100	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2500	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	0.88	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.005	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8970	0.14	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1080	27.5	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	450	40	NA	5/14/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/13/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2550	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9045	5	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1111	24.2	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	500	40	N/A	5/14/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/12/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2200	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2600	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	0.9	6uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9043	2	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1134	23.7	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service
Model 3 w 44-9	72899	119651	434	to	631	cpm	Yes	440	40	N/A	5/14/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/11/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2100	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2420	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	0.9	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8994	0.12	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1144	21.6	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/10/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	No	Not Used	N/A	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	No	Not Used	N/A	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	No	Not Used	N/A	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	No	Not Used	N/A	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	Not Used	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8971	0.1	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1002	22.7	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	No	Not Used	N/A	10	5/21/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/7/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2500	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	0.05	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	0.21	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	mR/hr	Yes	4	0.02	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	8882	0.08	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1072	24.1	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	Yes	46155	4901	10	5/21/2008	In Service

Note: All source checks are 1 minute in length

Technician: Jack Mucia / Linda Finn

Date: 6/6/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2100	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2500	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	0.5	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	0.5	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	Yes	4	0.2	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9002	0.14	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1110	23.2	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	No	Not Used	N/A	10	5/8/2008	Not Used
2350w/44-10-402	126179	402	41860	to	56731	cpm	Yes	47112	4110	10	5/21/2008	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn / Carl Ingle

Date: 6/5/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2100	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2500	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	mR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	mR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	Yes	4	0.1	NA	5/9/2008	In Service
L2350wFiddler	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9079	0.1	50	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1078	26.3	10	9/26/2007	In Service
2350w/44-10-230079	126170	230079	37377	to	53448	cpm	Yes	45149	5659	10	5/8/2008	In Service
2350w/44-10-402	126179	402	41860	to	56731	cpm	Yes	48770	4780	10	5/21/2008	In Service

Note: All source checks are 1 minute in length

Technician: Jack Mucia

Date: 6/3/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2000	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2400	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	uR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	uR/hr	Yes	1.1	5uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	Yes	4	0.1	NA	5/9/2008	In Service
L2350	126170	051707	790752	to	905481	cpm	No	Not Used	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	No	O.O.S.	N/A	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9116	0	10	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1058	22.7	10	926/07	In Service

Note: All source checks are 1 minute in length

Technician: Linda Finn

Date: 6/2/2007

Meter	Serial #	Probe #	Range				Acceptable	Source Check	Background	Background Count Time (min)	Cal Due	Status
Model 3	96784	127389	1700	to	2400	cpm	Yes	2200	0	NA	5/14/2008	In Service
Model 3	118497	117588	2400	to	2700	cpm	Yes	2600	0	NA	5/14/2008	In Service
Model 19	91491	NA	0.866	to	1.01	uR/hr	Yes	1	5uR	NA	5/8/2008	In Service
Model 19	167145	NA	1.003	to	1.156	uR/hr	Yes	1.1	6uR	NA	5/8/2008	In Service
Model 14C	35100	75094	3.27	to	4.56	.1mR/hr	Yes	3.99	0.1	NA	5/9/2008	In Service
L2350w/Fiddler	126170	051707	790752	to	905481	cpm	Not Used	N/A	N/A	NA	5/21/2008	Not Used
RO-20	1468	NA	1.296	to	1.544	mRad/hr	Yes	1.5	0.4	NA	5/9/2008	O.O.S.
SAC4	1163	NA	8723	to	9434	cpm	Yes	9085	0.2	10	11/14/2007	In Service
BC4	337	NA	935	to	1264	cpm	Yes	1027	23.2	10	926/07	In Service

Note: All source checks are 1 minute in length

SMEAR SURVEY RESULT FORM

ORIGINAL

Counted by W. HOFFMAN (Print) Signature W. Hoffman Date: 5-21-07

All smears are 100 cm2 unless otherwise noted.

B,γ Counter Type/No.: 2929 Bkg = 38 CPM Eff.= 18.4 Cal Due Date: 3-02-08

α Counter Type/No.: 2929 Bkg= 0 CPM Eff.= 28.04 Cal DueDate: 3-02-08

	βγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
1	< 1000	< 100
2		
3		
4		
5	< 1000	< 100
6		
7		
8		
9		
10		
11		
12		
13		
14		
15	N	A
16		
17		
18		
19		
20		
21		
22		

	Bγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35	N	A
36		
37		
38		
39		
40		
41		
42		
43		
44		

	Bγ	α
Smear Number	DPM 100cm2	DPM 100 cm2
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57	N	A
58		
59		
60		
61		
62		
63		
64		
65		
66		

Remarks: N/D = NO DETECTABLE

B MDCR=23.42 MDA= 127 DPM MDCR= 4.39 MDA= 16 DPM

 Signature/Reviewed by: B Moore Date: 5/28/07

Report on Sources Winnie Texas

SourceID:	*SerialNumber:*	*Isotope*	*Cal Date*	*InitialActivity:*	*Custodian*
019457	0027	CS-137		5	Glenn Parkhurst
099612	FD148	TH-230	8/8/1996	0.01	Glenn Parkhurst
119651	FD175	TC-99	8/9/1996	0.00211	Glenn Parkhurst
119719	FS454	TC-99	10/14/1997	0.0104	Glenn Parkhurst
120403	69411-466	Mixed Gamma	10/1/2004	2.09	Glenn Parkhurst

Notes about Source

Checked By: LC. Fenn *date:* 6-29-07 *Reviewed By:*

Report on Sources at Winnie Texas

SourceID:	*SerialNumber:*	*Isotope*	*Cal Date*	*InitialActivity:*	*Custodian*
019457	0027	CS-137		5	Doug Schult
099612	FD148	TH-230	8/8/1996	0.01	Doug Schult
119657	FD180	TC-99	8/9/1996	0.002	Doug Schult
119719	FS454	TC-99	10/14/1997	0.0104	Doug Schult
120403	69411-466	Mixed Gamma	10/1/2004	2.09	Doug Schult

Notes about Source

Sources inventoried by Tony Rizzi before heading out to project inside Mobile Lab

Checked By: [illegible] *date:* 5/22/07 *Reviewed By:* [illegible] *date:* 5/25/07

Eckert & Ziegler
Analytics

040701

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www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74706-466

Sand in 250 mL Marinelli Beaker Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from calibrated master liquid radionuclide solutions. The master sources were calibrated with an ionization chamber that was calibrated by the National Physical Laboratory, Teddington, U.K., and is directly traceable to national standards.

Radionuclide purity and calibration were checked with a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

CALIBRATION DATE: April 1, 2007 12:00 EST

ISOTOPE:	ACTIVITY (Bq):	HALF-LIFE:	RELATIVE EXPANDED UNCERTAINTY* (k=2):
Cd-109	2.604 E4	462.6 d	3.3%
Co-57	5.832 E2	271.79 d	3.3%
Ce-139	1.768 E3	137.6 d	3.3%
Sn-113	1.485 E3	115.1 d	3.3%
Cs-137	7.356 E2	3.007 E1 y	3.3%
Y-88	5.097 E3	106.6 d	3.3%
Co-60	1.180 E3	5.271 Y	3.3%

Impurities: γ-impurities <0.1%

310 mL/496 grams of sand.

P O NUMBER PO-000414, Item 1

SOURCE PREPARED BY: N Kiesman
N. E. Kiesman, Radiochemist

Q A APPROVED: [illegible] 4-6-07

Eckert & Ziegler
Analytics

040702

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CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74707-466

Solid in 130G GA-MA Beaker Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from calibrated master liquid radionuclide solutions. The master sources were calibrated with an ionization chamber that was calibrated by the National Physical Laboratory, Teddington, U.K., and is directly traceable to national standards.

Radionuclide purity and calibration were checked with a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

U.S. Patent 4,430,258; U.K. Patent GB2,149,194B; CA. Patent 1,196,776. Density of solid matrix 1.15 g/cc.

CALIBRATION DATE: April 1, 2007 12:00 EST

ISOTOPE:	ACTIVITY (Bq):	HALF-LIFE:	RELATIVE EXPANDED UNCERTAINTY* (k=2):
Cd-109	2.613 E4	462.6 d	3.3%
Co-57	5.853 E2	271.79 d	3.3%
Ce-139	1.774 E3	137.6 d	3.3%
Sn-113	1.490 E3	115.1 d	3.3%
Cs-137	7.382 E2	3.007 E1 y	3.3%
Y-88	5.115 E3	106.6 d	3.3%
Co-60	1.184 E3	5.271 Y	3.3%

Impurities: γ-impurities <0.1%

1161 mL solid.

P O NUMBER PO-000414, Item 2

SOURCE PREPARED BY: N Kiesman
N. E. Kiesman, Radiochemist

Q A APPROVED: MM

Eckert & Ziegler Analytics

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040703

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74708-466

47 mm Diameter Simulated Filter in Petri Dish

This standard radionuclide source was prepared using aliquots measured gravimetrically from calibrated master liquid radionuclide solutions. The master sources were calibrated with an ionization chamber that was calibrated by the National Physical Laboratory, Teddington, U.K., and is directly traceable to national standards.

Radionuclide purity and calibration were checked with a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

CALIBRATION DATE: April 1, 2007 12:00 EST

ISOTOPE:	ACTIVITY (Bq):	HALF-LIFE:	RELATIVE EXPANDED UNCERTAINTY* (k=2):
Cd-109	2.615 E4	462.6 d	3.3%
Co-57	5.858 E2	271.79 d	3.3%
Ce-139	1.775 E3	137.6 d	3.3%
Sn-113	1.491 E3	115.1 d	3.3%
Cs-137	7.387 E2	3.007 E1 y	3.3%
Y-88	5.119 E3	106.6 d	3.3%
Co-60	1.185 E3	5.271 Y	3.3%

Impurities: γ-impurities <0.1%

Diameter active area: 47 mm. Tall loose Petri.

P O NUMBER PO-000414, Item 3

SOURCE PREPARED BY: N Kiesman
N. E. Kiesman, Radiochemist

Q A APPROVED: M. Mg 4-06-07

Eckert & Ziegler Analytics

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040704

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74709-466

High Density Solid in Petri Dish Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from calibrated master liquid radionuclide solutions. The master sources were calibrated with an ionization chamber that was calibrated by the National Physical Laboratory, Teddington, U.K., and is directly traceable to national standards.

Radionuclide purity and calibration were checked with a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

CALIBRATION DATE: April 1, 2007 12:00 EST

ISOTOPE:	ACTIVITY (Bq):	HALF-LIFE:	RELATIVE EXPANDED UNCERTAINTY* (k=2):
Cd-109	2.552 E4	462.6 d	3.3%
Co-57	5.716 E2	271.79 d	3.3%
Ce-139	1.733 E3	137.6 d	3.3%
Sn-113	1.455 E3	115.1 d	3.3%
Cs-137	7.209 E2	3.007 E1 y	3.3%
Y-88	4.996 E3	106.6 d	3.3%
Co-60	1.156 E3	5.271 Y	3.3%

Impurities: γ-impurities <0.1%

Approximately 24 mL solid. Density 1.86 g/cc. Tall loose petri.

P O NUMBER PO-000414, Item 4

SOURCE PREPARED BY: N Kiesman
N. E. Kiesman, Radiochemist

Q A APPROVED: M. M. 4-6-07

ANALYTICS

Reviewed Thomas F. Scott 12-17-04

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CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

120402

2.02 µCi

69410A-466

High Density Solid in Fisher Petri Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: October 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1262	3.0
Cd-109	88	462.6	d	1924	3.3
Co-57	122	271.79	d	987.2	3.0
Ce-139	166	137.6	d	1433	2.8
Hg-203	279	46.61	d	3202	2.7
Sn-113	392	115.1	d	1912	2.6
Cs-137	662	30.07	y	1259	3.0
Y-88	898	106.6	d	4258	2.6
Co-60	1173	5.2714	y	2323	2.7
Co-60	1332	5.2714	y	2349	2.6
Y-88	1836	106.6	d	4447	2.6

Approximate volume 26.5 mL. Density of solid matrix 1.7 g/cc.
P O NUMBER 17106, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 12-2-04

This standard will expire one year after the calibration date.

Produced using Analytics' Mixed Gamma Batch 118.

ANALYTICS

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Reviewed Thomas F. Scott 12-17-04

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

120403
2.09 μCi

69411-466

Sand in 250 mL Marinelli Beaker Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: October 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1306	3.0
Cd-109	88	462.6	d	1990	3.3
Co-57	122	271.79	d	1021	3.0
Ce-139	166	137.6	d	1483	2.8
Hg-203	279	46.61	d	3313	2.7
Sn-113	392	115.1	d	1978	2.6
Cs-137	662	30.07	y	1302	3.0
Y-88	898	106.6	d	4405	2.6
Co-60	1173	5.2714	y	2403	2.7
Co-60	1332	5.2714	y	2430	2.6
Y-88	1836	106.6	d	4601	2.6

490 grams/310 mL of sand.
P O NUMBER 17106, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 12-2-04

This standard will expire one year after the calibration date.

Produced using Analytics' Mixed Gamma Batch 118.

ANALYTICS

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Reviewed
Thomas F. Scott
12-17-04

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

120404
1.86 μCi

69418-466

47 mm Diameter Simulated Filter in Fisher Petri

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: October 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1161	3.0
Cd-109	88	462.6	d	1769	3.3
Co-57	122	271.79	d	907.7	3.0
Ce-139	166	137.6	d	1318	2.8
Hg-203	279	46.61	d	2945	2.7
Sn-113	392	115.1	d	1758	2.6
Cs-137	662	30.07	y	1158	3.0
Y-88	898	106.6	d	3915	2.6
Co-60	1173	5.2714	y	2136	2.7
Co-60	1332	5.2714	y	2160	2.6
Y-88	1836	106.6	d	4089	2.6

Diameter active area: 43 mm. Tall loose petri.
P O NUMBER 17131, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 12-2-04

This standard will expire one year after the calibration date.

Produced using Analytics' Mixed Gamma Batch 118.

ANALYTICS

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Reviewed
Thomas G. Scott
12-17-04

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

120405
1.53 mCi

69417-466

250 mL Solid in 250 mL Marinelli Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.
Density of solid matrix 1.15 g/cc.

Calibration date: October 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	957.0	3.0
Cd-109	88	462.6	d	1459	3.3
Co-57	122	271.79	d	748.6	3.0
Ce-139	166	137.6	d	1087	2.8
Hg-203	279	46.61	d	2428	2.7
Sn-113	392	115.1	d	1450	2.6
Cs-137	662	30.07	y	954.7	3.0
Y-88	898	106.6	d	3229	2.6
Co-60	1173	5.2714	y	1762	2.7
Co-60	1332	5.2714	y	1781	2.6
Y-88	1836	106.6	d	3372	2.6

P O NUMBER 17131, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: M. M. 12-2-04

This standard will expire one year after the calibration date.

Produced using Analytics' Mixed Gamma Batch 118.

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Analytics, Incorporated
Atlanta, Georgia

is a participant for the period January 1, 2004, through December 31, 2004, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with the Nuclear Energy Institute. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed on the back of this certificate.

For the Director,

Michael P. Unterweger, Acting Leader
Radioactivity Group
Physics Laboratory

(over)

ANALYTICS

Reviewed
Thomas F. Scott
12-17-04

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CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

120403
2.09 mCi

69411-466

Sand in 250 mL Marinelli Beaker Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: October 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1306	3.0
Cd-109	88	462.6	d	1990	3.3
Co-57	122	271.79	d	1021	3.0
Ce-139	166	137.6	d	1483	2.8
Hg-203	279	46.61	d	3313	2.7
Sn-113	392	115.1	d	1978	2.6
Cs-137	662	30.07	y	1302	3.0
Y-88	898	106.6	d	4405	2.6
Co-60	1173	5.2714	y	2403	2.7
Co-60	1332	5.2714	y	2430	2.6
Y-88	1836	106.6	d	4601	2.6

490 grams/310 mL of sand.
P O NUMBER 17106, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 12-2-04

This standard will expire one year after the calibration date.

Produced using Analytics' Mixed Gamma Batch 118.

119709

14 October 1997 Men/wo
Page 1 of 2 pages, Issue 07/95

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D-38001 Braunschweig

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Fax (05307) 930-293
Fax-Zentrale 930-237

Amersham
The Health Science Group

CERTIFICATE

No. 363232

for a Sealed Radioactive Source

Source Type: Alpha Wide Area Reference Source

Product Code	TZRX1921
Drawing	VZ-1368
Dimensions of Active Surface	Ø 36 mm
Overall Dimensions	Ø 47 mm x 3 mm
Source No.	FS 444
Nuclide	Thorium-230

Measurement Data

Activity	43.5 Bq
Overall Uncertainty*	± 10 %
Alpha Surface Emission Rate	20.2 s^{-1} ± 5 % in 2 π steradian
Reference Date	30 September 1997
Traceability*	Defined on page 2

Leakage and Contamination Test(s)

Test Method(s)*	I
Test(s) passed on	13 October 1997

Additional Information

ISO Classification*	C.34645
Recommended Working Life*	10 years
Remark	

* see page 2 for explanation

Amersham Buchler

i. A. Rt

(Production Manager)

11971.

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Amersham
The Health Science Group

CERTIFICATE

No. 363235

for a Sealed Radioactive Source

Source Type: Beta Wide Area Reference Source

Product Code	TCRX1896
Drawing	VZ-1368
Dimensions of Active Surface	Ø 36 mm
Overall Dimensions	Ø 47 mm x 3 mm
Source No.	FS 454
Nuclide	Technetium-99

Measurement Data

Activity	385 Bq
Overall Uncertainty*	± 10 %
Beta Surface Emission Rate	190 s^{-1} ± 10 % in 2 π steradian
Reference Date	30 September 1997
Traceability*	Defined on page 2

Leakage and Contamination Test(s)

Test Method(s)*	I
Test(s) passed on	13 October 1997

Additional Information

ISO Classification*	C.34645
Recommended Working Life*	10 years
Remark	

* see page 2 for explanation

Amersham Buchler

i. A. Pet

(Production Manager)

119651

22 August 1996 Men/wo
Page 1 of 2 pages, Issue 07/95

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Fax (05307) 930-293
Fax-Zentrale 930-237

Amersham
The Health Science Group

CERTIFICATE

No. 206423

for a Sealed Radioactive Source

Source Type: Beta Wide Area Reference Source

Product Code	TCRX1919
Drawing	VZ-1368
Dimensions of Active Surface	Ø 36 mm
Overall Dimensions	Ø 47 mm x 3 mm
Source No.	FD 175
Nuclide	Technetium-99

Measurement Data

Activity	78.1 Bq
Overall Uncertainty*	± 10 %
Beta Surface Emission Rate	38.5 s^{-1} ± 10 % in 2 π steradian
Reference Date	9 August 1996
Traceability*	Defined on page 2

Leakage and Contamination Test(s)

Test Method(s)*	I
Test(s) passed on	21 August 1996

Additional Information

ISO Classification*	C.34645
Recommended Working Life*	10 years
Remark	---

* see page 2 for explanation

Amersham Buchler

(Production Manager)

8.Mai. 2000 13:08 AEA TECHNOLOGY CUSTOMER SERVICE Nr.0349 S. 5
05/03 '00 11:43 NO.941 05/16

09960 12

15 August 1996 Men/wo
Page 1 of 2 pages, Issue 07/95

Amersham Buchler
GmbH & Co KG
Gieselweg 1
D-38110 Braunschweig
Postfach 11 49
D-38001 Braunschweig

Tel. (05307) 930-0
Fax (05307) 930-293
Fax-Zentrale 930-237

Amersham
The Health Science Group

CERTIFICATE

No. 206432

for a Sealed Radioactive Source

Source Type; Alpha Wide Area Reference Source

Product Code	TZRX1920
Drawing	VZ-1368
Dimensions of Active Surface	Ø 36 mm
Overall Dimensions	Ø 47 mm x 3 mm
Source No.	FD 148
Nuclide	Thorium-230

Measurement Data

Activity	388 Bq
Overall Uncertainty*	± 10 %
Alpha Surface Emission Rate	180 s^{-1} ± 5 % in 2 π steradian
Reference Date	8 August 1996
Traceability*	Defined on page 2

Leakage and Contamination Test(s)

Test Method(s)*	I
Test(s) passed on	14 August 1996

Additional Information

ISO Classification*	C.34645
Recommended Working Life*	10 years
Remark	---

* see page 2 for explanation

Amersham Buchler

(Production Manager)

Report on Sources at Winnie Texas

SourceID:	*SerialNumber:*	*Isotope*	*Cal Date*	*InitialActivity:*	*Custodian*
019457	0027	CS-137		5	Doug Schult
099612	FD148	TH-230	8/8/1996	0.01	Doug Schult
~~119657~~ 119651	FD~~180~~ 175	TC-99	8/9/1996	0.002	Doug Schult
119719 JRC7 5-25-07	FS454 JRC7	TC-99	10/14/1997	0.0104	Doug Schult
120403	69411-466 5-25-07	Mixed Gamma	10/1/2004	2.09	Doug Schult

5/25/07 0750 - Called Tony (instruments) JRC7

Report on Sources at Winnie Texas

SourceID:	*SerialNumber:*	*Isotope*	*Cal Date*	*InitialActivity:*	*Custodian*
019457	0027	CS-137		5	Doug Schult
099612	FD148	TH-230	8/8/1996	0.01	Doug Schult
~~119657~~ 119651	FD~~180~~ 175	TC-99	8/9/1996	0.002	Doug Schult
119719 SCZ 5/25/07	FS454 SCZ 5-25-07	TC-99	10/14/1997	0.0104	Doug Schult
120403	69411-466	Mixed Gamma	10/1/2004	2.09	Doug Schult

SEALED SOURCE LEAK TEST

1.) MIXED γ + Am-241 #69411-466
2.) Cs-137 # 019457
3.) Th-230 # 099612
4.) Tc-99 # 119719
5.) Tc-99 # 119651

ORIGINAL

SWIPES USED : 1-5
TYPE OF SURVEY : CONTAMINATION ONLY

RWP 078000
DATE : 5-21-07
TIME 1330

RAD INST :
SERIAL # : N/A
CAL DUE :

CON INST :
SERIAL # : N/A
CAL DUE :

LAB INST :
SERIAL # : N/A
CAL DUE :

TECHNICIAN :
SIGN : W. Hoffman
PRINT : W. HOFFMAN

REVIEW BY : B Moore
SIGNATURE : [signature]
DATE : 5/24/07

SEE ATTACHED SHEET FOR CONTAMINATION RESULTS
ALL RESULTS < 1000 DPM/100 cm² β/γ, < 100 DPM/100 cm² α
PAGE 1 of 2

HP-AD-105-F1 Rev 0

ENERGYSOLUTIONS

WINNIE, TEXAS PROJECT

EMPLOYEE TLD'S *August*

Employee	Social #	TLD Serial #	TLD #	Date	Term
CONTROL	N/A	11278341	N/A	6/18/07	*8/14/07*
Glen Parkhurst	544-60-4200	1127826I	#1	6/18/07	*8/14/07*
Chris Higgins	006-86-7946	1127828I	#2	6/18/07	*6/28/07*
Linda C. Finn	264-66-0451	1127827I	#3	6/18/07	*8/14/07*
Jack Mucia	382-56-9424	1127823I	#4	6/18/07	*8/14/07*
Carl Ingle	400-88-1510	1127824I	#5	6/18/07	*8/14/07*
Ed Armstrong	381-08-4748	1127825I	#6	6/18/07	*8/3/07*
Jody Petri	437-49-2242	9957393H	#7	6/20/07	*6/13/07*
Justin Bourgeois	435-57-2062	9957394H	#8	6/20/07	*6/18/07*
Doug Schult	024-52-4118	1127822I	#9	6/26/07	*7/7/07*
Mike Pries	390-78-1841	11278151	#10	7/3/07	*8/14/07*
Will Stiff	364-90-3415	11278161	#11	7/3/07	*8/14/07*
Darryl Howard	378-82-5673	11278131	#12	7/7/07	*8/14/07*
Leroy Cuneo	518-92-5327	112780810	#13	7/14/07	*8/14/07*
Byron Bland	219-06-6079	11278171	#14	7/14/07	*8/06/07*
Daryl L. Lowe	412-53-0475		#15	7/17/07	*8/14/07*
Barron Bradley	560-33-6701	1127830	#16	8/9/07	*8/14/07*
Chris Cummin		1127831	#17	8/9/07	*8/14/07*
Larry Derting		1127820	#18	8/9/07	*8/14/07*

WINNIE, TEXAS PROJECT

EMPLOYEE TLD'S *JULY*

Employee	Social #	TLD Serial #	TLD #	Date	Term
CONTROL	N/A	11278341	N/A	6/18/076	
Glen Parkhurst	544-60-4200	1127826I	#1	6/18/07	
Chris Higgins	006-86-7946	1127828I	#2	6/18/07	*6/28/07*
Linda C. Finn	264-66-0451	1127827I	#3	6/18/07	
Jack Mucia	382-56-9424	1127823I	#4	6/18/07	
Carl Ingle	400-88-1510	1127824I	#5	6/18/07	
Ed Armstrong	381-08-4748	1127825I	#6	6/18/07	
Jody Petri	437-49-2242	9957393H	#7	6/20/07	*6/13/07*
Justin Bourgeois	435-57-2062	9957394H	#8	6/20/07	*6/18/07*
Doug Schult	024-52-4118	1127822I	#9	6/26/07	
Mike Pries	390-78-1841	11278151	#10	7/3/07	
Will Stiff	364-90-3415	11278161	#11	7/3/07	
Darryl Howard	378-82-5673	11278131	#12	7/7/07	
Leroy Cuneo	518-92-5327	112780810	#13	7/14/07	
Byron Bland	219-06-6079	11278171	#14	7/14/07	
Daryl L. Lowe	412-53-0475		#15	7/17/07	

WINNIE, TEXAS PROJECT

EMPLOYEE TLD'S *June*

Employee	Social #	TLD Serial #	TLD #	Date	Term
CONTROL	N/A	11278341	N/A	6/18/07	
Glen Parkhurst	544-60-4200	1127826I	#1	6/18/07	
Chris Higgins	006-86-7946	1127828I	#2	6/18/07	*6/28/07*
Linda C. Finn	264-66-0451	1127827I	#3	6/18/07	
Jack Mucia	382-56-9424	1127823I	#4	6/18/07	
Carl Ingle	400-88-1510	1127824I	#5	6/18/07	
Ed Armstrong	381-08-4748	1127825I	#6	6/18/07	
Jody Petri	437-49-2242	9957393H	#7	6/20/07	*6/13/07*
Justin Bourgeois	435-57-2062	9957394H	#8	6/20/06	*6/18/07*
Doug Schult	024-52-4118	1127822I	#9	6/26/07	
Mike Priest			#10		

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/2/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-222

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/29/2007 7:10

Flow Rate: 2.15 cfm Stop Time: 7/2/2007 7:00

Flow Rate: 60.88 lpm Total Time: 4310 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/6/2007 Count Time: 10:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2.62E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 7 counts

Gross (α): 29 counts

Gross Background (α): 0.12 cpm (R_B) (α)

Gross (α): 0.48 cpm

MDC

(α): 1.13E-15 µCi/ml

Activity Concentration:

(α): 1.63E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.05 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/2/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-223

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/29/2007 7:15

Flow Rate: 2.15 cfm Stop Time: 7/2/2007 7:00

Flow Rate: 60.88 lpm Total Time: 4305 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 1:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2.62E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 32 counts

Gross Background (α): 0.17 cpm $(R_B)_{(\alpha)}$

Gross (α): 0.53 cpm

MDC

(α): 1.31E-15 µCi/ml

Activity Concentration:

(α): 1.63E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.05 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/3/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-225

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/2/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/3/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 9:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 19 counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.32 cpm

MDC

(α): 3.92E-15 µCi/ml

Activity Concentration:

(α): 1.99E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.07 % DAC

Surveyor: Carl Ingle / Signature 7-14-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/3/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-226

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/2/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/3/2007 7:05

Flow Rate: 60.88 lpm Total Time: 1445 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 10:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87973840 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 21 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 0.35 cpm

MDC

(α): 3.91E-15 µCi/ml

Activity Concentration:

(α): 2.43E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.08 % DAC

Surveyor: Carl Ingle / (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/2/2007

Air Sample Location: Deconning Workover Tank Air Sample Number: WI07-0227

Purpose/Type: Work Zone RWP #: W07-02,03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 15:24

Flow Rate: 3.7 cfm Stop Time: 15:58

Flow Rate: 104.77 lpm Total Time: 34 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 11:30 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 3562279 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 294 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 4.90 cpm

MDC

(α): 9.65E-14 µCi/ml

Activity Concentration:

(α): 1.55E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 51.55 % DAC

Surveyor: Jack Mucia / (Signature) 7/14/07 (Date)

Reviewer: (Signature) 7/16/07 (Date)

entered

ESFS 82A8008

WI07 - 0227 D1 A-F - WZ W-Z Decon W.O. tank 072107

Sample description
WI07- 0227 D1 A/F (W/Z) Deconning W.O. Tank 072107

Spectrum Filename: C:\User\Win00211.An1

Acquisition information
Start time: 21-Jul-2007 10:17:34
Live time: 600
Real time: 603
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5620E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 3.5620E+06) = 2.8074E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0227 D1 A-F - WZ W-Z Decon W.O. tank 072107

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1867

********** 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	
28.86	7.39	139.	598.	0.997	11.24	1.473	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	180.88	45.39	3.	13.	0.022	72.11	0.755s
AM-241	237.88	59.63	7.	27.	0.045	52.55	0.574s
Th-234	254.17	63.70	14.	18.	0.030	100.00	0.417s
Pb-214	298.61	74.81	5.	0.	0.000	0.00	0.458D
Pb-212	298.63	74.81	12.	0.	0.000	0.00	0.214D
Pb-212	306.00	76.66	1.	0.	0.000	0.00	0.000s
Pb-214	307.80	77.11	2.	0.	0.000	0.00	0.000D
Pb-214	350.83	87.86	1.	1.	0.001	339.93	0.339s
Th-234	370.00	92.65	7.	28.	0.047	55.10	0.561s
Ac-228	380.79	95.35	1.	0.	0.000	0.00	0.000D
Ac-228	837.67	209.53	1.	0.	0.001	240.37	0.197s
Pb-212	951.75	238.04	0.	10.	0.017	63.25	0.500s
Pb-214	967.50	241.98	1.	0.	0.000	0.00	0.000D
Ac-228	1077.50	269.47	0.	4.	0.007	100.00	0.500s
Pb-214	1181.25	295.40	0.	5.	0.008	89.44	0.312s
Ac-228	1308.33	327.16	0.	4.	0.007	100.00	0.250s
Ac-228	1354.00	338.57	1.	0.	0.000	0.00	0.000s
Pb-214	1406.00	351.57	0.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2437.00	609.22	0.	6.	0.010	81.65	0.250s
CS-137	2648.50	662.07	0.	2.	0.003	141.42	0.500s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	4.	0.007	100.00	0.250s

WI07 - 0227 D1 A-F - WZ W-Z Decon W.O. tank 072107

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	1.2189E-05	609.31	1.219E-05	?(	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	%	1.001E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	?	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	1.157E-04	?	9.756E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	4.449E-05	&	3.750E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	?	1.226E-05	X
			327.64	5.876E-05	?	4.954E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 8.2995E-06	238.62	8.299E-06	&(	8.299E-07	G K
		77.11	0.000E+00	?	2.296E-06	X
		74.81	0.000E+00	?	1.044E-05	Energy duplication
CS-137	2.5895E-06	661.66	2.589E-06	?(	1.295E-06	G
Th-234	N 1.0428E-04	92.35	1.100E-04	(	1.679E-05	G
		63.29	9.617E-05	@(	3.107E-05	G
Pb-214	N 0.0000E+00	351.92	0.000E+00	?	1.364E-06	G K
		295.21	1.115E-05	?	8.251E-06	G
		77.11	0.000E+00	?	5.041E-06	Energy duplication
		241.98	0.000E+00	?	9.964E-06	G
		74.81	0.000E+00	!	1.228E-05	Energy duplication

```
                WI07 - 0227 D1 A-F - WZ  W-Z Decon W.O. tank 072107
                            87.30 0.000E+00 &   1.149E-05          X

Pb-210   N   6.5444E-05     46.50 6.544E-05 &(  1.405E-05          G

AM-241       1.5196E-05     59.54 1.520E-05  (  2.406E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 10:27:44 Page    5
EnergySolutions                    Spectrum name: Win00211.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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
               uCi/ml        uCi/ml       uCi/ml

Bi-214 #     3.4221E-12    2.794E-12    2.795E-12
K-40    <    5.6726E-12
Ac-228 B<    1.6144E-12
Pb-212 #     2.3300E-12    1.474E-12    1.475E-12
CS-137 #C    7.2698E-13    1.028E-12    1.028E-12
Th-234 #     2.9275E-11    1.613E-11    1.614E-11
Pb-214 B<    3.8295E-13
Pb-210 #     1.8373E-11    1.325E-11    1.326E-11
AM-241       4.2662E-12    2.242E-12    2.248E-12

  # - 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.
```

WI07 - 0227 D1 A-F - WZ W-Z Decon W.O. tank 072107

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 5.8392673E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: L.C. Lema
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0232 Lapel Filter (D.Schult) 070307

Sample description
WI07-0232 D1 Lapel Filter (D.Shult) 070307

Spectrum Filename: C:\User\Win00142.An1

Acquisition information

Start time:	03-Jul-2007 15:28:43
Live time:	600
Real time:	603
Dead time:	0.47 %
Detector ID:	1

Detector system
MCB 07044698

Calibration

Filename:	Air Filter LeGe.Clb

47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	1.0000E+00
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

WI07-0232 Lapel Filter (D.Schult) 070307

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0951

********** 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	
28.65	7.34	133.	480.	0.800	13.12	1.203	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.86	46.63	11.	17.	0.028	93.04	0.944
AM-241	237.82	59.62	13.	60.	0.099	34.92	0.638s
Th-234	252.30	63.24	5.	14.	0.024	76.28	0.458s
Pb-214	298.61	74.81	8.	0.	0.000	0.00	0.431D
Pb-212	298.63	74.81	11.	0.	0.000	1004.43	0.000D
Pb-212	309.92	77.64	4.	11.	0.018	92.60	0.333s
Pb-214	307.80	77.11	7.	0.	0.000	180.28	0.265D
Pb-214	349.00	87.40	3.	0.	0.000	0.00	0.000s
Th-234	368.79	92.35	7.	8.	0.014	114.59	0.985D
Ac-228	380.79	95.35	8.	6.	0.011	145.22	0.987D
Ac-228	837.50	209.49	0.	2.	0.003	141.42	0.500s
Pb-212	954.00	238.61	3.	2.	0.003	308.22	0.000s
Pb-214	967.50	241.98	0.	0.	0.000	0.00	0.100D
Ac-228	1081.00	270.35	1.	0.	0.000	0.00	0.000s
Pb-214	1177.00	294.34	0.	2.	0.003	141.42	0.250s
Ac-228	1309.33	327.41	0.	3.	0.005	115.47	0.375s
Ac-228	1354.50	338.70	0.	4.	0.007	100.00	0.500s
Pb-214	1403.00	350.82	0.	8.	0.013	70.71	0.250s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1841.67	460.44	0.	8.	0.013	70.71	0.375s
Bi-214	2435.50	608.85	0.	2.	0.003	141.42	0.500s
CS-137	2646.67	661.62	1.	0.	0.001	240.37	0.197s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.33	794.48	0.	5.	0.008	89.44	0.250s

WI07-0232 Lapel Filter (D.Schult) 070307

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	1.	0.002	200.00	0.250s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5846.00	1461.07	0.	2.	0.003	141.42	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.0631E-06	609.31	4.063E-06	?(	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	4.0412E-05	1460.81	4.041E-05	?(	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	1.705E-05	?	1.437E-05	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	1.447E-04	?	1.071E-04	G
			463.00	1.211E-04	&	6.860E-05	G
			209.28	1.572E-05	?	2.014E-05	G
			270.23	0.000E+00	?	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	3.924E-05	$	3.565E-05	X
			327.64	4.407E-05	?	4.407E-05	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00	%	3.072E-06	G K
			77.11	1.224E-05	&	6.888E-06	X
			74.81	0.000E+00	%	9.908E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	5.0414E-05	92.35	3.204E-05	(	1.663E-05	G
			63.29	7.658E-05	*(	1.921E-05	G
Pb-214	N	1.0912E-05	351.92	1.091E-05	&(	1.364E-06	G K
			295.21	4.458E-06	&	5.710E-06	G
			77.11	0.000E+00	&	8.237E-06	Energy duplication
			241.98	0.000E+00	%	8.061E-06	G
			74.81	0.000E+00	?	1.544E-05	Energy duplication

WI07-0232 Lapel Filter (D.Schult) 070307

			87.30	0.000E+00 ?	1.345E-05		X
Pb-210	N	8.1805E-05	46.50	8.180E-05	(2.595E-05		G
AM-241		3.3582E-05	59.54	3.358E-05	(3.201E-06		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

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 (63) wan32 G53W2.06 03-JUL-2007 15:38:53 Page 5
EnergySolutions Spectrum name: Win00142.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 uCi/g	Uncertainty Counting uCi/g	2 Sigma Total uCi/g
Bi-214	#C	4.0631E-06	5.746E-06	5.747E-06
K-40	#C	4.0412E-05	5.715E-05	5.716E-05
Ac-228	B<	5.7505E-06		
Pb-212	B<	3.0721E-06		
CS-137	<	2.5895E-06		
Th-234		5.0414E-05	3.470E-05	3.472E-05
Pb-214	#	1.0912E-05	7.716E-06	7.720E-06
Pb-210		8.1805E-05	7.611E-05	7.613E-05
AM-241		3.3582E-05	1.173E-05	1.179E-05

Should have been counted prior to release not as an A/S

- 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.

WI07-0232 Lapel Filter (D.Schult) 070307

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 2.2118841E-04 uCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/3/2007

Air Sample Location: Putting Drums (from RCA) in Bag Air Sample Number: WI07-0233

Purpose/Type: Work Zone RWP #: W07-02,03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 15:55

Flow Rate: 3.7 cfm Stop Time: 16:30

Flow Rate: 104.77 lpm Total Time: 35 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/9/2007 Count Time: 7:25 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 3667052 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 11 counts

Gross (α): 19 counts

Gross Background (α): 0.18 cpm $(R_B)_{(\alpha)}$

Gross (α): 0.32 cpm

MDC

(α): 9.75E-14 µCi/ml

Activity Concentration:

(α): 4.23E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.41 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Signature 7/16/07 Date

initial

WI07 - 0233 D1 A-F - WZ Dumping Drums 072007

Sample description
WI07- 0233 D1 W/Z Dumping Drums 072007

Spectrum Filename: C:\User\Win00208.An1

Acquisition information
Start time: 20-Jul-2007 11:14:41
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6670E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 3.6670E+06) =
2.7270E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0233 D1 A-F - WZ Dumping Drums 072007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.74	7.36	136.	516.	0.860	12.48	1.385	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.97	46.16	5.	10.	0.017	98.48	0.548s
AM-241	239.27	59.98	5.	5.	0.008	154.92	0.446s
Th-234	254.55	63.80	9.	11.	0.018	121.19	0.598s
Pb-214	298.61	74.81	6.	0.	0.000	0.00	0.291D
Pb-212	298.63	74.81	3.	0.	0.000	360.56	0.211D
Pb-212	308.06	77.17	5.	1.	0.001	724.19	0.222s
Pb-214	307.80	77.11	5.	0.	0.000	724.19	0.222D
Pb-214	350.81	87.86	5.	6.	0.010	146.57	0.285s
Th-234	368.79	92.35	4.	11.	0.018	81.18	0.984D
Ac-228	380.79	95.35	5.	3.	0.005	234.60	0.987D
Ac-228	835.00	208.87	0.	0.	0.001	223.61	0.100s
Pb-212	952.00	238.11	0.	0.	0.000	0.00	0.000s
Pb-214	967.50	241.98	5.	0.	0.000	0.00	0.264D
Ac-228	1082.00	270.60	1.	0.	0.000	0.00	0.000s
Pb-214	1180.00	295.09	1.	0.	0.000	0.00	0.000s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1353.00	338.32	0.	1.	0.002	200.00	0.250s
Pb-214	1404.00	351.07	0.	8.	0.013	70.71	0.250s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.00	463.03	0.	0.	0.001	223.61	0.000s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2647.00	661.70	1.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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Ac-228	3641.83	910.30	1.	1.	0.001	366.67	0.223s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	2.	0.004	126.88	1.589D
Ac-228	3877.18	969.11	1.	0.	0.001	569.41	1.591D
Bi-214	4482.00	1120.24	0.	1.	0.002	200.00	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	%	2.299E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.473E-05	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	7.774E-05		8.713E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	0.000E+00	?	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	2.778E-05	X
			327.64	0.000E+00	?	1.469E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 0.0000E+00	238.62	0.000E+00	?	8.299E-07	G K
		77.11	0.000E+00	%	4.592E-06	X
		74.81	0.000E+00	%	5.512E-06	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	2.589E-06	G
Th-234	N 4.8651E-05	92.35	4.280E-05	(	1.369E-05	G
		63.29	5.699E-05	&(	2.591E-05	G
Pb-214	N 1.2696E-05	351.92	1.091E-05	&(	1.364E-06	G K
		295.21	0.000E+00	?	4.458E-06	G
		77.11	0.000E+00	%	7.486E-06	Energy duplication
		241.98	0.000E+00	?	1.895E-05	G
		74.81	0.000E+00	&	1.374E-05	Energy duplication

WI07 - 0233 D1 A-F - WZ Dumping Drums 072007

```
                                87.30 2.690E-05 &(  1.660E-05          X

Pb-210   N   5.0719E-05      46.50 5.072E-05 ?(  1.765E-05          G

AM-241       2.8141E-06      59.54 2.814E-06 ?(  2.083E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 11:24:52 Page    5
 EnergySolutions                  Spectrum name: Win00208.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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                uCi/ml         uCi/ml        uCi/ml

 ____________________________________________________________________________
 Bi-214 B<    5.5401E-13
 K-40    <    5.5102E-12
 Ac-228 B<    4.0169E-12
 Pb-212 B<    2.2633E-13
 CS-137  <    7.0616E-13
 Th-234       1.3267E-11    9.677E-12     9.681E-12
 Pb-214 #     3.4622E-12    2.448E-12     2.449E-12
 Pb-210 #     1.3831E-11    1.362E-11     1.362E-11
 AM-241 #C    7.6742E-13    1.189E-12     1.189E-12

   # - 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.
```

WI07 - 0233 D1 A-F - WZ Dumping Drums 072007

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 3.1328180E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/7/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0236

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 12:35

Flow Rate: 3.7 cfm Stop Time: 14:15

Flow Rate: 104.77 lpm Total Time: 100 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 2:17 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 10477290 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 2456 counts

Gross Background (α): 0.17 cpm $(R_B)_{(\alpha)}$

Gross (α): 40.93 cpm

MDC

(α): 3.28E-14 µCi/ml

Activity Concentration:

(α): 4.53E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 150.96 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Signature 7/16/07 Date

Entered

ESFS 82A8008

WI07-0236 D1 A-F Cut W.O. Tank 071007

Sample description
WI07-0236 A/F -Cuting W.O. Tank w-torch 071007

Spectrum Filename: C:\User\Win00156.An1

Acquisition information
Start time: 10-Jul-2007 07:35:27
Live time: 600
Real time: 602
Dead time: 0.34 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.0480E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.0480E+07) = 9.5420E-08
Detection limit method: Traditional ORTEC method

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

WI07-0236 D1 A-F Cut W.O. Tank 071007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0198

********** 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	
28.67	7.35	88.	490.	0.817	11.73	1.607	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.57	46.31	4.	10.	0.016	100.06	0.267s
AM-241	237.58	59.56	7.	119.	0.198	20.05	1.234s
Th-234	249.57	62.55	12.	10.	0.017	135.79	0.238s
Pb-214	298.61	74.81	4.	0.	0.000	0.00	0.251D
Pb-212	298.63	74.81	4.	0.	0.000	316.23	0.251D
Pb-212	306.87	76.87	1.	4.	0.006	131.59	0.345s
Pb-214	307.80	77.11	5.	0.	0.000	0.00	0.062D
Pb-214	350.10	87.68	3.	18.	0.031	57.84	0.364s
Th-234	368.79	92.35	17.	13.	0.022	103.30	0.985D
Ac-228	380.79	95.35	8.	4.	0.006	235.24	0.987D
Ac-228	836.67	209.28	1.	0.	0.001	240.37	0.197s
Pb-212	951.62	238.01	5.	3.	0.004	291.55	0.262s
Pb-214	966.85	241.82	14.	0.	0.000	0.00	1.101
Ac-228	1073.92	268.58	2.	4.	0.007	146.86	0.233s
Pb-214	1178.00	294.59	0.	6.	0.010	81.65	0.250s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1353.67	338.49	0.	3.	0.005	115.47	0.375s
Pb-214	1406.00	351.57	0.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2438.00	609.47	0.	3.	0.005	115.47	0.750s
CS-137	2646.00	661.45	0.	1.	0.002	200.00	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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Ac-228	3644.00	910.84	0.	1.	0.002	200.00	0.250s
Bi-214	3736.00	933.83	0.	2.	0.003	141.42	0.250s
Ac-228	3859.17	964.61	0.	0.	0.000	0.00	1.589
Ac-228	3875.33	968.65	1.	0.	0.001	240.37	0.197s
Bi-214	4480.50	1119.87	0.	2.	0.003	141.42	0.500s
Bi-214	4954.00	1238.18	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.4715E-05	609.31	6.095E-06	?(	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	2.299E-05	?(	1.149E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	1.001E-04	?(	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	1.278E-05	?	1.278E-05	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	4.634E-05	&	4.449E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.326E-05	X
			327.64	0.000E+00	?	1.469E-05	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00	&	3.761E-06	G K
			77.11	4.401E-06	?	4.249E-06	X
			74.81	0.000E+00	%	6.493E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	5.3322E-05	92.35	5.200E-05	(	2.479E-05	G
			63.29	5.521E-05	&(	2.862E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	?	1.364E-06	G K
			295.21	1.337E-05	&	8.916E-06	G
			77.11	0.000E+00	?	7.284E-06	Energy duplication
			241.98	0.000E+00		2.878E-05	G
			74.81	0.000E+00	%	1.119E-05	Energy duplication

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			87.30	8.220E-05 ?	3.139E-05		X
Pb-210	N	4.7447E-05	46.50	4.745E-05 ?(	1.711E-05		G
AM-241		6.6976E-05	59.54	6.698E-05 (	2.406E-06		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

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

- -

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EnergySolutions Spectrum name: Win00156.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214 #	1.4041E-12	1.081E-12	1.081E-12
K-40 <	1.9280E-12		
Ac-228 B<	1.0974E-12		
Pb-212 B<	3.5884E-13		
CS-137 <	2.4709E-13		
Th-234	5.0880E-12	4.340E-12	4.342E-12
Pb-214 B<	1.3016E-13		
Pb-210 #	4.5274E-12	4.530E-12	4.531E-12
AM-241	6.3909E-12	1.281E-12	1.303E-12

\# - 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.

WI07-0236 D1 A-F Cut W.O. Tank 071007

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.7410361E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: LC. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/3/2007

Air Sample Location: General Area--South while weed cutting in RCA Air Sample Number: WI07-0006

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 8:40 AM

Flow Rate: 2.15 cfm Stop Time: 4:00 PM

Flow Rate: 60.88 lpm Total Time: 440 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/5/2007 Count Time: 7:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 26787882 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 5 counts

Gross (α): 62 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 1.2 cpm

MDC

(α): 2.97E-14 uCi/ml

Activity Concentration:

(α): 1.26E-13 µCi/ml DAC Value Am-241 3.00E-12 uCi/ml 4.20 % DAC

Surveyor: Carl Ingle / Signature 6/5/2007 Date

Reviewer: Chris Higgins / Signature 6-5-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/2/2007

Air Sample Location: General Area–North Air Sample Number: WI07-0007

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 9:48 AM

Flow Rate: 2.15 cfm Stop Time: 3:08 PM

Flow Rate: 60.88 lpm Total Time: 320 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/4/2007 Count Time: 9:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 19482096 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 6 counts

Gross (α): 16 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.3 cpm

MDC

(α): 4.38E-14 dpm/100cm^2

Activity Concentration:

(α): 3.04E-14 µCi/ml DAC Value Am-241 3.00E-12 1.01 % DAC

Surveyor: Carl Ingle / [signature] (Signature) 6-15-07 (Date)

Reviewer: Chris Higgins [signature] (Signature) 6-5-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/3/2007

Air Sample Location: General Area--South while weed cutting in RCA Air Sample Number: W07-0008

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6:35 AM

Flow Rate: 2.15 cfm Stop Time: 4:05 PM

Flow Rate: 60.88 lpm Total Time: 570 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/5/2007 Count Time: 7:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 34702484 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 5 counts

Gross (α): 62 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 1.2 cpm

MDC

(α): 2.29E-14 dpm/100cm^2

Activity Concentration:

(α): 9.74E-14 µCi/ml DAC Value Am-241 3.00E-12 3.25 % DAC

Surveyor: Carl Ingle / Signature 6/5/2007 Date

Reviewer: Chris Higgins Signature 6-5-07 Date

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/3/2007

Air Sample Location: General Area--South while weed cutting in RCA Air Sample Number: WI07-0009

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 8:40 AM

Flow Rate: 2.15 cfm Stop Time: 4:00 PM

Flow Rate: 60.88 lpm Total Time: 440 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/5/2007 Count Time: 7:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 26787882 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 5 counts

Gross (α): 62 counts

Gross Background (α): 0.10 cpm (R_B) $_{(\alpha)}$

Gross (α): 1.2 cpm

MDC

(α): 2.97E-14 uCi/ml

Activity Concentration:

(α): 1.26E-13 µCi/ml DAC Value = 3.00E-12 uCi/ml 4.20 % DAC

Surveyor: Carl Ingle / (Signature) 6-19-07 6/5/2007 (Date)

Reviewer: Chris Higgins (Signature) 6-5-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/4/2007

Air Sample Location: Poly tank outlet Air Sample Number: WI07-0024

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 2:35 PM

Flow Rate: 4 cfm Stop Time: 3:20 PM

Flow Rate: 113.27 lpm Total Time: 45 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/6/2007 Count Time: 7:30 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 5097060 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 10 counts

Gross Background (α): 0.08 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.2 cpm

MDC

(α): 1.43E-13 µCi/ml

Activity Concentration:

(α): 6.98E-14 µCi/ml DAV Value Am-241 3.00E-12 µCi/ml 2.33 % DAC

Surveyor: Carl Ingle / Signature 6/7/2007 Date

Reviewer: Chris Higgins / Signature 6-7-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/4/2007

Air Sample Location: General Area--North while taking soil samples in RCA Air Sample Number: WI07-0025

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6:50 AM

Flow Rate: 2.15 cfm Stop Time: 3:28 PM

Flow Rate: 60.88 lpm Total Time: 518 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/6/2007 Count Time: 7:30 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 31536643 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 7 counts

Gross (α): 27 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.5 cpm

MDC

(α): 2.88E-14 µCi/ml

Activity Concentration:

(α): 3.76E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.25 % DAC

Surveyor: Carl Ingle / Signature 6/6/2007 Date

Reviewer: Chris Higgins Signature 6-6-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/4/2007

Air Sample Location: General Area--South while taking soil samples in RCA Air Sample Number: WI07-0026

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6:50 AM

Flow Rate: 2.15 cfm Stop Time: 3:30 PM

Flow Rate: 60.88 lpm Total Time: 520 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/6/2007 Count Time: 10:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 31658406 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 7 counts

Gross (α): 31 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.6 cpm

MDC

(α): 2.87E-14 µCi/ml

Activity Concentration:

(α): 4.49E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.50 % DAC

Surveyor: Carl Ingle / Signature 6/6/2007 Date

Reviewer: Chris Higgins Signature 6-6-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/5/2007

Air Sample Location: General Area–North while soil sampling in RCA Air Sample Number: WI07-0079

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6:51 AM

Flow Rate: 2.15 cfm Stop Time: 2:50 PM

Flow Rate: 60.88 lpm Total Time: 479 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/8/2007 Count Time: 11:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 29162262 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 19 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.4 cpm

MDC

(α): 2.50E-14 µCi/ml

Activity Concentration:

(α): 3.05E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.02 % DAC

Surveyor: Carl Ingle / Signature 6/7/2007 Date

Reviewer: Chris Higgins / Signature 6-7-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/4/2007

Air Sample Location: General Area--South while taking soil samples in RCA Air Sample Number: WI07-0080

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6:55 AM

Flow Rate: 2.15 cfm Stop Time: 2:42 PM

Flow Rate: 60.88 lpm Total Time: 467 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/8/2007 Count Time: 12:00 PM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 28431684 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 23 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.5 cpm

MDC

(α): 2.57E-14 µCi/ml

Activity Concentration:

(α): 3.96E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.32 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 6/7/2007 (Date)

Reviewer: Chris Higgins / CH (Signature) 6-7-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/6/2007

Air Sample Location: Northside @ RCA boundary Air Sample Number: WI07-0084

Purpose/Type: Daily / General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/6/2007 6:51

Flow Rate: 2.15 cfm Stop Time: 6/7/2007 14:50

Flow Rate: 60.88 lpm Total Time: 1919 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/6/2007 Count Time: 7:30 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 70.80% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 1.17E+08 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 186 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 3.7 cpm

MDC

(α): 2.68E-15 µCi/ml

Activity Concentration:

(α): 3.96E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.32 % DAC

Surveyor: Jack Mucia / Signature 8/3/07 Date

Reviewer: Signature 8/3/07 Date

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/8/2007

Air Sample Location: Southside @ RCA boundary Air Sample Number: WI07-0085

Purpose/Type: Daily / while cutting pipes RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/7/2007 7:05

Flow Rate: 2.15 cfm Stop Time: 6/8/2007 7:05

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/10/2007 Count Time: 10:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 5 counts

Gross (α): 36 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.7 cpm

MDC

(α): 9.06E-15 µCi/ml

Activity Concentration:

(α): 2.10E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.70 % DAC

Surveyor: Jack Mucia / Signature 6/21/07 Date

Reviewer: Chris Higgins / Signature 6-8-07 Date

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/7/2007

Air Sample Location: Poly tank outlet Air Sample Number: WI07-0087

Purpose/Type: General Area RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 8:42 AM

Flow Rate: 4 cfm Stop Time: 10:43 AM

Flow Rate: 113.27 lpm Total Time: 121 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/10/2007 Count Time: 12:30 PM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 13705428 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 31 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.6 cpm

MDC

(α): 5.32E-14 µCi/ml

Activity Concentration:

(α): 1.17E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 3.89 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 6-8-07 (Date)

Reviewer: Chris Higgins (Signature) 6-7-07 (Date)

WI07 - 0087 D1 A-F - WZ Cutting up pipes 072507

Sample description
WI07-0087 D1 W/Z Cutting up pipes 072507

Spectrum Filename: C:\User\Win00258.An1

Acquisition information
Start time: 25-Jul-2007 14:27:31
Live time: 600
Real time: 603
Dead time: 0.51 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.3710E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.3710E+07) = 7.2939E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0087 D1 A-F - WZ Cutting up pipes 072507

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2347

********** 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	
28.50	7.30	76.	396.	0.661	13.25	1.466	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.53	46.30	0.	15.	0.025	51.64	0.562s
AM-241	238.50	59.79	2.	19.	0.031	55.10	0.716s
Th-234	251.25	62.97	3.	5.	0.009	127.48	0.259s
Pb-214	298.61	74.81	7.	2.	0.003	457.35	0.971D
Pb-212	298.63	74.81	6.	0.	0.000	374.17	0.259D
Pb-212	307.80	77.11	10.	5.	0.009	183.94	0.972D
Pb-214	307.80	77.11	5.	0.	0.000	208.17	0.141D
Pb-214	345.45	86.52	6.	3.	0.005	282.84	0.250s
Th-234	368.79	92.35	6.	11.	0.018	89.42	0.985D
Ac-228	380.79	95.35	8.	10.	0.017	100.21	0.987D
Ac-228	838.00	209.62	0.	2.	0.003	141.42	0.250s
Pb-212	954.08	238.62	3.	6.	0.011	110.78	1.099D
Pb-214	967.50	241.98	3.	5.	0.008	131.87	1.101D
Ac-228	1081.00	270.35	1.	0.	0.000	0.00	0.000s
Pb-214	1180.00	295.09	1.	0.	0.000	0.00	0.000s
Ac-228	1308.09	327.10	6.	0.	0.001	802.08	0.139s
Ac-228	1352.67	338.24	2.	1.	0.002	416.33	0.225s
Pb-214	1405.80	351.52	0.	9.	0.015	66.67	0.312s

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:37:41 Page 3
EnergySolutions Spectrum name: Win00258.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1851.33	462.86	0.	3.	0.005	115.47	0.250s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2647.00	661.70	0.	0.	0.001	223.61	0.000s
Bi-214	3072.00	767.91	0.	1.	0.002	200.00	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0087 D1 A-F - WZ Cutting up pipes 072507

Ac-228	3644.67	911.01	0.	3.	0.005	115.47	0.375s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	2.	2.	0.004	214.70	1.589D
Ac-228	3877.18	969.11	1.	3.	0.005	135.89	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.57	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	2.6312E-05	911.07	1.725E-05	?(	5.750E-06	G K
			969.11	3.160E-05	(	1.813E-05	G
			338.32	0.000E+00	%	1.278E-05	G
			964.60	0.000E+00	%	1.055E-04	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	4.542E-05	?(	1.514E-05	G
			209.28	1.572E-05	?(	7.862E-06	G
			270.23	0.000E+00	?	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	6.221E-05	(	2.755E-05	X
			327.64	0.000E+00	%	5.876E-05	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:37:41 Page 4
EnergySolutions Spectrum name: Win00258.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	5.5794E-06	238.62	5.332E-06	(	2.529E-06	G K
			77.11	6.192E-06	(	5.638E-06	Energy duplication
			74.81	0.000E+00	%	7.702E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	3.6622E-05	92.35	4.233E-05	(	1.596E-05	G
			63.29	2.849E-05	?(	1.530E-05	G
Pb-214	N	1.4414E-05	351.92	1.228E-05	?(	1.364E-06	G K
			295.21	0.000E+00	?	4.458E-06	G
			77.11	0.000E+00	%	7.284E-06	Energy duplication
			241.98	2.503E-05	(	1.490E-05	G
			74.81	0.000E+00	%	1.583E-05	Energy duplication

```
                WI07 - 0087  D1 A-F - WZ   Cutting up pipes   072507
                             87.30 0.000E+00 &   2.140E-05        X

Pb-210   N   7.3624E-05     46.50 7.362E-05  (  4.908E-06        G

AM-241       1.0506E-05     59.54 1.051E-05  (  1.529E-06        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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 14:37:41 Page    5
EnergySolutions                  Spectrum name: Win00258.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 B<    1.4818E-13
K-40    <    2.9476E-12
Ac-228       1.9192E-12    1.052E-12    1.053E-12
Pb-212       4.0696E-13    4.369E-13    4.370E-13
CS-137  <    1.8888E-13
Th-234       2.6712E-12    2.080E-12    2.081E-12
Pb-214       1.0514E-12    7.009E-13    7.013E-13
Pb-210       5.3701E-12    2.773E-12    2.776E-12
AM-241       7.6631E-13    4.222E-13    4.232E-13
  < - 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 (    2.7 to  1999.2 keV) 1.2185102E-11  uCi/ml
```

WI07 - 0087 D1 A-F - WZ Cutting up pipes 072507

The library has energies which are not separable.

Analyzed by: RC. Funn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/7/2007

Air Sample Location: RCA / Work Zone Air Sample Number: WI07-0088

Purpose/Type: Cutting Pipe RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 12:40 PM

Flow Rate: 3.7 cfm Stop Time: 2:17 PM

Flow Rate: 104.77 lpm Total Time: 97 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/11/2007 Count Time: 12:00 PM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 10162971 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 6 counts

Gross (α): 70 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 1.4 cpm

MDC

(α): 8.40E-14 µCi/ml

Activity Concentration:

(α): 3.73E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 12.44 % DAC

Surveyor: Jack Mucia (Signature) 6/21/07 (Date)

Reviewer: Chris Higgins / (Signature) 6-7-07 (Date)

WI07 - 0188 D1 A-F - WZ Cutting Pipes 072607

Sample description
WI07- 088 D1 A/F (W-Z) Cutting Pipes 072607

Spectrum Filename: C:\User\Win00263.An1

Acquisition information

Start time:	26-Jul-2007 07:19:07
Live time:	600
Real time:	603
Dead time:	0.48 %
Detector ID:	1

Detector system
MCB 07044698

Calibration

Filename:	Air Filter LeGe.Clb

47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	1.0160E+07
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0160E+07) = 9.8425E-08
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

WI07 - 0188 D1 A-F - WZ Cutting Pipes 072607

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0504

********** 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	
28.58	7.32	65.	425.	0.708	12.23	1.343	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.41	46.52	6.	8.	0.013	128.12	0.501s
AM-241	243.68	61.08	3.	13.	0.022	76.92	0.307s
Th-234	256.23	64.22	3.	21.	0.034	57.34	1.046s
Pb-214	298.61	74.81	8.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	3.	0.	0.000	0.00	0.125D
Pb-212	314.32	78.74	5.	5.	0.008	177.28	0.292s
Pb-214	307.80	77.11	12.	0.	0.000	148.80	0.302D
Pb-214	348.00	87.15	2.	0.	0.001	450.92	0.000s
Th-234	368.79	92.35	14.	17.	0.028	81.44	0.985D
Ac-228	380.79	95.35	4.	1.	0.002	425.86	0.987D
Ac-228	833.57	208.51	4.	10.	0.016	100.06	0.458s
Pb-212	954.08	238.62	4.	6.	0.010	121.08	1.099D
Pb-214	967.50	241.98	4.	7.	0.011	117.54	1.101D
Ac-228	1079.00	269.85	0.	0.	0.001	223.61	0.100s
Pb-214	1179.00	294.84	0.	0.	0.000	0.00	0.000s
Ac-228	1310.33	327.66	0.	4.	0.007	100.00	0.250s
Ac-228	1354.00	338.57	1.	0.	0.000	0.00	0.000s
Pb-214	1407.22	351.87	2.	2.	0.002	328.86	0.271s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.33	463.11	1.	0.	0.001	240.37	0.197s
Bi-214	2437.20	609.27	0.	9.	0.015	66.67	0.625s
CS-137	2647.00	661.70	0.	1.	0.002	200.00	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.64	0.	1.	0.002	200.00	0.250s

```
                    WI07 - 0188 D1  A-F - WZ   Cutting Pipes  072607
                                 87.30 0.000E+00 %   1.345E-05          X

Pb-210   N   3.6812E-05     46.50 3.681E-05 ?(  1.892E-05          G

AM-241       7.3168E-06     59.54 7.317E-06 &(  1.688E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 07:29:18 Page    5
EnergySolutions                    Spectrum name: Win00263.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 #     1.7996E-12    1.200E-12    1.200E-12
K-40   #C    3.9775E-12    5.625E-12    5.626E-12
Ac-228 B<    1.1320E-12
Pb-212       5.0941E-13    5.468E-13    5.469E-13
CS-137  <    2.5487E-13
Th-234       8.2430E-12    4.105E-12    4.110E-12
Pb-214 B<    4.5275E-13
Pb-210 #     3.6233E-12    4.642E-12    4.643E-12
AM-241 #     7.2015E-13    5.540E-13    5.546E-13

  # - 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.
```

WI07 - 0188 D1 A-F - WZ Cutting Pipes 072607

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.8872990E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/6/2007

Air Sample Location: Southside @ RCA boundary Air Sample Number: WI07-0089

Purpose/Type: Daily / while cutting pipes RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/6/2007 6:32

Flow Rate: 2.15 cfm Stop Time: 6/7/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1468 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/8/2007 Count Time: 1:00 PM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 89374115 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 139 counts

Gross Background (α): 0.1 cpm $(R_B)_{(\alpha)}$

Gross (α): 2.8 cpm

MDC

(α): 8.16E-15 µCi/ml

Activity Concentration:

(α): 8.95E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 2.98 % DAC

Surveyor: Jack Mucia / Signature 6/21/07 Date

Reviewer: Chris Higgins / Signature 6-22-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/8/2007

Air Sample Location: Northside @ RCA boundary Air Sample Number: WI07-0090

Purpose/Type: Daily / while cutting pipes RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/7/2007 6:55

Flow Rate: 2.15 cfm Stop Time: 6/8/2007 6:55

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/10/2007 Count Time: 8:30 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 5 counts

Gross (α): 34 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.7 cpm

MDC

(α): 9.06E-15 µCi/ml

Activity Concentration:

(α): 1.96E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.65 % DAC

Surveyor: Jack Mucia / Signature 6/21/07 Date

Reviewer: Chris Higgins / Signature 6-8-07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/8/2007

Air Sample Location: RCA / Work Zone Air Sample Number: WI07-0091

Purpose/Type: Cutting Pipe with Grinder RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 10:30 AM

Flow Rate: 3.7 cfm Stop Time: 5:25 PM

Flow Rate: 104.77 lpm Total Time: 415 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/14/2007 Count Time: 7:45 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 43480754 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 7 counts

Gross (α): 431 counts

Gross Background (α): 0.1 cpm (R_B) $_{(\alpha)}$

Gross (α): 8.6 cpm

MDC

(α): 2.09E-14 µCi/ml

Activity Concentration:

(α): 5.78E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 19.27 % DAC

Surveyor: Jack Mucia (Signature) 6/21/07 (Date)

Reviewer: Chris Higgins / (Signature) 6-25-07 (Date)

WI07 - 0091 D1 A-F - WZ Cutting up pipes 1 072507

Sample description
WI07-0091 D1 W/Z Cutting up pipes 072507

Spectrum Filename: C:\User\Win00257.An1

Acquisition information
Start time: 25-Jul-2007 14:04:47
Live time: 600
Real time: 602
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.3480E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 4.3480E+07) =
2.2999E-08
Detection limit method: Traditional ORTEC method

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

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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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
29.58	7.57	117.	335.	0.558	16.92	1.873	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.00	46.67	8.	2.	0.003	454.61	0.000s
AM-241	237.29	59.48	3.	2.	0.003	282.84	1.116
Th-234	253.79	63.61	6.	14.	0.024	81.70	0.590s
Pb-214	298.61	74.81	9.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	2.	0.	0.000	416.33	0.328D
Pb-212	305.10	76.43	2.	14.	0.023	63.89	0.468s
Pb-214	307.80	77.11	4.	0.	0.000	582.14	0.500D
Pb-214	350.43	87.76	5.	2.	0.003	334.17	0.251s
Th-234	368.79	92.35	6.	16.	0.027	65.18	0.985D
Ac-228	380.79	95.35	2.	7.	0.012	94.99	0.987D
Ac-228	836.39	209.21	2.	8.	0.013	107.50	0.226s
Pb-212	955.00	238.86	0.	10.	0.017	63.25	0.250s
Pb-214	966.07	241.62	6.	0.	0.000	0.00	1.101
Ac-228	1078.88	269.82	1.	4.	0.006	131.59	0.460s
Pb-214	1179.33	294.92	1.	0.	0.001	240.37	0.197s
Ac-228	1307.94	327.06	1.	4.	0.006	142.00	0.238s
Ac-228	1352.29	338.14	2.	3.	0.006	167.33	0.218s
Pb-214	1406.33	351.65	1.	0.	0.001	240.37	0.197s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.33	463.11	1.	0.	0.001	240.37	0.197s
Bi-214	2438.00	609.47	0.	4.	0.007	100.00	0.750s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3073.00	768.16	0.	2.	0.003	141.42	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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			87.30	0.000E+00 %	1.917E-05	X
Pb-210	N	0.0000E+00	46.50	0.000E+00 %	2.454E-05	G
AM-241		0.0000E+00	59.54	0.000E+00 %	2.083E-06	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

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 (63) wan32 G53W2.06 25-JUL-2007 14:14:57 Page 5
EnergySolutions Spectrum name: Win00257.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	#	2.8311E-13	2.452E-13	2.453E-13
K-40	<	4.6472E-13		
Ac-228	B<	2.6451E-13		
Pb-212		2.4228E-13	1.089E-13	1.090E-13
CS-137	<	2.9778E-14		
Th-234		1.6077E-12	8.401E-13	8.409E-13
Pb-214	B<	6.2744E-14		
Pb-210	<	5.6443E-13		
AM-241	<	4.7915E-14		

- 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.

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/11/2007

Air Sample Location: General Area--North @ RCA Boundary Air Sample Number: WI07-0092

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/8/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 6/11/2007 6:40

Flow Rate: 60.88 lpm Total Time: 4300 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/14/2007 Count Time: 10:45 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 2.62E+08 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 199 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 4.0 cpm

MDC

(α): 2.79E-15 µCi/ml

Activity Concentration:

(α): 4.41E-14 µCi/ml DAC Value 3.00E-12 µCi/ml 1.47 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7/31/07 6/7/2007 (Date)

Reviewer: Glenn Parkhurst (Signature) 8/2/07 (Date)

✓

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/11/2007

Air Sample Location: South @ RCA boundary Air Sample Number: WI07-0093

Purpose/Type: Daily / General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/8/2007 7:05

Flow Rate: 2.15 cfm Stop Time: 6/11/2007 6:45

Flow Rate: 60.88 lpm Total Time: 4300 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/14/2007 Count Time: 12:30 PM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 2.62E+08 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 145 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 2.9 cpm

MDC

(α): 2.79E-15 µCi/ml

Activity Concentration:

(α): 3.19E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.06 % DAC

Surveyor: Jack Mucia / Signature 6/21/07 Date

Reviewer: Chris Higgins / Signature 6-11-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/11/2007

Air Sample Location: RCA / Work Zone Air Sample Number: WI07-0094

Purpose/Type: Cutting Pipe with Grinder RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 7:13 AM

Flow Rate: 3.7 cfm Stop Time: 7:48 AM

Flow Rate: 104.77 lpm Total Time: 35 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/14/2007 Count Time: 9:00 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 3667052 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 7 counts

Gross (α): 19 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.4 cpm

MDC

(α): 2.47E-13 µCi/ml

Activity Concentration:

(α): 1.94E-13 µCi/ml DAC Value 3.00E-12 µCi/ml 6.47 % DAC

Surveyor: Jack Mucia (Signature) 6/21/07 (Date)

Reviewer: Chris Higgins / (Signature) 6-11-07 (Date)

ESFS 82A8008

WI07 - 0094 D1 A-F - WZ Cutting up pipes 072507

Sample description
WI07-0094 D1 W/Z Cutting up pipes 072507

Spectrum Filename: C:\User\Win00259.An1

Acquisition information
Start time: 25-Jul-2007 14:42:07
Live time: 600
Real time: 603
Dead time: 0.43 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6670E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 3.6670E+06) =
2.7270E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0094 D1 A-F - WZ Cutting up pipes 072507

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1437

********** 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	
28.79	7.38	102.	467.	0.778	12.54	1.019	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.31	45.99	5.	22.	0.036	59.27	0.458s
AM-241	236.56	59.30	6.	10.	0.016	105.44	0.251s
Th-234	253.84	63.62	4.	4.	0.006	190.24	0.627s
Pb-214	298.61	74.81	2.	0.	0.000	0.00	0.350D
Pb-212	298.63	74.81	2.	0.	0.000	331.66	0.350D
Pb-212	309.00	77.41	2.	0.	0.000	0.00	0.000s
Pb-214	307.80	77.11	2.	0.	0.000	0.00	0.000D
Pb-214	349.61	87.56	3.	8.	0.013	106.14	0.568s
Th-234	368.79	92.35	4.	13.	0.021	73.80	0.985D
Ac-228	380.79	95.35	6.	11.	0.018	92.30	0.987D
Ac-228	832.90	208.34	2.	3.	0.006	167.33	0.232s
Pb-212	953.90	238.58	2.	12.	0.019	78.26	0.533s
Pb-214	967.50	241.98	1.	0.	0.000	0.00	0.000D
Ac-228	1082.00	270.60	1.	0.	0.000	0.00	0.000s
Pb-214	1177.00	294.34	2.	0.	0.001	368.18	0.386s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1356.33	339.16	0.	6.	0.010	81.65	0.250s
Pb-214	1408.00	352.07	1.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.67	463.19	1.	0.	0.001	240.37	0.197s
Bi-214	2437.00	609.22	0.	4.	0.007	100.00	0.250s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0094 D1 A-F - WZ Cutting up pipes 072507

Ac-228	3643.00	910.59	0.	1.	0.002	200.00	0.250s
Bi-214	3738.00	934.33	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	1.	1.	0.002	245.12	1.589D
Ac-228	3877.18	969.11	1.	3.	0.005	156.06	1.591D
Bi-214	4483.00	1120.49	0.	2.	0.003	141.42	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.57	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.6171E-05	609.31	8.126E-06	?(	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	2.299E-05	?(	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	1.001E-04	?(	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	2.843E-05		3.311E-05	G
			338.32	2.557E-05	&	1.705E-05	G
			964.60	0.000E+00	%	8.015E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	2.621E-05	&	2.910E-05	G
			270.23	0.000E+00	?	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	6.439E-05		3.895E-05	X
			327.64	0.000E+00	?	1.469E-05	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:52:17 Page 4
EnergySolutions Spectrum name: Win00259.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	9.5444E-06	238.62	9.544E-06	(	2.317E-06	G K
			77.11	0.000E+00	?	2.941E-06	X
			74.81	0.000E+00	%	4.434E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N	4.9296E-05	92.35	4.930E-05	(	1.384E-05	G
			63.29	1.870E-05	-	2.284E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	?	2.728E-06	G K
			295.21	0.000E+00	&	5.710E-06	G
			77.11	0.000E+00	?	5.041E-06	Energy duplication
			241.98	0.000E+00	?	9.964E-06	G
			74.81	0.000E+00	%	7.640E-06	Energy duplication

```
                WI07 - 0094  D1 A-F - WZ   Cutting up pipes   072507
                                87.30 3.437E-05 ?   2.339E-05          X

Pb-210   N   1.0635E-04      46.50 1.063E-04 &(  1.867E-05          G

AM-241       5.3469E-06      59.54 5.347E-06  (  2.169E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 14:52:17 Page    5
EnergySolutions                    Spectrum name: Win00259.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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
              uCi/ml         uCi/ml       uCi/ml

Bi-214 #     4.4099E-12    3.287E-12    3.289E-12
K-40    <    1.1020E-11
Ac-228 B<    3.1363E-12
Pb-212       2.6028E-12    2.037E-12    2.038E-12
CS-137  <    3.5308E-13
Th-234       1.3443E-11    9.921E-12    9.926E-12
Pb-214 B<    7.4396E-13
Pb-210 #     2.9001E-11    1.719E-11    1.720E-11
AM-241       1.4581E-12    1.537E-12    1.538E-12

  # - 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.
```

WI07 - 0094 D1 A-F - WZ Cutting up pipes 072507

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 5.0914769E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/11/2007

Air Sample Location: General Area - North @ RCA Boundary Air Sample Number: WI07-0124

Purpose/Type: General Area RWP #: W07-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6:40 AM

Flow Rate: 2.15 cfm Stop Time: 4:00 PM

Flow Rate: 60.88 lpm Total Time: 560 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/14/2007 Count Time: 9:40 AM

Serial #: 1163

Probe Serial #: NA Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 50 min (t_B) Sample Volume: 34093668 ml

Sample Count Time: 50 min (t_S)

Gross Background (α): 4 counts

Gross (α): 28 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.6 cpm

MDC

(α): 2.14E-14 µCi/ml

Activity Concentration:

(α): 4.17E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.39 % DAC

Surveyor: Carl Ingle / (Signature) 6/11/07 ~~6/7/2007~~ (Date)

Reviewer: Chris Higgins / (Signature) 6-11-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/12/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-125

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/11/2007 6:45

Flow Rate: 2.15 cfm Stop Time: 6/12/2007 6:25

Flow Rate: 60.88 lpm Total Time: 1420 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/15/2007 Count Time: 11:15 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86451801 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 3 counts

Gross (α): 153 counts

Gross Background (α): 0.05 cpm (R_B) (α)

Gross (α): 2.55 cpm

MDC

(α): 2.48E-15 µCi/ml

Activity Concentration:

(α): 3.37E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.12 % DAC

Surveyor: Carl Ingle / (Signature) (Date)

Reviewer: (Signature) 7/30/07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/13/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-126

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/12/2007 6:30

Flow Rate: 2.15 cfm Stop Time: 6/13/2007 6:30

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/18/2007 Count Time: 12:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 7 counts

Gross (α): 19 counts

Gross Background (α): 0.12 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.32 cpm

MDC

(α): 3.39E-15 µCi/ml

Activity Concentration:

(α): 2.66E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.09 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/14/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-127

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/13/2007 6:25

Flow Rate: 2.15 cfm Stop Time: 6/14/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1475 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/19/2007 Count Time: 8:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89800286 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 19 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.32 cpm

MDC

(α): 2.90E-15 µCi/ml

Activity Concentration:

(α): 3.02E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.10 % DAC

Surveyor: Carl Ingle / Signature 8/5/07 Date

Reviewer: Signature 8/6/07 Date

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Surveyor: Linda Finn (Name) **Date Drawn:** 6/12/2007

Air Sample Location: Inside RCA Air Sample Number: WI07-0128

Purpose/Type: W/Z - Cutting Pipes RWP #: WI-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 11:00 AM

Flow Rate: 3.7 cfm Stop Time: 1:00 PM

Flow Rate: 104.77 lpm Total Time: 120 min

Counter/Scaler Data:

Model #: SAC4 Count Date: 6/15/2007 Count Time: 1:30 PM

Serial #: 1163

Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 12572748 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 3 counts

Gross (α): 20 counts

Gross Background (α): 0.1 cpm (R_B) (α)

Gross (α): 0.3 cpm

MDC

(α): 0 µCi/ml

Activity Concentration:

(α): 6.68E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 2.226125 Percent DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 6-8-07 (Date)

Reviewer: Chris Higgins (Signature) 6-22-07 (Date)

WI07 - 0128 D1 A-F - WZ Cutting Pipes 072507

Sample description
WI07-0128 D1 W/Z Cutting up pipes 072507

Spectrum Filename: C:\User\Win00256.An1

Acquisition information
Start time: 25-Jul-2007 13:40:36
Live time: 600
Real time: 606
Dead time: 1.02 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.2570E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.2570E+07) =
7.9554E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0128 D1 A-F - WZ Cutting Pipes 072507

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0435

********** 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	
28.19	7.23	133.	386.	0.643	15.34	0.812	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.40	46.77	11.	9.	0.015	140.84	0.256s
AM-241	238.29	59.74	7.	16.	0.027	78.40	0.284s
Th-234	251.86	63.13	10.	16.	0.026	95.77	0.287s
Pb-214	298.61	74.81	4.	3.	0.005	231.02	0.971D
Pb-212	298.63	74.81	4.	0.	0.000	558.77	0.000D
Pb-212	307.80	77.11	7.	2.	0.003	395.68	0.972D
Pb-214	307.80	77.11	4.	0.	0.000	479.58	0.000D
Pb-214	351.00	87.90	2.	3.	0.005	176.38	0.562s
Th-234	368.79	92.35	5.	20.	0.033	54.93	0.985D
Ac-228	380.79	95.35	5.	2.	0.004	281.62	0.987D
Ac-228	835.17	208.91	3.	0.	0.001	437.16	0.211s
Pb-212	953.83	238.56	5.	15.	0.024	79.77	0.268s
Pb-214	967.50	241.98	4.	0.	0.000	0.00	0.000D
Ac-228	1081.50	270.47	0.	10.	0.017	63.25	0.375s
Pb-214	1179.00	294.84	0.	0.	0.000	0.00	0.000s
Ac-228	1308.74	327.26	2.	8.	0.013	89.44	0.367s
Ac-228	1351.75	338.01	0.	4.	0.007	100.00	0.375s
Pb-214	1407.00	351.82	2.	0.	0.001	368.18	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1853.00	463.28	0.	1.	0.002	200.00	0.250s
Bi-214	2435.33	608.80	0.	4.	0.007	100.00	0.250s
CS-137	2648.00	661.95	0.	1.	0.002	200.00	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0128 D1 A-F - WZ Cutting Pipes 072507

Ac-228	3646.50	911.47	0.	2.	0.003	141.42	0.500s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3857.00	964.07	0.	1.	0.002	200.00	0.250s
Ac-228	3877.18	969.11	1.	0.	0.000	0.00	1.591
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5513.00	1377.86	0.	2.	0.003	141.42	0.250s
K-40	5844.00	1460.57	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.64	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.5534E-05	609.31	8.126E-06	?(	2.032E-06	G K
			1764.49	0.000E+00	%	3.493E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.899E-05	?(	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	2.7578E-05	911.07	1.150E-05	?(	5.750E-06	G K
			969.11	0.000E+00		1.961E-05	G
			338.32	1.705E-05	?(	4.261E-06	G
			964.60	0.000E+00	%	6.258E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	0.000E+00	%	2.359E-05	G
			270.23	1.112E-04	?(	1.112E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	2.621E-05	X
			327.64	1.102E-04	?(	3.383E-05	G

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EnergySolutions Spectrum name: Win00256.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	1.2173E-05	238.62	1.217E-05	(	3.157E-06	G K
			77.11	0.000E+00	%	5.484E-06	Energy duplication
			74.81	0.000E+00	%	6.604E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	8.0207E-05	92.35	7.838E-05	(	1.459E-05	G
			63.29	8.281E-05	(	2.611E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	3.494E-06	G K
			295.21	0.000E+00	?	2.229E-06	G
			77.11	0.000E+00	%	6.283E-06	Energy duplication
			241.98	0.000E+00	%	1.680E-05	G
			74.81	0.000E+00	%	1.431E-05	Energy duplication

```
                    WI07 - 0128 D1  A-F - WZ   Cutting Pipes  072507
                                87.30 1.345E-05 &   1.660E-05          X

Pb-210   N   4.4175E-05     46.50 4.417E-05 ?(  2.561E-05          G

AM-241       9.0052E-06     59.54 9.005E-06 *(  2.406E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 13:53:13 Page    5
EnergySolutions                    Spectrum name: Win00256.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 #     1.2358E-12    1.070E-12    1.071E-12
K-40    <    3.2149E-12
Ac-228 #C    2.1939E-12    1.124E-12    1.125E-12
Pb-212       9.6838E-13    7.725E-13    7.728E-13
CS-137  <    2.0601E-13
Th-234       6.3808E-12    3.505E-12    3.508E-12
Pb-214 B<    2.7797E-13
Pb-210 #     3.5143E-12    4.949E-12    4.950E-12
AM-241 #     7.1641E-13    5.616E-13    5.623E-13

  # - 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.
```

WI07 - 0128 D1 A-F - WZ Cutting Pipes 072507

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.5009660E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/14/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-129

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/13/2007 6:25

Flow Rate: 2.15 cfm Stop Time: 6/14/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1475 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/19/2007 Count Time: 8:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89800286 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 19 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.32 cpm

MDC

(α): 2.90E-15 µCi/ml

Activity Concentration:

(α): 3.02E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.10 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/14/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-130

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/13/2007 6:30

Flow Rate: 2.15 cfm Stop Time: 6/14/2007 7:07

Flow Rate: 60.88 lpm Total Time: 1477 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/19/2007 Count Time: 9:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89922049 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 23 counts

Gross Background (α): 0.08 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.38 cpm

MDC

(α): 2.89E-15 µCi/ml

Activity Concentration:

(α): 3.88E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.13 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/14/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-140

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7:05

Flow Rate: 2.15 cfm Stop Time: 16:00

Flow Rate: 60.88 lpm Total Time: 535 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/19/2007 Count Time: 10:15 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 32571629 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 29 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.48 cpm

MDC

(α): 7.98E-15 µCi/ml

Activity Concentration:

(α): 1.43E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.48 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/15/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-141

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/14/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 6/15/2007 8:45

Flow Rate: 60.88 lpm Total Time: 1545 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/20/2007 Count Time: 11:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 94061995 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 3 counts

Gross (α): 6 counts

Gross Background (α): 0.05 cpm (R_B) (α)

Gross (α): 0.10 cpm

MDC

(α): 2.28E-15 µCi/ml

Activity Concentration:

(α): 6.19E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.02 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/16/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-145

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/15/2007 8:50

Flow Rate: 2.15 cfm Stop Time: 6/16/2007 8:45

Flow Rate: 60.88 lpm Total Time: 1435 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/20/2007 Count Time: 6:35 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87365024 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 3 counts

Gross (α): 13 counts

Gross Background (α): 0.05 cpm (R_B) (α)

Gross (α): 0.22 cpm

MDC

(α): 2.46E-15 µCi/ml

Activity Concentration:

(α): 2.22E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.07 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/16/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-146

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/15/2007 8:45

Flow Rate: 2.15 cfm Stop Time: 6/16/2007 8:40

Flow Rate: 60.88 lpm Total Time: 1435 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/20/2007 Count Time: 12:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87365024 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 3 counts

Gross (α): 12 counts

Gross Background (α): 0.05 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.20 cpm

MDC

(α): 2.46E-15 µCi/ml

Activity Concentration:

(α): 2.00E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.07 % DAC

Surveyor: Carl Ingle / Signature Date 7-11-07

Reviewer: Signature Date 7-12-07

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/18/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-0150

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/16/2007 8:45

Flow Rate: 2.15 cfm Stop Time: 6/18/2007 8:17

Flow Rate: 60.88 lpm Total Time: 2852 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/21/2007 Count Time: 7:30 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 1.74E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 15 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.25 cpm

MDC

(α): 1.50E-15 µCi/ml

Activity Concentration:

(α): 1.12E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.04 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/18/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-151

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/16/2007 8:35

Flow Rate: 2.15 cfm Stop Time: 6/18/2007 8:20

Flow Rate: 60.88 lpm Total Time: 2865 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/25/2007 Count Time: 8:50 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 1.74E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 24 counts

Gross Background (α): 0.23 cpm $(R_B)_{(\alpha)}$

Gross (α): 0.40 cpm

MDC

(α): 2.27E-15 µCi/ml

Activity Concentration:

(α): 1.11E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.04 % DAC

Surveyor: Carl Ingle / Signature 7-1-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/19/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-154

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/18/2007 8:20

Flow Rate: 2.15 cfm Stop Time: 6/19/2007 6:30

Flow Rate: 60.88 lpm Total Time: 1330 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/25/2007 Count Time: 10:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 80972462 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 13 counts

Gross Background (α): 0.23 cpm (R_B) (α)

Gross (α): 0.22 cpm

MDC

(α): 4.89E-15 µCi/ml

Activity Concentration:

(α): -2.40E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml -0.01 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/19/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-155

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/18/2007 8:20

Flow Rate: 2.15 cfm Stop Time: 6/19/2007 6:35

Flow Rate: 60.88 lpm Total Time: 1335 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/25/2007 Count Time: 11:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 81276869 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 12 counts

Gross Background (α): 0.23 cpm (R_B) (α)

Gross (α): 0.20 cpm

MDC

(α): 4.87E-15 µCi/ml

Activity Concentration:

(α): -4.77E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml -0.02 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

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Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/19/2007

Air Sample Location: Hammering on grouted pump head Air Sample Number: WI07-0160

Purpose/Type: Work Zone RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 9:30

Flow Rate: 3.7 cfm Stop Time: 12:30

Flow Rate: 104.77 lpm Total Time: 180 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 7:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 18859122 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 13 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 0.22 cpm

MDC

(α): 2.16E-14 µCi/ml

Activity Concentration:

(α): -2.06E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml -0.07 % DAC

Surveyor: Jack Mucia / Signature 7-11-07 Date

Reviewer: Chris Higgins / Signature for CH 7-10-07 Date

entered

ESFS 82A8008

WI07 - 0160 D1 A-F - W-Z Hammering on pump-head072007

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EnergySolutions Spectrum name: Win00204.An1

Sample description
WI07- 0160 D1 W/Z -Hammering on pump head 072007

Spectrum Filename: C:\User\Win00204.An1

Acquisition information
Start time: 20-Jul-2007 09:02:32
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.8860E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.8860E+07) =
5.3022E-08
Detection limit method: Traditional ORTEC method

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

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EnergySolutions Spectrum name: Win00204.An1
Page 1

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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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.28	7.25	132.	380.	0.632	15.30	1.366	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.77	46.36	5.	22.	0.036	59.27	0.513s
AM-241	238.00	59.66	1.	0.	0.000	0.00	0.000s
Th-234	256.00	64.16	8.	3.	0.005	310.32	1.371s
Pb-214	298.61	74.81	10.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	3.	0.	0.000	485.34	0.000D
Pb-212	307.80	77.11	13.	0.	0.000	0.00	0.973D
Pb-214	307.80	77.11	5.	0.	0.000	146.57	0.309D
Pb-214	345.83	86.61	4.	2.	0.004	254.03	0.223s
Th-234	368.79	92.35	20.	11.	0.019	126.84	0.985D
Ac-228	380.79	95.35	16.	2.	0.003	627.79	0.987D
Ac-228	842.26	210.68	4.	20.	0.034	60.19	0.283s
Pb-212	954.08	238.62	3.	11.	0.018	75.87	1.099D
Pb-214	967.50	241.98	1.	3.	0.004	177.78	1.101D
Ac-228	1082.00	270.60	0.	1.	0.002	200.00	0.250s
Pb-214	1179.33	294.92	1.	0.	0.001	240.37	0.197s
Ac-228	1309.50	327.45	0.	2.	0.003	141.42	0.500s
Ac-228	1352.76	338.26	1.	10.	0.016	73.96	0.568s
Pb-214	1405.33	351.40	0.	4.	0.007	100.00	0.250s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.67	463.19	1.	0.	0.001	240.37	0.197s
Bi-214	2437.00	609.22	0.	1.	0.002	200.00	0.250s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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Ac-228	3644.00	910.84	0.	1.	0.002	200.00	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	1.	0.002	181.48	1.589D
Ac-228	3877.18	969.11	0.	1.	0.001	335.42	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	4.063E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	4.119E-05	?	2.223E-05	G
			964.60	3.800E-05		6.686E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	1.599E-04	&	5.854E-05	G
			270.23	0.000E+00	%	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.998E-05	X
			327.64	2.938E-05	?	3.763E-05	G

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EnergySolutions Spectrum name: Win00204.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
Pb-212	N	9.0469E-06	238.62	9.047E-06	(	2.523E-06		G K
			77.11	0.000E+00		6.456E-06		Energy duplication
			74.81	0.000E+00	%	6.027E-06		Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06		G
Th-234	N	4.4124E-05	92.35	4.412E-05	(	2.674E-05		G
			63.29	0.000E+00	&	2.787E-05		G
Pb-214	N	6.7222E-06	351.92	5.456E-06	?(	1.364E-06		G K
			295.21	0.000E+00	%	4.458E-06		G
			77.11	0.000E+00	?	7.284E-06		Energy duplication
			241.98	1.301E-05	(	1.116E-05		G
			74.81	0.000E+00	%	1.626E-05		Energy duplication

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                WI07 - 0160 D1 A-F -    W-Z Hammering on pump-head072007
                                87.30 0.000E+00 &   1.793E-05          X

Pb-210   N   1.0635E-04     46.50 1.063E-04  (  1.867E-05          G

AM-241       0.0000E+00     59.54 0.000E+00 ?   1.126E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 09:12:41 Page    5
EnergySolutions                    Spectrum name: Win00204.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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
              uCi/ml         uCi/ml       uCi/ml

Bi-214 B<    2.1544E-13
K-40    <    1.0714E-12
Ac-228 B<    6.0981E-13
Pb-212       4.7969E-13    3.639E-13    3.641E-13
CS-137  <    6.8650E-14
Th-234       2.3395E-12    2.968E-12    2.968E-12
Pb-214       3.5643E-13    3.564E-13    3.565E-13
Pb-210 #     5.6387E-12    3.342E-12    3.344E-12
AM-241  <    5.9685E-14

  # - 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.
```

WI07 - 0160 D1 A-F - W-Z Hammering on pump-head072007

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 8.8143937E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fern
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/20/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-161

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/19/2007 6:30

Flow Rate: 2.15 cfm Stop Time: 6/20/2007 6:30

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/25/2007 Count Time: 1:42 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 22 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 0.37 cpm

MDC

(α): 4.65E-15 µCi/ml

Activity Concentration:

(α): 1.55E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.05 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/20/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-162

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/19/2007 6:35

Flow Rate: 2.15 cfm Stop Time: 6/20/2007 6:50

Flow Rate: 60.88 lpm Total Time: 1455 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 12:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 88582655 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 16 counts

Gross Background (α): 0.25 cpm $(R_B)_{(\alpha)}$

Gross (α): 0.27 cpm

MDC

(α): 4.60E-15 µCi/ml

Activity Concentration:

(α): 2.19E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.01 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

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Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/21/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-168

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/20/2007 6:30

Flow Rate: 2.15 cfm Stop Time: 6/21/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1470 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/25/2007 Count Time: 1:42 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89495878 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 24 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 0.40 cpm

MDC

(α): 4.56E-15 µCi/ml

Activity Concentration:

(α): 1.95E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.07 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/21/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-169

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/20/2007 6:30

Flow Rate: 2.15 cfm Stop Time: 6/21/2007 7:05

Flow Rate: 60.88 lpm Total Time: 1475 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 12:40 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89800286 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 18 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 0.30 cpm

MDC

(α): 4.54E-15 µCi/ml

Activity Concentration:

(α): 6.48E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.02 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/21/2007

Air Sample Location: Cutting Poly Tank in RCA Air Sample Number: WI07-0170

Purpose/Type: Work Zone RWP #: W07-02

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 9:05

Flow Rate: 3.7 cfm Stop Time: 12:55

Flow Rate: 104.77 lpm Total Time: 230 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 3:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 24097767 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 505 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 8.42 cpm

MDC

(α): 1.69E-14 µCi/ml

Activity Concentration:

(α): 3.94E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 13.15 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature for CH 7-10-07 Date

enbd

ESFS 82A8008

WI07 - 0422 D1 A-F - WZ Cut poly tank 072007

Sample description
WI07- 0170 D1 W/Z Cutting poly tank 072007

Spectrum Filename: C:\User\Win00205.An1

Acquisition information
Start time: 20-Jul-2007 09:34:28
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.4100E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 2.4100E+07) = 4.1494E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0422 D1 A-F - WZ Cut poly tank 072007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0728

********** 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	
28.71	7.35	130.	443.	0.738	13.87	1.502	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.06	46.68	7.	11.	0.019	95.21	1.118
AM-241	237.79	59.61	6.	28.	0.047	49.94	1.027
Th-234	248.04	62.17	8.	3.	0.005	310.32	0.434s
Pb-214	298.61	74.81	2.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	3.	0.	0.000	0.00	0.000D
Pb-212	308.00	77.16	3.	0.	0.000	0.00	0.000s
Pb-214	307.80	77.11	3.	0.	0.000	485.34	0.000D
Pb-214	341.00	85.40	3.	3.	0.005	216.02	0.083s
Th-234	368.79	92.35	9.	15.	0.025	75.75	0.985D
Ac-228	380.79	95.35	4.	1.	0.001	828.81	0.987D
Ac-228	836.75	209.30	0.	4.	0.007	100.00	0.375s
Pb-212	951.13	237.89	2.	7.	0.012	98.12	0.574s
Pb-214	967.50	241.98	0.	0.	0.000	0.00	0.000D
Ac-228	1081.14	270.38	1.	1.	0.002	281.40	0.440s
Pb-214	1180.00	295.09	1.	0.	0.000	0.00	0.000s
Ac-228	1306.00	326.58	1.	4.	0.006	142.00	0.087s
Ac-228	1352.67	338.24	1.	0.	0.001	240.37	0.197s
Pb-214	1403.83	351.03	1.	1.	0.001	366.67	0.223s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.001	223.61	0.000s
Bi-214	2436.00	608.97	1.	0.	0.000	0.00	0.083s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3074.00	768.40	0.	0.	0.001	223.61	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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Ac-228	3646.00	911.34	0.	2.	0.003	141.42	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3860.34	964.90	0.	0.	0.000	0.00	1.589
Ac-228	3878.00	969.32	0.	1.	0.002	200.00	0.250s
Bi-214	4481.00	1119.99	0.	1.	0.002	200.00	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.50	1460.69	0.	2.	0.003	141.42	0.500s
Ac-228	6353.00	1587.74	0.	1.	0.002	200.00	0.250s
Bi-214	7060.00	1764.39	1.	1.	0.002	346.41	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	4.063E-06	G K
			1764.49	0.000E+00	%	4.473E-05	G
			1120.29	0.000E+00	%	2.299E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	4.0412E-05	1460.81	4.041E-05	?(	2.021E-05	G
Ac-228	N	1.7827E-05	911.07	1.150E-05	?(	5.750E-06	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	3.145E-05	?(	7.862E-06	G
			270.23	0.000E+00	%	2.849E-05	G
			1588.00	0.000E+00	%	1.356E-04	G
			95.35	0.000E+00	%	2.269E-05	X
			327.64	5.386E-05	&(	3.243E-05	G

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:44:39 Page 4
EnergySolutions Spectrum name: Win00205.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	5.9479E-06	238.62	5.948E-06	&(	2.057E-06	G K
			77.11	0.000E+00	%	3.735E-06	X
			74.81	0.000E+00	?	5.776E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N	5.9451E-05	92.35	5.945E-05	(	1.862E-05	G
			63.29	0.000E+00	&	2.787E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	&	3.494E-06	G K
			295.21	0.000E+00	?	4.458E-06	G
			77.11	0.000E+00	%	6.160E-06	Energy duplication
			241.98	0.000E+00	?	4.982E-06	G
			74.81	0.000E+00	%	8.498E-06	Energy duplication

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			87.30	0.000E+00	&	1.793E-05	X
Pb-210	N	5.5627E-05	46.50	5.563E-05	?(	2.054E-05	G
AM-241		1.5947E-05	59.54	1.595E-05	(	2.197E-06	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

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 (63) wan32 G53W2.06 20-JUL-2007 09:44:39 Page 5
EnergySolutions Spectrum name: Win00205.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	B<	1.6859E-13		
K-40	#C	1.6768E-12	2.371E-12	2.372E-12
Ac-228	#C	7.3972E-13	5.523E-13	5.525E-13
Pb-212	#	2.4680E-13	2.422E-13	2.422E-13
CS-137	<	5.3724E-14		
Th-234		2.4668E-12	1.869E-12	1.869E-12
Pb-214	B<	1.4498E-13		
Pb-210	#	2.3082E-12	2.198E-12	2.198E-12
AM-241		6.6169E-13	3.305E-13	3.314E-13

- 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.

WI07 - 0422 D1 A-F - WZ Cut poly tank 072007

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 8.1000892E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: LC. Fiss
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/22/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-171

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/21/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 6/22/2007 6:40

Flow Rate: 60.88 lpm Total Time: 1420 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 5:09 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86451801 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 19 counts

Gross Background (α): 0.25 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.32 cpm

MDC

(α): 4.72E-15 µCi/ml

Activity Concentration:

(α): 8.98E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.03 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

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Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/22/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-172

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/21/2007 7:05

Flow Rate: 2.15 cfm Stop Time: 6/22/2007 6:45

Flow Rate: 60.88 lpm Total Time: 1420 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/26/2007 Count Time: 4:05 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86451801 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 29 counts

Gross Background (α): 0.25 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.48 cpm

MDC

(α): 4.72E-15 µCi/ml

Activity Concentration:

(α): 3.14E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.10 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

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Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/22/2007

Air Sample Location: Cutting poly Tank Air Sample Number: WI07-0177

Purpose/Type: Work Zone RWP #: WI-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2007

Serial #: 866 Start Time: 9:30

Flow Rate: 3.7 cfm Stop Time: 13:00

Flow Rate: 60.00 lpm Total Time: 210 min

Counter/Scaler Data:

Model #: L-2929 Count Date: 6/27/2007 Count Time: 10:00 AM

Serial #: 118407

Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 5/3/2008 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 12600000 ml

Sample Count Time: 108 min (t_S)

Gross Background (α): 10 counts

Gross (α): 813 counts

Gross Background (α): 0.2 cpm $(R_B)_{(\alpha)}$

Gross (α): 7.5 cpm

MDC

(α): 5.74E-14 µCi/ml

Activity Concentration:

(α): 1.73E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 57.71052 Percent DAC

Surveyor: Jack Mucia / (Signature) 7/31/07 (Date)

Reviewer: (Signature) 7/28/07 (Date)

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WI07 - 0177 D1 A-F - WZ Cutting Poly Tank 072507

Sample description
WI07-0177 D1 A/F W/Z Cutting Poly Tank 072507

Spectrum Filename: C:\User\Win00253.An1

Acquisition information
Start time: 25-Jul-2007 11:15:04
Live time: 600
Real time: 604
Dead time: 0.63 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.2600E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.2600E+07) =
7.9365E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0177 D1 A-F - WZ Cutting Poly Tank 072507

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2492

********** 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	
28.68	7.35	198.	531.	0.884	13.54	1.277	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.91	46.64	2.	11.	0.018	74.97	0.470s
AM-241	239.18	59.96	7.	16.	0.027	71.52	0.528s
Th-234	250.48	62.78	11.	15.	0.025	92.75	0.217s
Pb-214	299.00	74.91	3.	0.	0.000	0.00	0.000s
Pb-212	298.63	74.81	3.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	7.	0.	0.000	0.00	1.083D
Pb-214	307.80	77.11	12.	0.	0.000	352.14	0.956D
Pb-214	349.21	87.46	7.	8.	0.014	122.64	0.278s
Th-234	368.79	92.35	16.	11.	0.019	113.61	0.985D
Ac-228	380.79	95.35	7.	3.	0.006	241.76	0.987D
Ac-228	843.45	210.98	4.	5.	0.008	164.92	0.320s
Pb-212	954.08	238.62	1.	9.	0.015	72.57	1.099D
Pb-214	967.50	241.98	2.	4.	0.006	153.09	1.101D
Ac-228	1075.20	268.90	0.	8.	0.013	70.71	0.375s
Pb-214	1179.00	294.84	0.	3.	0.005	115.47	0.250s
Ac-228	1309.33	327.41	1.	0.	0.001	240.37	0.197s
Ac-228	1349.00	337.32	0.	11.	0.018	60.30	0.250s
Pb-214	1407.00	351.82	0.	10.	0.017	63.25	0.250s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.00	463.03	1.	0.	0.000	0.00	0.000s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3073.00	768.16	0.	3.	0.005	115.47	0.750s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

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Ac-228	3643.00	910.59	0.	1.	0.002	200.00	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	1.	0.002	273.80	1.589D
Ac-228	3877.18	969.11	1.	2.	0.004	152.28	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.00	1460.82	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	7.611E-05	?	7.611E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	2.424E-05		2.946E-05	G
			338.32	4.688E-05	&	2.223E-05	G
			964.60	0.000E+00	%	8.015E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	3.028E-05	G
			209.28	3.931E-05	&	3.752E-05	G
			270.23	8.897E-05	&	5.039E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.065E-05	X
			327.64	0.000E+00	%	2.938E-05	G

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EnergySolutions Spectrum name: Win00253.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak	MDA	Comments
Pb-212	N	7.5521E-06	238.62	7.552E-06	(	1.604E-06		G K
			77.11	0.000E+00	&	5.008E-06		Energy duplication
			74.81	0.000E+00	?	5.776E-06		Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06		G
Th-234	N	5.9916E-05	92.35	4.509E-05	(	2.393E-05		G
			63.29	8.103E-05	&(	2.768E-05		G
Pb-214	N	1.6651E-05	351.92	1.364E-05	?(	1.364E-06		G K
			295.21	6.687E-06	-	6.687E-06		G
			77.11	0.000E+00	&	1.054E-05		Energy duplication
			241.98	1.869E-05	(	1.334E-05		G
			74.81	0.000E+00	?	9.953E-06		X

```
                                87.30 3.736E-05  (  1.877E-05          X

Pb-210   N   5.3991E-05      46.50 5.399E-05 ?(  1.257E-05          G

AM-241       9.1928E-06      59.54 9.193E-06  (  2.356E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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EnergySolutions Spectrum name: Win00253.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214 B<	1.6123E-13		
K-40 <	3.2073E-12		
Ac-228 B<	9.1277E-13		
Pb-212	5.9938E-13	4.349E-13	4.352E-13
CS-137 <	1.0276E-13		
Th-234	4.7552E-12	3.487E-12	3.489E-12
Pb-214	1.3215E-12	8.358E-13	8.364E-13
Pb-210 #	4.2850E-12	3.212E-12	3.214E-12
AM-241	7.2959E-13	5.218E-13	5.225E-13

```
  # - 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.
```

WI07 - 0177 D1 A-F - WZ Cutting Poly Tank 072507

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.1690753E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Lunn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/25/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-178

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/22/2007 6:40

Flow Rate: 2.15 cfm Stop Time: 6/25/2007 8:05

Flow Rate: 60.88 lpm Total Time: 4405 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/28/2007 Count Time: 8:05 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_I): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2.68E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 15 counts

Gross (α): 52 counts

Gross Background (α): 0.25 cpm (R_B) (α)

Gross (α): 0.87 cpm

MDC

(α): 1.52E-15 µCi/ml

Activity Concentration:

(α): 2.68E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.09 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-179

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/22/2007 6:45

Flow Rate: 2.15 cfm Stop Time: 6/25/2007 5:10

Flow Rate: 60.88 lpm Total Time: 4225 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/1/2007 Count Time: 9:05 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2.57E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 59 counts

Gross Background (α): 0.15 cpm (R_B) (α)

Gross (α): 0.98 cpm

MDC

(α): 1.28E-15 µCi/ml

Activity Concentration:

(α): 3.77E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.13 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: Cutting Work Over Tank w/torch Air Sample Number: WI07-0180

Purpose/Type: Work Zone RWP #: W07-02,03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 7:40

Flow Rate: 3.7 cfm Stop Time: 9:35

Flow Rate: 104.77 lpm Total Time: 115 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/29/2007 Count Time: 12:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 12048884 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 164 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 2.73 cpm

MDC

(α): 2.16E-14 µCi/ml

Activity Concentration:

(α): 2.56E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 8.53 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature for CH 7-10-07 Date

entered

ESFS 82A8008

WI07 - 0180 D1 A-F - WZ Cutting W.O. tank 072007

Sample description
WI07- 0180 D1 W/Z Cutting workover tank 072007

Spectrum Filename: C:\User\Win00206.An1

Acquisition information
Start time: 20-Jul-2007 10:03:33
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.2050E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.2050E+07) =
8.2988E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0180 D1 A-F - WZ Cutting W.O. tank 072007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0680

********** 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	
28.61	7.33	131.	422.	0.704	14.22	0.895	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.81	46.87	0.	16.	0.027	50.00	1.187s
AM-241	239.93	60.14	9.	9.	0.015	133.58	0.393s
Th-234	252.78	63.36	9.	14.	0.024	90.19	0.322s
Pb-214	298.61	74.81	10.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	4.	0.	0.000	336.65	0.000D
Pb-212	307.76	77.10	1.	7.	0.012	85.71	0.449s
Pb-214	307.80	77.11	3.	0.	0.000	140.70	0.398D
Pb-214	349.67	87.57	2.	1.	0.002	416.33	0.181s
Th-234	368.79	92.35	9.	1.	0.001	1460.88	0.985D
Ac-228	380.79	95.35	4.	1.	0.002	556.11	0.987D
Ac-228	834.78	208.81	1.	1.	0.002	346.41	0.218s
Pb-212	955.26	238.92	12.	0.	0.000	0.00	1.099
Pb-214	967.00	241.86	0.	12.	0.020	57.74	1.125
Ac-228	1079.00	269.85	0.	2.	0.003	141.42	0.250s
Pb-214	1179.75	295.02	0.	6.	0.010	81.65	0.375s
Ac-228	1316.75	329.26	0.	7.	0.012	75.59	0.375s
Ac-228	1351.72	338.00	2.	7.	0.011	108.31	0.327s
Pb-214	1407.73	352.00	3.	3.	0.005	216.02	0.863s

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EnergySolutions Spectrum name: Win00206.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1853.50	463.40	0.	2.	0.003	141.42	0.500s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2647.00	661.70	0.	0.	0.001	223.61	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.67	794.56	1.	0.	0.001	240.37	0.197s

WI07 - 0180 D1 A-F - WZ Cutting W.O. tank 072007

Ac-228	3645.00	911.09	0.	2.	0.003	141.42	0.250s
Bi-214	3736.67	934.00	1.	1.	0.001	366.67	0.181s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	1.589
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	3.	0.005	115.47	0.250s
Bi-214	7058.50	1764.02	0.	2.	0.003	141.42	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	3.493E-05	?	4.473E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	%	1.283E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	3.5407E-05	911.07	1.150E-05	?(	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	2.912E-05	?(	1.125E-05	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	%	5.786E-05	G
			463.00	3.028E-05	?(	1.514E-05	G
			209.28	0.000E+00	%	2.014E-05	G
			270.23	2.224E-05	?(	1.112E-05	G
			1588.00	2.034E-04	?(	6.781E-05	G
			95.35	0.000E+00	%	2.269E-05	X
			327.64	1.028E-04	&(	1.469E-05	G

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 10:13:42 Page 4
EnergySolutions Spectrum name: Win00206.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00		4.567E-06	G K
			77.11	8.036E-06	?	5.202E-06	X
			74.81	0.000E+00	%	6.493E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	0.0000E+00	92.35	0.000E+00	%	1.964E-05	G
			63.29	7.658E-05		3.900E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	5.456E-06	G K
			295.21	1.337E-05	?	8.916E-06	G
			77.11	0.000E+00	?	6.160E-06	Energy duplication
			241.98	5.978E-05	?	2.702E-05	G
			74.81	0.000E+00		1.625E-05	Energy duplication

```
                WI07 - 0180 D1 A-F - WZ   Cutting W.O. tank  072007
                                87.30 0.000E+00 %   1.345E-05          X

Pb-210   N   7.8533E-05      46.50 7.853E-05 ?(  4.908E-06          G

AM-241       4.9716E-06      59.54 4.972E-06 &(  2.708E-06          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

   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

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     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 10:13:42 Page    5
 EnergySolutions                  Spectrum name: Win00206.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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                uCi/ml         uCi/ml        uCi/ml

 ------------------------------------------------------------------------
 Bi-214 B<    1.6859E-13
 K-40    <    3.3537E-12
 Ac-228 #C    2.9383E-12    1.476E-12     1.477E-12
 Pb-212 B<    3.7904E-13
 CS-137  <    2.1490E-13
 Th-234  <    1.6297E-12
 Pb-214 B<    4.5280E-13
 Pb-210 #     6.5172E-12    3.259E-12     3.262E-12
 AM-241 #     4.1258E-13    5.511E-13     5.513E-13

   # - 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.
```

WI07 - 0180 D1 A-F - WZ Cutting W.O. tank 072007

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 9.8681523E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Lexx
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-182

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/25/2007 8:10

Flow Rate: 2.15 cfm Stop Time: 6/26/2007 6:40

Flow Rate: 60.88 lpm Total Time: 1350 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/30/2007 Count Time: 12:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 82190093 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 15 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.25 cpm

MDC

(α): 3.16E-15 µCi/ml

Activity Concentration:

(α): 2.36E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.08 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-183

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/25/2007 8:15

Flow Rate: 2.15 cfm Stop Time: 6/26/2007 6:45

Flow Rate: 60.88 lpm Total Time: 1350 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/30/2007 Count Time: 1:18 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 82190093 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 16 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 0.27 cpm

MDC

(α): 3.16E-15 µCi/ml

Activity Concentration:

(α): 2.60E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.09 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: Cutting Work Over Tank w/torch Air Sample Number: WI07-0184

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 9:40

Flow Rate: 3.7 cfm Stop Time: 11:35

Flow Rate: 104.77 lpm Total Time: 115 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/27/2007 Count Time: 7:12 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 12048884 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 813 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 13.55 cpm

MDC

(α): 2.85E-14 µCi/ml

Activity Concentration:

(α): 1.29E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 43.10 % DAC

Surveyor: Jack Mucia / (Signature) 7/14/07 (Date)

Reviewer: Chris Higgins / (Signature) for CH 7-10-07 (Date)

Entered

ESFS 82A8008

WI07 - 0184 D1 A-F - WZ Cutting W.O. tank 072107

Sample description
WI07- 0184 D1 A/F (W/Z) Cutting W.O. Tank 072107

Spectrum Filename: C:\User\Win00215.An1

Acquisition information
Start time: 21-Jul-2007 12:29:40
Live time: 600
Real time: 603
Dead time: 0.42 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.2050E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.2050E+06) =
8.2988E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0184 D1 A-F - WZ Cutting W.O. tank 072107

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0547

********** 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	
28.89	7.40	190.	922.	1.537	8.81	1.677	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.03	46.67	6.	8.	0.014	115.47	0.295s
AM-241	237.90	59.64	8.	44.	0.072	40.10	0.713s
Th-234	253.44	63.52	0.	26.	0.043	39.22	0.687s
Pb-214	298.61	74.81	2.	2.	0.003	283.95	0.971D
Pb-212	298.63	74.81	1.	0.	0.000	366.67	0.181D
Pb-212	307.80	77.11	3.	7.	0.012	99.06	0.973D
Pb-214	307.80	77.11	7.	0.	0.000	414.33	0.000D
Pb-214	348.62	87.31	1.	1.	0.001	339.93	0.375s
Th-234	370.53	92.79	5.	15.	0.024	79.77	0.528s
Ac-228	380.79	95.35	2.	0.	0.000	0.00	0.000D
Ac-228	836.62	209.27	2.	14.	0.024	62.12	0.707s
Pb-212	954.08	238.62	7.	0.	0.000	0.00	1.099
Pb-214	966.00	241.61	0.	0.	0.000	0.00	0.000s
Ac-228	1080.67	270.26	1.	0.	0.001	240.37	0.197s
Pb-214	1181.33	295.42	0.	7.	0.012	75.59	0.375s
Ac-228	1309.00	327.33	0.	1.	0.002	200.00	0.250s
Ac-228	1351.00	337.82	0.	0.	0.001	223.61	0.100s
Pb-214	1407.50	351.94	0.	6.	0.010	81.65	0.500s

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EnergySolutions Spectrum name: Win00215.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1856.25	464.09	0.	8.	0.013	70.71	0.375s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0184 D1 A-F - WZ Cutting W.O. tank 072107

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	1.	0.002	200.00	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	%	3.493E-05	G
			1120.29	0.000E+00	%	2.299E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	1.211E-04	&	6.860E-05	G
			209.28	1.114E-04	$	4.858E-05	G
			270.23	0.000E+00	%	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	1.412E-05	X
			327.64	0.000E+00	%	2.938E-05	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00		3.492E-06	G K
			77.11	8.286E-06	$	5.740E-06	Energy duplication
			74.81	0.000E+00	%	4.057E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N	9.1149E-05	92.35	5.761E-05	?(	1.494E-05	G
			63.29	1.389E-04	?(	5.343E-06	G
Pb-214	N	1.0710E-05	351.92	8.184E-06	?(	1.364E-06	G K
			295.21	1.560E-05	?(	2.229E-06	G
			77.11	0.000E+00	&	8.413E-06	Energy duplication
			241.98	0.000E+00	?	4.982E-06	G
			74.81	0.000E+00	%	1.059E-05	Energy duplication

WI07 - 0184 D1 A-F - WZ Cutting W.O. tank 072107

			87.30	0.000E+00 %		1.149E-05	X
Pb-210	N	4.1721E-05	46.50	4.172E-05	?(	1.892E-05	G
AM-241		2.4483E-05	59.54	2.448E-05	(	2.619E-06	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

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

- -

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EnergySolutions Spectrum name: Win00215.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	B<	1.6859E-12		
K-40	<	1.6768E-11		
Ac-228	B<	4.7722E-12		
Pb-212	B<	2.8983E-12		
CS-137	<	1.0745E-12		
Th-234	#	7.5642E-11	2.967E-11	2.972E-11
Pb-214	#	8.8880E-12	4.945E-12	4.949E-12
Pb-210	#	3.4623E-11	3.998E-11	3.999E-11
AM-241		2.0318E-11	8.148E-12	8.183E-12

- 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.

WI07 - 0184 D1 A-F - WZ Cutting W.O. tank 072107

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.3947099E-10 uCi/ml

The library has energies which are not separable.

Analyzed by: L.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/26/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-0186

Purpose/Type: General Area while citting Work Tank RWP #: WI-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3364 Start Time: 6:40

Flow Rate: 1.5 cfm Stop Time: 18:00

Flow Rate: 60.00 lpm Total Time: 680 min

Counter/Scaler Data:

Model #: L-2929 Count Date: 6/27/2007 Count Time: 8:33 AM

Serial #: 118407

Instrument Efficiency (ε_i): 30.40% (α)

Cal Due: 5/3/2008 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 40800000 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 46 counts

Gross Background (α): 0.2 cpm (R_B) (α)

Gross (α): 0.8 cpm

MDC

(α): 2.14E-14 µCi/ml

Activity Concentration:

(α): 4.36E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.452691 Percent DAC

Surveyor: Carl Ingle / Signature Date 8/2/07

Reviewer: Signature Date 8/3/07

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ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0190

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 3361 Start Time: 10:08

Flow Rate: 3.7 cfm Stop Time: 12:15

Flow Rate: 104.77 lpm Total Time: 127 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/27/2007 Count Time: 12:50 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 13306158 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 1625 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 27.08 cpm

MDC

(α): 2.58E-14 µCi/ml

Activity Concentration:

(α): 2.35E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 78.48 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature for CH 7/23/07 Date

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Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Cutting WorkOver Tank Air Sample Number: WI07-0190a

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 10:08

Flow Rate: 3.7 cfm Stop Time: 12:15

Flow Rate: 104.77 lpm Total Time: 127 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/30/2007 Count Time: 10:36 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 13306158 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 901 counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 15.02 cpm

MDC

(α): 2.58E-14 µCi/ml

Activity Concentration:

(α): 1.30E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 43.30 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature for Chris Higgins 7/23/07 Date

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0190b

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 10:08

Flow Rate: 3.7 cfm Stop Time: 12:15

Flow Rate: 104.77 lpm Total Time: 127 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/3/2007 Count Time: 11:30 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 13306158 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 4 counts

Gross (α): * 913 counts

Gross Background (α): 0.07 cpm (R_B) (α)

Gross (α): 15.22 cpm

MDC

(α): 1.79E-14 µCi/ml

* 3rd Count

Activity Concentration:

(α): 1.33E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 44.17 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: ~~Chris Higgins~~ / Signature for CH 7/23/07 Date

ESFS 82A8008

WI07 - 0190 D1 A-F - WZ Cleaning sludge W.O. Tank 072107

Sample description
WI07- 0190 D1 A/F (W/Z) Cleaning sludge from W.O. Tank 072
107

Spectrum Filename: C:\User\Win00214.An1

Acquisition information
Start time: 21-Jul-2007 12:11:08
Live time: 600
Real time: 602
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.3310E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.3310E+07) =
7.5131E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0190 D1 A-F - WZ Cleaning sludge W.O. Tank 072107

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0964

********** 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	
28.25	7.24	115.	393.	0.656	14.51	1.061	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	190.54	47.80	2.	9.	0.015	86.07	0.245s
AM-241	237.67	59.58	8.	34.	0.057	44.80	0.776
Th-234	253.10	63.44	8.	14.	0.023	100.57	0.370s
Pb-214	298.61	74.81	13.	0.	0.000	0.00	0.203D
Pb-212	298.63	74.81	10.	0.	0.000	163.94	0.720D
Pb-212	304.67	76.32	4.	2.	0.004	296.65	0.172s
Pb-214	307.80	77.11	4.	0.	0.000	600.00	0.000D
Pb-214	346.78	86.85	6.	12.	0.019	90.51	0.276s
Th-234	368.79	92.35	16.	11.	0.019	117.01	0.985D
Ac-228	380.79	95.35	12.	7.	0.012	151.73	0.987D
Ac-228	836.67	209.28	1.	0.	0.001	240.37	0.197s
Pb-212	949.50	237.48	6.	7.	0.012	147.01	0.916
Pb-214	967.50	241.98	1.	0.	0.000	0.00	0.704D
Ac-228	1082.50	270.72	0.	3.	0.005	115.47	0.500s
Pb-214	1175.00	293.84	0.	5.	0.008	89.44	0.250s
Ac-228	1310.00	327.58	0.	4.	0.007	100.00	0.250s
Ac-228	1353.00	338.32	0.	1.	0.002	200.00	0.250s
Pb-214	1402.00	350.57	0.	11.	0.018	60.30	0.250s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.001	223.61	0.000s
Bi-214	2437.00	609.22	0.	0.	0.001	223.61	0.100s
CS-137	2647.67	661.87	1.	0.	0.001	240.37	0.197s
Bi-214	3073.00	768.16	0.	1.	0.002	200.00	0.250s
Ac-228	3179.00	794.64	0.	1.	0.002	200.00	0.250s

WI07 - 0190 D1 A-F - WZ Cleaning sludge W.O. Tank 072107

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.100D
Ac-228	3875.00	968.57	0.	1.	0.002	200.00	0.250s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	4.063E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00	%	5.063E-05	G
			794.70	0.000E+00	%	5.786E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	3.336E-05	?	3.336E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	4.514E-05	$	4.126E-05	X
			327.64	5.876E-05	?	4.954E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 6.0863E-06	238.62	6.086E-06	&(	3.240E-06	G K
		77.11	0.000E+00	&	4.907E-06	X
		74.81	0.000E+00	&	9.627E-06	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N 5.5562E-05	92.35	4.393E-05	(	2.414E-05	G
		63.29	7.212E-05	(	2.486E-05	G
Pb-214	N 1.3691E-05	351.92	1.500E-05	&(	1.364E-06	G K
		295.21	1.115E-05	&(	2.229E-06	G
		77.11	0.000E+00	%	6.636E-06	Energy duplication
		241.98	0.000E+00	?	1.100E-05	G
		74.81	0.000E+00	&	1.855E-05	Energy duplication

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			87.30	5.156E-05	+	2.848E-05	X
Pb-210	N	4.4175E-05	46.50	4.417E-05	&(	1.257E-05	G
AM-241		1.9136E-05	59.54	1.914E-05	(	2.550E-06	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

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 (63) wan32 G53W2.06 21-JUL-2007 12:21:18 Page 5
EnergySolutions Spectrum name: Win00214.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214 B<	3.0527E-13		
K-40 <	1.5181E-12		
Ac-228 B<	4.3204E-13		
Pb-212 #	4.5727E-13	6.722E-13	6.723E-13
CS-137 <	1.9455E-13		
Th-234	4.1745E-12	3.220E-12	3.222E-12
Pb-214 #	1.0286E-12	5.548E-13	5.553E-13
Pb-210 #	3.3189E-12	2.856E-12	2.857E-12
AM-241	1.4377E-12	6.441E-13	6.463E-13

- 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.

WI07 - 0190 D1 A-F - WZ Cleaning sludge W.O. Tank 072107
F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.0416977E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-191

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/26/2007 6:35

Flow Rate: 2.15 cfm Stop Time: 6/27/2007 6:35

Flow Rate: 60.88 lpm Total Time: 1440 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/1/2007 Count Time: 9:05 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 87669432 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 28 counts

Gross Background (α): 0.08 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.47 cpm

MDC

(α): 2.97E-15 µCi/ml

Activity Concentration:

(α): 5.09E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.17 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-192

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/26/2007 18:00

Flow Rate: 2.15 cfm Stop Time: 6/27/2007 6:20

Flow Rate: 60.88 lpm Total Time: 740 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/1/2007 Count Time: 9:05 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 45052347 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 20 counts

Gross Background (α): 0.08 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.33 cpm

MDC

(α): 5.77E-15 µCi/ml

Activity Concentration:

(α): 6.46E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.22 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn
Name

Date Drawn: 6/27/2007

Air Sample Location: ~~Clean~~ Cleaning Sludge from Workover Tank
RCY 7-22-07

Air Sample Number: WI07-0195

Purpose/Type: Work Zone

RWP #: W07-03

Air Sampler Data:

Model #: HV-1

Cal Due: 1/30/2008

Serial #: 866

Start Time: 12:20

Flow Rate: 3.7 cfm

Stop Time: 14:55

Flow Rate: 104.77 lpm

Total Time: 155 min

Counter/Scaler Data:

Model #: L2929

Count Date: 6/28/2007

Count Time: 7:30 AM

Serial #: 118407

Probe Serial #: 92751

Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007

Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B)

Sample Volume: 16239800 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 508 counts

Gross Background (α): 0.15 cpm (R_B) (α)

Gross (α): 8.47 cpm

MDC

(α): 2.03E-14 µCi/ml

Activity Concentration:

(α): 5.96E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 19.87 % DAC

Surveyor: Jack Mucia / [signature] 7/14/07
Signature Date

Reviewer: Chris Higgins / [signature] for CH 7-10-07 7-10-07
Signature Date

entered

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Clean Sludge from Workover Tank Air Sample Number: WI07-0195a

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 12:20

Flow Rate: 3.7 cfm Stop Time: 14:55

Flow Rate: 104.77 lpm Total Time: 155 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/29/2007 Count Time: 1:15 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 16239800 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): * 478 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 7.97 cpm

MDC

(α): 1.60E-14 µCi/ml

* **2nd Count**

Activity Concentration:

(α): 5.65E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 18.83 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature for CH 7-10-07 Date

ESFS 82A8008

WI07 - 0195 D1 A-F - WZ Cutting W.O. Tank 072107

Sample description
WI07- 0195 D1 A/F (W/Z) Cutting W.O. Tank 072107

Spectrum Filename: C:\User\Win00213.An1

Acquisition information
Start time: 21-Jul-2007 11:21:58
Live time: 600
Real time: 603
Dead time: 0.43 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.6240E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.6240E+07) = 6.1576E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0195 D1 A-F - WZ Cutting W.O. Tank 072107

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.56	7.32	113.	508.	0.846	12.09	0.943	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	177.54	44.55	2.	22.	0.036	51.16	0.226s
AM-241	237.90	59.64	5.	39.	0.064	39.47	1.611s
Th-234	251.30	62.99	2.	16.	0.026	63.54	0.403s
Pb-214	298.61	74.81	6.	0.	0.000	0.00	0.255D
Pb-212	298.63	74.81	14.	0.	0.000	791.62	0.177D
Pb-212	306.60	76.81	2.	0.	0.001	331.66	0.350s
Pb-214	307.80	77.11	2.	0.	0.000	331.66	0.350D
Pb-214	348.00	87.15	2.	0.	0.001	412.31	0.000s
Th-234	371.17	92.95	2.	12.	0.021	66.42	0.493s
Ac-228	380.79	95.35	10.	0.	0.000	0.00	0.987
Ac-228	837.33	209.45	1.	0.	0.001	240.37	0.197s
Pb-212	954.08	238.62	4.	10.	0.017	81.99	1.099D
Pb-214	967.50	241.98	2.	8.	0.013	93.66	1.101D
Ac-228	1080.83	270.30	1.	2.	0.003	200.00	0.350s
Pb-214	1179.33	294.92	1.	0.	0.001	240.37	0.197s
Ac-228	1308.14	327.11	0.	11.	0.018	60.30	0.375s
Ac-228	1350.25	337.63	0.	8.	0.013	70.71	0.375s
Pb-214	1401.97	350.56	3.	4.	0.006	193.28	0.912

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1851.33	462.86	0.	3.	0.005	115.47	0.250s
Bi-214	2438.00	609.47	0.	1.	0.002	200.00	0.250s
CS-137	2645.33	661.28	1.	0.	0.001	240.37	0.197s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0195 D1 A-F - WZ Cutting W.O. Tank 072107

Ac-228	3646.00	911.34	0.	1.	0.002	200.00	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3857.00	964.07	0.	0.	0.000	0.00	0.000s
Ac-228	3877.18	969.11	0.	0.	0.000	0.00	1.591
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.61	0.	1.	0.002	200.00	0.250s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7058.50	1764.02	0.	2.	0.003	141.42	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	4.063E-06	G K
			1764.49	3.493E-05	?	4.473E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	9.899E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00		9.819E-06	G
			338.32	3.409E-05	&	1.931E-05	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	4.542E-05	?	4.542E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	0.000E+00	%	3.336E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.065E-05	X
			327.64	1.616E-04	?	7.664E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 8.3971E-06	238.62	8.397E-06	(	2.663E-06	G K
		77.11	0.000E+00	%	2.941E-06	X
		74.81	0.000E+00	%	1.101E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N 6.2621E-05	92.35	4.844E-05	&(	9.399E-06	G
		63.29	8.281E-05	(	1.491E-05	G
Pb-214	N 1.0457E-05	351.92	5.002E-06	&(	4.269E-06	G K
		295.21	0.000E+00	%	4.458E-06	G
		77.11	0.000E+00	%	4.532E-06	Energy duplication
		241.98	3.755E-05	$(	1.382E-05	G
		74.81	0.000E+00	?	1.279E-05	Energy duplication

WI07 - 0195 D1 A-F - WZ Cutting W.O. Tank 072107

```
                                87.30 0.000E+00 %   1.345E-05          X

Pb-210    N   1.0553E-04      46.50 1.055E-04 &(  1.370E-05          G

AM-241        2.1763E-05      59.54 2.176E-05 *(  2.141E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 11:32:08 Page    5
EnergySolutions                    Spectrum name: Win00213.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml        uCi/ml

Bi-214 B<     2.5019E-13
K-40    <     1.2442E-12
Ac-228 B<     7.0819E-13
Pb-212        5.1707E-13    4.239E-13     4.241E-13
CS-137  <     1.5945E-13
Th-234        3.8560E-12    1.772E-12     1.774E-12
Pb-214  C     6.4392E-13    6.031E-13     6.033E-13
Pb-210 #      6.4981E-12    3.325E-12     3.328E-12
AM-241 #      1.3401E-12    5.289E-13     5.312E-13

  # - 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.
```

WI07 - 0195 D1 A-F - WZ Cutting W.O. Tank 072107

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.2855063E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Clean Sludge from Workover Tank Air Sample Number: WI07-0196a

Purpose/Type: Work Zone RWP #: W07-02,03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 16:40

Flow Rate: 3.7 cfm Stop Time: 17:13

Flow Rate: 104.77 lpm Total Time: 33 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/29/2007 Count Time: 11:40 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 3457506 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 109 counts

Gross Background (α): 0.15 cpm (R_B) (α)

Gross (α): 1.82 cpm

MDC

(α): 9.51E-14 µCi/ml

Activity Concentration:

(α): 5.61E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 18.70 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature 7-10-07 Date

7-10-07 CH

entered

ESFS 82A8008

WI07 - 0196 D1 A-F - WZ Remove sludge from W.O. tank 072007

Sample description
WI07- 0196 D1 A/F (W/Z) Remove sludge from W.O. Tank 072107

Spectrum Filename: C:\User\Win00212.An1

Acquisition information
Start time: 21-Jul-2007 10:36:47
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4580E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 3.4580E+06) =
2.8918E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0196 D1 A-F - WZ Remove sludge from W.O. tank 072007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.3859

********** 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
29.02	7.43	178.	498.	0.831	13.80	0.892	CU-64 s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.64	46.08	6.	20.	0.033	69.01	1.027s
AM-241	238.75	59.85	5.	20.	0.034	58.93	0.576s
Th-234	253.53	63.54	6.	24.	0.039	59.79	0.340s
Pb-214	298.61	74.81	4.	7.	0.011	119.40	0.971D
Pb-212	298.63	74.81	3.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	5.	3.	0.004	276.38	0.972D
Pb-214	307.80	77.11	2.	0.	0.000	331.66	0.350D
Pb-214	346.59	86.80	0.	19.	0.032	45.88	0.500s
Th-234	368.79	92.35	4.	9.	0.015	89.50	0.985D
Ac-228	380.79	95.35	17.	3.	0.005	376.62	0.987D
Ac-228	838.20	209.67	0.	5.	0.008	89.44	0.375s
Pb-212	954.08	238.62	2.	4.	0.006	150.02	1.099D
Pb-214	967.50	241.98	3.	2.	0.003	361.86	1.102D
Ac-228	1081.67	270.51	1.	1.	0.001	366.67	0.181s
Pb-214	1171.50	292.96	0.	6.	0.010	81.65	0.500s
Ac-228	1310.00	327.58	1.	0.	0.000	0.00	0.000s
Ac-228	1352.33	338.16	0.	3.	0.005	115.47	0.375s
Pb-214	1408.67	352.23	1.	1.	0.001	366.67	0.181s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2648.50	662.07	0.	2.	0.003	141.42	0.500s
Bi-214	3074.33	768.49	1.	0.	0.001	240.37	0.197s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0196 D1 A-F - WZ Remove sludge from W.O. tank 072007

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.11	0.	2.	0.003	141.42	0.250s
K-40	5846.00	1461.07	0.	1.	0.002	200.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	%	3.493E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.899E-05	?	1.268E-04	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	1.278E-05	?	1.278E-05	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	3.931E-05	?	2.910E-05	G
			270.23	0.000E+00	%	2.849E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	4.196E-05	X
			327.64	0.000E+00	?	2.938E-05	G

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EnergySolutions Spectrum name: Win00212.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak	MDA	Comments
Pb-212	N	2.9991E-06	238.62	2.999E-06	(	2.071E-06		G K
			77.11	0.000E+00	%	5.202E-06		Energy duplication
			74.81	0.000E+00	?	5.776E-06		Energy duplication
CS-137		2.5895E-06	661.66	2.589E-06	?(	1.295E-06		G
Th-234	N	7.3537E-05	92.35	3.638E-05	(	1.319E-05		G
			63.29	1.264E-04	(	2.187E-05		G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	3.494E-06		G K
			295.21	1.337E-05	&	8.916E-06		G
			77.11	0.000E+00	%	4.532E-06		Energy duplication
			241.98	0.000E+00	%	1.844E-05		G
			74.81	2.182E-05		1.731E-05		Energy duplication

WI07 - 0196 D1 A-F - WZ Remove sludge from W.O. tank 072007

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                                87.30 8.519E-05     2.997E-05          X

Pb-210   N   9.6530E-05      46.50 9.653E-05 *(  2.009E-05          G

AM-241       1.1444E-05      59.54 1.144E-05 ?(  2.024E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
□

     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 10:46:57 Page    5
 EnergySolutions                  Spectrum name: Win00212.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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                uCi/ml        uCi/ml        uCi/ml

 ____________________________________________________________________________
 Bi-214 B<    5.8750E-13
 K-40    <    1.1686E-11
 Ac-228 B<    1.6629E-12
 Pb-212       8.6730E-13    1.301E-12     1.301E-12
 CS-137 #C    7.4884E-13    1.059E-12     1.059E-12
 Th-234       2.1266E-11    1.144E-11     1.145E-11
 Pb-214 B<    1.0104E-12
 Pb-210 #     2.7915E-11    1.927E-11     1.928E-11
 AM-241 #     3.3095E-12    1.950E-12     1.954E-12

   # - 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.
```

WI07 - 0196 D1 A-F - WZ Remove sludge from W.O. tank 072007
F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 5.4106258E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/27/2007

Air Sample Location: Clean Sludge from Workover Tank Air Sample Number: WI07-0196

Purpose/Type: Work Zone RWP #: W07-02,03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 16:40

Flow Rate: 3.7 cfm Stop Time: 17:13

Flow Rate: 104.77 lpm Total Time: 33 min

Counter/Scaler Data:

Model #: L2929 Count Date: 6/28/2007 Count Time: 8:42 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 3457506 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 134 counts

Gross Background (α): 0.15 cpm (R_B) (α)

Gross (α): 2.23 cpm

MDC

(α): 9.51E-14 µCi/ml

Activity Concentration:

(α): 7.01E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 23.38 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Chris Higgins / Signature 7-10-07 Date

for CH

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/28/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-197

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/27/2007 7:30

Flow Rate: 2.15 cfm Stop Time: 6/28/2007 7:45

Flow Rate: 60.88 lpm Total Time: 1455 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/2/2007 Count Time: 11:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 88582655 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 6 counts

Gross (α): 24 counts

Gross Background (α): 0.10 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.40 cpm

MDC

(α): 3.15E-15 µCi/ml

Activity Concentration:

(α): 3.94E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.13 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 6/28/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-198

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/27/2007 6:35

Flow Rate: 2.15 cfm Stop Time: 6/28/2007 7:45

Flow Rate: 60.88 lpm Total Time: 1510 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/3/2007 Count Time: 10:35 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 91931140 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 4 counts

Gross (α): 37 counts

Gross Background (α): 0.07 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.62 cpm

MDC

(α): 2.60E-15 µCi/ml

Activity Concentration:

(α): 6.96E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.23 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/3/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-205

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 6/28/2007 6:45

Flow Rate: 2.15 cfm Stop Time: 6/29/2007 7:10

Flow Rate: 60.88 lpm Total Time: 1465 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/3/2007 Count Time: 4:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89191471 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 4 counts

Gross (α): 42 counts

Gross Background (α): 0.07 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.70 cpm

MDC

(α): 2.68E-15 µCi/ml

Activity Concentration:

(α): 8.27E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.28 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-11-07 (Date)

Reviewer: (Signature) 7-10-07 (Date)

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 6/28/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-206

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 6/28/2007 6:45

Flow Rate: 2.15 cfm Stop Time: 6/29/2007 7:15

Flow Rate: 60.88 lpm Total Time: 1470 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/3/2007 Count Time: 2:30 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89495879 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 4 counts

Gross (α): 17 counts

Gross Background (α): 0.07 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.28 cpm

MDC

(α): 2.67E-15 µCi/ml

Activity Concentration:

(α): 2.82E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.09 % DAC

Surveyor: Carl Ingle / Signature 7-11-07 Date

Reviewer: Signature 7-10-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/7/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0238

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 5/18/2008

Serial #: 1671 Start Time: 12:25

Flow Rate: 3.9 cfm Stop Time: 15:35

Flow Rate: 110.44 lpm Total Time: 190 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/7/2007 Count Time: 3:45 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 20982897 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 716 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 11.93 cpm

MDC

(α): 1.64E-14 µCi/ml

Activity Concentration:

(α): 6.53E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 21.76 % DAC

Surveyor: Jack Mudia / Signature 7/14/07 Date

Reviewer: Signature 7-10-07 Date

entered

WI07 - 0238 D1 A-F - WZ Cut W.O. tank 072007

Sample description
WI07- 0238 D1 G/A Cutting workover tank 072007

Spectrum Filename: C:\User\Win00207.An1

Acquisition information
Start time: 20-Jul-2007 10:35:46
Live time: 600
Real time: 602
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.0980E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 2.0980E+07) = 4.7664E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0238 D1 A-F - WZ Cut W.O. tank 072007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.85	7.39	136.	609.	1.015	11.04	1.717	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.50	46.54	2.	4.	0.007	141.42	0.666s
AM-241	237.95	59.65	10.	46.	0.077	41.09	0.399s
Th-234	252.46	63.28	3.	9.	0.016	84.52	0.344s
Pb-214	298.61	74.81	5.	7.	0.012	118.54	0.971D
Pb-212	298.63	74.81	4.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	9.	4.	0.006	256.11	0.972D
Pb-214	307.80	77.11	1.	0.	0.000	339.93	0.375D
Pb-214	345.00	86.40	9.	5.	0.008	256.35	0.000s
Th-234	368.79	92.35	7.	14.	0.023	75.41	0.985D
Ac-228	380.79	95.35	16.	1.	0.002	895.20	0.987D
Ac-228	833.73	208.55	2.	10.	0.017	80.00	0.713s
Pb-212	953.17	238.40	0.	9.	0.015	66.67	0.375s
Pb-214	967.50	241.98	0.	0.	0.000	0.00	0.250D
Ac-228	1081.50	270.47	0.	12.	0.020	57.74	0.292s
Pb-214	1179.60	294.99	0.	6.	0.010	81.65	0.437s
Ac-228	1309.89	327.55	1.	2.	0.004	177.42	0.229s
Ac-228	1354.00	338.57	0.	8.	0.013	70.71	0.250s
Pb-214	1404.78	351.26	1.	1.	0.002	346.41	0.218s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1851.00	462.78	0.	1.	0.002	200.00	0.250s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2648.00	661.95	0.	6.	0.010	81.65	0.375s
Bi-214	3074.67	768.57	1.	0.	0.001	240.37	0.197s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0238 D1 A-F - WZ Cut W.O. tank 072007

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.57	0.	2.	0.003	141.42	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.64	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	%	3.493E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	4.0412E-05	1460.81	4.041E-05	?(	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	3.409E-05	?	1.931E-05	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	7.862E-05	&	4.265E-05	G
			270.23	1.335E-04	?	6.033E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.925E-05	X
			327.64	3.183E-05	?	4.407E-05	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	7.4695E-06	238.62	7.470E-06	?(	8.299E-07	G K
			77.11	0.000E+00	%	6.456E-06	Energy duplication
			74.81	0.000E+00	?	6.493E-06	Energy duplication
CS-137		7.7685E-06	661.66	7.768E-06	?(	1.295E-06	G
Th-234	N	5.2937E-05	92.35	5.510E-05	(	1.676E-05	G
			63.29	4.986E-05	?(	1.530E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	&	3.494E-06	G K
			295.21	1.337E-05	?	8.916E-06	G
			77.11	0.000E+00	%	4.345E-06	Energy duplication
			241.98	0.000E+00	?	4.982E-06	G
			74.81	2.310E-05		1.800E-05	Energy duplication

```
                    WI07 - 0238 D1 A-F - WZ   Cut W.O. tank 072007
                                 87.30 0.000E+00 &   2.607E-05          X

Pb-210   N   1.9633E-05     46.50 1.963E-05 ?(  1.257E-05          G

AM-241       2.5890E-05     59.54 2.589E-05 @(  2.814E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 10:45:56 Page    5
EnergySolutions                  Spectrum name: Win00207.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 B<    9.6833E-14
K-40   #C    1.9262E-12    2.724E-12    2.724E-12
Ac-228 B<    2.7409E-13
Pb-212 #     3.5603E-13    2.374E-13    2.375E-13
CS-137 #     3.7028E-13    3.023E-13    3.025E-13
Th-234       2.5232E-12    1.429E-12    1.430E-12
Pb-214 B<    1.6654E-13
Pb-210 #     9.3581E-13    1.323E-12    1.324E-12
AM-241 #     1.2340E-12    5.071E-13    5.092E-13

  # - 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.
```

WI07 - 0238 D1 A-F - WZ Cut W.O. tank 072007

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 7.3455764E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/7/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0239

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 14:20

Flow Rate: 3.7 cfm Stop Time: 15:35

Flow Rate: 104.77 lpm Total Time: 75 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/9/2007 Count Time: 10:10 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 7857968 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 11 counts

Gross (α): 618 counts

Gross Background (α): 0.18 cpm (R_B) (α)

Gross (α): 10.30 cpm

MDC

(α): 4.55E-14 µCi/ml

Activity Concentration:

(α): 1.50E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 49.95 % DAC

Surveyor: Jack Mucia / (Signature) (Date)

Reviewer: Chris Higgins / (Signature) (Date)

Endorsed

ESFS 82A8008

WI07 - 0239 D1 A-F - BZ Cutting W.O. Tank 072307

Sample description
WI07- 0239 D1 AF (BZ) Cutting W.O. Tank 072307

Spectrum Filename: C:\User\Win00223.An1

Acquisition information
Start time: 23-Jul-2007 11:03:47
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 7.8580E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 7.8580E+06) =
1.2726E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0239 D1 A-F - BZ Cutting W.O. Tank 072307

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2341

********** 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
28.30	7.25	79.	451.	0.751	12.19	1.621	CU-64 s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.21	46.72	2.	21.	0.034	51.61	0.350s
AM-241	237.64	59.57	15.	42.	0.070	48.09	1.230s
Th-234	253.43	63.52	15.	18.	0.030	93.29	0.410s
Pb-214	298.61	74.81	7.	0.	0.000	0.00	0.437D
Pb-212	298.63	74.81	9.	0.	0.000	823.95	0.200D
Pb-212	309.67	77.57	2.	0.	0.001	450.92	0.666s
Pb-214	307.80	77.11	3.	0.	0.000	529.15	0.937D
Pb-214	349.61	87.56	6.	17.	0.028	78.74	0.262s
Th-234	368.79	92.35	9.	10.	0.017	106.18	0.985D
Ac-228	380.79	95.35	5.	4.	0.006	197.56	0.987D
Ac-228	838.00	209.62	0.	2.	0.003	141.42	0.250s
Pb-212	954.08	238.62	12.	4.	0.007	249.41	1.099D
Pb-214	967.50	241.98	9.	1.	0.001	1058.06	1.101D
Ac-228	1079.00	269.85	1.	1.	0.002	316.23	0.100s
Pb-214	1178.67	294.75	1.	0.	0.000	260.34	0.210s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1354.00	338.57	0.	3.	0.005	115.47	0.750s
Pb-214	1398.80	349.77	0.	13.	0.022	55.47	0.375s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.001	223.61	0.000s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2647.33	661.78	1.	0.	0.001	240.37	0.197s
Bi-214	3074.33	768.49	0.	4.	0.007	100.00	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07 - 0239 D1 A-F - BZ Cutting W.O. Tank 072307

Ac-228	3643.33	910.68	0.	6.	0.010	81.65	0.250s
Bi-214	3737.67	934.25	1.	0.	0.001	240.37	0.197s
Ac-228	3858.08	964.34	0.	0.	0.000	0.00	1.588
Ac-228	3876.25	968.88	0.	5.	0.008	89.44	0.375s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.50	1237.81	0.	2.	0.003	141.42	0.500s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	6.233E-05	?	7.984E-05	G
			768.36	1.015E-04	?	8.555E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	%	1.001E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	3.8757E-05	911.07	3.450E-05	?(	5.750E-06	G K
			969.11	4.910E-05	?(	9.819E-06	G
			338.32	1.278E-05	-	1.278E-05	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	1.572E-05	-	2.014E-05	G
			270.23	0.000E+00	%	2.849E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	2.338E-05	(	2.305E-05	X
			327.64	0.000E+00	?	1.469E-05	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 11:13:58 Page 4
EnergySolutions Spectrum name: Win00223.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00	%	5.128E-06	G K
			77.11	0.000E+00	%	3.444E-06	X
			74.81	0.000E+00	%	9.263E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	6.2684E-05	92.35	3.917E-05	(	1.877E-05	G
			63.29	9.617E-05	$(	3.206E-05	G
Pb-214	N	1.7733E-05	351.92	1.773E-05	&(	1.364E-06	G K
			295.21	0.000E+00	%	4.458E-06	G
			77.11	0.000E+00	%	5.904E-06	Energy duplication
			241.98	0.000E+00	%	2.453E-05	G
			74.81	0.000E+00	?	1.389E-05	Energy duplication

```
                WI07 - 0239  D1 A-F - BZ  Cutting W.O. Tank    072307
                             87.30 7.473E-05 +   3.273E-05          X

Pb-210   N   1.0144E-04     46.50 1.014E-04  (  1.334E-05          G

AM-241       2.3639E-05     59.54 2.364E-05 *(  3.377E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 11:13:58 Page    5
EnergySolutions                  Spectrum name: Win00223.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 B<    2.5853E-13
K-40    <    2.5714E-12
Ac-228       4.9321E-12    3.810E-12    3.811E-12
Pb-212 B<    6.5260E-13
CS-137  <    3.2954E-13
Th-234       7.9771E-12    5.637E-12    5.640E-12
Pb-214 #     2.2566E-12    1.252E-12    1.253E-12
Pb-210       1.2909E-11    6.663E-12    6.669E-12
AM-241 #     3.0082E-12    1.447E-12    1.451E-12

  # - 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.
```

WI07 - 0239 D1 A-F - BZ Cutting W.O. Tank 072307

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 3.1083008E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/9/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-240

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/3/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/9/2007 6:50

Flow Rate: 60.88 lpm Total Time: 8630 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/12/2007 Count Time: 8:11 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 5.25E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 155 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 2.58 cpm

MDC

(α): 6.54E-16 µCi/ml

Activity Concentration:

(α): 5.35E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.18 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Signature 7/16/07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/9/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-241

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/3/2007 7:05

Flow Rate: 2.15 cfm Stop Time: 7/9/2007 6:50

Flow Rate: 60.88 lpm Total Time: 8625 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/11/2007 Count Time: 12:40 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 5.25E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 30 counts

Gross Background (α): 0.15 cpm (R_B) (α)

Gross (α): 0.50 cpm

MDC

(α): 6.27E-16 µCi/ml

Activity Concentration:

(α): 7.76E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.03 % DAC

Surveyor: Carl Ingle (Signature) 8/3/07 (Date)

Reviewer: (Signature) 8/5/07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/9/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0242

Purpose/Type: Breathing Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 7:20

Flow Rate: 3.7 cfm Stop Time: 8:05

Flow Rate: 104.77 lpm Total Time: 45 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/9/2007 Count Time: 10:10 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 4714781 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 11 counts

Gross (α): 4373 counts

Gross Background (α): 0.18 cpm (R_B) (α)

Gross (α): 72.88 cpm

MDC

(α): 7.58E-14 µCi/ml

Activity Concentration:

(α): 1.79E-11 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 598.26 % DAC

Surveyor: Jack Mucia (Signature) 7/17/07 (Date)

Reviewer: (Signature) 7-17-07 (Date)

ESFS 82A8008

WI07-0242 D1 A-F Cut W.O. Tank 071007

Sample description
WI07-0242 A/F -Cuting W.O. Tank w-torch 071007

Spectrum Filename: C:\User\Win00158.An1

Acquisition information

Start time:	10-Jul-2007 08:42:37
Live time:	600
Real time:	602
Dead time:	0.37 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	4.7150E+06
Activity scaling factor:	1.0000E+00/(1.0000E+00* 4.7150E+06) = 2.1209E-07
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

WI07-0242 D1 A-F Cut W.O. Tank 071007

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2228

********** 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	
28.85	7.39	122.	459.	0.765	13.26	1.248	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.33	46.75	5.	10.	0.017	98.48	0.228s
AM-241	237.42	59.52	9.	263.	0.438	13.15	0.907s
Th-234	253.11	63.44	8.	9.	0.015	127.66	0.437s
Pb-214	298.61	74.81	6.	0.	0.000	0.00	0.970D
Pb-212	298.63	74.81	2.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	6.	0.	0.000	0.00	0.972D
Pb-214	307.80	77.11	3.	0.	0.000	485.34	0.000D
Pb-214	350.00	87.65	1.	0.	0.000	0.00	0.000s
Th-234	369.67	92.57	11.	13.	0.022	108.63	0.727s
Ac-228	380.79	95.35	4.	0.	0.000	0.00	0.417D
Ac-228	829.69	207.54	4.	13.	0.022	82.76	0.366s
Pb-212	954.08	238.62	2.	6.	0.010	100.52	1.099D
Pb-214	967.50	241.98	4.	5.	0.009	132.02	1.101D
Ac-228	1079.00	269.85	0.	0.	0.000	0.00	0.000s
Pb-214	1179.20	294.89	0.	5.	0.008	89.44	0.312s
Ac-228	1306.33	326.66	2.	1.	0.001	478.42	0.197s
Ac-228	1353.67	338.49	1.	0.	0.001	240.37	0.197s
Pb-214	1405.14	351.35	1.	3.	0.005	149.07	0.339s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1853.00	463.28	0.	4.	0.007	100.00	0.250s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2643.00	660.70	0.	2.	0.003	141.42	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	2.	0.003	141.42	0.250s
K-40	5844.00	1460.57	0.	4.	0.007	100.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.899E-05	?	1.268E-04	G
			934.06	0.000E+00	%	1.001E-04	G
K-40	N	8.0824E-05	1460.81	8.082E-05	?(	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	6.056E-05	?	5.106E-05	G
			209.28	1.048E-04	&	4.994E-05	G
			270.23	0.000E+00	?	1.112E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	&	1.995E-05	X
			327.64	0.000E+00	&	4.407E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 5.1638E-06	238.62	5.164E-06	(	2.034E-06	G K
		77.11	0.000E+00		4.592E-06	Energy duplication
		74.81	0.000E+00	?	4.932E-06	Energy duplication
CS-137	2.5895E-06	661.66	2.589E-06	&(	1.295E-06	G
Th-234	N 5.0600E-05	92.35	5.237E-05	(	2.021E-05	G
		63.29	4.808E-05	(	2.421E-05	G
Pb-214	N 8.8511E-06	351.92	4.092E-06	?(	2.728E-06	G K
		295.21	1.115E-05	?(	2.229E-06	G
		77.11	0.000E+00	%	6.160E-06	Energy duplication
		241.98	2.661E-05	(	1.598E-05	G
		74.81	0.000E+00		1.327E-05	Energy duplication

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			87.30	0.000E+00	?	8.967E-06	X
Pb-210	N	5.0719E-05	46.50	5.072E-05	?(	1.765E-05	G
AM-241		1.4802E-04	59.54	1.480E-04	@(	2.686E-06	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

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

- -

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EnergySolutions Spectrum name: Win00158.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214 B<	4.3087E-13		
K-40 #	1.7142E-11	1.714E-11	1.715E-11
Ac-228 B<	1.2196E-12		
Pb-212	1.0952E-12	1.101E-12	1.101E-12
CS-137 #C	5.4920E-13	7.767E-13	7.768E-13
Th-234	1.0732E-11	8.994E-12	8.998E-12
Pb-214	1.8772E-12	1.366E-12	1.367E-12
Pb-210 #	1.0757E-11	1.059E-11	1.060E-11
AM-241 #	3.1394E-11	4.128E-12	4.288E-12

\# - 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.

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F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 7.3546294E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/9/2007

Air Sample Location: Cutting Work Over Tank Air Sample Number: WI07-0243

Purpose/Type: Work Zone RWP #: W07-03

Air Sampler Data:

Model #: HV-1 Cal Due: 5/18/2008

Serial #: 1671 Start Time: 7:20

Flow Rate: 3.9 cfm Stop Time: 8:05

Flow Rate: 110.44 lpm Total Time: 45 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/9/2007 Count Time: 3:15 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 4969634 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 11 counts

Gross (α): 703 counts

Gross Background (α): 0.18 cpm (R_B) $_{(\alpha)}$

Gross (α): 11.72 cpm

MDC

(α): 7.19E-14 µCi/ml

Activity Concentration:

(α): 2.70E-12 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 90.04 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Signature 7-10-07 Date

WI07-0243 D1 A-F Cut W.O. Tank 071007

Sample description
WI07-0243 A/F -Cuting W.O. Tank w-torch 071007

Spectrum Filename: C:\User\Win00159.An1

Acquisition information

Start time:	10-Jul-2007 09:20:56
Live time:	600
Real time:	602
Dead time:	0.35 %
Detector ID:	1

Detector system
MCB 07044698

Calibration

Filename:	Air Filter LeGe.Clb

47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	4.9700E+06
Activity scaling factor:	1.0000E+00/(1.0000E+00* 4.9700E+06) = 2.0121E-07
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

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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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1024

********** 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	
28.45	7.29	82.	429.	0.715	12.72	1.098	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.42	7.	1.	0.002	616.44	0.000s
AM-241	237.81	59.62	9.	46.	0.077	37.08	0.476s
Th-234	252.61	63.31	5.	17.	0.028	69.10	0.502s
Pb-214	298.61	74.81	7.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	1.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	12.	0.	0.000	0.00	0.972D
Pb-214	307.80	77.11	6.	0.	0.000	97.28	0.300D
Pb-214	346.78	86.85	2.	2.	0.003	244.95	0.218s
Th-234	368.79	92.35	14.	10.	0.017	117.30	0.985D
Ac-228	380.79	95.35	4.	2.	0.003	372.68	0.987D
Ac-228	837.33	209.45	1.	0.	0.001	240.37	0.197s
Pb-212	954.08	238.62	2.	11.	0.018	69.03	1.099D
Pb-214	967.50	241.98	2.	1.	0.002	362.63	1.102D
Ac-228	1073.97	268.59	3.	10.	0.017	93.81	0.488s
Pb-214	1179.62	294.99	1.	1.	0.001	339.93	0.375s
Ac-228	1308.50	327.20	0.	4.	0.007	100.00	0.250s
Ac-228	1354.00	338.57	0.	1.	0.002	200.00	0.250s
Pb-214	1406.33	351.65	1.	0.	0.001	240.37	0.197s

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EnergySolutions Spectrum name: Win00159.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2644.00	660.95	0.	5.	0.008	89.44	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07-0243 D1 A-F Cut W.O. Tank 071007

Ac-228	3645.67	911.26	1.	0.	0.001	240.37	0.197s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3860.42	964.92	0.	0.	0.000	0.00	1.589
Ac-228	3878.00	969.32	0.	1.	0.002	200.00	0.250s
Bi-214	4481.50	1120.12	0.	2.	0.003	141.42	0.500s
Bi-214	4954.00	1238.18	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	2.	0.003	141.42	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	2.299E-05	?	2.944E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	4.0412E-05	1460.81	4.041E-05	?(	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	0.000E+00	%	1.572E-05	G
			270.23	1.112E-04	&	6.254E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	2.317E-05	X
			327.64	5.876E-05	?	4.954E-05	G

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	9.0083E-06	238.62	9.008E-06	(	1.952E-06	G K
			77.11	0.000E+00		6.227E-06	Energy duplication
			74.81	0.000E+00	?	3.851E-06	Energy duplication
CS-137		6.4737E-06	661.66	6.474E-06	&(	1.295E-06	G
Th-234	N	6.1578E-05	92.35	4.104E-05	(	2.251E-05	G
			63.29	9.082E-05	*(	1.978E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	2.728E-06	G K
			295.21	0.000E+00	%	5.710E-06	G
			77.11	0.000E+00	&	7.585E-06	Energy duplication
			241.98	0.000E+00	%	1.652E-05	G
			74.81	0.000E+00		1.418E-05	Energy duplication

WI07-0243 D1 A-F Cut W.O. Tank 071007

			87.30	0.000E+00 %	1.512E-05		X
Pb-210	N	0.0000E+00	46.50	0.000E+00 %	2.224E-05		G
AM-241		2.6078E-05	59.54	2.608E-05 (	2.641E-06		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

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 (63) wan32 G53W2.06 10-JUL-2007 09:31:06 Page 5
EnergySolutions Spectrum name: Win00159.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	B<	4.0876E-13		
K-40	#C	8.1312E-12	1.150E-11	1.150E-11
Ac-228	B<	2.3141E-12		
Pb-212		1.8125E-12	1.251E-12	1.252E-12
CS-137	#	1.3026E-12	1.165E-12	1.165E-12
Th-234		1.2390E-11	8.434E-12	8.439E-12
Pb-214	B<	5.4891E-13		
Pb-210	<	4.4749E-12		
AM-241		5.2470E-12	1.945E-12	1.955E-12

\# - 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.

WI07-0243 D1 A-F Cut W.O. Tank 071007

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 2.8883220E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/11/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-255

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/9/2007 7:07

Flow Rate: 2.15 cfm Stop Time: 7/11/2007 6:49

Flow Rate: 60.88 lpm Total Time: 2862 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/14/2007 Count Time: 4:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_I): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 1.74E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 31 counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.52 cpm

MDC

(α): 1.97E-15 µCi/ml

Activity Concentration:

(α): 2.34E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.08 % DAC

Surveyor: Carl Ingle / Signature 7-19-07 Date

Reviewer: Signature 7-19-07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/11/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-256

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/9/2007 7:12

Flow Rate: 2.15 cfm Stop Time: 7/11/2007 6:40

Flow Rate: 60.88 lpm Total Time: 2848 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/13/2007 Count Time: 4:30 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 1.73E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 11 counts

Gross (α): 1236 counts

Gross Background (α): 0.18 cpm (R_B) $_{(\alpha)}$

Gross (α): 20.60 cpm

MDC

(α): 2.06E-15 µCi/ml

Activity Concentration:

(α): 1.37E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 4.57 % DAC

Surveyor: Carl Ingle (Signature) 7-14-07 (Date)

Reviewer: (Signature) 7-15-07 (Date)

ESFS 82A8008

WI07-0256 D1 A-F G-A North @ RCA Boundary (WZ) 071407

Sample description
WI07- 0256 D1 A/F (G/A) North @ RCA Boundary 071407

Spectrum Filename: C:\User\Win00181.An1

Acquisition information
Start time: 14-Jul-2007 07:53:02
Live time: 600
Real time: 602
Dead time: 0.37 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.7300E+08
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.7300E+08) = 5.7803E-09
Detection limit method: Traditional ORTEC method

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

WI07-0256 D1 A-F G-A North @ RCA Boundary (WZ) 071407

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2309

********** 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	
28.96	7.42	75.	460.	0.767	11.77	2.230	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.44	46.53	4.	6.	0.009	131.53	0.472s
AM-241	237.92	59.64	7.	61.	0.102	31.53	1.079
Th-234	250.73	62.84	8.	8.	0.013	141.42	0.243s
Pb-214	299.31	74.99	7.	9.	0.014	125.22	0.278s
Pb-212	298.63	74.81	11.	0.	0.000	768.11	0.183D
Pb-212	307.80	77.11	3.	0.	0.000	0.00	0.333D
Pb-214	307.80	77.11	4.	0.	0.000	0.00	0.234D
Pb-214	349.53	87.54	2.	11.	0.018	77.66	0.533s
Th-234	369.90	92.63	4.	20.	0.033	58.76	0.368s
Ac-228	380.79	95.35	0.	0.	0.000	0.00	0.500D
Ac-228	836.00	209.12	1.	0.	0.000	0.00	0.000s
Pb-212	955.05	238.87	7.	0.	0.000	0.00	1.099
Pb-214	969.23	242.41	0.	14.	0.023	53.45	0.750s
Ac-228	1079.00	269.85	0.	0.	0.000	0.00	0.000s
Pb-214	1177.21	294.39	2.	6.	0.010	109.32	0.225s
Ac-228	1310.00	327.58	0.	4.	0.007	100.00	0.375s
Ac-228	1352.46	338.19	1.	2.	0.004	177.42	0.229s
Pb-214	1408.00	352.07	0.	5.	0.008	89.44	0.375s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 08:03:13 Page 3
EnergySolutions Spectrum name: Win00181.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1853.00	463.28	0.	1.	0.002	200.00	0.250s
Bi-214	2437.50	609.35	0.	2.	0.003	141.42	0.500s
CS-137	2646.00	661.45	0.	3.	0.005	115.47	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.64	0.	3.	0.005	115.47	0.250s

WI07-0256 D1 A-F G-A North @ RCA Boundary (WZ) 071407

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 9.8557176E-13 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [illegible]
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/9/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-260

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/3/2007 7:05

Flow Rate: 2.15 cfm Stop Time: 7/9/2007 6:50

Flow Rate: 60.88 lpm Total Time: 8625 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/11/2007 Count Time: 12:40 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 5.25E+08 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 9 counts

Gross (α): 30 counts

Gross Background (α): 0.15 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.50 cpm

MDC

(α): 6.27E-16 µCi/ml

Activity Concentration:

(α): 7.76E-16 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.03 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-14-07 (Date)

Reviewer: (Signature) 7-16-07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/12/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-261

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/11/2007 6:50

Flow Rate: 2.15 cfm Stop Time: 7/12/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1450 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/16/2007 Count Time: 1:20 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 88278248 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 22 counts

Gross Background (α): 0.23 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.37 cpm

MDC

(α): 4.48E-15 µCi/ml

Activity Concentration:

(α): 1.76E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.06 % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-17-07 (Date)

Reviewer: (Signature) 7-17-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/12/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-262

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/11/2007 6:48

Flow Rate: 2.15 cfm Stop Time: 7/12/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1452 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/17/2007 Count Time: 8:00 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 88400011 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 7 counts

Gross (α): 37 counts

Gross Background (α): 0.12 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.62 cpm

MDC

(α): 3.36E-15 µCi/ml

Activity Concentration:

(α): 6.58E-15 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 0.22 % DAC

Surveyor: Jack Mucia (Signature) 7/17/07 (Date)

Reviewer: (Signature) 7/17/07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/14/2007

Air Sample Location: North / center @ RCA Boundary Air Sample Number: WI07-330

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3360 Start Time: 7:00

Flow Rate: 2.15 cfm Stop Time: 14:30

Flow Rate: 60.88 lpm Total Time: 450 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/19/2007 Count Time: 3:30 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 27396698 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 19 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 0.32 cpm

MDC

(α): 1.25E-14 µCi/ml

Activity Concentration:

(α): **6.37E-15** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **0.21** % DAC

Surveyor: Jack Mucia / Signature 7/22/07 Date

Reviewer: Signature 7/22/07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/15/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-344

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/14/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/15/2007 6:45

Flow Rate: 60.88 lpm Total Time: 1425 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/20/2007 Count Time: 4:00 PM

Serial #: 102015

Probe Serial #: 100443 Instrument Efficiency (ε_i): 70.40% (α)

Cal Due: 11/22/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86756209 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): _____ counts

Gross (α): 42 counts

Gross Background (α): 0.00 cpm (R_B) (α)

Gross (α): 0.70 cpm

MDC

(α): **7.38E-16** µCi/ml

Activity Concentration:

(α): **1.03E-14** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **0.34** % DAC

Surveyor: Carl Ingle / Carl Ingle (Signature) 7-24-07 (Date)

Reviewer: (Signature) 7/24/07 (Date)

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/15/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-**345**

Purpose/Type: General Area RWP #: WI-**01**

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/14/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/15/2007 6:45

Flow Rate: 60.88 lpm Total Time: 1425 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/22/2007 Count Time: 10:05

Serial #: 102015

Probe Serial #: 100443 Instrument Efficiency (ε_i): 70.40% (α)

Cal Due: 11/22/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86756209 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): **0.07** counts

Gross (α): **57** counts

Gross Background (α): 0.00 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.95 cpm

MDC

(α): 1.04E-15 µCi/ml

Activity Concentration:

(α): **1.40E-14** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **0.47** % DAC

Surveyor: **Carl Ingle /** Carl Ingle (Signature) 7-24-07 (Date)

Reviewer: (Signature) 7/24/07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/15/2007

Air Sample Location: North / center @ RCA Boundary Air Sample Number: WI07-348

Purpose/Type: General Area RWP #: W7-04

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3360 Start Time: 6:40

Flow Rate: 2.15 cfm Stop Time: 7:25

Flow Rate: 60.88 lpm Total Time: 45 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/21/2007 Count Time: 11:21 AM

Serial #: 102015

Probe Serial #: 100443 Instrument Efficiency (ε_i): 70.40% (α)

Cal Due: 11/22/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2739670 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 2 counts

Gross (α): 35 counts

Gross Background (α): 0.03 cpm (R_B) (α)

Gross (α): 0.58 cpm

MDC

(α): 7.46E-14 µCi/ml

Activity Concentration:

(α): **2.57E-13** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **8.56** % DAC

Surveyor: Jack Mucia / Signature 7/22/07 Date

Reviewer: Signature 7/22/07 Date

ESFS 82A8008

WI07 - 0348 D1 A-F - GA Bagging Soil 072507

Sample description
WI07-0348 D1 G/A Loading Bags 072507

Spectrum Filename: C:\User\Win00252.An1

Acquisition information
Start time: 25-Jul-2007 10:50:05
Live time: 600
Real time: 603
Dead time: 0.48 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.7400E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 2.7400E+06) =
3.6496E-07
Detection limit method: Traditional ORTEC method

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

WI07 - 0348 D1 A-F - GA Bagging Soil 072507

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1241

********** 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	
28.86	7.39	115.	430.	0.717	13.56	0.798	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	176.47	44.28	2.	11.	0.018	80.53	0.490s
AM-241	236.70	59.34	4.	5.	0.008	151.44	0.221s
Th-234	250.18	62.71	12.	24.	0.039	75.68	0.288s
Pb-214	298.61	74.81	12.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	7.	0.	0.000	180.28	0.583D
Pb-212	310.00	77.66	2.	0.	0.000	0.00	0.083s
Pb-214	307.80	77.11	12.	0.	0.000	495.70	0.231D
Pb-214	348.44	87.27	2.	1.	0.002	416.33	0.289s
Th-234	368.79	92.35	12.	11.	0.018	112.13	0.985D
Ac-228	380.79	95.35	10.	0.	0.001	2076.44	0.987D
Ac-228	836.94	209.35	3.	8.	0.013	106.14	0.255s
Pb-212	952.95	238.34	2.	10.	0.016	76.63	0.302s
Pb-214	967.50	241.98	2.	0.	0.000	0.00	0.335D
Ac-228	1081.33	270.43	1.	0.	0.001	240.37	0.197s
Pb-214	1181.17	295.38	4.	2.	0.004	305.73	0.267s
Ac-228	1305.00	326.33	0.	4.	0.007	100.00	0.250s
Ac-228	1353.00	338.32	1.	0.	0.000	0.00	0.000s
Pb-214	1407.00	351.82	4.	0.	0.001	568.62	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.67	463.19	1.	0.	0.001	240.37	0.197s
Bi-214	2436.62	609.13	1.	1.	0.001	339.93	0.375s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3073.00	768.16	0.	1.	0.002	200.00	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

Ac-228	3643.33	910.68	1.	0.	0.001	240.37	0.197s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3857.00	964.07	0.	0.	0.000	0.00	0.000s
Ac-228	3877.18	969.11	0.	0.	0.000	0.00	1.591
Bi-214	4483.50	1120.62	0.	2.	0.003	141.42	0.500s
Bi-214	4953.50	1238.06	0.	2.	0.003	141.42	0.500s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.33	1460.90	1.	0.	0.001	240.37	0.197s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	5.204E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	2.299E-05	?	2.944E-05	G
			1238.11	6.233E-05	?	7.984E-05	G
			768.36	0.000E+00	%	5.074E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00		9.819E-06	G
			338.32	0.000E+00	?	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	%	3.028E-05	G
			209.28	6.027E-05	?	4.101E-05	G
			270.23	0.000E+00	%	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	3.065E-05	X
			327.64	5.876E-05	&	4.954E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 7.8845E-06	238.62	7.884E-06	?(	1.911E-06	G K
		77.11	0.000E+00	&	2.941E-06	X
		74.81	0.000E+00	?	8.059E-06	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N 7.6282E-05	92.35	4.168E-05	(	2.161E-05	G
		63.29	1.255E-04	&(	2.843E-05	G
Pb-214	N 0.0000E+00	351.92	0.000E+00	%	4.600E-06	G K
		295.21	0.000E+00	%	8.916E-06	G
		77.11	0.000E+00	&	1.054E-05	Energy duplication
		241.98	0.000E+00	&	1.147E-05	G
		74.81	0.000E+00	&	1.800E-05	Energy duplication

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			87.30	0.000E+00	%	1.345E-05	X
Pb-210	N	5.2355E-05	46.50	5.236E-05	&(	1.334E-05	G
AM-241		2.8141E-06	59.54	2.814E-06	?(	1.898E-06	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

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

- -

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EnergySolutions Spectrum name: Win00252.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	B<	1.8993E-12		
K-40	<	1.4749E-11		
Ac-228	B<	4.1974E-12		
Pb-212	#	2.8775E-12	2.205E-12	2.206E-12
CS-137	<	4.7253E-13		
Th-234		2.7840E-11	1.883E-11	1.884E-11
Pb-214	B<	1.6788E-12		
Pb-210	#	1.9108E-11	1.539E-11	1.539E-11
AM-241	#	1.0271E-12	1.555E-12	1.556E-12

- 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.

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F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 5.0852340E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/15/2007

Air Sample Location: North / center @ RCA Boundary Air Sample Number: WI07-349

Purpose/Type: General Area RWP #: W7-04

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3360 Start Time: 6:40

Flow Rate: 2.15 cfm Stop Time: 7:20

Flow Rate: 60.88 lpm Total Time: 40 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/21/2007 Count Time: 9:47 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 2435262 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 26 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 0.43 cpm

MDC

(α): 1.41E-13 µCi/ml

Activity Concentration:

(α): **1.27E-13** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **4.25** % DAC

Surveyor: Jack Mucia / Signature 7/22/07 Date

Reviewer: Signature 7/22/07 Date

ESFS 82A8008

WI07 - 0349 D1 A-F - WZ Bagging Soil 072507

Sample description
WI07-0349 D1 W/Z Loading Bags (center) 072507

Spectrum Filename: C:\User\Win00251.An1

Acquisition information
Start time: 25-Jul-2007 10:14:29
Live time: 600
Real time: 603
Dead time: 0.48 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.4350E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 2.4350E+06) =
4.1068E-07
Detection limit method: Traditional ORTEC method

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

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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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.07	7.20	71.	492.	0.820	11.23	1.037	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.46	46.28	10.	20.	0.032	78.84	0.292s
AM-241	237.50	59.54	8.	7.	0.012	159.08	0.410s
Th-234	250.31	62.74	6.	17.	0.028	69.60	0.252s
Pb-214	298.61	74.81	15.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	8.	0.	0.000	214.30	0.256D
Pb-212	306.50	76.78	1.	1.	0.001	339.93	0.417s
Pb-214	307.80	77.11	2.	0.	0.000	331.66	0.350D
Pb-214	349.23	87.46	2.	7.	0.012	98.12	0.338s
Th-234	368.79	92.35	22.	7.	0.012	192.41	0.985D
Ac-228	380.79	95.35	6.	1.	0.002	801.74	0.987D
Ac-228	840.33	210.20	0.	5.	0.008	89.44	0.250s
Pb-212	954.08	238.62	4.	7.	0.011	112.68	1.099D
Pb-214	967.50	241.98	6.	2.	0.003	366.66	1.101D
Ac-228	1079.00	269.85	0.	0.	0.000	0.00	0.000s
Pb-214	1177.90	294.56	0.	12.	0.020	57.74	0.500s
Ac-228	1306.94	326.81	1.	4.	0.006	142.00	0.238s
Ac-228	1349.00	337.32	0.	2.	0.003	141.42	0.250s
Pb-214	1403.00	350.82	0.	7.	0.012	75.59	0.250s

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EnergySolutions Spectrum name: Win00251.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2438.20	609.52	0.	10.	0.017	63.25	0.312s
CS-137	2646.00	661.45	0.	1.	0.002	200.00	0.250s
Bi-214	3074.67	768.57	0.	5.	0.008	89.44	0.375s
Ac-228	3178.50	794.52	0.	3.	0.005	115.47	0.500s

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Ac-228	3645.00	911.09	0.	1.	0.002	200.00	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.27	964.63	1.	0.	0.000	0.00	1.589
Ac-228	3877.00	969.07	1.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.67	1460.98	1.	0.	0.001	240.37	0.197s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.0316E-05	609.31	2.032E-05	?(	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	1.268E-04	+	9.391E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	4.041E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	?	1.964E-05	G
			338.32	8.523E-06	&	1.092E-05	G
			964.60	0.000E+00		6.081E-05	G
			794.70	8.679E-05	?	8.679E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	3.931E-05	&	2.910E-05	G
			270.23	0.000E+00	?	1.112E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	2.621E-05	X
			327.64	5.386E-05	&	5.437E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 5.7247E-06	238.62	5.725E-06	(	2.828E-06	G K
		77.11	0.000E+00	%	2.941E-06	X
		74.81	0.000E+00	%	8.482E-06	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N 5.4533E-05	92.35	2.904E-05	(	2.786E-05	G
		63.29	9.082E-05	&(	2.137E-05	G
Pb-214	N 1.6683E-05	351.92	9.548E-06	&(	1.364E-06	G K
		295.21	2.675E-05	&(	2.229E-06	G
		77.11	0.000E+00	%	4.532E-06	Energy duplication
		241.98	0.000E+00	%	2.257E-05	G
		74.81	0.000E+00	&	1.970E-05	Energy duplication

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			87.30	3.213E-05	?(	1.112E-05	X
Pb-210	N	9.5712E-05	46.50	9.571E-05	@(	2.399E-05	G
AM-241		3.9398E-06	59.54	3.940E-06	?(	2.550E-06	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

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

- -

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EnergySolutions Spectrum name: Win00251.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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214	#	8.3432E-12	5.277E-12	5.280E-12
K-40	<	1.6596E-11		
Ac-228	B<	4.7232E-12		
Pb-212		2.3510E-12	2.649E-12	2.650E-12
CS-137	<	1.0634E-12		
Th-234	C	2.2395E-11	1.559E-11	1.560E-11
Pb-214	#	6.8514E-12	3.121E-12	3.125E-12
Pb-210	#	3.9307E-11	3.099E-11	3.100E-11
AM-241	#	1.6180E-12	2.574E-12	2.575E-12

- 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.

WI07 - 0349 D1 A-F - WZ Bagging Soil 072507

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 8.0865523E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: SC. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/12/2007

Air Sample Location: Filling Bags Air Sample Number: WI07-0274

Purpose/Type: W/Z RWP #: W07-04

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 14:30

Flow Rate: 3.7 cfm Stop Time: 16:20

Flow Rate: 104.77 lpm Total Time: 110 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/20/2007 Count Time: 10:22 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: **11525019** ml

Sample Count Time: 60 min (t_S)

Gross Background (α): **10** counts

Gross (α): **4945** counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 82.42 cpm

MDC

(α): **2.98E-14** µCi/ml

Activity Concentration:

(α): **8.31E-12** µCi/ml DAC Value Am-241 **3.00E-12** µCi/ml **276.89** % DAC

Surveyor: Jack Mucia / (Signature) (Date)

Reviewer: (Signature) 7/21/07 (Date)

entered

ESFS 82A8008

WI07-0274 D1 A-F Filling Cajun Bags (WZ) 071207

Sample description
WI07- 0274 A-F while filling C. Bags (WZ) 071207

Spectrum Filename: C:\User\Win00172.An1

Acquisition information

Start time:	12-Jul-2007 16:52:11
Live time:	600
Real time:	601
Dead time:	0.24 %
Detector ID:	1

Detector system
MCB 07044698

Calibration

Filename:	Air Filter LeGe.Clb

47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	1.1530E+07
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.1530E+07) = 8.6730E-08
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

WI07-0274 D1 A-F Filling Cajun Bags (WZ) 071207

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.71	7.36	785.	2208.	3.680	6.54	1.228	CU-64	s
44.00	11.18	596.	130.	0.217	65.52	0.628	PB-214	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	191.50	48.04	9.	6.	0.010	177.95	0.219s
AM-241	231.90	58.14	88.	50.	0.083	76.21	0.415s
Th-234	251.37	63.00	4.	1.	0.002	553.77	0.268s
Pb-214	298.57	74.80	23.	13.	0.021	150.16	0.326s
Pb-212	298.63	74.81	13.	0.	0.000	1002.22	0.000D
Pb-212	307.80	77.11	30.	0.	0.000	0.00	0.972D
Pb-214	307.80	77.11	24.	0.	0.000	125.54	0.382D
Pb-214	349.56	87.54	2.	3.	0.005	176.38	0.326s
Th-234	368.79	92.35	8.	2.	0.003	452.34	0.984D
Ac-228	380.79	95.35	4.	5.	0.009	136.89	0.987D
Ac-228	835.00	208.87	0.	0.	0.000	0.00	0.000s
Pb-212	954.08	238.62	12.	5.	0.009	196.75	1.099D
Pb-214	967.50	241.98	7.	0.	0.000	2799.47	1.101D
Ac-228	1077.20	269.40	2.	3.	0.004	208.42	0.208s
Pb-214	1180.00	295.09	2.	0.	0.000	0.00	0.000s
Ac-228	1310.00	327.58	0.	3.	0.005	115.47	0.250s
Ac-228	1353.67	338.49	1.	0.	0.001	240.37	0.197s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1406.67	351.73	1.	0.	0.001	240.37	0.197s
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2437.00	609.22	1.	0.	0.000	0.00	0.000s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s

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Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3644.00	910.84	0.	1.	0.002	200.00	0.250s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	1.589
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	1.	0.002	200.00	0.250s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	4.063E-06	G K
			1764.49	0.000E+00	%	3.493E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	?	3.117E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	9.899E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00		3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	0.000E+00	?	7.862E-06	G
			270.23	0.000E+00	&	4.117E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	3.209E-05		2.931E-05	X
			327.64	4.407E-05	?	4.407E-05	G

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EnergySolutions Spectrum name: Win00172.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	4.5092E-06	238.62	4.509E-06	(	4.428E-06	G K
			77.11	0.000E+00		9.485E-06	Energy duplication
			74.81	0.000E+00	%	1.095E-05	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N	0.0000E+00	92.35	0.000E+00	%	1.964E-05	G
			63.29	0.000E+00	%	1.978E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	2.728E-06	G K
			295.21	0.000E+00	?	5.710E-06	G
			77.11	0.000E+00	&	1.461E-05	Energy duplication
			241.98	0.000E+00	%	2.130E-05	G

```
                    WI07-0274 D1 A-F  Filling Cajun Bags (WZ) 071207
                              74.81 4.202E-05 ?   2.986E-05         X
                              87.30 1.345E-05 ?   1.660E-05         X

Pb-210   N   2.9450E-05      46.50 2.945E-05 &(  2.342E-05         G

AM-241       2.7860E-05      59.54 2.786E-05 &(  7.732E-06         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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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     ORTEC g v - i (  63) wan32  G53W2.06  12-JUL-2007 17:02:21 Page    5
EnergySolutions                  Spectrum name: Win00172.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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                uCi/ml        uCi/ml       uCi/ml

Bi-214 B<    3.5240E-13
K-40    <    1.7525E-12
Ac-228 B<    9.9748E-13
Pb-212  C    3.9109E-13    7.695E-13    7.695E-13
CS-137  <    1.1229E-13
Th-234  <    1.7032E-12
Pb-214 B<    2.3661E-13
Pb-210 #C    2.5542E-12    4.545E-12    4.546E-12
AM-241 #     2.4163E-12    1.841E-12    1.844E-12

  # - 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.
```

WI07-0274 D1 A-F Filling Cajun Bags (WZ) 071207

C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 5.3615792E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/13/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-275

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/12/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/13/2007 6:28

Flow Rate: 60.88 lpm Total Time: 1408 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/16/2007 Count Time: 11:45 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 85721222 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 226 counts

Gross Background (α): 0.23 cpm (R_B) $_{(\alpha)}$

Gross (α): 3.77 cpm

MDC

(α): 4.62E-15 µCi/ml

Activity Concentration:

(α): 4.80E-14 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 1.60 % DAC

Surveyor: Jack Mucia (Signature) 7/17/07 (Date)

Reviewer: (Signature) 7-17-07 (Date)

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/13/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-276

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/12/2007 7:00

Flow Rate: 2.15 cfm Stop Time: 7/13/2007 6:34

Flow Rate: 60.88 lpm Total Time: 1414 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/18/2007 Count Time: 11:50 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 86086512 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 8 counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.13 cpm

MDC

(α): **3.99E-15** µCi/ml

Activity Concentration:

(α): **-4.51E-16** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **-0.02** % DAC

Surveyor: Carl Ingle / Signature 7-19-07 Date

Reviewer: Signature 7-19-07 Date

ESFS 82A8008

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/13/2007

Air Sample Location: Loading Shipping Bags Air Sample Number: WI07-0290

Purpose/Type: W/Z RWP #: W07-05

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 6:58

Flow Rate: 3.7 cfm Stop Time: 13:50

Flow Rate: 104.77 lpm Total Time: 412 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/15/2007 Count Time: 8:50 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 43166435 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 13 counts

Gross (α): 825 counts

Gross Background (α): 0.22 cpm (R_B) (α)

Gross (α): 13.75 cpm

MDC

(α): 8.89E-15 µCi/ml

Activity Concentration:

(α): 3.65E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 12.16 % DAC

Surveyor: Jack Mucia / Signature 7/17/07 Date

Reviewer: Signature 7/17/07 Date

entered

ESFS 82A8008

WI07-0290 D1 A-F Filling Cajun Bags (WZ) 071307

Sample description
WI07-0290 A/F (W/Z) Loading Cajun Bags 071307

Spectrum Filename: C:\User\Win00177.An1

Acquisition information
Start time: 13-Jul-2007 14:32:24
Live time: 600
Real time: 601
Dead time: 0.21 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.3170E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 4.3170E+07) =
2.3164E-08
Detection limit method: Traditional ORTEC method

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

WI07-0290 D1 A-F Filling Cajun Bags (WZ) 071307

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2849

********** 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	
28.47	7.30	833.	2345.	3.908	6.35	1.275	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	188.48	47.29	6.	6.	0.009	166.97	0.350s
AM-241	238.67	59.83	6.	1.	0.002	663.32	0.181s
Th-234	251.61	63.06	8.	0.	0.000	0.00	0.360s
Pb-214	298.61	74.81	25.	12.	0.019	136.44	0.970D
Pb-212	298.63	74.81	22.	0.	0.000	187.69	0.264D
Pb-212	307.80	77.11	20.	4.	0.007	302.24	0.972D
Pb-214	307.80	77.11	10.	0.	0.000	0.00	0.000D
Pb-214	347.00	86.90	1.	1.	0.002	316.23	0.000s
Th-234	367.67	92.07	5.	13.	0.022	84.96	0.327s
Ac-228	380.79	95.35	2.	0.	0.000	0.00	0.254D
Ac-228	829.00	207.37	0.	6.	0.010	81.65	0.250s
Pb-212	954.08	238.62	10.	1.	0.001	1040.50	1.099D
Pb-214	967.50	241.98	6.	2.	0.003	458.24	1.101D
Ac-228	1077.50	269.47	0.	9.	0.015	66.67	0.500s
Pb-214	1180.00	295.09	1.	0.	0.000	0.00	0.000s
Ac-228	1308.20	327.13	0.	11.	0.018	60.30	0.375s
Ac-228	1353.33	338.41	1.	0.	0.001	240.37	0.197s
Pb-214	1406.67	351.73	1.	0.	0.001	240.37	0.197s

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EnergySolutions Spectrum name: Win00177.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1850.00	462.53	0.	2.	0.003	141.42	0.250s
Bi-214	2438.00	609.47	1.	0.	0.000	0.00	0.000s
CS-137	2640.00	659.95	0.	5.	0.008	89.44	0.250s
Bi-214	3074.67	768.57	2.	1.	0.002	360.56	0.176s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s

WI07-0290 D1 A-F Filling Cajun Bags (WZ) 071307

Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4482.00	1120.24	0.	2.	0.003	141.42	0.250s
Bi-214	4952.00	1237.68	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.57	0.	2.	0.003	141.42	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	2.	0.003	141.42	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	4.063E-06	G K
			1764.49	3.493E-05	?	4.473E-05	G
			1120.29	2.299E-05	?	2.944E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	%	7.611E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	4.0412E-05	1460.81	4.041E-05	?(	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	%	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	3.028E-05	?	3.878E-05	G
			209.28	4.717E-05	&	3.145E-05	G
			270.23	1.001E-04	&	5.307E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	?	1.711E-05	X
			327.64	1.616E-04	?	7.664E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N 0.0000E+00	238.62	0.000E+00	%	4.330E-06	G K
		77.11	0.000E+00	%	8.548E-06	Energy duplication
		74.81	0.000E+00	?	1.377E-05	Energy duplication
CS-137	6.4737E-06	661.66	6.474E-06	&(	1.295E-06	G
Th-234	N 5.1059E-05	92.35	5.106E-05	(	1.454E-05	G
		63.29	0.000E+00	?	2.421E-05	G
Pb-214	N 0.0000E+00	351.92	0.000E+00	%	2.728E-06	G K
		295.21	0.000E+00	?	4.458E-06	G
		77.11	0.000E+00	?	9.840E-06	Energy duplication
		241.98	0.000E+00	%	2.257E-05	G
		74.81	3.842E-05		3.025E-05	Energy duplication

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                    WI07-0290 D1 A-F  Filling Cajun Bags (WZ) 071307
                              87.30 0.000E+00 %   1.149E-05          X

Pb-210   N   2.6996E-05      46.50 2.700E-05 &(  1.892E-05          G

AM-241       0.0000E+00      59.54 0.000E+00 %   2.406E-06          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

   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

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     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 14:42:34 Page    5
EnergySolutions                    Spectrum name: Win00177.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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
              uCi/ml         uCi/ml       uCi/ml

Bi-214 B<    9.4119E-14
K-40   #C    9.3611E-13    1.324E-12    1.324E-12
Ac-228 B<    1.3321E-13
Pb-212 B<    1.0030E-13
CS-137 #     1.4996E-13    1.341E-13    1.342E-13
Th-234       1.1827E-12    1.005E-12    1.005E-12
Pb-214 B<    6.3194E-14
Pb-210 #     6.2533E-13    1.044E-12    1.044E-12
AM-241  <    5.5734E-14

  # - 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.
```

WI07-0290 D1 A-F Filling Cajun Bags (WZ) 071307

F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 2.8941454E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/13/2007

Air Sample Location: Loading Shipping Bags Air Sample Number: WI07-0302

Purpose/Type: W/Z RWP #: W07-04

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 14:15

Flow Rate: 3.7 cfm Stop Time: 16:00

Flow Rate: 104.77 lpm Total Time: 105 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/16/2007 Count Time: 2:35 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 11001155 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 14 counts

Gross (α): 103 counts

Gross Background (α): 0.23 cpm (R_B) $_{(\alpha)}$

Gross (α): 1.72 cpm

MDC

(α): 3.60E-14 µCi/ml

Activity Concentration:

(α): 1.57E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 5.23 % DAC

Surveyor: Jack Mucia / (Signature) 7/22/07 (Date)

Reviewer: (Signature) 7/22/07 (Date)

Entered

ESFS 82A8008

WI07-0302 D1 A-F (WZ) Filling Bags (WZ) 071307

Sample description
WI07-0302 D1 A/F (W/Z) Loading Bags 071307

Spectrum Filename: C:\User\D2 Samples\WI07-0286 D2 Bag # S-007 (from Grids D1-1,2,3) 071307.An1

Acquisition information

Start time:	13-Jul-2007 16:37:43
Live time:	600
Real time:	601
Dead time:	0.20 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	1.1420E+07
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.1420E+07) = 8.7566E-08
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%

WI07-0302 D1 A-F (WZ) Filling Bags (WZ) 071307

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2508

********** 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	
26.42	6.78	123.	34.	0.056	95.75	0.619	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.74	46.85	4.	12.	0.021	77.30	0.280s
AM-241	238.54	59.80	7.	5.	0.009	180.28	0.423s
Th-234	254.00	63.66	3.	0.	0.000	0.00	0.125s
Pb-214	298.61	74.81	11.	0.	0.000	0.00	0.494D
Pb-212	298.63	74.81	15.	0.	0.000	1160.94	0.000D
Pb-212	300.04	75.17	11.	8.	0.013	156.46	0.494s
Pb-214	307.80	77.11	14.	0.	0.000	568.62	0.197D
Pb-214	348.50	87.28	2.	0.	0.000	0.00	0.292s
Th-234	368.79	92.35	12.	3.	0.004	413.88	0.985D
Ac-228	380.79	95.35	17.	2.	0.003	632.65	0.987D
Ac-228	835.00	208.87	6.	8.	0.013	141.32	0.086s
Pb-212	953.00	238.36	1.	0.	0.000	0.00	0.000s
Pb-214	967.50	241.98	4.	0.	0.000	0.00	0.278D
Ac-228	1077.00	269.35	0.	3.	0.005	115.47	0.250s
Pb-214	1180.00	295.09	2.	0.	0.000	0.00	0.000s
Ac-228	1311.00	327.83	1.	0.	0.000	0.00	0.000s
Ac-228	1351.00	337.82	0.	0.	0.000	0.00	0.000s

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 16:47:51 Page 3
EnergySolutions Spectrum name: WI07-0286 D2 Bag # S-007 (from G

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1404.44	351.18	6.	12.	0.020	100.00	0.484s
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2435.93	608.95	1.	3.	0.005	136.84	0.236s
CS-137	2648.00	661.95	0.	1.	0.002	200.00	0.250s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s

WI07-0302 D1 A-F (WZ) Filling Bags (WZ) 071307

Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4955.00	1238.43	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	6.4333E-06	609.31	6.433E-06	?(	3.828E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	5.750E-06	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	?	4.261E-06	G
			964.60	0.000E+00	%	3.129E-05	G
			794.70	0.000E+00	?	2.893E-05	G
			463.00	0.000E+00	?	1.514E-05	G
			209.28	5.896E-05	?	4.572E-05	G
			270.23	3.336E-05	&	3.336E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	%	4.098E-05	X
			327.64	0.000E+00	?	2.938E-05	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00	?	1.660E-06	G K
			77.11	9.184E-06	&	7.674E-06	X
			74.81	0.000E+00	%	1.161E-05	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	2.589E-06	G
Th-234	N	0.0000E+00	92.35	0.000E+00	%	2.357E-05	G
			63.29	0.000E+00	?	1.603E-05	G
Pb-214	N	1.6369E-05	351.92	1.637E-05	&(	5.456E-06	G K
			295.21	0.000E+00	?	5.710E-06	G
			77.11	0.000E+00	%	1.144E-05	Energy duplication
			241.98	0.000E+00	!	1.737E-05	G

```
                    WI07-0302 D1 A-F   (WZ) Filling  Bags (WZ) 071307
                                 74.81 0.000E+00 !   1.731E-05Energy duplication
                                 87.30 0.000E+00 ?   1.149E-05         X

Pb-210   N   6.0536E-05     46.50 6.054E-05 ?(  1.597E-05         G

AM-241       3.0017E-06     59.54 3.002E-06 ?(  2.356E-06         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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 16:47:51 Page    5
EnergySolutions                    Spectrum name: WI07-0286 D2 Bag # S-007 (from G

*****   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        Counting     Total
              uCi/ml        uCi/ml       uCi/ml

Bi-214 #     5.6333E-13    7.709E-13    7.710E-13
K-40    <    1.7693E-12
Ac-228 B<    5.0354E-13
Pb-212 B<    1.4535E-13
CS-137  <    2.2675E-13
Th-234  <    2.0635E-12
Pb-214 #     1.4333E-12    1.433E-12    1.434E-12
Pb-210 #     5.3008E-12    4.098E-12    4.099E-12
AM-241 #C    2.6285E-13    4.739E-13    4.740E-13

  # - 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.
```

WI07-0302 D1 A-F (WZ) Filling Bags (WZ) 071307

C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 7.5603621E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ENERGYSOLUTIONS

Air Sample Data Analysis Sheet

Counted by: Linda Finn (Name) **Date Drawn:** 7/14/2007

Air Sample Location: North @ RCA Boundary Air Sample Number: WI07-303

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/14/2007

Serial #: 3361 Start Time: 7/13/2007 6:28

Flow Rate: 2.15 cfm Stop Time: 7/14/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1472 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/18/2007 Count Time: 1:00 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89617642 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): **10** counts

Gross (α): **126** counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 2.10 cpm

MDC

(α): **3.83E-15** µCi/ml

Activity Concentration:

(α): **2.51E-14** µCi/ml DAC Value Am-241 **3.00E-12** µCi/ml **0.84** % DAC

Surveyor: Jack Mucia (Signature) 7/19/07 (Date)

Reviewer: (Signature) 7-19-07 (Date)

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/14/2007

Air Sample Location: South @ RCA Boundary Air Sample Number: WI07-304

Purpose/Type: General Area RWP #: W7-01

Air Sampler Data:

Model #: LV-1 Cal Due: 11/28/2007

Serial #: 3364 Start Time: 7/13/2007 6:35

Flow Rate: 2.15 cfm Stop Time: 7/14/2007 7:00

Flow Rate: 60.88 lpm Total Time: 1465 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/18/2007 Count Time: 2:05 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 89191471 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): 32 counts

Gross Background (α): 0.17 cpm (R_B) $_{(\alpha)}$

Gross (α): 0.53 cpm

MDC

(α): **3.85E-15** µCi/ml

Activity Concentration:

(α): **4.79E-15** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **0.16** % DAC

Surveyor: Jack Mucia / Signature 7/19/07 Date

Reviewer: Signature 7/19/07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/14/2007

Air Sample Location: Loading Bags Air Sample Number: WI07-**325**

Purpose/Type: General Area RWP #: WI-04

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 12:15

Flow Rate: 3.7 cfm Stop Time: 14:30

Flow Rate: 104.77 lpm Total Time: 135 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/18/2007 Count Time: 4:40 PM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 14144342 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): **183** counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 3.05 cpm

MDC

(α): 2.43E-14 µCi/ml

Activity Concentration:

(α): **2.37E-13** µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **7.91** % DAC

Surveyor: Jack Mucia / (Signature) 7/22/07 (Date)

Reviewer: (Signature) 7/22/07 (Date)

entered

ESFS 82A8008

WI07 - 0325 D1 A-F - WZ W-Z Loading Bags071907

Sample description
WI07- 0325 D1 (WZ) Loading Boxes 071907

Spectrum Filename: C:\User\Win00201.An1

Acquisition information
Start time: 19-Jul-2007 14:52:58
Live time: 600
Real time: 603
Dead time: 0.44 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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: 16-May-2007 13:49:37
Knee Energy: 120.00 keV
Above the Knee: Interpolative Uncertainty = 0.00 %
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.4140E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 1.4140E+07) = 7.0721E-08
Detection limit method: Traditional ORTEC method

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

WI07 - 0325 D1 A-F - WZ W-Z Loading Bags071907

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1801

********** 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	
29.11	7.46	91.	440.	0.734	12.75	1.831	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.35	46.75	5.	14.	0.023	84.35	0.750
AM-241	237.16	59.45	6.	17.	0.028	69.60	0.332s
Th-234	253.00	63.41	2.	0.	0.000	0.00	0.000s
Pb-214	298.61	74.81	2.	0.	0.000	0.00	0.292D
Pb-212	298.63	74.81	2.	0.	0.000	0.00	0.292D
Pb-212	308.89	77.38	1.	3.	0.005	149.07	0.484s
Pb-214	307.80	77.11	3.	0.	0.000	520.68	0.000D
Pb-214	349.00	87.40	2.	0.	0.000	0.00	0.000s
Th-234	370.83	92.86	4.	22.	0.036	54.91	0.444s
Ac-228	380.79	95.35	3.	0.	0.000	0.00	0.312D
Ac-228	833.11	208.39	2.	12.	0.019	75.59	0.590s
Pb-212	957.56	239.49	1.	3.	0.005	149.07	0.295s
Pb-214	967.50	241.98	0.	0.	0.000	0.00	0.100D
Ac-228	1081.67	270.51	1.	0.	0.001	240.37	0.197s
Pb-214	1173.50	293.46	0.	6.	0.010	81.65	0.500s
Ac-228	1309.00	327.33	1.	0.	0.000	0.00	0.000s
Ac-228	1352.00	338.07	1.	0.	0.000	0.00	0.000s
Pb-214	1404.78	351.26	2.	2.	0.003	244.95	0.218s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1851.50	462.90	0.	3.	0.005	115.47	0.500s
Bi-214	2436.00	608.97	0.	0.	0.000	0.00	0.000s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3177.50	794.27	0.	3.	0.005	115.47	0.500s

WI07 - 0325 D1 A-F - WZ W-Z Loading Bags071907

Ac-228	3643.00	910.59	0.	0.	0.001	223.61	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.00	968.57	0.	0.	0.000	0.00	0.000s
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	2.032E-06	G K
			1764.49	0.000E+00	?	1.746E-05	G
			1120.29	0.000E+00	?	1.149E-05	G
			1238.11	0.000E+00	%	6.233E-05	G
			768.36	0.000E+00	?	2.537E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	4.949E-05	G
			934.06	0.000E+00	?	5.007E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.021E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.150E-05	G K
			969.11	0.000E+00	?	9.819E-06	G
			338.32	0.000E+00	?	8.523E-06	G
			964.60	0.000E+00	?	3.129E-05	G
			794.70	8.679E-05	?	8.679E-05	G
			463.00	4.542E-05	?	4.542E-05	G
			209.28	9.172E-05	&	4.572E-05	G
			270.23	0.000E+00	%	2.224E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	0.000E+00	&	1.919E-05	X
			327.64	0.000E+00	?	2.938E-05	G

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	2.7642E-06	238.62	2.490E-06	&(	1.660E-06	G K
			77.11	3.444E-06	?(	2.296E-06	X
			74.81	0.000E+00	?	4.932E-06	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	1.295E-06	G
Th-234	N	8.5098E-05	92.35	8.510E-05	&(	1.369E-05	G
			63.29	0.000E+00	?	1.369E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	&	4.600E-06	G K
			295.21	1.337E-05	&	8.916E-06	G
			77.11	0.000E+00	%	6.160E-06	Energy duplication
			241.98	0.000E+00	%	8.061E-06	G
			74.81	0.000E+00	?	8.498E-06	Energy duplication

```
                    WI07 - 0325 D1 A-F - WZ   W-Z Loading Bags071907
                              87.30 0.000E+00 ?   1.149E-05          X

Pb-210   N   6.7080E-05     46.50 6.708E-05  (  1.867E-05          G

AM-241       9.5681E-06     59.54 9.568E-06  (  2.251E-06          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 15:03:08 Page    5
EnergySolutions                  Spectrum name: Win00201.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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
               uCi/ml        uCi/ml       uCi/ml

Bi-214 B<    1.4367E-13
K-40    <    1.4290E-12
Ac-228 B<    8.1336E-13
Pb-212 #     1.9549E-13    2.061E-13    2.061E-13
CS-137  <    9.1566E-14
Th-234       6.0183E-12    3.305E-12    3.308E-12
Pb-214 B<    3.2532E-13
Pb-210       4.7440E-12    4.002E-12    4.003E-12
AM-241       6.7667E-13    4.710E-13    4.716E-13

  # - 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.
```

WI07 - 0325 D1 A-F - WZ W-Z Loading Bags071907

F - Failed fraction or key line test.

H - Halflife limit exceeded

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

Total Activity (2.7 to 1999.2 keV) 1.1634416E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/10/2007

Air Sample Location: Loading Sealand Air Sample Number: WI07-0251

Purpose/Type: W/Z RWP #: W07-05

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 10:30

Flow Rate: 3.7 cfm Stop Time: 16:25

Flow Rate: 104.77 lpm Total Time: 355 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/10/2007 Count Time: 8:55 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 37194380 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 5 counts

Gross (α): 417 counts

Gross Background (α): 0.08 cpm (R_B) (α)

Gross (α): 6.95 cpm

MDC

(α): 6.99E-15 µCi/ml

Activity Concentration:

(α): 2.15E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml 7.16 % DAC

Surveyor: Jack Mucia / Signature 7/14/07 Date

Reviewer: Signature 7/16/07 Date

ESFS 82A8008

Air Sample Data Analysis Sheet

ENERGYSOLUTIONS

Counted by: Linda Finn (Name) **Date Drawn:** 7/10/2007

Air Sample Location: Loading Sealand Air Sample Number: WI07-0251

Purpose/Type: W/Z RWP #: W07-05

Air Sampler Data:

Model #: HV-1 Cal Due: 1/30/2008

Serial #: 866 Start Time: 10:30

Flow Rate: 3.7 cfm Stop Time: 16:25

Flow Rate: 104.77 lpm Total Time: 355 min

Counter/Scaler Data:

Model #: L2929 Count Date: 7/10/2007 Count Time: 8:55 AM

Serial #: 118407

Probe Serial #: 92751 Instrument Efficiency (ε_i): 77.40% (α)

Cal Due: 11/14/2007 Surface Efficiency (ε_s): 0.5

Background Count Time: 60 min (t_B) Sample Volume: 37194380 ml

Sample Count Time: 60 min (t_S)

Gross Background (α): 10 counts

Gross (α): * 392 counts

Gross Background (α): 0.17 cpm (R_B) (α)

Gross (α): 6.53 cpm

MDC

(α): 9.24E-15 µCi/ml

Activity Concentration:

(α): 1.99E-13 µCi/ml DAC Value Am-241 3.00E-12 µCi/ml **6.64** % DAC

*** 2nd count (after decay)**

Surveyor: Jack Muciaf (Signature) 7/22/07 (Date)

Reviewer: (Signature) 7/22/07 (Date)

1 D1 A-F loading Sealand 7-10-07 (W-Z) 071207

Sample description
WI07-0251 D1 A-F loading Sealand (W/Z) 071207

Spectrum Filename: C:\User\Win00169.An1

Acquisition information

Start time:	12-Jul-2007 09:06:53
Live time:	600
Real time:	602
Dead time:	0.34 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: Air Filter LeGe.Clb
47 mm Air Filter Geometry in Petris Dish

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:	16-May-2007 13:49:37		
Knee Energy:	120.00 keV		
Above the Knee:	Interpolative	Uncertainty =	0.00 %
Below the Knee:	Interpolative	Uncertainty =	0.00 %

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.9190E+07
Activity scaling factor:	1.0000E+00/(1.0000E+00* 3.9190E+07) = 2.5517E-08
Detection limit method:	Traditional ORTEC method
Random error:	1.0000000E+00
Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).

1 D1 A-F loading Sealand 7-10-07 (W-Z) 071207

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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0701
No unknown peaks passed sensitivity test.

********** 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	185.25	46.48	3.	10.	0.016	89.12	0.338s
AM-241	237.52	59.54	8.	42.	0.069	38.37	1.096
Th-234	251.80	63.11	7.	11.	0.018	105.14	0.230s
Pb-214	298.61	74.81	12.	0.	0.000	0.00	0.303D
Pb-212	298.63	74.81	11.	0.	0.000	489.90	0.225D
Pb-212	308.00	77.16	3.	0.	0.000	0.00	0.000s
Pb-214	307.80	77.11	3.	0.	0.000	0.00	0.000D
Pb-214	346.83	86.86	3.	23.	0.038	51.44	0.494s
Th-234	368.69	92.33	10.	15.	0.025	94.28	0.756s
Ac-228	380.79	95.35	2.	0.	0.000	0.00	0.244D
Ac-228	836.71	209.29	0.	11.	0.018	60.30	0.375s
Pb-212	954.08	238.62	3.	6.	0.011	112.05	1.099D
Pb-214	967.50	241.98	6.	5.	0.009	156.60	1.102D
Ac-228	1081.00	270.35	0.	0.	0.001	223.61	0.000s
Pb-214	1179.00	294.84	0.	0.	0.000	0.00	0.000s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1353.00	338.32	0.	4.	0.007	100.00	0.500s
Pb-214	1406.00	351.57	1.	0.	0.000	0.00	0.083s
Ac-228	1847.00	461.78	0.	5.	0.008	89.44	0.250s
Bi-214	2436.62	609.13	1.	1.	0.001	339.93	0.375s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3735.33	933.67	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3876.00	968.82	0.	1.	0.002	200.00	0.250s

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 09:17:03 Page 3
EnergySolutions Spectrum name: Win00169.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s

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

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 uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Bi-214 B<	1.3279E-13		
K-40 <	5.1559E-13		
Ac-228 B<	1.4673E-13		
Pb-212	1.3400E-13	1.502E-13	1.502E-13
CS-137 <	3.3038E-14		
Th-234	1.4830E-12	1.047E-12	1.048E-12

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 09:17:03 Page 5
EnergySolutions Spectrum name: Win00169.An1

Pb-214 B<	6.9612E-14		
Pb-210	1.2107E-12	1.079E-12	1.079E-12
AM-241	5.9840E-13	2.296E-13	2.306E-13

< - 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 (2.7 to 1999.2 keV) 3.4260934E-12 uCi/ml

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

1 D1 A-F loading Sealand 7-10-07 (W-Z) 071207

Laboratory: EnergySolutions

WI07-0461 D2 Bag# S-038 (Grid A1-2) 072307

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 07:42:17 Page    1
EnergySolutions                  Spectrum name: Win00295.An1

Sample description
     WI07- 0461  D2 Bag# S-038 Grid A1-2  072307


Spectrum Filename: C:\User\Win00295.An1

Acquisition information
       Start time:                 23-Jul-2007 07:14:07
       Live time:                600
       Real time:                602
       Dead time:                  0.26 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.4620E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.4620E+02) =
                                   2.8885E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 07:42:17 Page    2
EnergySolutions                  Spectrum name: Win00295.An1
```

WI07-0461 D2 Bag# S-038 (Grid A1-2) 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0823

********** 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	
11.63	2.90	4635.	10493.	17.489	2.68	0.854	-	D
15.82	3.95	14803.	9747.	16.245	4.07	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	187.00	46.93	39.	33.	0.055	75.82	1.000s
AM-241	236.83	59.38	77.	74.	0.123	49.15	1.054
Th-234	252.46	63.29	84.	49.	0.082	80.09	0.358s
Pb-214	298.54	74.81	90.	130.	0.216	27.12	0.917D
Pb-212	298.56	74.81	142.	0.	0.000	380.38	0.528D
Pb-212	307.74	77.11	82.	179.	0.299	20.64	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	290.04	0.322D
Pb-214	348.55	87.31	72.	55.	0.091	62.92	0.632s
Th-234	368.72	92.35	67.	55.	0.091	50.41	0.933D
Ac-228	380.72	95.35	39.	14.	0.024	132.82	0.935D
Ac-228	836.98	209.39	13.	32.	0.053	51.78	0.399s
Pb-212	953.94	238.62	19.	270.	0.450	13.01	1.057D
Pb-214	967.37	241.98	32.	59.	0.098	37.65	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.65	270.29	10.	32.	0.053	51.16	1.116
Pb-214	1181.00	295.38	10.	68.	0.113	29.85	1.388s
Ac-228	1310.00	327.62	6.	3.	0.005	282.84	0.000s
Ac-228	1353.51	338.49	8.	84.	0.141	26.13	1.063s
Pb-214	1407.04	351.87	11.	112.	0.187	22.82	1.105

WI07-0461 D2 Bag# S-038 (Grid A1-2) 072307

Ac-228	1851.87	463.05	7.	26.	0.043	60.30	0.441s
Bi-214	2438.04	609.54	0.	83.	0.138	21.95	0.947s
CS-137	2646.96	661.76	2.	13.	0.022	65.09	0.786s
Bi-214	3062.60	765.63	0.	21.	0.035	43.64	0.312s
Ac-228	3180.67	795.13	2.	10.	0.017	80.00	0.285s
Ac-228	3645.85	911.38	0.	53.	0.088	27.47	1.541
Bi-214	3725.91	931.39	8.	4.	0.006	311.68	0.232s
Ac-228	3858.81	964.60	1.	11.	0.018	67.87	1.595D
Ac-228	3876.86	969.11	4.	22.	0.037	49.41	1.598D
Bi-214	4480.67	1119.99	0.	15.	0.025	51.64	0.437s
Bi-214	4953.25	1238.08	0.	6.	0.010	81.65	0.375s
Bi-214	5514.33	1378.28	0.	4.	0.007	100.00	0.250s
K-40	5845.08	1460.92	0.	36.	0.060	33.33	0.843s
Ac-228	6353.25	1587.88	0.	4.	0.007	100.00	0.375s
Bi-214	7062.57	1765.10	0.	21.	0.035	43.64	0.275s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.8597E-04	609.31	3.860E-04	(	4.650E-06	G K
			1764.49	7.473E-04	+	2.491E-04	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	1.094E-03	&	3.648E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	0.000E+00	&	5.069E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	6.0131E-04	911.07	5.837E-04	(	1.101E-05	G K
			969.11	4.296E-04	-	1.501E-04	G
			338.32	9.883E-04	+	1.649E-04	G
			964.60	6.626E-04	(	1.338E-04	G
			794.70	5.880E-04	?(	1.506E-04	G
			463.00	1.000E-03	+	3.367E-04	G
			209.28	6.701E-04	(	1.204E-04	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 07:42:17 Page 4
EnergySolutions Spectrum name: Win00295.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.998E-04	+	3.024E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	2.776E-04	-	2.082E-04	X
		327.64	0.000E+00	%	1.943E-04	G
Pb-212	N 6.3948E-04	238.62	6.204E-04	(	1.545E-05	G K
		77.11	6.868E-04	(	5.086E-05	Energy duplication
		74.81	0.000E+00	%	1.124E-04	Energy duplication
CS-137	3.5680E-05	661.66	3.568E-05	?(	6.718E-06	G
Th-234	N 7.8534E-04	92.35	6.813E-04	(	1.512E-04	G
		63.29	9.335E-04	$(	2.566E-04	G

```
Pb-214    N   4.1861E-04    351.92 4.148E-04  (  1.932E-05          G K
                            295.21 4.260E-04 *(  3.132E-05          G
                             77.11 0.000E+00 %   1.363E-04Energy duplication
                            241.98 8.148E-04 +   1.936E-04          G
                             74.81 1.449E-03 +   2.397E-04Energy duplication
                             87.30 7.933E-04 +   2.386E-04          X

Pb-210    N   6.7366E-04     46.50 6.737E-04 *(  1.908E-04          G

AM-241        1.5238E-04     59.54 1.524E-04  (  2.660E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.1149E+00	2.447E-01	2.483E-01
K-40 #	4.5783E+00	1.526E+00	1.536E+00
Ac-228	1.7369E+00	4.772E-01	4.816E-01
Pb-212	1.8472E+00	2.253E-01	2.357E-01
CS-137 #	1.0306E-01	6.708E-02	6.720E-02
Th-234	2.2685E+00	1.073E+00	1.075E+00
Pb-214	1.2092E+00	2.272E-01	2.316E-01
Pb-210 #	1.9459E+00	1.475E+00	1.476E+00
AM-241	4.4014E-01	2.163E-01	2.169E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0461 D2 Bag# S-038 (Grid A1-2) 072307

& - 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 (2.7 to 1999.3 keV) 1.5243884E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0473 D2 Bag# S-039 072307

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 09:27:32 Page    1
EnergySolutions                  Spectrum name: Win00296.An1

Sample description
     WI07- 0473  D2  Bag# S-039   072307


Spectrum Filename: C:\User\Win00296.An1

Acquisition information
       Start time:                 23-Jul-2007 09:17:21
       Live time:                600
       Real time:                601
       Dead time:                  0.24 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.0820E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.0820E+02) =
                                   3.2446E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 09:27:32 Page    2
EnergySolutions                  Spectrum name: Win00296.An1
```

WI07-0473 D2 Bag# S-039 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1101

********** 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	
14.69	3.86	4647.	20838.	34.730	1.91	2.288	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.10	46.45	40.	30.	0.051	84.06	0.759
AM-241	237.56	59.57	98.	792.	1.320	8.87	0.753
Th-234	253.37	63.52	20.	21.	0.035	84.77	0.386s
Pb-214	298.54	74.81	31.	58.	0.097	37.71	0.917D
Pb-212	298.56	74.81	50.	0.	0.000	343.19	0.330D
Pb-212	307.74	77.11	25.	82.	0.136	28.16	0.919D
Pb-214	307.74	77.11	101.	0.	0.000	3385.43	0.601D
Pb-214	348.20	87.22	32.	23.	0.038	94.86	0.291s
Th-234	371.49	93.04	16.	37.	0.061	52.06	0.579s
Ac-228	382.19	95.72	14.	0.	0.000	0.00	0.936
Ac-228	835.16	208.94	12.	0.	0.001	1121.51	0.153s
Pb-212	953.94	238.62	12.	64.	0.107	29.05	1.057D
Pb-214	967.37	241.98	21.	19.	0.032	81.33	1.060D
Ac-228	1078.07	269.65	0.	14.	0.023	53.45	0.312s

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 09:27:32 Page 3
EnergySolutions Spectrum name: Win00296.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.81	295.08	3.	31.	0.052	40.93	0.347s
Ac-228	1316.60	329.27	3.	7.	0.012	124.54	0.368s
Ac-228	1352.07	338.13	0.	23.	0.038	41.70	0.312s
Pb-214	1407.34	351.95	0.	65.	0.108	24.81	1.479s
Ac-228	1850.56	462.72	0.	15.	0.025	51.64	0.437s

WI07-0473 D2 Bag# S-039 072307

Bi-214	2437.22	609.34	3.	45.	0.075	33.55	0.535s
CS-137	2646.92	661.74	0.	15.	0.025	51.64	0.500s
Bi-214	3074.00	768.48	0.	3.	0.005	115.47	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.38	911.26	0.	17.	0.028	48.51	0.375s
Bi-214	3738.00	934.41	3.	2.	0.003	389.87	0.000s
Ac-228	3860.00	964.90	0.	8.	0.013	70.71	0.625s
Ac-228	3877.92	969.37	6.	0.	0.000	0.00	1.598
Bi-214	4482.25	1120.39	0.	12.	0.020	57.74	0.750s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.50	1377.82	0.	2.	0.003	141.42	0.500s
K-40	5846.47	1461.26	0.	19.	0.032	45.88	0.333s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2878E-04	609.31	2.093E-04	(	1.395E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	3.597E-04	G
K-40	N	8.3653E-04	1460.81	8.365E-04	?(	4.403E-05	G
Ac-228	N	2.1681E-04	911.07	1.872E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	7.899E-05	G
			338.32	2.695E-04	?(	1.172E-05	G
			964.60	4.938E-04	+	2.797E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	5.847E-04	+	2.339E-04	G
			209.28	0.000E+00	%	1.148E-04	G
			270.23	4.374E-04	&	1.817E-04	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 09:27:32 Page 4
EnergySolutions Spectrum name: Win00296.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00		1.120E-04	X
		327.64	2.851E-04	&(	1.222E-04	G
Pb-212	N 1.4804E-04	238.62	1.480E-04	(	1.227E-05	G K
		77.11	3.128E-04	+	5.795E-05	Energy duplication
		74.81	0.000E+00	%	6.809E-05	Energy duplication
CS-137	4.0648E-05	661.66	4.065E-05	?(	2.710E-06	G
Th-234	N 4.3248E-04	92.35	4.575E-04	&(	7.782E-05	G
		63.29	3.969E-04	$(	1.309E-04	G
Pb-214	N 2.3024E-04	351.92	2.407E-04	(	3.704E-06	G K

```
                                WI07-0473 D2 Bag# S-039    072307
                                 295.21 1.963E-04 ?(  1.793E-05         G
                                  77.11 0.000E+00 %   9.654E-05Energy duplication
                                 241.98 2.652E-04  (  9.641E-05         G
                                  74.81 6.482E-04 +   1.546E-04Energy duplication
                                  87.30 3.338E-04 +   1.596E-04         X

Pb-210   N   6.1922E-04      46.50 6.192E-04  (  1.923E-04         G

AM-241       1.6308E-03      59.54 1.631E-03  (  2.988E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 09:27:32 Page    5
 EnergySolutions                    Spectrum name: Win00296.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        7.4232E-01    2.491E-01     2.506E-01
 K-40    #     2.7142E+00    1.245E+00     1.250E+00
 Ac-228  #     7.0347E-01    2.934E-01     2.946E-01
 Pb-212        4.8035E-01    1.396E-01     1.407E-01
 CS-137  #     1.3189E-01    6.811E-02     6.829E-02
 Th-234        1.4033E+00    6.980E-01     6.988E-01
 Pb-214        7.4706E-01    1.853E-01     1.874E-01
 Pb-210        2.0091E+00    1.689E+00     1.690E+00
 AM-241        5.2915E+00    4.692E-01     5.085E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0473 D2 Bag# S-039 072307

< - 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 (2.7 to 1999.3 keV) 1.4223225E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0474 D2 Bag# S-40 072307

Sample description
WI07- 0474 D2 Bag# S-040 072307

Spectrum Filename: C:\User\Win00297.An1

Acquisition information
Start time: 23-Jul-2007 09:51:16
Live time: 600
Real time: 602
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.7980E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7980E+02) = 3.5740E+03
Detection limit method: Traditional ORTEC method

WI07-0474 D2 Bag# S-40 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1640

********** 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	
14.71	3.86	6570.	22505.	37.508	1.96	2.238	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	46.56	19.	27.	0.046	61.61	0.804
AM-241	237.74	59.61	62.	604.	1.006	9.50	0.891
Th-234	253.60	63.58	31.	45.	0.075	57.18	0.766s
Pb-214	298.54	74.81	22.	33.	0.056	52.51	0.918D
Pb-212	298.56	74.81	36.	0.	0.000	860.23	0.398D
Pb-212	307.74	77.11	33.	55.	0.092	39.99	0.920D
Pb-214	307.74	77.11	69.	0.	0.000	2634.39	0.332D
Pb-214	349.51	87.55	14.	18.	0.031	78.15	0.689s
Th-234	368.72	92.35	17.	30.	0.049	54.14	0.933D
Ac-228	380.72	95.35	15.	6.	0.010	190.39	0.935D
Ac-228	837.17	209.44	5.	16.	0.026	75.76	0.267s
Pb-212	953.94	238.62	1.	65.	0.108	25.27	1.057D
Pb-214	967.37	241.98	5.	17.	0.029	60.64	1.060D
Ac-228	1080.00	270.13	13.	0.	0.000	1208.76	0.098s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.56	295.01	3.	48.	0.081	31.54	0.474s
Ac-228	1314.30	328.69	4.	12.	0.019	86.38	0.396s
Ac-228	1353.00	338.36	2.	0.	0.000	0.00	0.000s
Pb-214	1406.80	351.81	4.	71.	0.119	26.62	0.862s
Ac-228	1844.00	461.08	0.	10.	0.017	63.25	0.250s

WI07-0474 D2 Bag# S-40 072307

Bi-214	2438.18	609.58	0.	57.	0.095	26.49	1.095
CS-137	2647.33	661.85	0.	12.	0.020	57.74	0.375s
Bi-214	3072.60	768.13	0.	8.	0.013	70.71	0.375s
Ac-228	3179.33	794.80	1.	0.	0.001	240.37	0.197s
Ac-228	3644.38	911.01	0.	10.	0.017	63.25	0.437s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	1.	0.002	331.26	1.595D
Ac-228	3876.86	969.11	1.	8.	0.013	85.34	1.598D
Bi-214	4481.40	1120.18	0.	10.	0.017	63.25	0.500s
Bi-214	4954.50	1238.39	0.	2.	0.003	141.42	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.91	1460.12	3.	4.	0.007	169.56	0.327s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.10	1764.98	0.	10.	0.017	63.25	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7940E-04	609.31	2.651E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	4.169E-04	+	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.7611E-04	1460.81	1.761E-04	?(	1.321E-04	G
Ac-228	N	1.4123E-04	911.07	1.101E-04	?(	1.101E-05	G K
			969.11	1.470E-04	(	4.396E-05	G
			338.32	0.000E+00	?	3.002E-05	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	3.898E-04	&	1.949E-04	G
			209.28	3.315E-04	?(	8.049E-05	G
			270.23	0.000E+00	%	1.757E-04	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 10:01:28 Page 4
EnergySolutions Spectrum name: Win00297.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.209E-04	(	1.146E-04	X
		327.64	4.751E-04	&	2.516E-04	G
Pb-212	N 1.4841E-04	238.62	1.484E-04	(	4.596E-06	G K
		77.11	2.106E-04	+	5.274E-05	Energy duplication
		74.81	0.000E+00	%	5.829E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 3.6976E-04	92.35	3.698E-04	(	8.003E-05	G
		63.29	8.541E-04	+	2.446E-04	G
Pb-214	N 2.7193E-04	351.92	2.636E-04	@(	1.227E-05	G K

```
                                WI07-0474  D2 Bag# S-40    072307
                                 295.21 3.028E-04  (  1.793E-05          G
                                  77.11 0.000E+00 %   8.045E-05Energy duplication
                                 241.98 2.365E-04  (  5.073E-05          G
                                  74.81 3.733E-04 +   1.231E-04Energy duplication
                                  87.30 2.685E-04  (  8.301E-05          X

Pb-210    N   5.5798E-04      46.50 5.580E-04  (  1.354E-04          G

AM-241        1.2427E-03      59.54 1.243E-03  (  2.407E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 10:01:28 Page    5
 EnergySolutions                    Spectrum name: Win00297.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g           pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214        9.9856E-01    2.645E-01    2.672E-01
 K-40    #C    6.2942E-01    1.067E+00    1.067E+00
 Ac-228        5.0475E-01    2.913E-01    2.919E-01
 Pb-212        5.3041E-01    1.340E-01    1.355E-01
 CS-137  #     1.1622E-01    6.710E-02    6.725E-02
 Th-234        1.3215E+00    7.155E-01    7.162E-01
 Pb-214        9.7187E-01    2.587E-01    2.612E-01
 Pb-210        1.9942E+00    1.229E+00    1.229E+00
 AM-241        4.4414E+00    4.221E-01    4.529E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0474 D2 Bag# S-40 072307

< - 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 (2.7 to 1999.3 keV) 1.1508286E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0475 D2 Bag# S-41 072307

Sample description
WI07- 0475 D2 Bag# S-041 072307

Spectrum Filename: C:\User\Win00298.An1

Acquisition information
Start time: 23-Jul-2007 10:15:44
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4050E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4050E+02) = 2.9369E+03
Detection limit method: Traditional ORTEC method

WI07-0475 D2 Bag# S-41 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1068

********** 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	
11.71	2.91	6160.	14284.	23.807	2.28	0.854	-	D
17.78	4.42	17713.	10555.	17.591	4.06	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.74	46.61	54.	44.	0.073	66.96	0.704
AM-241	237.51	59.55	137.	1291.	2.152	6.72	0.975
Th-234	252.59	63.32	12.	27.	0.045	55.92	0.348s
Pb-214	298.54	74.81	29.	41.	0.068	48.89	0.917D
Pb-212	298.56	74.81	37.	0.	0.000	133.30	0.614D
Pb-212	307.74	77.11	25.	49.	0.082	40.38	0.919D
Pb-214	307.74	77.11	64.	0.	0.000	249.63	0.000D
Pb-214	347.70	87.10	16.	18.	0.031	83.57	0.267s
Th-234	368.72	92.35	31.	30.	0.051	63.08	0.933D
Ac-228	380.72	95.35	27.	2.	0.003	941.22	0.935D
Ac-228	835.92	209.13	10.	12.	0.020	108.01	0.627s
Pb-212	953.94	238.62	20.	69.	0.116	29.98	1.057D
Pb-214	967.37	241.98	16.	18.	0.029	81.19	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 10:25:54 Page 3
EnergySolutions Spectrum name: Win00298.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.82	270.84	2.	14.	0.023	67.77	0.551s
Pb-214	1180.19	295.17	3.	45.	0.074	34.43	1.594s
Ac-228	1310.42	327.72	3.	1.	0.002	360.56	0.211s
Ac-228	1351.74	338.05	9.	18.	0.030	74.23	0.513s
Pb-214	1407.86	352.08	3.	66.	0.110	27.01	1.088

WI07-0475 D2 Bag# S-41 072307

Ac-228	1853.00	463.33	3.	2.	0.003	389.87	0.000s
Bi-214	2437.73	609.47	0.	37.	0.062	32.88	0.428s
CS-137	2647.65	661.93	0.	17.	0.028	48.51	0.375s
Bi-214	3073.00	768.23	0.	7.	0.012	75.59	0.250s
Ac-228	3174.00	793.47	0.	4.	0.007	100.00	0.250s
Ac-228	3645.76	911.36	0.	21.	0.035	43.64	0.312s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	0.	0.000	3782.00	1.595D
Ac-228	3876.86	969.11	1.	9.	0.016	68.45	1.598D
Bi-214	4479.00	1119.58	0.	6.	0.010	81.65	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.56	1461.03	0.	18.	0.030	47.14	1.062s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7054.67	1763.13	3.	1.	0.002	583.10	0.210s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.6565E-04	609.31	1.721E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	&	1.200E-04	G
			1120.29	1.460E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.648E-04	+	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	7.9250E-04	1460.81	7.925E-04	?(	4.403E-05	G
Ac-228	N	2.1705E-04	911.07	2.313E-04	(	1.101E-05	G K
			969.11	1.840E-04	(	3.179E-05	G
			338.32	2.090E-04	?(	5.638E-05	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	2.352E-04	&(	5.880E-05	G
			463.00	0.000E+00	%	1.443E-04	G
			209.28	2.539E-04	(	1.058E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.270E-04	&	1.930E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.566E-04	X
		327.64	0.000E+00	%	1.373E-04	G
Pb-212	N 1.6797E-04	238.62	1.597E-04	(	1.555E-05	G K
		77.11	1.885E-04	(	2.893E-05	Energy duplication
		74.81	0.000E+00	?	5.930E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	(	2.710E-06	G
Th-234	N 4.3468E-04	92.35	3.787E-04	(	1.041E-04	G
		63.29	5.144E-04	?(	1.033E-04	G

```
                                WI07-0475  D2 Bag# S-41     072307
Pb-214   N   2.5538E-04    351.92 2.438E-04  (  1.135E-05          G K
                           295.21 2.798E-04  (  1.961E-05          G
                            77.11 0.000E+00 %   7.789E-05Energy duplication
                           241.98 2.420E-04  (  8.663E-05          G
                            74.81 4.548E-04 +   1.377E-04Energy duplication
                            87.30 2.685E-04 ?(  9.093E-05          X

Pb-210   N   8.9480E-04     46.50 8.948E-04  (  2.229E-04          G

AM-241       2.6590E-03     59.54 2.659E-03  (  3.509E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 10:25:54 Page    5
 EnergySolutions                    Spectrum name: Win00298.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214 #      4.8650E-01    1.600E-01     1.610E-01
 K-40   #      2.3275E+00    1.097E+00     1.101E+00
 Ac-228        6.3744E-01    2.343E-01     2.355E-01
 Pb-212        4.9330E-01    1.240E-01     1.254E-01
 CS-137        1.3530E-01    6.563E-02     6.583E-02
 Th-234        1.2766E+00    5.381E-01     5.389E-01
 Pb-214        7.5002E-01    2.026E-01     2.045E-01
 Pb-210        2.6279E+00    1.760E+00     1.761E+00
 AM-241        7.8092E+00    5.249E-01     5.992E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0475 D2 Bag# S-41 072307

& - 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 (2.7 to 1999.3 keV) 1.6543726E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0476 D2 Bag# S-042 072307

Sample description
WI07- 0476 D2 Bag# S-042 072307

Spectrum Filename: C:\User\D1 Samples\WI07-0239 D1 A-F BZ Cutting W.
O. Tank 072307.An1

Acquisition information
Start time: 23-Jul-2007 11:09:54
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 kev
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6550E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6550E+02) =
2.7360E+03

Detection limit method: Traditional ORTEC method

WI07-0476 D2 Bag# S-042 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1369

********** 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	
14.59	3.84	5496.	23576.	39.293	1.81	2.152	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.23	46.74	48.	31.	0.052	85.35	0.547s
AM-241	237.75	59.61	91.	914.	1.523	7.59	0.760
Th-234	250.99	62.92	32.	30.	0.051	78.76	0.531s
Pb-214	298.54	74.81	31.	47.	0.078	44.76	0.917D
Pb-212	298.56	74.81	44.	0.	0.000	635.96	0.327D
Pb-212	307.74	77.11	27.	73.	0.122	30.93	0.919D
Pb-214	307.74	77.11	58.	0.	0.000	224.50	0.364D
Pb-214	348.28	87.24	16.	28.	0.047	60.87	1.175s
Th-234	368.72	92.35	20.	40.	0.066	44.99	0.933D
Ac-228	380.72	95.35	13.	2.	0.004	464.16	0.936D
Ac-228	836.77	209.34	3.	14.	0.024	70.63	0.768s
Pb-212	953.94	238.62	17.	65.	0.109	30.40	1.057D
Pb-214	967.37	241.98	12.	23.	0.039	58.87	1.060D

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 11:20:05 Page 3
EnergySolutions Spectrum name: WI07-0239 D1 A-F BZ Cutting W.O

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.66	270.30	3.	14.	0.023	72.84	0.472s
Pb-214	1181.77	295.57	6.	39.	0.065	40.70	1.008s
Ac-228	1308.00	327.12	2.	1.	0.002	314.25	0.083s
Ac-228	1355.25	338.93	5.	4.	0.007	187.08	0.214s
Pb-214	1407.90	352.09	7.	44.	0.073	40.42	1.324

WI07-0476 D2 Bag# S-042 072307

Ac-228	1850.33	462.66	0.	11.	0.018	60.30	0.375s
Bi-214	2438.47	609.65	0.	47.	0.078	29.17	0.727s
CS-137	2648.50	662.14	0.	11.	0.018	60.30	0.375s
Bi-214	3071.50	767.85	0.	5.	0.008	89.44	0.500s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3644.25	910.98	0.	12.	0.020	57.74	0.312s
Bi-214	3738.67	934.58	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	3.	2.	0.003	365.46	1.595D
Ac-228	3876.86	969.11	2.	10.	0.017	73.27	1.598D
Bi-214	4477.56	1119.21	3.	1.	0.002	412.31	0.204s
Bi-214	4951.67	1237.68	0.	3.	0.005	115.47	0.375s
Bi-214	5512.33	1377.78	0.	4.	0.007	100.00	0.250s
K-40	5845.69	1461.07	0.	16.	0.027	50.00	0.417s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.46	0.	8.	0.013	70.71	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3452E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	0.000E+00	&	8.206E-05	G
			1238.11	2.034E-04	?(	6.779E-05	G
			768.36	2.606E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	+	3.649E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G
Ac-228	N	1.6869E-04	911.07	1.322E-04	?(	1.101E-05	G K
			969.11	1.949E-04	(	4.725E-05	G
			338.32	4.688E-05	&	5.593E-05	G
			964.60	0.000E+00	%	2.223E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	4.288E-04	+	2.033E-04	G
			209.28	2.998E-04	?(	6.205E-05	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 11:20:05 Page 4
EnergySolutions Spectrum name: WI07-0239 D1 A-F BZ Cutting W.O

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.374E-04	+	1.985E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.156E-04	X
		327.64	0.000E+00	%	1.222E-04	G
Pb-212	N 1.5017E-04	238.62	1.502E-04	(	1.446E-05	G K
		77.11	2.791E-04	+	5.609E-05	Energy duplication
		74.81	0.000E+00	%	6.409E-05	Energy duplication
CS-137	2.9809E-05	661.66	2.981E-05	?(	2.710E-06	G
Th-234	N 5.3152E-04	92.35	4.967E-04	(	8.576E-05	G
		63.29	5.811E-04	*(	1.634E-04	G

```
                          WI07-0476  D2 Bag# S-042     072307
Pb-214   N   1.8984E-04    351.92 1.617E-04 ?(  1.616E-05          G K
                           295.21 2.443E-04 @(  2.506E-05          G
                            77.11 0.000E+00 %   7.404E-05Energy duplication
                           241.98 3.212E-04 +   1.228E-04          G
                            74.81 5.214E-04 +   1.451E-04Energy duplication
                            87.30 4.136E-04 +   1.451E-04          X

Pb-210   N   6.3283E-04     46.50 6.328E-04 *(  2.105E-04          G

AM-241       1.8821E-03     59.54 1.882E-03  (  2.883E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 11:20:05 Page    5
 EnergySolutions                  Spectrum name: WI07-0239 D1 A-F  BZ Cutting W.O

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        6.4165E-01    1.872E-01     1.887E-01
 K-40    #     1.9273E+00    9.637E-01     9.664E-01
 Ac-228        4.6153E-01    1.800E-01     1.808E-01
 Pb-212        4.1085E-01    1.249E-01     1.259E-01
 CS-137  #     8.1556E-02    4.918E-02     4.928E-02
 Th-234        1.4542E+00    6.542E-01     6.551E-01
 Pb-214        5.1940E-01    1.490E-01     1.502E-01
 Pb-210  #     1.7314E+00    1.478E+00     1.478E+00
 AM-241        5.1493E+00    3.907E-01     4.347E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0476 D2 Bag# S-042 072307

& - 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 (2.7 to 1999.3 keV) 1.2377214E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0481 D2 Bag# S-043 072307

Sample description
WI07- 0481 D2 Bag# S-043 072307

Spectrum Filename: C:\User\Win00300.An1

Acquisition information
Start time: 23-Jul-2007 12:42:46
Live time: 600
Real time: 608
Dead time: 1.39 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9990E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9990E+02) = 3.3344E+03
Detection limit method: Traditional ORTEC method

WI07-0481 D2 Bag# S-043 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1059

********** 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	
11.63	2.90	3417.	8629.	14.382	2.88	0.854	-	D
16.67	4.16	14117.	6678.	11.130	5.60	0.855	-	D
55.68	14.11	172.	88.	0.147	50.27	0.881	PU-239	
69.93	17.67	333.	1198.	1.997	8.40	1.175	MO-99	s
84.01	21.19	252.	1001.	1.668	8.96	1.169	TC-99M	s
105.04	26.44	184.	1569.	2.614	5.96	0.889	AM-241	
128.73	32.36	379.	879.	1.466	10.83	1.074	XE-138	s
146.05	36.69	386.	234.	0.390	31.89	0.871	CE-144	s
197.77	49.58	7641.	2504.	4.173	10.65	0.895	EU-155	D
395.01	98.92	38.	120.	0.199	26.50	0.810	PA-234	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

********** 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	185.28	46.50	3404.	3.	0.004	6344.17	0.893D
AM-241	237.65	59.59	9583.	122478.	204.129	0.66	0.925
Th-234	251.80	63.13	43.	33.	0.054	74.54	0.551s
Pb-214	298.54	74.81	79.	92.	0.153	34.39	0.917D

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 12:53:04 Page 3
EnergySolutions Spectrum name: Win00300.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	298.56	74.81	100.	0.	0.000	949.85	0.519D
Pb-212	307.74	77.11	53.	145.	0.242	21.77	0.919D
Pb-214	307.74	77.11	134.	0.	0.000	3414.84	0.425D
Pb-214	348.48	87.29	63.	33.	0.055	91.88	0.973s
Th-234	368.72	92.35	31.	53.	0.088	40.64	0.933D

WI07-0481 D2 Bag# S-043 072307

Ac-228	380.72	95.35	49.	2.	0.004	948.03	0.936D
Ac-228	830.17	207.69	24.	54.	0.090	48.86	0.293s
Pb-212	953.94	238.62	22.	181.	0.302	16.57	1.057D
Pb-214	967.37	241.98	26.	22.	0.037	77.85	1.060D
Ac-228	1080.27	270.20	11.	28.	0.047	57.97	0.505s
Pb-214	1181.12	295.41	12.	46.	0.078	40.86	0.844
Ac-228	1310.02	327.62	8.	6.	0.009	186.39	0.355s
Ac-228	1353.11	338.39	10.	35.	0.058	46.07	0.811s
Pb-214	1407.55	352.00	3.	87.	0.145	23.04	0.621s
Ac-228	1852.00	463.08	0.	21.	0.035	43.64	0.375s
Bi-214	2436.71	609.21	3.	63.	0.104	28.03	1.050
CS-137	2647.71	661.94	0.	17.	0.028	48.51	0.812s
Bi-214	3076.00	768.98	2.	2.	0.003	311.13	0.000s
Ac-228	3181.15	795.25	0.	13.	0.022	55.47	0.500s
Ac-228	3646.21	911.47	0.	42.	0.070	30.86	0.531s
Bi-214	3735.67	933.83	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	4.	9.	0.015	88.84	1.595D
Ac-228	3876.86	969.11	2.	19.	0.032	49.20	1.598D
Bi-214	4476.06	1118.84	4.	4.	0.006	227.45	0.208s
Bi-214	4953.00	1238.02	0.	6.	0.010	81.65	0.375s
Bi-214	5513.00	1377.94	0.	2.	0.003	141.42	0.250s
K-40	5845.86	1461.11	0.	49.	0.082	28.57	0.687s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.00	1764.21	3.	1.	0.002	412.31	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9143E-04	609.31	2.914E-04	(	1.456E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	0.000E+00	&	1.103E-04	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	0.000E+00	%	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	4.858E-04	+	3.597E-04	G

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 12:53:04 Page 4
EnergySolutions Spectrum name: Win00300.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	2.1574E-03	1460.81	2.157E-03	?(	4.403E-05	G
Ac-228	N	4.3817E-04	911.07	4.625E-04	(	1.101E-05	G K
			969.11	3.757E-04	(	4.633E-05	G
			338.32	4.102E-04	(	5.860E-05	G
			964.60	5.692E-04	(	2.033E-04	G
			794.70	7.644E-04	+	3.306E-04	G
			463.00	8.185E-04	+	2.728E-04	G
			209.28	1.143E-03	&	2.751E-04	G
			270.23	8.852E-04	+	2.920E-04	G
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	0.000E+00	%	2.044E-04	X
			327.64	2.308E-04	-	2.368E-04	G

```
                          WI07-0481  D2 Bag# S-043     072307
Pb-212    N   4.1598E-04    238.62 4.160E-04  (  1.643E-05          G K
                            77.11 5.567E-04 +   7.812E-05Energy duplication
                            74.81 0.000E+00 %   9.490E-05Energy duplication

CS-137        4.6068E-05    661.66 4.607E-05 ?(  2.710E-06          G

Th-234    N   6.4382E-04     92.35 6.589E-04  (  1.050E-04          G
                            63.29 6.223E-04 $(  1.871E-04          G

Pb-214    N   3.1059E-04    351.92 3.216E-04 @(  1.135E-05          G K
                           295.21 2.913E-04 ?(  3.461E-05          G
                            77.11 0.000E+00 %   1.108E-04Energy duplication
                           241.98 3.054E-04  (  1.067E-04          G
                            74.81 1.026E-03 +   2.120E-04Energy duplication
                            87.30 4.813E-04 +   2.085E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   1.695E-03          G

AM-241        2.5220E-01     59.54 2.522E-01  (  2.861E-04          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
0

      ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 12:53:04 Page    5
 EnergySolutions                  Spectrum name: Win00300.An1

       library energy centroid for positive identification.
   P - Peakbackground subtraction

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        9.7175E-01    2.723E-01     2.748E-01
 K-40    #     7.1936E+00    2.055E+00     2.073E+00
 Ac-228        1.4610E+00    4.226E-01     4.262E-01
```

WI07-0481 D2 Bag# S-043 072307

Pb-212	1.3871E+00	2.299E-01	2.357E-01
CS-137 #	1.5361E-01	7.451E-02	7.474E-02
Th-234	2.1468E+00	8.726E-01	8.740E-01
Pb-214	1.0357E+00	2.386E-01	2.417E-01
Pb-210 <	5.6530E+00		
AM-241	8.4094E+02	5.561E+00	3.162E+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 (2.7 to 1999.3 keV) 8.5529138E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0482 D2 Bag# S-044 072307

Sample description
WI07- 0482 D2 Bag# S-044 072307

Spectrum Filename: C:\User\Win00301.An1

Acquisition information
Start time: 23-Jul-2007 13:19:27
Live time: 600
Real time: 603
Dead time: 0.53 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.2590E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.2590E+02) = 4.4267E+03
Detection limit method: Traditional ORTEC method

0

WI07-0482 D2 Bag# S-044 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1995

********** 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	
14.70	3.86	5358.	21261.	35.435	1.94	2.218	CU-64	s
60.66	15.35	653.	61.	0.101	126.66	0.516	Y-91M	s
104.92	26.41	720.	357.	0.595	28.11	0.708	AM-241	
128.10	32.21	563.	194.	0.323	45.92	0.968	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	654.	0.	0.000	0.00	0.000s
AM-241	237.64	59.59	1614.	22448.	37.413	1.51	0.933
Th-234	250.54	62.81	90.	28.	0.047	119.39	0.717
Pb-214	298.54	74.81	95.	74.	0.123	44.22	0.918D
Pb-212	298.56	74.81	104.	0.	0.000	327.35	0.259D
Pb-212	307.74	77.11	99.	114.	0.190	30.92	0.920D
Pb-214	307.74	77.11	200.	0.	0.000	149.09	0.000D
Pb-214	347.58	87.07	60.	41.	0.068	72.52	0.722
Th-234	368.72	92.35	71.	26.	0.044	99.06	0.933D
Ac-228	380.72	95.35	42.	5.	0.008	394.95	0.935D
Ac-228	839.45	210.01	20.	19.	0.032	101.81	0.396s

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 13:29:40 Page 3
EnergySolutions Spectrum name: Win00301.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	25.	99.	0.166	24.53	1.057D
Pb-214	967.37	241.98	20.	22.	0.036	72.89	1.060D
Ac-228	1080.00	270.13	2.	0.	0.000	0.00	0.000s
Pb-214	1181.24	295.44	8.	68.	0.114	30.05	0.801s
Ac-228	1310.08	327.64	3.	1.	0.002	360.56	0.211s

WI07-0482 D2 Bag# S-044 072307

Ac-228	1354.64	338.77	6.	34.	0.056	46.04	0.460s
Pb-214	1408.02	352.12	9.	97.	0.162	24.96	0.597s
Ac-228	1852.33	463.16	1.	1.	0.001	339.93	0.197s
Bi-214	2437.43	609.39	0.	75.	0.125	23.09	1.179s
CS-137	2647.31	661.84	0.	18.	0.030	47.14	0.375s
Bi-214	3073.40	768.33	0.	10.	0.017	63.25	0.875s
Ac-228	3178.00	794.47	0.	4.	0.007	100.00	0.750s
Ac-228	3646.28	911.49	0.	32.	0.053	35.36	0.781s
Bi-214	3739.20	934.71	0.	12.	0.020	57.74	0.375s
Ac-228	3858.81	964.60	1.	3.	0.006	123.67	1.595D
Ac-228	3876.86	969.11	1.	12.	0.021	59.21	1.598D
Bi-214	4482.27	1120.39	0.	15.	0.025	51.64	0.500s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.20	1377.99	0.	5.	0.008	89.44	0.375s
K-40	5844.25	1460.71	0.	32.	0.053	35.36	1.749
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5277E-04	609.31	3.488E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	1.166E-03	+	5.271E-04	G
K-40	N	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	3.6883E-04	911.07	3.524E-04	(	1.101E-05	G K
			969.11	2.415E-04	-	1.092E-04	G
			338.32	3.946E-04	(	4.798E-05	G
			964.60	2.129E-04	-	2.082E-04	G
			794.70	2.352E-04	-	1.983E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	0.000E+00	%	9.984E-05	G
		209.28	4.056E-04	&(	1.443E-04	G
		270.23	0.000E+00	?	8.003E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	0.000E+00	%	1.373E-04	G
Pb-212	N 2.2839E-04	238.62	2.284E-04	(	1.732E-05	G K
		77.11	4.372E-04	+	8.095E-05	Energy duplication
		74.81	0.000E+00	%	9.671E-05	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G
Th-234	N 4.1310E-04	92.35	3.264E-04	(	1.549E-04	G

```
                          WI07-0482  D2 Bag# S-044     072307
                              63.29 5.366E-04 $(  2.651E-04          G

Pb-214   N   3.8268E-04     351.92 3.593E-04  (  1.767E-05          G K
                            295.21 4.281E-04 @(  2.786E-05          G
                             77.11 0.000E+00 ?   1.345E-04Energy duplication
                            241.98 2.995E-04 -   1.338E-04          G
                             74.81 8.208E-04 +   2.108E-04Energy duplication
                             87.30 5.950E-04 +   2.136E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   7.542E-04          G

AM-241       4.6224E-02      59.54 4.622E-02  (  1.180E-04          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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 13:29:40 Page    5
 EnergySolutions                    Spectrum name: Win00301.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------------
 Bi-214 #     1.5616E+00     3.606E-01     3.654E-01
 K-40   #     6.2368E+00     2.205E+00     2.217E+00
 Ac-228       1.6327E+00     5.773E-01     5.805E-01
 Pb-212       1.0110E+00     2.480E-01     2.509E-01
 CS-137 #     2.1593E-01     1.018E-01     1.021E-01
 Th-234       1.8287E+00     1.418E+00     1.419E+00
 Pb-214       1.6940E+00     3.308E-01     3.369E-01
 Pb-210  <    3.3386E+00
 AM-241       2.0462E+02     3.099E+00     8.184E+00
```

WI07-0482 D2 Bag# S-044 072307

- 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 (2.7 to 1999.3 keV) 2.1880026E+02 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0483 D2 Bag# S-045 072307

Sample description
WI07- 0483 D2 Bag# S-045 072307

Spectrum Filename: C:\User\Win00302.An1

Acquisition information
Start time: 23-Jul-2007 13:33:08
Live time: 600
Real time: 604
Dead time: 0.65 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9450E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9450E+02) = 3.3956E+03
Detection limit method: Traditional ORTEC method

WI07-0483 D2 Bag# S-045 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1355

********** 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	
11.78	2.90	3218.	8945.	14.909	2.77	0.854	-	D
17.95	4.44	14933.	6296.	10.494	6.04	0.855	-	D
69.61	17.59	119.	328.	0.547	17.07	0.921	MO-99	s
84.51	21.31	111.	309.	0.515	17.96	1.505	TC-99M	s
104.90	26.41	65.	514.	0.856	10.76	1.016	AM-241	
128.79	32.38	153.	311.	0.518	19.54	1.010	XE-138	s
197.47	49.66	2972.	957.	1.595	17.36	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	1168.	59.	0.098	165.99	0.892D
AM-241	237.61	59.58	3584.	41634.	69.390	1.15	0.949
Th-234	253.82	63.63	40.	51.	0.086	52.79	0.979
Pb-214	298.54	74.81	59.	89.	0.148	32.54	0.917D
Pb-212	298.56	74.81	103.	0.	0.000	2243.88	0.365D
Pb-212	307.74	77.11	68.	128.	0.213	25.51	0.919D
Pb-214	307.74	77.11	153.	0.	0.000	249.53	0.000D
Pb-214	348.01	87.17	43.	71.	0.119	42.31	0.893s

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 13:43:22 Page 3
EnergySolutions Spectrum name: Win00302.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	30.	48.	0.080	43.16	0.933D
Ac-228	380.72	95.35	40.	7.	0.012	253.49	0.936D
Ac-228	838.38	209.74	17.	32.	0.053	61.61	1.111s
Pb-212	953.94	238.62	25.	172.	0.287	17.34	1.057D
Pb-214	967.37	241.98	29.	29.	0.048	65.40	1.060D

Ac-228	1074.50	268.76	17.	24.	0.040	78.69	0.281s
Pb-214	1181.66	295.54	8.	60.	0.100	31.51	1.282s
Ac-228	1310.79	327.81	5.	18.	0.029	69.07	0.548s
Ac-228	1353.25	338.43	2.	40.	0.066	34.31	0.578s
Pb-214	1407.62	352.01	0.	92.	0.153	20.85	0.991
Ac-228	1852.84	463.29	5.	21.	0.034	61.38	0.533s
Bi-214	2438.53	609.67	0.	66.	0.110	24.62	1.585
CS-137	2640.39	660.11	3.	6.	0.009	134.65	0.473s
Bi-214	3069.00	767.23	0.	8.	0.013	70.71	0.250s
Ac-228	3179.17	794.76	0.	6.	0.010	81.65	0.500s
Ac-228	3647.31	911.75	0.	40.	0.067	31.62	0.450s
Bi-214	3737.67	934.33	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	0.	10.	0.016	68.14	1.595D
Ac-228	3876.86	969.11	5.	16.	0.027	62.88	1.598D
Bi-214	4482.52	1120.46	0.	21.	0.035	43.64	0.462s
Bi-214	4957.20	1239.07	0.	8.	0.013	70.71	0.312s
Bi-214	5506.67	1376.36	3.	1.	0.002	583.10	0.210s
K-40	5845.69	1461.07	0.	55.	0.092	26.97	0.662s
Ac-228	6352.00	1587.57	0.	3.	0.005	115.47	0.250s
Bi-214	7060.75	1764.65	0.	12.	0.020	57.74	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0693E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	5.110E-04	+	1.703E-04	G
			1238.11	5.424E-04	&	3.072E-04	G
			768.36	4.169E-04	&	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	&	3.649E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.4215E-03	1460.81	2.422E-03	(	4.403E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ac-228	N 4.5274E-04	911.07	4.405E-04	?(	1.101E-05	G K
		969.11	3.139E-04	-	1.359E-04	G
		338.32	4.668E-04	(	3.095E-05	G
		964.60	5.869E-04	(	9.949E-05	G
		794.70	3.528E-04	?(	5.880E-05	G
		463.00	8.055E-04	+	3.012E-04	G
		209.28	6.771E-04	+	2.203E-04	G
		270.23	7.498E-04	&	2.990E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	7.194E-04	+	2.973E-04	G
Pb-212	N 3.9507E-04	238.62	3.951E-04	(	1.747E-05	G K
		77.11	4.881E-04	+	7.773E-05	Energy duplication
		74.81	0.000E+00	%	9.611E-05	Energy duplication

```
CS-137        1.5356E-05    661.66 1.536E-05 &(  8.482E-06          G

Th-234    N   7.5626E-04     92.35 6.005E-04  (  1.029E-04          G
                             63.29 9.779E-04 $(  1.795E-04          G

Pb-214    N   3.5769E-04    351.92 3.407E-04  (  3.704E-06          G K
                            295.21 3.759E-04 *(  2.838E-05          G
                             77.11 0.000E+00 %   1.181E-04Energy duplication
                            241.98 3.953E-04  (  1.132E-04          G
                             74.81 9.881E-04 +   1.977E-04Energy duplication
                             87.30 1.035E-03 +   2.265E-04          X

Pb-210    N   1.2037E-03     46.50 1.204E-03  (  9.969E-04          G

AM-241        8.5730E-02     59.54 8.573E-02  (  1.754E-04          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
```

ORTEC g v - i (63) wan32 G53W2.06 23-JUL-2007 13:43:22 Page 5
EnergySolutions Spectrum name: Win00302.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0422E+00	2.566E-01	2.595E-01
K-40 #	8.2225E+00	2.217E+00	2.239E+00
Ac-228	1.5373E+00	4.861E-01	4.895E-01
Pb-212	1.3415E+00	2.326E-01	2.380E-01
CS-137 #	5.2143E-02	7.021E-02	7.024E-02
Th-234	2.5679E+00	8.754E-01	8.774E-01
Pb-214	1.2146E+00	2.533E-01	2.573E-01

WI07-0483 D2 Bag# S-045 072307

Pb-210	C	4.0872E+00	6.785E+00	6.785E+00
AM-241		2.9110E+02	3.361E+00	1.129E+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 (2.7 to 1999.3 keV) 3.1116953E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0484 D2 Bag# S-046 072307

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 14:17:20 Page    1
EnergySolutions                  Spectrum name: Win00303.An1

Sample description
     WI07- 0484  D2  Bag# S-046   072307


Spectrum Filename: C:\User\Win00303.An1

Acquisition information
       Start time:                 23-Jul-2007 14:07:07
       Live time:                600
       Real time:                603
       Dead time:                  0.43 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.1270E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1270E+02) =
                                   3.1980E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 14:17:20 Page    2
EnergySolutions                  Spectrum name: Win00303.An1
```

WI07-0484 D2 Bag# S-046 072307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1666

********** 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	
11.71	2.90	3635.	10695.	17.825	2.51	0.854	-	D
16.80	4.18	16006.	8814.	14.691	4.58	0.855	-	D
70.19	17.73	85.	98.	0.163	42.01	0.601	MO-99	s
104.77	26.38	32.	188.	0.314	18.11	0.968	AM-241	s
128.46	32.30	96.	127.	0.212	35.60	0.867	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.45	46.29	417.	25.	0.042	266.14	0.318s
AM-241	237.60	59.58	1503.	16889.	28.148	1.79	0.927
Th-234	252.22	63.23	48.	40.	0.066	72.63	1.091s
Pb-214	298.54	74.81	43.	87.	0.145	30.35	0.917D
Pb-212	298.56	74.81	86.	0.	0.000	298.97	0.594D
Pb-212	307.74	77.11	49.	129.	0.215	23.41	0.920D
Pb-214	307.74	77.11	137.	0.	0.000	676.85	0.472D
Pb-214	349.18	87.47	35.	60.	0.100	45.03	0.395s
Th-234	371.02	92.93	33.	62.	0.104	41.98	1.124s
Ac-228	380.72	95.35	21.	0.	0.000	0.00	0.935

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EnergySolutions Spectrum name: Win00303.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	832.78	208.34	17.	29.	0.048	66.92	0.399s
Pb-212	953.94	238.62	22.	145.	0.241	19.03	1.057D
Pb-214	967.37	241.98	38.	27.	0.046	74.13	1.060D
Ac-228	1079.00	269.88	2.	23.	0.038	47.73	1.092
Pb-214	1181.24	295.43	10.	62.	0.102	32.70	0.815s

WI07-0484 D2 Bag# S-046 072307

Ac-228	1308.78	327.31	4.	1.	0.002	553.77	0.214s
Ac-228	1351.74	338.05	2.	31.	0.051	39.82	0.694s
Pb-214	1407.31	351.94	0.	88.	0.147	21.32	1.254
Ac-228	1848.71	462.26	4.	16.	0.027	63.30	0.233s
Bi-214	2437.77	609.48	0.	69.	0.115	24.08	0.364s
CS-137	2646.78	661.71	2.	10.	0.017	74.40	0.946s
Bi-214	3073.91	768.45	0.	13.	0.022	55.47	0.750s
Ac-228	3164.00	790.97	0.	20.	0.033	44.72	0.250s
Ac-228	3646.26	911.48	0.	46.	0.077	29.49	1.343
Bi-214	3737.50	934.28	0.	14.	0.023	53.45	0.500s
Ac-228	3858.81	964.60	3.	6.	0.010	115.99	1.595D
Ac-228	3876.86	969.11	3.	21.	0.035	48.59	1.598D
Bi-214	4482.43	1120.43	0.	14.	0.023	53.45	0.417s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.88	1461.12	0.	52.	0.087	27.74	0.393s
Ac-228	6352.33	1587.65	2.	1.	0.002	416.33	0.197s
Bi-214	7058.00	1763.96	0.	8.	0.013	70.71	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1734E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	1.360E-03	+	5.650E-04	G
K-40	N	2.2894E-03	1460.81	2.289E-03	?(	4.403E-05	G
Ac-228	N	4.8658E-04	911.07	5.066E-04	(	1.101E-05	G K
			969.11	4.132E-04	(	5.603E-05	G
			338.32	3.614E-04	-	1.012E-04	G
			964.60	3.798E-04	(	1.922E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	1.176E-03	&	4.024E-04	G
		463.00	6.366E-04	&(	1.268E-04	G
		209.28	6.136E-04	&(	1.344E-04	G
		270.23	7.134E-04	+	2.371E-04	G
		1588.00	0.000E+00	%	4.357E-04	G
		95.35	0.000E+00	%	1.358E-04	X
		327.64	0.000E+00	%	1.507E-04	G
Pb-212 N	3.3235E-04	238.62	3.323E-04	(	1.657E-05	G K
		77.11	4.931E-04	+	7.417E-05	Energy duplication
		74.81	0.000E+00	%	8.825E-05	Energy duplication
CS-137	2.8002E-05	661.66	2.800E-05	?(	6.485E-06	G

```
                          WI07-0484  D2 Bag# S-046     072307
Th-234    N   7.6732E-04     92.35 7.777E-04 &(  1.073E-04          G
                            63.29 7.525E-04 ?(  1.955E-04          G

Pb-214    N   3.4986E-04    351.92 3.259E-04  (  3.704E-06          G K
                            295.21 3.853E-04 *(  3.062E-05          G
                             77.11 0.000E+00 %   1.121E-04Energy duplication
                            241.98 3.780E-04  (  1.271E-04          G
                             74.81 9.679E-04 +   1.856E-04Energy duplication
                             87.30 8.707E-04 +   2.074E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   6.172E-04          G

AM-241        3.4777E-02     59.54 3.478E-02  (  1.139E-04          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  23-JUL-2007 14:17:20 Page    5
 EnergySolutions                  Spectrum name: Win00303.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        1.0148E+00     2.443E-01     2.473E-01
 K-40    #     7.3215E+00     2.031E+00     2.049E+00
 Ac-228        1.5561E+00     4.589E-01     4.626E-01
 Pb-212        1.0628E+00     2.023E-01     2.062E-01
 CS-137  #     8.9550E-02     6.663E-02     6.672E-02
 Th-234  #     2.4539E+00     1.029E+00     1.031E+00
 Pb-214        1.1188E+00     2.385E-01     2.422E-01
 Pb-210   <    1.9739E+00
 AM-241        1.1121E+02     1.993E+00     4.574E+00
```

WI07-0484 D2 Bag# S-046 072307

- 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 (2.7 to 1999.3 keV) 1.2583202E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lunn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0535 D2 Bag# S-047 Grid A3-1 072507

Sample description
WI07- 0535 D2 Bag # S-047 Grid A3-1. 072507

Spectrum Filename: C:\User\Win00312.An1

Acquisition information
Start time: 25-Jul-2007 10:55:10
Live time: 600
Real time: 601
Dead time: 0.22 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5760E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5760E+02) = 2.7964E+03
Detection limit method: Traditional ORTEC method

WI07-0535 D2 Bag# S-047 Grid A3-1 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1110
No unknown peaks passed sensitivity test.

********** 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	183.96	46.17	42.	30.	0.050	83.27	0.398s
AM-241	237.26	59.49	63.	391.	0.652	12.97	0.997
Th-234	247.97	62.17	42.	8.	0.014	262.30	0.278s
Pb-214	298.54	74.81	61.	81.	0.135	35.30	0.917D
Pb-212	298.56	74.81	85.	0.	0.000	224.85	0.673D
Pb-212	307.74	77.11	75.	107.	0.178	30.09	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	193.61	0.333D
Pb-214	348.75	87.36	40.	35.	0.058	70.41	1.089
Th-234	368.72	92.35	43.	44.	0.074	51.30	0.933D
Ac-228	380.72	95.35	22.	7.	0.012	199.32	0.935D
Ac-228	836.61	209.30	8.	38.	0.062	42.58	1.052s
Pb-212	953.94	238.62	34.	144.	0.240	20.21	1.057D
Pb-214	967.37	241.98	20.	26.	0.043	62.41	1.060D
Ac-228	1080.04	270.14	2.	36.	0.061	36.86	0.715s
Pb-214	1181.18	295.42	8.	38.	0.064	41.80	1.223
Ac-228	1308.94	327.35	4.	30.	0.049	45.61	0.285s
Ac-228	1352.55	338.25	3.	51.	0.085	30.78	1.409s
Pb-214	1407.64	352.02	0.	83.	0.138	21.95	0.667s
Ac-228	1850.00	462.58	4.	0.	0.000	0.00	0.000s
Bi-214	2436.88	609.25	0.	49.	0.082	28.57	1.421
CS-137	2646.11	661.54	0.	34.	0.057	34.30	0.500s
Bi-214	3075.30	768.80	0.	15.	0.025	51.64	0.312s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	3644.70	911.09	0.	34.	0.057	34.30	0.562s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	3.	6.	0.011	107.86	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.82	1.598D
Bi-214	4482.00	1120.33	0.	18.	0.030	47.14	1.062s

WI07-0535 D2 Bag# S-047 Grid A3-1 072507

Bi-214	4948.50	1236.89	0.	5.	0.008	89.44	0.500s
Bi-214	5511.50	1377.57	0.	2.	0.003	141.42	0.500s
K-40	5844.09	1460.67	0.	25.	0.042	40.00	0.833s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7059.00	1764.21	2.	0.	0.000	0.00	0.042s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2694E-04	609.31	2.279E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	3.390E-04	&	2.509E-04	G
			768.36	7.817E-04	+	3.127E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.1007E-03	1460.81	1.101E-03	?(	4.403E-05	G
Ac-228	N	4.6398E-04	911.07	3.744E-04	?(	1.101E-05	G K
			969.11	5.431E-04	(	1.942E-05	G
			338.32	5.997E-04	(	3.437E-05	G
			964.60	3.910E-04	(	1.767E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	0.000E+00	%	1.359E-04	G
			209.28	7.935E-04	+	2.116E-04	G
			270.23	1.140E-03	+	2.920E-04	G
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	1.378E-04	-	1.566E-04	X
			327.64	1.201E-03	+	3.518E-04	G
Pb-212	N	3.5328E-04	238.62	3.311E-04	(	2.011E-05	G K
			77.11	4.082E-04	(	4.896E-05	Energy duplication
			74.81	0.000E+00	%	8.775E-05	Energy duplication

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CS-137	9.2136E-05	661.66	9.214E-05	?(	2.710E-06	G
Th-234	N 5.5381E-04	92.35	5.538E-04	(	1.216E-04	G
		63.29	0.000E+00	&	2.003E-04	G
Pb-214	N 3.1620E-04	351.92	3.074E-04	@(	3.704E-06	G K
		295.21	2.412E-04	-	6.330E-05	G
		77.11	0.000E+00	?	1.205E-04	Energy duplication
		241.98	3.599E-04	(	9.457E-05	G
		74.81	9.015E-04	+	1.937E-04	Energy duplication
		87.30	5.030E-04	+	1.851E-04	X
Pb-210	N 6.1241E-04	46.50	6.124E-04	(	1.976E-04	G
AM-241	8.0512E-04	59.54	8.051E-04	(	2.417E-05	G

WI07-0535 D2 Bag# S-047 Grid A3-1 072507

(- 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

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

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EnergySolutions Spectrum name: Win00312.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
Bi-214	6.3461E-01	1.813E-01	1.829E-01
K-40 #	3.0780E+00	1.231E+00	1.237E+00
Ac-228	1.2975E+00	3.994E-01	4.024E-01
Pb-212	9.8793E-01	1.791E-01	1.828E-01
CS-137 #	2.5765E-01	8.837E-02	8.892E-02
Th-234	1.5487E+00	7.944E-01	7.952E-01
Pb-214	8.8423E-01	1.941E-01	1.969E-01
Pb-210	1.7126E+00	1.426E+00	1.427E+00
AM-241	2.2515E+00	2.920E-01	3.037E-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 (2.7 to 1999.3 keV) 1.2652630E+01 pCi/g

WI07-0535 D2 Bag# S-047 Grid A3-1 072507

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0536 D2 Bag# S-048 Grid A3-1 072507

Sample description
WI07- 0536 D2 Bag # S-048 Grid A3-1 072507

Spectrum Filename: C:\User\Win00313.An1

Acquisition information

Start time:	25-Jul-2007 12:14:48
Live time:	600
Real time:	601
Dead time:	0.25 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.9270E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.9270E+02) = 2.5465E+03
Detection limit method:	Traditional ORTEC method

WI07-0536 D2 Bag# S-048 Grid A3-1 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1846

********** 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	
11.74	2.92	5270.	11050.	18.417	2.66	0.854	-	D
16.85	4.20	14650.	8622.	14.369	4.52	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.26	46.74	35.	32.	0.053	77.69	0.369s
AM-241	237.62	59.58	48.	360.	0.601	12.35	0.984
Th-234	252.14	63.21	35.	37.	0.062	68.27	1.033
Pb-214	298.54	74.81	46.	74.	0.123	34.82	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	619.17	0.000D
Pb-212	307.74	77.11	48.	90.	0.149	30.45	0.919D
Pb-214	307.74	77.11	116.	0.	0.000	225.07	0.000D
Pb-214	346.86	86.89	26.	32.	0.054	67.16	0.819
Th-234	368.72	92.35	43.	32.	0.054	67.50	0.933D
Ac-228	380.72	95.35	36.	13.	0.021	146.10	0.935D
Ac-228	834.92	208.88	9.	25.	0.041	60.56	1.016
Pb-212	953.94	238.62	11.	136.	0.227	18.46	1.057D
Pb-214	967.37	241.98	14.	26.	0.044	56.03	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 12:24:59 Page 3
EnergySolutions Spectrum name: Win00313.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.44	270.74	9.	3.	0.004	370.81	0.199s
Pb-214	1179.35	294.96	13.	48.	0.081	41.61	0.888
Ac-228	1310.53	327.75	7.	23.	0.038	66.55	0.571s
Ac-228	1353.00	338.36	7.	43.	0.071	41.10	0.972
Pb-214	1407.16	351.90	0.	93.	0.155	20.74	1.166s

WI07-0536 D2 Bag# S-048 Grid A3-1 072507

Ac-228	1842.25	460.64	0.	12.	0.020	57.74	0.375s
Bi-214	2438.08	609.55	3.	48.	0.079	33.07	0.685s
CS-137	2646.29	661.59	2.	12.	0.021	73.76	0.396s
Bi-214	3070.33	767.56	0.	16.	0.027	50.00	0.250s
Ac-228	3177.47	794.33	2.	1.	0.002	447.21	0.184s
Ac-228	3647.38	911.76	0.	30.	0.050	36.51	0.400s
Bi-214	3733.00	933.16	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	3.	2.	0.004	271.02	1.595D
Ac-228	3876.86	969.11	2.	15.	0.025	57.50	1.598D
Bi-214	4475.00	1118.58	0.	12.	0.020	57.74	0.250s
Bi-214	4953.00	1238.02	0.	7.	0.012	75.59	0.250s
Bi-214	5510.60	1377.34	0.	7.	0.012	75.59	0.500s
K-40	5845.17	1460.94	0.	24.	0.040	40.82	0.281s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7059.42	1764.31	0.	12.	0.020	57.74	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3896E-04	609.31	2.217E-04	(	1.456E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	2.920E-04	&(	2.433E-05	G
			1238.11	4.746E-04	+	2.898E-04	G
			768.36	8.338E-04	&	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	+	4.625E-04	G
			934.06	3.887E-04	&	3.277E-04	G
K-40	N	1.0567E-03	1460.81	1.057E-03	?(	4.403E-05	G
Ac-228	N	3.2230E-04	911.07	3.304E-04	?(	1.101E-05	G K
			969.11	2.936E-04	(	4.868E-05	G
			338.32	5.000E-04	+	1.232E-04	G
			964.60	0.000E+00	%	2.349E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	4.677E-04	&(	3.898E-05	G
			209.28	5.219E-04	+	1.854E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 12:24:59 Page 4
EnergySolutions Spectrum name: Win00313.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.695E-04	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	2.436E-04	(	1.742E-04	X
		327.64	9.231E-04	+	3.365E-04	G
Pb-212	N 3.2162E-04	238.62	3.129E-04	(	1.191E-05	G K
		77.11	3.432E-04	(	3.961E-05	Energy duplication
		74.81	0.000E+00	%	8.898E-05	Energy duplication
CS-137	3.3874E-05	661.66	3.387E-05	?(	7.564E-06	G
Th-234	N 5.2656E-04	92.35	4.013E-04	(	1.219E-04	G
		63.29	7.049E-04	(	1.692E-04	G

```
                    WI07-0536   D2 Bag# S-048   Grid A3-1   072507
Pb-214   N   3.3398E-04     351.92 3.444E-04 *(  3.704E-06          G K
                            295.21 3.028E-04  (  3.482E-05          G
                             77.11 0.000E+00 %   1.031E-04Energy duplication
                            241.98 3.620E-04  (  7.992E-05          G
                             74.81 8.260E-04 +   1.786E-04Energy duplication
                             87.30 4.692E-04 +   1.637E-04          X

Pb-210   N   6.5324E-04      46.50 6.532E-04  (  1.813E-04          G

AM-241       7.4198E-04      59.54 7.420E-04  (  2.116E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 12:24:59 Page    5
EnergySolutions                    Spectrum name: Win00313.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		6.0852E-01	2.012E-01	2.025E-01
K-40	#	2.6908E+00	1.099E+00	1.103E+00
Ac-228		8.2074E-01	2.997E-01	3.013E-01
Pb-212		8.1900E-01	1.458E-01	1.490E-01
CS-137	#	8.6258E-02	6.362E-02	6.371E-02
Th-234		1.3409E+00	6.436E-01	6.444E-01
Pb-214		8.5048E-01	1.764E-01	1.792E-01
Pb-210		1.6635E+00	1.292E+00	1.293E+00
AM-241		1.8894E+00	2.334E-01	2.437E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0536 D2 Bag# S-048 Grid A3-1 072507

& - 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 (2.7 to 1999.3 keV) 1.0769526E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0537 D2 Bag# S-049 072507

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 11:40:47 Page 1
EnergySolutions Spectrum name: Win00314.An1

Sample description
WI07- 0537 D2 Bag # S-049 Grid A3-1. 072507

Spectrum Filename: C:\User\Win00314.An1

Acquisition information
Start time: 25-Jul-2007 11:30:36
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.5570E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.5570E+02) =
2.1944E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 11:40:47 Page 2
EnergySolutions Spectrum name: Win00314.An1

WI07-0537 D2 Bag# S-049 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1264

********** 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	
11.86	2.92	4883.	12505.	20.842	2.39	0.854	-	D
18.35	4.54	13272.	7547.	12.579	4.89	0.856	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.66	46.59	124.	70.	0.117	60.07	0.741s
AM-241	237.67	59.60	200.	243.	0.405	27.42	0.949
Th-234	252.96	63.42	86.	47.	0.078	72.85	0.592s
Pb-214	298.54	74.81	78.	78.	0.129	39.47	0.917D
Pb-212	298.56	74.81	102.	0.	0.000	2863.56	0.410D
Pb-212	307.74	77.11	85.	135.	0.224	25.99	0.919D
Pb-214	307.74	77.11	212.	0.	0.000	289.27	0.404D
Pb-214	347.26	86.99	61.	58.	0.097	54.26	1.480s
Th-234	368.72	92.35	85.	28.	0.047	98.94	0.933D
Ac-228	380.72	95.35	68.	12.	0.020	202.70	0.935D
Ac-228	835.73	209.08	21.	23.	0.038	88.63	0.298s
Pb-212	953.94	238.62	18.	206.	0.344	15.07	1.057D
Pb-214	967.37	241.98	24.	29.	0.049	59.81	1.060D

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 11:40:47 Page 3
EnergySolutions Spectrum name: Win00314.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.07	270.15	11.	29.	0.048	59.25	0.523s
Pb-214	1180.98	295.37	11.	45.	0.075	38.79	1.137
Ac-228	1311.17	327.91	4.	16.	0.026	69.21	0.555s
Ac-228	1354.11	338.64	7.	58.	0.096	33.25	0.424s
Pb-214	1406.66	351.78	3.	91.	0.151	22.46	0.917s

WI07-0537 D2 Bag# S-049 072507

Ac-228	1852.00	463.08	0.	18.	0.030	47.14	0.417s
Bi-214	2436.98	609.28	3.	53.	0.089	30.10	0.976s
CS-137	2646.35	661.60	0.	29.	0.048	37.14	1.000s
Bi-214	3075.00	768.73	0.	13.	0.022	55.47	0.312s
Ac-228	3178.60	794.62	0.	6.	0.010	81.65	0.437s
Ac-228	3645.26	911.23	0.	41.	0.068	31.23	0.300s
Bi-214	3733.00	933.16	0.	7.	0.012	75.59	0.250s
Ac-228	3858.81	964.60	4.	11.	0.018	81.87	1.595D
Ac-228	3876.86	969.11	2.	21.	0.035	47.37	1.598D
Bi-214	4481.62	1120.23	0.	16.	0.027	50.00	0.562s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.50	1377.82	0.	2.	0.003	141.42	0.500s
K-40	5845.00	1460.90	0.	36.	0.060	33.33	0.393s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7061.57	1764.85	0.	9.	0.015	66.67	0.437s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6275E-04	609.31	2.472E-04	(	1.364E-05	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	3.893E-04	+	1.503E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	6.802E-04	&	4.154E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	(	4.403E-05	G
Ac-228	N	4.3216E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	4.092E-04	(	4.901E-05	G
			338.32	6.758E-04	+	1.396E-04	G
			964.60	6.620E-04	+	3.704E-04	G
			794.70	3.528E-04	?(	5.880E-05	G
			463.00	7.016E-04	+	2.542E-04	G
			209.28	4.796E-04	(	1.492E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.956E-04	+	2.955E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	2.535E-04	X
		327.64	6.380E-04	+	2.787E-04	G
Pb-212	N 4.8595E-04	238.62	4.742E-04	(	1.485E-05	G K
		77.11	5.150E-04	(	5.201E-05	Energy duplication
		74.81	0.000E+00	%	9.581E-05	Energy duplication
CS-137	7.8587E-05	661.66	7.859E-05	?(	2.710E-06	G
Th-234	N 5.7637E-04	92.35	3.545E-04	(	1.686E-04	G
		63.29	8.922E-04	$(	2.598E-04	G

WI07-0537 D2 Bag# S-049 072507

Pb-214	N	3.2807E-04	351.92	3.364E-04	*(	1.135E-05	G K
			295.21	2.819E-04	(	3.268E-05	G
			77.11	0.000E+00	&	1.384E-04	Energy duplication
			241.98	4.050E-04	(	1.024E-04	G
			74.81	8.658E-04	+	2.028E-04	Energy duplication
			87.30	8.465E-04	+	2.312E-04	X
Pb-210	N	1.4290E-03	46.50	1.429E-03	@(	3.318E-04	G
AM-241		5.0037E-04	59.54	5.004E-04	(	4.223E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 11:40:47 Page 5
EnergySolutions Spectrum name: Win00314.An1

R - Coincidence Corrected
H - Halflife limit exceeded
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
Bi-214	5.7659E-01	1.736E-01	1.749E-01
K-40	3.4782E+00	1.159E+00	1.167E+00
Ac-228	9.4834E-01	2.962E-01	2.983E-01
Pb-212	1.0664E+00	1.602E-01	1.651E-01
CS-137 #	1.7245E-01	6.405E-02	6.439E-02
Th-234	1.2648E+00	7.770E-01	7.775E-01
Pb-214	7.1992E-01	1.617E-01	1.639E-01
Pb-210 #	3.1358E+00	1.884E+00	1.885E+00
AM-241	1.0980E+00	3.010E-01	3.038E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0537 D2 Bag# S-049 072507

& - 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 (2.7 to 1999.3 keV) 1.2460439E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0538 D2 Bag# S-050 Grid A3-1,2 072507

Sample description
WI07- 0538 D2 Bag # S-050 Grid A3-1,2 072507

Spectrum Filename: C:\User\Win00315.An1

Acquisition information
Start time: 25-Jul-2007 12:30:41
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.2980E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.2980E+02) = 2.3267E+03
Detection limit method: Traditional ORTEC method

WI07-0538 D2 Bag# S-050 Grid A3-1,2 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1228

********** 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	
14.60	3.84	4203.	21886.	36.477	1.80	2.221	CU-64	s
252.94	63.41	80.	60.	0.100	61.46	0.669	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.56	46.57	51.	36.	0.061	86.59	0.458s
AM-241	236.91	59.41	83.	83.	0.139	47.18	0.433s
Th-234	252.41	63.28	117.	0.	0.000	0.00	0.907
Pb-214	298.54	74.81	77.	107.	0.179	30.16	0.917D
Pb-212	298.56	74.81	119.	0.	0.000	447.21	0.494D
Pb-212	307.74	77.11	86.	154.	0.257	23.47	0.919D
Pb-214	307.74	77.11	198.	0.	0.000	216.34	0.150D
Pb-214	348.21	87.22	46.	58.	0.097	47.15	1.282s
Th-234	368.72	92.35	80.	44.	0.073	65.35	0.933D
Ac-228	380.72	95.35	44.	0.	0.000	7085.21	0.935D
Ac-228	836.57	209.29	14.	31.	0.052	56.86	0.344s
Pb-212	953.94	238.62	28.	240.	0.400	14.35	1.057D
Pb-214	967.37	241.98	36.	39.	0.065	54.11	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.58	270.03	20.	32.	0.054	64.67	0.868
Pb-214	1180.12	295.16	3.	68.	0.113	26.31	0.409s
Ac-228	1309.65	327.53	11.	18.	0.030	79.75	0.297s
Ac-228	1352.69	338.29	13.	55.	0.091	37.23	0.876s
Pb-214	1407.13	351.89	9.	94.	0.156	23.85	1.261

WI07-0538 D2 Bag# S-050 Grid A3-1,2 072507

Ac-228	1849.50	462.46	4.	26.	0.043	54.42	0.396s
Bi-214	2436.77	609.23	0.	66.	0.110	24.62	1.571
CS-137	2647.58	661.91	4.	32.	0.054	42.75	1.692s
Bi-214	3073.50	768.35	0.	6.	0.010	81.65	0.375s
Ac-228	3180.09	794.99	0.	13.	0.022	55.47	0.812s
Ac-228	3645.44	911.28	0.	63.	0.105	25.20	1.100s
Bi-214	3734.33	933.49	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	13.	4.	0.007	276.48	1.595D
Ac-228	3876.86	969.11	22.	7.	0.011	218.19	1.598D
Bi-214	4484.33	1120.91	0.	13.	0.022	55.47	0.250s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	5.	0.008	89.44	0.250s
K-40	5845.00	1460.90	25.	3.	0.005	556.44	0.000s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7060.33	1764.54	1.	1.	0.001	339.93	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0950E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	3.127E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.522E-04	G
Ac-228	N	6.8795E-04	911.07	6.938E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.575E-04	G
			338.32	6.407E-04	(	6.666E-05	G
			964.60	0.000E+00	%	3.944E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	1.000E-03	+	3.220E-04	G
			209.28	6.559E-04	?(	1.230E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 12:40:52 Page 4
EnergySolutions Spectrum name: Win00315.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.005E-03	+	3.346E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.906E-04	X
		327.64	7.398E-04	(	2.110E-04	G
Pb-212	N 5.6215E-04	238.62	5.512E-04	(	1.843E-05	G K
		77.11	5.892E-04	(	5.218E-05	Energy duplication
		74.81	0.000E+00	%	1.032E-04	Energy duplication
CS-137	8.8071E-05	661.66	8.807E-05	(	8.652E-06	G
Th-234	N 5.4573E-04	92.35	5.457E-04	(	1.644E-04	G
		63.29	0.000E+00		3.011E-04	G

```
                    WI07-0538   D2 Bag# S-050   Grid A3-1,2   072507
Pb-214    N   3.7383E-04     351.92 3.469E-04  (  1.796E-05          G K
                             295.21 4.260E-04 *(  1.879E-05          G
                              77.11 0.000E+00 %   1.339E-04Energy duplication
                             241.98 5.385E-04 +   1.764E-04          G
                              74.81 1.195E-03 +   2.197E-04Energy duplication
                              87.30 8.441E-04 +   2.167E-04          X

Pb-210    N   7.4170E-04      46.50 7.417E-04 @(  2.160E-04          G

AM-241        1.7159E-04      59.54 1.716E-04 @(  2.753E-05          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

   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
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 12:40:52 Page    5
 EnergySolutions                  Spectrum name: Win00315.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214        7.2010E-01    1.773E-01    1.793E-01
 K-40     <    8.1950E-01
 Ac-228        1.6006E+00    3.880E-01    3.926E-01
 Pb-212        1.3079E+00    1.799E-01    1.864E-01
 CS-137        2.0491E-01    8.759E-02    8.794E-02
 Th-234        1.2697E+00    8.298E-01    8.303E-01
 Pb-214        8.6977E-01    1.544E-01    1.578E-01
 Pb-210 #      1.7257E+00    1.494E+00    1.495E+00
 AM-241 #      3.9924E-01    1.884E-01    1.889E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0538 D2 Bag# S-050 Grid A3-1,2 072507

& - 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 (2.7 to 1999.3 keV) 8.0980167E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0539 D2 Bag# S-051 Grid A3-2 072507

Sample description
WI07- 0539 D2 Bag # S-051 Grid A3-2 072507

Spectrum Filename: C:\User\Win00316.An1

Acquisition information
Start time: 25-Jul-2007 12:56:59
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.0660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0660E+02) = 2.4594E+03
Detection limit method: Traditional ORTEC method

WI07-0539 D2 Bag# S-051 Grid A3-2 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1012

********** 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	
11.73	2.92	5594.	10899.	18.165	2.73	0.854	-	D
16.79	4.18	15075.	8719.	14.532	4.52	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.01	46.43	54.	27.	0.046	105.08	0.679
AM-241	237.73	59.61	68.	708.	1.180	8.53	0.900
Th-234	253.27	63.49	25.	22.	0.037	85.60	0.551s
Pb-214	298.54	74.81	39.	65.	0.108	36.87	0.917D
Pb-212	298.56	74.81	76.	0.	0.000	423.45	0.260D
Pb-212	307.74	77.11	44.	100.	0.167	27.37	0.919D
Pb-214	307.74	77.11	94.	0.	0.000	824.62	0.659D
Pb-214	347.42	87.03	26.	34.	0.058	66.67	0.792
Th-234	368.72	92.35	41.	24.	0.041	84.46	0.933D
Ac-228	380.72	95.35	14.	7.	0.012	165.80	0.935D
Ac-228	837.33	209.48	0.	52.	0.087	27.74	0.750s
Pb-212	953.94	238.62	13.	101.	0.168	22.44	1.057D
Pb-214	967.37	241.98	8.	30.	0.049	45.84	1.060D

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 13:07:11 Page 3
EnergySolutions Spectrum name: Win00316.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.00	270.38	4.	0.	0.001	479.58	0.000s
Pb-214	1180.53	295.26	7.	56.	0.093	33.41	0.930
Ac-228	1311.64	328.03	2.	7.	0.012	98.12	0.413s
Ac-228	1353.27	338.43	3.	31.	0.052	41.60	0.553s
Pb-214	1407.37	351.95	0.	67.	0.112	24.43	1.476s

WI07-0539 D2 Bag# S-051 Grid A3-2 072507

Ac-228	1851.91	463.06	0.	11.	0.018	60.30	0.500s
Bi-214	2437.67	609.45	0.	46.	0.077	29.49	0.650s
CS-137	2645.50	661.39	0.	10.	0.017	63.25	0.500s
Bi-214	3066.00	766.48	0.	8.	0.013	70.71	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3643.33	910.75	6.	3.	0.005	240.37	0.197s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	8.	6.	0.010	154.57	1.595D
Ac-228	3876.86	969.11	13.	1.	0.002	761.73	1.598D
Bi-214	4483.00	1120.58	12.	2.	0.003	616.44	0.000s
Bi-214	4957.33	1239.10	0.	6.	0.010	81.65	0.250s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5847.31	1461.47	0.	16.	0.027	50.00	0.500s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7059.62	1764.37	0.	8.	0.013	70.71	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3192E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.415E-04	G
			1238.11	4.068E-04	&	2.712E-04	G
			768.36	4.169E-04	&	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.255E-05	G K
			969.11	0.000E+00	%	1.137E-04	G
			338.32	3.653E-04		1.027E-04	G
			964.60	3.781E-04		3.621E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	4.288E-04	?	2.033E-04	G
			209.28	1.100E-03	*	2.266E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 13:07:11 Page 4
EnergySolutions Spectrum name: Win00316.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.054E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.372E-04		1.348E-04	X
		327.64	2.919E-04	?	1.943E-04	G
Pb-212	N 2.3122E-04	238.62	2.312E-04	(	1.310E-05	G K
		77.11	3.834E-04	+	6.691E-05	Energy duplication
		74.81	0.000E+00	%	8.307E-05	Energy duplication
CS-137	2.7099E-05	661.66	2.710E-05	?(	2.710E-06	G
Th-234	N 3.5132E-04	92.35	3.037E-04	(	1.189E-04	G
		63.29	4.191E-04	$(	1.446E-04	G

```
                    WI07-0539   D2 Bag# S-051   Grid A3-2   072507
Pb-214   N   2.4815E-04    351.92 2.481E-04  (  3.704E-06         G K
                           295.21 3.508E-04 +   7.352E-05         G
                            77.11 0.000E+00 %   9.356E-05Energy duplication
                           241.98 4.105E-04 +   1.276E-04         G
                            74.81 7.242E-04 +   1.666E-04Energy duplication
                            87.30 5.006E-04 +   1.664E-04         X

Pb-210   N   5.5798E-04     46.50 5.580E-04  (  2.219E-04         G

AM-241       1.4579E-03     59.54 1.458E-03  (  2.507E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 13:07:11 Page    5
EnergySolutions                    Spectrum name: Win00316.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214        5.7039E-01    1.682E-01    1.696E-01
K-40    #     1.7325E+00    8.663E-01    8.687E-01
Ac-228  B<    1.2925E-01
Pb-212        5.6867E-01    1.276E-01    1.294E-01
CS-137  #     6.6648E-02    4.215E-02    4.223E-02
Th-234        8.6405E-01    5.195E-01    5.199E-01
Pb-214        6.1030E-01    1.491E-01    1.509E-01
Pb-210        1.3723E+00    1.442E+00    1.442E+00
AM-241        3.5855E+00    3.059E-01    3.334E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0539 D2 Bag# S-051 Grid A3-2 072507

& - 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 (2.7 to 1999.3 keV) 9.3703899E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0540 D2 Bag# S-052 Grid A3-2,5 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 07:22:06 Page 1
4714781 Spectrum name: Win00375.An1

Sample description
WI07-0540 D2 Bag # S-052 Grid A3-2,5 07-29-07

Spectrum Filename: C:\User\Win00375.An1

Acquisition information
Start time: 29-Jul-2007 07:11:55
Live time: 600
Real time: 602
Dead time: 0.35 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5110E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5110E+02) = 2.8482E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 07:22:06 Page 2
4714781 Spectrum name: Win00375.An1

WI07-0540 D2 Bag# S-052 Grid A3-2,5 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1133

********** 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	
11.82	2.92	4985.	12382.	20.636	2.41	0.854	-	D
18.08	4.48	12721.	8571.	14.285	4.30	0.855	-	D
104.94	26.42	43.	129.	0.216	26.14	0.964	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.90	46.66	222.	31.	0.052	159.25	0.622s
AM-241	237.69	59.60	651.	9296.	15.494	2.33	0.906
Th-234	252.46	63.29	37.	40.	0.067	52.87	0.907D
Pb-214	298.54	74.81	67.	75.	0.126	38.39	0.917D
Pb-212	298.56	74.81	85.	0.	0.000	224.85	0.495D
Pb-212	307.74	77.11	70.	148.	0.247	22.91	0.919D
Pb-214	307.74	77.11	254.	0.	0.000	83.56	0.000D
Pb-214	348.35	87.26	42.	49.	0.082	53.99	0.970
Th-234	368.72	92.35	49.	45.	0.075	53.07	0.933D
Ac-228	380.72	95.35	34.	9.	0.016	185.91	0.935D
Ac-228	836.57	209.29	17.	22.	0.037	73.18	0.517s
Pb-212	953.94	238.62	34.	206.	0.343	16.06	1.057D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 07:22:06 Page 3
4714781 Spectrum name: Win00375.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	30.	19.	0.031	96.28	1.060D
Ac-228	1078.72	269.81	13.	24.	0.041	72.18	0.847s
Pb-214	1181.59	295.52	10.	71.	0.118	30.12	1.381s
Ac-228	1311.62	328.02	5.	2.	0.004	272.55	0.267s
Ac-228	1352.31	338.19	8.	63.	0.105	32.22	1.222

WI07-0540 D2 Bag# S-052 Grid A3-2,5 072907

Pb-214	1407.19	351.91	7.	93.	0.156	23.69	1.287
Ac-228	1854.00	463.58	0.	17.	0.028	48.51	0.292s
Bi-214	2436.39	609.13	0.	80.	0.133	22.36	0.861s
CS-137	2647.48	661.89	0.	29.	0.048	37.14	0.604s
Bi-214	3072.00	767.98	1.	1.	0.002	316.23	0.100s
Ac-228	3179.00	794.72	0.	10.	0.017	63.25	0.625s
Ac-228	3645.60	911.32	0.	48.	0.080	28.87	1.250
Bi-214	3734.33	933.49	0.	7.	0.012	75.59	0.375s
Ac-228	3858.81	964.60	0.	6.	0.010	80.65	1.595D
Ac-228	3876.86	969.11	0.	22.	0.037	42.56	1.598D
Bi-214	4482.50	1120.45	0.	9.	0.015	66.67	0.375s
Bi-214	4953.08	1238.04	3.	1.	0.002	360.56	0.211s
Bi-214	5510.55	1377.33	4.	2.	0.004	305.73	0.312s
K-40	5845.27	1460.96	0.	45.	0.075	29.81	0.783s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.33	1764.54	1.	0.	0.001	240.37	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7204E-04	609.31	3.720E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	2.190E-04	-	1.161E-04	G
			1238.11	0.000E+00	%	2.286E-04	G
			768.36	0.000E+00	%	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	4.328E-04	G
			934.06	6.802E-04	+	4.154E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	?(	4.403E-05	G
Ac-228	N	5.1060E-04	911.07	5.286E-04	(	1.101E-05	G K
			969.11	4.289E-04	(	1.942E-05	G
			338.32	7.383E-04	+	1.456E-04	G
			964.60	3.796E-04	-	2.495E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	6.626E-04	?(	3.898E-05	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 07:22:06 Page 4
4714781 Spectrum name: Win00375.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.726E-04	?(	1.332E-04	G
		270.23	7.602E-04	+	2.848E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.813E-04	-	1.885E-04	X
		327.64	0.000E+00	%	1.741E-04	G
Pb-212	N 4.7358E-04	238.62	4.736E-04	(	2.011E-05	G K
		77.11	5.670E-04	+	8.187E-05	Energy duplication
		74.81	0.000E+00	%	8.775E-05	Energy duplication
CS-137	7.8587E-05	661.66	7.859E-05	?(	2.710E-06	G
Th-234	N 6.4725E-04	92.35	5.622E-04	(	1.298E-04	G
		63.29	7.684E-04	$(	1.729E-04	G

```
Pb-214   N   3.7941E-04    351.92 3.457E-04  (  1.550E-05         G K
                           295.21 4.448E-04  (  3.132E-05         G
                            77.11 0.000E+00 ?   1.512E-04Energy duplication
                           241.98 2.561E-04 -   1.440E-04         G
                            74.81 8.415E-04 +   1.940E-04Energy duplication
                            87.30 7.110E-04 +   2.032E-04         X

Pb-210   N   6.3963E-04     46.50 6.396E-04 ?(  4.402E-04         G

AM-241       1.9142E-02     59.54 1.914E-02  (  7.532E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 07:22:06 Page    5
 4714781                          Spectrum name: Win00375.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214 #      1.0596E+00    2.369E-01     2.402E-01
 K-40   #      5.6430E+00    1.682E+00     1.696E+00
 Ac-228        1.4543E+00    3.485E-01     3.527E-01
 Pb-212        1.3488E+00    2.167E-01     2.225E-01
 CS-137 #      2.2383E-01    8.313E-02     8.357E-02
 Th-234        1.8435E+00    6.905E-01     6.918E-01
 Pb-214        1.0806E+00    2.071E-01     2.110E-01
 Pb-210 #C     1.8218E+00    2.901E+00     2.901E+00
 AM-241        5.4521E+01    1.268E+00     2.383E+00

   # - All peaks for activity calculation had bad shape.
```

WI07-0540 D2 Bag# S-052 Grid A3-2,5 072907

* - 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 (2.7 to 1999.3 keV) 6.8996796E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0542 D2 Bag# S-053 Grid A3-1 072507

Sample description
WI07- 0542 D2 Bag # S-053 Grid A3-1 072507

Spectrum Filename: C:\User\D1 Samples\WI07-0128 D1 A-F (WZ) Cutting Pipes 072507.An1

Acquisition information

Start time:	25-Jul-2007 13:56:17
Live time:	600
Real time:	602
Dead time:	0.29 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.0200E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0200E+02) = 3.3113E+03

Detection limit method: Traditional ORTEC method

WI07-0542 D2 Bag# S-053 Grid A3-1 072507

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1518

********** 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	
14.49	3.81	3753.	22518.	37.530	1.72	2.160	CU-64	s
105.19	26.48	25.	70.	0.116	38.00	0.631	AM-241	s
2332.87	583.26	4.	59.	0.098	30.47	0.364	TL-208	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.02	46.68	128.	36.	0.059	109.01	0.518s
AM-241	237.55	59.56	282.	2732.	4.554	4.58	0.916
Th-234	253.57	63.57	58.	34.	0.058	89.01	0.356s
Pb-214	298.54	74.81	74.	77.	0.128	38.94	0.917D
Pb-212	298.56	74.81	98.	0.	0.000	978.28	0.000D
Pb-212	307.74	77.11	60.	119.	0.199	25.95	0.919D
Pb-214	307.74	77.11	178.	0.	0.000	139.40	0.345D
Pb-214	348.54	87.31	50.	49.	0.082	61.09	0.643s
Th-234	368.72	92.35	43.	37.	0.062	59.70	0.933D
Ac-228	380.72	95.35	29.	9.	0.015	185.76	0.935D
Ac-228	836.20	209.20	11.	21.	0.035	70.37	0.536s

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:06:28 Page 3
EnergySolutions Spectrum name: WI07-0128 D1 A-F (WZ) Cutti

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	24.	169.	0.281	17.48	1.057D
Pb-214	967.37	241.98	24.	8.	0.013	196.40	1.060D
Ac-228	1083.41	270.98	6.	27.	0.045	52.90	0.486s
Pb-214	1181.04	295.39	15.	53.	0.089	41.38	0.762s
Ac-228	1309.00	327.37	5.	0.	0.000	0.00	0.000s

WI07-0542 D2 Bag# S-053 Grid A3-1 072507

Ac-228	1351.20	337.91	8.	40.	0.068	42.22	0.522s
Pb-214	1406.55	351.75	9.	92.	0.153	24.60	1.369
Ac-228	1852.93	463.31	2.	10.	0.017	80.00	0.515s
Bi-214	2436.68	609.20	0.	53.	0.088	27.47	1.112
CS-137	2647.86	661.98	6.	29.	0.048	50.21	0.429s
Bi-214	3072.60	768.13	0.	8.	0.013	70.71	0.312s
Ac-228	3179.15	794.75	0.	13.	0.022	55.47	0.312s
Ac-228	3645.93	911.40	0.	42.	0.070	30.86	0.514s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	12.	0.021	56.82	1.595D
Ac-228	3876.86	969.11	0.	25.	0.042	39.99	1.598D
Bi-214	4483.57	1120.72	0.	7.	0.012	75.59	0.500s
Bi-214	4952.25	1237.83	0.	8.	0.013	70.71	0.375s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.35	1460.98	0.	34.	0.057	34.30	0.387s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7060.50	1764.58	0.	2.	0.003	141.42	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4647E-04	609.31	2.465E-04	(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	1.703E-04	-	1.040E-04	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	4.169E-04	+	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	4.6467E-04	911.07	4.625E-04	?(	1.101E-05	G K
			969.11	4.857E-04	(	1.942E-05	G
			338.32	4.746E-04	(	5.453E-05	G
			964.60	7.649E-04	+	3.397E-04	G
			794.70	7.644E-04	+	3.306E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:06:28 Page 4
EnergySolutions Spectrum name: WI07-0128 D1 A-F (WZ) Cutti

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	3.898E-04	(	9.984E-05	G
		209.28	4.479E-04	(	1.096E-04	G
		270.23	8.435E-04	&	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.700E-04	-	1.778E-04	X
		327.64	0.000E+00	?	1.507E-04	G
Pb-212	N 4.0731E-04	238.62	3.876E-04	(	1.722E-05	G K
		77.11	4.560E-04	(	4.385E-05	Energy duplication
		74.81	0.000E+00	%	9.398E-05	Energy duplication
CS-137	7.8587E-05	661.66	7.859E-05	(	1.084E-05	G
Th-234	N 5.4333E-04	92.35	4.633E-04	(	1.219E-04	G

			63.29	6.573E-04	?(	2.140E-04		G
Pb-214	N	3.3848E-04	351.92	3.407E-04	(	1.767E-05		G K
			295.21	3.341E-04	(	3.720E-05		G
			77.11	0.000E+00	?	1.273E-04	Energy duplication	
			241.98	1.057E-04	-	1.177E-04		G
			74.81	8.597E-04	+	1.996E-04	Energy duplication	
			87.30	7.110E-04	+	2.116E-04		X
Pb-210	N	7.2809E-04	46.50	7.281E-04	(	3.374E-04		G
AM-241		5.6259E-03	59.54	5.626E-03	(	4.993E-05		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

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 Counting pCi/g	2 Sigma Total pCi/g
Bi-214		8.1614E-01	2.242E-01	2.263E-01
K-40	#	4.9568E+00	1.700E+00	1.710E+00
Ac-228		1.5386E+00	3.854E-01	3.897E-01
Pb-212		1.3487E+00	2.110E-01	2.170E-01
CS-137		2.6022E-01	1.307E-01	1.310E-01
Th-234		1.7991E+00	9.641E-01	9.650E-01
Pb-214		1.1208E+00	2.698E-01	2.730E-01
Pb-210		2.4109E+00	2.628E+00	2.629E+00
AM-241		1.8629E+01	8.523E-01	1.096E+00

WI07-0542 D2 Bag# S-053 Grid A3-1 072507

- 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 (2.7 to 1999.3 keV) 3.2880096E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0543 D2 Bag# S-054 Grid C2-5 072507

Sample description
WI07- 0543 D2 Bag # S-054 Grid C2-5 072507

Spectrum Filename: C:\User\D1 Samples\WI07-0091 D1 A-F (WZ) Cutt
ing Pipes 072507.An1

Acquisition information
Start time: 25-Jul-2007 14:10:07
Live time: 600
Real time: 602
Dead time: 0.37 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.3370E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3370E+02) =
2.9967E+03

Detection limit method: Traditional ORTEC method

WI07-0543 D2 Bag# S-054 Grid C2-5 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0967

********** 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	
11.72	2.93	5068.	9081.	15.136	3.05	0.854	-	D
16.79	4.19	13275.	7553.	12.588	4.89	0.855	-	D
104.94	26.42	54.	163.	0.272	23.89	0.743	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	317.	0.	0.000	0.00	0.000s
AM-241	237.58	59.57	745.	10574.	17.623	2.19	0.960
Th-234	253.78	63.62	65.	65.	0.108	51.98	0.633s
Pb-214	298.54	74.81	95.	134.	0.224	26.78	0.917D
Pb-212	298.56	74.81	129.	0.	0.000	206.91	0.333D
Pb-212	307.74	77.11	71.	178.	0.296	20.15	0.919D
Pb-214	307.74	77.11	175.	0.	0.000	717.45	0.293D
Pb-214	348.31	87.25	48.	72.	0.120	40.82	0.531s
Th-234	368.72	92.35	74.	44.	0.074	62.38	0.933D
Ac-228	380.72	95.35	47.	8.	0.013	251.97	0.935D
Ac-228	834.54	208.78	19.	35.	0.059	57.66	0.981s

0

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:20:18 Page 3
EnergySolutions Spectrum name: WI07-0091 D1 A-F (WZ) Cutti

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	38.	247.	0.412	14.54	1.057D
Pb-214	967.37	241.98	25.	38.	0.063	49.33	1.060D
Ac-228	1079.17	269.92	3.	42.	0.070	34.99	0.527s
Pb-214	1180.61	295.28	19.	64.	0.107	37.39	0.802s
Ac-228	1308.94	327.35	4.	2.	0.003	294.39	0.191s

WI07-0543 D2 Bag# S-054 Grid C2-5 072507

Ac-228	1351.99	338.11	13.	43.	0.071	44.85	0.934
Pb-214	1407.31	351.94	0.	122.	0.203	18.11	1.125s
Ac-228	1850.80	462.78	4.	15.	0.025	69.28	0.507s
Bi-214	2437.27	609.35	0.	90.	0.150	21.08	0.405s
CS-137	2647.68	661.94	0.	22.	0.037	42.64	0.833s
Bi-214	3074.55	768.61	0.	11.	0.018	60.30	0.750s
Ac-228	3173.60	793.37	0.	12.	0.020	57.74	0.375s
Ac-228	3644.76	911.11	3.	52.	0.087	30.44	1.011s
Bi-214	3737.12	934.19	0.	10.	0.017	63.25	0.500s
Ac-228	3858.81	964.60	3.	9.	0.014	90.53	1.595D
Ac-228	3876.86	969.11	1.	15.	0.025	54.59	1.598D
Bi-214	4479.67	1119.74	4.	2.	0.002	401.85	0.181s
Bi-214	4949.00	1237.02	0.	6.	0.010	81.65	0.250s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5844.62	1460.80	0.	50.	0.083	28.28	0.687s
Ac-228	6353.00	1587.82	0.	7.	0.012	75.59	0.250s
Bi-214	7060.78	1764.65	0.	27.	0.045	38.49	0.525s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1720E-04	609.31	4.185E-04	(	4.650E-06	G K
			1764.49	9.608E-04	+	2.799E-04	G
			1120.29	0.000E+00	%	9.007E-05	G
			1238.11	4.068E-04	&(	6.779E-05	G
			768.36	5.732E-04	+	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	(	4.403E-05	G
Ac-228	N	5.8059E-04	911.07	5.745E-04	?(	3.229E-05	G K
			969.11	2.927E-04	-	1.200E-04	G
			338.32	5.000E-04	(	6.666E-05	G
			964.60	5.342E-04	(	1.935E-04	G
			794.70	7.056E-04	&(	5.880E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	5.847E-04	(	1.314E-04	G
		209.28	7.476E-04	(	1.403E-04	G
		270.23	1.312E-03	+	3.124E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	2.119E-04	X
		327.64	0.000E+00	%	1.629E-04	G
Pb-212	N 5.6793E-04	238.62	5.679E-04	(	2.118E-05	G K
		77.11	6.801E-04	+	8.737E-05	Energy duplication
		74.81	0.000E+00	%	1.073E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	(	2.710E-06	G
Th-234	N 8.3356E-04	92.35	5.537E-04	(	1.578E-04	G

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                                63.29 1.232E-03 *(  2.275E-04          G

Pb-214    N   4.4521E-04      351.92 4.519E-04 @(  3.704E-06          G K
                              295.21 4.009E-04  (  4.187E-05          G
                               77.11 0.000E+00 %   1.260E-04Energy duplication
                              241.98 5.258E-04  (  1.049E-04          G
                               74.81 1.499E-03 +   2.445E-04Energy duplication
                               87.30 1.045E-03 +   2.322E-04          X

Pb-210    N   0.0000E+00       46.50 0.000E+00 %   5.254E-04          G

AM-241        2.1773E-02       59.54 2.177E-02  (  8.053E-05          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

   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
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     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 14:20:18 Page    5
 EnergySolutions                    Spectrum name: WI07-0091  D1  A-F   (WZ)  Cutti

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.2502E+00	2.636E-01	2.677E-01
K-40	6.5969E+00	1.866E+00	1.882E+00
Ac-228	1.7398E+00	4.359E-01	4.407E-01
Pb-212	1.7019E+00	2.475E-01	2.556E-01
CS-137	1.7866E-01	7.618E-02	7.648E-02
Th-234	2.4979E+00	1.014E+00	1.016E+00
Pb-214	1.3342E+00	2.416E-01	2.467E-01
Pb-210 <	1.5745E+00		
AM-241	6.5247E+01	1.430E+00	2.807E+00

< - MDA value printed.

WI07-0543 D2 Bag# S-054 Grid C2-5 072507

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 (2.7 to 1999.3 keV) 8.0546844E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0544 D2 Bag# S-055 Grid C2-5 072507

Sample description
WI07- 0544 D2 Bag # S-055 Grid C2-5 072507

Spectrum Filename: C:\User\Win00320.An1

Acquisition information
Start time: 25-Jul-2007 14:25:06
Live time: 600
Real time: 602
Dead time: 0.40 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4020E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4020E+02) = 2.9394E+03
Detection limit method: Traditional ORTEC method

WI07-0544 D2 Bag# S-055 Grid C2-5 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1242

********** 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	
11.77	2.93	5267.	10378.	17.297	2.79	0.854	-	D
16.68	4.16	14203.	8392.	13.987	4.57	0.855	-	D
69.78	17.63	62.	184.	0.308	21.77	1.122	MO-99	s
105.02	26.44	32.	210.	0.349	17.16	0.643	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	229.	16.	0.026	299.60	0.000s
AM-241	237.55	59.56	929.	14583.	24.304	1.85	0.898
Th-234	253.30	63.50	34.	28.	0.047	75.17	0.954
Pb-214	298.54	74.81	75.	90.	0.150	34.50	0.917D
Pb-212	298.56	74.81	102.	0.	0.000	2863.56	0.207D
Pb-212	307.74	77.11	65.	161.	0.269	21.17	0.919D
Pb-214	307.74	77.11	254.	0.	0.000	116.24	0.000D
Pb-214	348.01	87.17	46.	46.	0.076	60.52	0.789
Th-234	368.72	92.35	50.	47.	0.078	51.85	0.933D
Ac-228	380.72	95.35	31.	2.	0.003	966.02	0.936D
Ac-228	839.67	210.06	25.	42.	0.069	58.24	0.259s

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:35:18 Page 3
EnergySolutions Spectrum name: Win00320.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	25.	181.	0.302	16.79	1.057D
Pb-214	967.37	241.98	24.	50.	0.083	39.97	1.060D
Ac-228	1079.13	269.91	13.	17.	0.028	97.16	0.373s
Pb-214	1180.04	295.13	8.	102.	0.170	23.37	0.681s
Ac-228	1312.11	328.14	8.	24.	0.039	63.74	0.277s

WI07-0544 D2 Bag# S-055 Grid C2-5 072507

Ac-228	1352.67	338.28	9.	49.	0.082	37.63	0.924
Pb-214	1407.20	351.91	8.	130.	0.218	19.57	1.357
Ac-228	1851.57	462.97	7.	19.	0.032	71.84	0.875s
Bi-214	2437.49	609.41	0.	87.	0.145	21.44	1.468s
CS-137	2644.70	661.19	2.	8.	0.014	89.52	0.598s
Bi-214	3073.80	768.43	0.	16.	0.027	50.00	0.458s
Ac-228	3179.30	794.79	0.	11.	0.018	60.30	0.364s
Ac-228	3645.53	911.30	0.	32.	0.053	35.36	0.533s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	3.	4.	0.007	154.84	1.595D
Ac-228	3876.86	969.11	2.	16.	0.026	57.18	1.598D
Bi-214	4481.12	1120.11	0.	24.	0.040	40.82	0.417s
Bi-214	4949.67	1237.18	4.	2.	0.002	401.85	0.210s
Bi-214	5505.00	1375.94	0.	6.	0.010	81.65	0.250s
K-40	5844.43	1460.75	0.	44.	0.073	30.15	1.499
Ac-228	6354.67	1588.24	1.	0.	0.001	240.37	0.197s
Bi-214	7061.10	1764.73	0.	20.	0.033	44.72	0.562s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.0459E-04	609.31	4.046E-04	(	4.650E-06	G K
			1764.49	7.117E-04	+	2.435E-04	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	0.000E+00	&	2.509E-04	G
			768.36	8.338E-04	+	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	&	4.328E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	3.2611E-04	911.07	3.524E-04	?(	1.101E-05	G K
			969.11	3.057E-04	(	5.210E-05	G
			338.32	5.743E-04	+	1.322E-04	G
			964.60	2.512E-04	(	1.834E-04	G
			794.70	6.468E-04	+	3.067E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:35:18 Page 4
EnergySolutions Spectrum name: Win00320.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.536E-04	+	3.012E-04	G
		209.28	8.816E-04	&	2.557E-04	G
		270.23	5.207E-04	+	2.581E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.656E-04	X
		327.64	9.570E-04	+	3.468E-04	G
Pb-212	N 4.1603E-04	238.62	4.160E-04	(	1.743E-05	G K
		77.11	6.171E-04	+	8.335E-05	Energy duplication
		74.81	0.000E+00	%	9.581E-05	Energy duplication
CS-137	2.2131E-05	661.66	2.213E-05	?(	6.718E-06	G
Th-234	N 5.6507E-04	92.35	5.806E-04	(	1.305E-04	G

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                    WI07-0544   D2 Bag# S-055   Grid C2-5   072507
                                 63.29 5.430E-04 $(  1.681E-04          G

Pb-214    N   4.8333E-04      351.92 4.833E-04  (  1.723E-05          G K
                              295.21 6.390E-04 +   9.610E-05          G
                               77.11 0.000E+00 ?   1.512E-04Energy duplication
                              241.98 6.863E-04 +   1.753E-04          G
                               74.81 1.003E-03 +   2.084E-04Energy duplication
                               87.30 6.602E-04 +   2.032E-04          X

Pb-210    N   0.0000E+00       46.50 0.000E+00 %   4.622E-04          G

AM-241        3.0028E-02       59.54 3.003E-02  (  8.981E-05          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

   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
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     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 14:35:18 Page    5
 EnergySolutions                    Spectrum name: Win00320.An1

   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
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***** 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
Bi-214 #	1.1893E+00	2.550E-01	2.589E-01
K-40 #	5.6944E+00	1.717E+00	1.730E+00
Ac-228	9.5858E-01	3.389E-01	3.408E-01
Pb-212	1.2229E+00	2.053E-01	2.104E-01
CS-137 #	6.5052E-02	5.823E-02	5.829E-02
Th-234	1.6610E+00	7.584E-01	7.594E-01
Pb-214	1.4207E+00	2.781E-01	2.831E-01
Pb-210 <	1.3586E+00		
AM-241	8.8265E+01	1.631E+00	3.652E+00

WI07-0544 D2 Bag# S-055 Grid C2-5 072507

- 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 (2.7 to 1999.3 keV) 1.0047680E+02 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Tran
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0545 D2 Bag# S-056 Grid C2-1,5 072507

Sample description
WI07- 0545 D2 Bag # S-056 Grid C2-1,5 072507

Spectrum Filename: C:\User\D1 Samples\WI07-0087 D1 A-F (WZ) Cutt
ing Pipes 072507.An1

Acquisition information
Start time: 25-Jul-2007 14:37:33
Live time: 600
Real time: 602
Dead time: 0.33 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8760E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8760E+02) =
3.4771E+03

Detection limit method: Traditional ORTEC method

WI07-0545 D2 Bag# S-056 Grid C2-1,5 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0546

********** 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	
14.63	3.85	3126.	20604.	34.340	1.77	2.168	CU-64	s
105.00	26.43	32.	118.	0.198	25.72	1.066	AM-241	s
199.25	49.82	698.	206.	0.343	50.07	1.235	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.25	46.49	289.	0.	0.000	0.00	0.893
AM-241	237.54	59.56	570.	7715.	12.858	2.60	0.987
Th-234	253.20	63.48	40.	48.	0.080	54.01	0.600s
Pb-214	298.54	74.81	76.	94.	0.157	33.34	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	307.58	0.203D
Pb-212	307.74	77.11	61.	149.	0.248	22.10	0.919D
Pb-214	307.74	77.11	159.	0.	0.000	403.26	0.612D
Pb-214	348.19	87.22	66.	64.	0.107	56.60	1.300s
Th-234	368.72	92.35	33.	51.	0.086	42.04	0.933D
Ac-228	380.72	95.35	29.	11.	0.018	157.33	0.936D
Ac-228	836.71	209.32	11.	44.	0.073	42.75	0.562s

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:47:44 Page 3
EnergySolutions Spectrum name: WI07-0087 D1 A-F (WZ) Cutti

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	23.	173.	0.288	17.13	1.057D
Pb-214	967.37	241.98	28.	36.	0.060	53.08	1.060D
Ac-228	1079.50	270.01	5.	23.	0.038	57.33	0.834s
Pb-214	1181.26	295.44	13.	72.	0.119	31.75	0.724s
Ac-228	1306.06	326.63	9.	6.	0.010	177.95	0.311s

WI07-0545 D2 Bag# S-056 Grid C2-1,5 072507

Ac-228	1352.71	338.29	4.	33.	0.056	39.67	0.542s
Pb-214	1406.87	351.83	10.	95.	0.158	24.00	1.360
Ac-228	1852.90	463.30	3.	18.	0.030	60.86	0.314s
Bi-214	2436.85	609.25	4.	64.	0.106	28.04	0.629s
CS-137	2647.00	661.77	0.	3.	0.005	115.47	0.750s
Bi-214	3073.25	768.29	0.	8.	0.013	70.71	0.375s
Ac-228	3179.00	794.72	0.	5.	0.008	89.44	0.750s
Ac-228	3645.15	911.21	0.	47.	0.078	29.17	0.869s
Bi-214	3737.67	934.33	2.	2.	0.003	321.67	0.174s
Ac-228	3858.81	964.60	3.	4.	0.006	184.62	1.595D
Ac-228	3876.86	969.11	5.	24.	0.040	48.66	1.598D
Bi-214	4482.39	1120.42	0.	18.	0.030	47.14	0.625s
Bi-214	4953.50	1238.14	0.	4.	0.007	100.00	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.04	1460.66	0.	45.	0.075	29.81	0.583s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7061.17	1764.75	4.	2.	0.003	316.23	0.409s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9256E-04	609.31	2.953E-04	(	1.485E-05	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	4.169E-04	+	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	3.277E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	(	4.403E-05	G
Ac-228	N	4.7611E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	4.655E-04	(	7.202E-05	G
			338.32	3.907E-04	(	3.813E-05	G
			964.60	2.166E-04	-	2.639E-04	G
			794.70	2.940E-04	-	2.176E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 14:47:44 Page 4
EnergySolutions Spectrum name: WI07-0087 D1 A-F (WZ) Cutti

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.016E-04	+	2.728E-04	G
		209.28	9.240E-04	+	2.328E-04	G
		270.23	7.082E-04	+	2.499E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	2.040E-04	-	1.822E-04	X
		327.64	2.443E-04	&	2.443E-04	G
Pb-212	N 3.9721E-04	238.62	3.972E-04	(	1.683E-05	G K
		77.11	5.703E-04	+	8.039E-05	Energy duplication
		74.81	0.000E+00	%	1.017E-04	Energy duplication
CS-137	8.1297E-06	661.66	8.130E-06	?(	2.710E-06	G
Th-234	N 7.5382E-04	92.35	6.410E-04	(	1.072E-04	G

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                    WI07-0545   D2 Bag# S-056   Grid C2-1,5   072507
                                 63.29 9.144E-04  (  1.802E-04          G

Pb-214   N   3.9832E-04     351.92 3.519E-04  (  1.852E-05          G K
                            295.21 4.489E-04 @(  3.563E-05          G
                             77.11 0.000E+00 %   1.202E-04Energy duplication
                            241.98 4.994E-04  (  1.104E-04          G
                             74.81 1.050E-03 +   2.114E-04Energy duplication
                             87.30 9.287E-04 +   2.414E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00     5.011E-04          G

AM-241       1.5886E-02      59.54 1.589E-02  (  7.056E-05          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

   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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 14:47:44 Page    5
EnergySolutions                  Spectrum name: WI07-0087  D1  A-F   (WZ)  Cutti

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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***** 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
Bi-214	1.0172E+00	2.852E-01	2.878E-01
K-40	6.8889E+00	2.054E+00	2.070E+00
Ac-228	1.6555E+00	3.820E-01	3.870E-01
Pb-212	1.3811E+00	2.366E-01	2.422E-01
CS-137 #	2.8267E-02	3.264E-02	3.266E-02
Th-234	2.6211E+00	8.969E-01	8.990E-01
Pb-214	1.3850E+00	3.063E-01	3.107E-01
Pb-210 <	1.7424E+00		
AM-241	5.5237E+01	1.438E+00	2.500E+00

WI07-0545 D2 Bag# S-056 Grid C2-1,5 072507

- 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 (2.7 to 1999.3 keV) 7.0214355E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0546 D2 Bag# S-057 Grid C2-3,4,5 072507

Sample description
WI07- 0546 D2 Bag # S-057 Grid C2-3,4,5 072507

Spectrum Filename: C:\User\Win00322.An1

Acquisition information
Start time: 25-Jul-2007 14:59:56
Live time: 600
Real time: 604
Dead time: 0.64 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5460E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5460E+02) = 2.8201E+03
Detection limit method: Traditional ORTEC method

0

WI07-0546 D2 Bag# S-057 Grid C2-3,4,5 072507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0468

********** 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	
11.74	2.91	1901.	6907.	11.512	3.00	0.854	-	D
17.93	4.45	9309.	5676.	9.460	5.49	0.855	-	D
83.91	21.16	136.	193.	0.322	27.70	1.318	TC-99M	s
104.88	26.40	77.	443.	0.738	12.18	0.983	AM-241	s
128.75	32.37	123.	268.	0.447	20.57	0.785	XE-138	s
197.94	49.66	3758.	1014.	1.689	23.49	1.434	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.21	46.48	1306.	0.	0.000	0.00	0.893
AM-241	237.54	59.56	3297.	43897.	73.162	1.09	1.008
Th-234	258.22	64.73	61.	60.	0.101	53.71	0.242s
Pb-214	298.54	74.81	73.	90.	0.151	33.95	0.917D
Pb-212	298.56	74.81	92.	0.	0.000	201.02	0.237D
Pb-212	307.74	77.11	81.	160.	0.267	22.36	0.919D
Pb-214	307.74	77.11	162.	0.	0.000	386.54	0.282D
Pb-214	347.34	87.01	53.	76.	0.126	39.69	1.134s
Th-234	368.72	92.35	83.	41.	0.069	69.87	0.933D

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 15:33:21 Page 3
EnergySolutions Spectrum name: Win00322.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	33.	7.	0.012	236.04	0.935D
Ac-228	836.58	209.29	14.	39.	0.065	49.70	0.613s
Pb-212	953.94	238.62	17.	204.	0.340	15.14	1.057D
Pb-214	967.37	241.98	28.	35.	0.058	54.41	1.060D
Ac-228	1080.35	270.22	11.	39.	0.066	45.04	0.472s

WI07-0546 D2 Bag# S-057 Grid C2-3,4,5 072507

Pb-214	1181.17	295.42	15.	72.	0.121	32.81	1.297
Ac-228	1310.49	327.74	8.	19.	0.032	69.03	0.393s
Ac-228	1352.62	338.27	8.	48.	0.081	35.65	0.819s
Pb-214	1407.19	351.91	2.	124.	0.206	18.62	0.932
Ac-228	1851.06	462.84	4.	19.	0.031	60.98	0.673s
Bi-214	2436.77	609.23	4.	86.	0.142	24.56	1.610s
CS-137	2646.73	661.70	0.	14.	0.023	53.45	0.375s
Bi-214	3075.75	768.91	0.	8.	0.013	70.71	0.625s
Ac-228	3177.00	794.22	0.	4.	0.007	100.00	0.250s
Ac-228	3646.00	911.42	0.	46.	0.077	29.49	0.500s
Bi-214	3736.25	933.97	0.	11.	0.018	60.30	0.375s
Ac-228	3858.81	964.60	3.	11.	0.018	76.88	1.595D
Ac-228	3876.86	969.11	8.	17.	0.029	65.92	1.598D
Bi-214	4482.88	1120.54	0.	16.	0.027	50.00	0.750s
Bi-214	4952.00	1237.77	0.	15.	0.025	51.64	0.500s
Bi-214	5515.50	1378.57	0.	11.	0.018	60.30	0.250s
K-40	5844.77	1460.84	0.	32.	0.053	35.36	0.550s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7058.91	1764.19	0.	15.	0.025	51.64	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.9719E-04	609.31	3.976E-04	@(	1.647E-05	G K
			1764.49	5.338E-04	+	2.135E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	1.017E-03	+	4.068E-04	G
			768.36	4.169E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.190E-03	+	5.644E-04	G
			934.06	1.069E-03	+	5.069E-04	G
K-40	N	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	5.7136E-04	911.07	5.066E-04	?(	1.101E-05	G K
			969.11	3.367E-04	-	1.474E-04	G
			338.32	5.684E-04	(	5.163E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 15:33:21 Page 4
EnergySolutions Spectrum name: Win00322.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	6.661E-04	(	1.903E-04	G
		794.70	2.352E-04	-	1.983E-04	G
		463.00	7.276E-04	?(	1.359E-04	G
		209.28	8.217E-04	+	2.287E-04	G
		270.23	1.229E-03	+	3.284E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	7.737E-04	(	1.845E-04	G
Pb-212	N 4.6842E-04	238.62	4.684E-04	(	1.467E-05	G K
		77.11	6.141E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	%	9.116E-05	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G

WI07-0546 D2 Bag# S-057 Grid C2-3,4,5 072507

Th-234	N	7.7595E-04	92.35	5.136E-04	(	1.669E-04	G	
			63.29	1.149E-03	&(	2.196E-04	G	
Pb-214	N	4.5932E-04	351.92	4.574E-04	(	1.034E-05	G	K
			295.21	4.531E-04	(	3.720E-05	G	
			77.11	0.000E+00	%	1.215E-04	Energy duplication	
			241.98	4.847E-04	(	1.105E-04	G	
			74.81	1.009E-03	+	2.072E-04	Energy duplication	
			87.30	1.100E-03	+	2.404E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00		1.054E-03	G	
AM-241		9.0390E-02	59.54	9.039E-02	(	1.682E-04	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

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 15:33:21 Page 5
EnergySolutions Spectrum name: Win00322.An1

N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

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
Bi-214	#	1.1201E+00	2.751E-01	2.783E-01
K-40	#	3.9732E+00	1.405E+00	1.413E+00
Ac-228		1.6113E+00	4.144E-01	4.188E-01
Pb-212		1.3210E+00	2.000E-01	2.061E-01
CS-137	#	1.0699E-01	5.719E-02	5.733E-02
Th-234		2.1882E+00	9.642E-01	9.656E-01
Pb-214		1.2953E+00	2.412E-01	2.461E-01
Pb-210	<	2.9712E+00		

WI07-0546 D2 Bag# S-057 Grid C2-3,4,5 072507

AM-241	2.5491E+02	2.775E+00	9.835E+00

- 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 (2.7 to 1999.3 keV) 2.6652301E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Farr
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0547 D2 Bag# S-058 Grid C2-4 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:58:16 Page 1
4714781 Spectrum name: Win00343.An1

Sample description
WI07-0547 D2 Bag #S-058 Grid C2-4 07-26-07

Spectrum Filename: C:\User\Win00343.An1

Acquisition information
Start time: 26-Jul-2007 09:48:04
Live time: 600
Real time: 602
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.1200E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1200E+02) = 3.2051E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:58:16 Page 2
4714781 Spectrum name: Win00343.An1

WI07-0547 D2 Bag# S-058 Grid C2-4 072607

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1138

********** 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	
14.80	3.89	3771.	19103.	31.838	1.94	2.328	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.51	46.31	62.	38.	0.062	85.37	0.291s
AM-241	237.59	59.57	117.	1120.	1.866	7.03	0.885
Th-234	253.23	63.48	36.	36.	0.060	66.67	1.057s
Pb-214	298.54	74.81	61.	80.	0.133	35.63	0.917D
Pb-212	298.56	74.81	83.	0.	0.000	866.67	0.744D
Pb-212	307.74	77.11	47.	137.	0.228	22.19	0.919D
Pb-214	307.74	77.11	132.	0.	0.000	507.09	0.471D
Pb-214	348.44	87.28	30.	46.	0.077	50.70	1.046
Th-234	368.72	92.35	51.	22.	0.037	100.43	0.933D
Ac-228	380.72	95.35	30.	9.	0.014	193.62	0.935D
Ac-228	835.60	209.05	18.	34.	0.057	60.56	0.424s
Pb-212	953.94	238.62	19.	210.	0.350	15.01	1.057D
Pb-214	967.37	241.98	29.	20.	0.033	89.44	1.060D
Ac-228	1085.94	271.62	16.	6.	0.010	244.95	0.441s

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:58:16 Page 3
4714781 Spectrum name: Win00343.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.52	295.26	9.	59.	0.098	32.30	1.415s
Ac-228	1312.38	328.21	5.	20.	0.033	61.24	0.453s
Ac-228	1353.38	338.46	8.	30.	0.049	50.62	1.262
Pb-214	1407.03	351.87	8.	87.	0.145	25.91	1.171s
Ac-228	1853.37	463.42	4.	26.	0.044	49.06	0.559s

WI07-0547 D2 Bag# S-058 Grid C2-4 072607

Bi-214	2438.51	609.66	4.	67.	0.112	27.84	0.668s
CS-137	2650.18	662.56	4.	4.	0.006	227.45	0.284s
Bi-214	3075.00	768.73	4.	2.	0.002	476.10	0.200s
Ac-228	3178.40	794.57	0.	15.	0.025	51.64	0.375s
Ac-228	3643.60	910.82	0.	30.	0.050	36.51	1.333
Bi-214	3734.00	933.41	0.	3.	0.005	115.47	0.250s
Ac-228	3856.83	964.10	1.	1.	0.001	339.93	0.339s
Ac-228	3876.93	969.13	15.	0.	0.000	0.00	1.598
Bi-214	4477.06	1119.09	3.	11.	0.018	87.20	0.578s
Bi-214	4953.00	1238.02	0.	2.	0.003	141.42	0.250s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5844.50	1460.77	0.	32.	0.053	35.36	0.417s
Ac-228	6350.25	1587.13	0.	5.	0.008	89.44	0.375s
Bi-214	7059.33	1764.29	1.	0.	0.001	240.37	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0032E-04	609.31	3.116E-04	@(	1.568E-05	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	2.677E-04	&(	7.300E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	0.000E+00	%	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	3.3486E-04	911.07	3.304E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	1.180E-04	G
			338.32	3.457E-04	(	5.163E-05	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	1.033E-03	+	3.220E-04	G
			209.28	7.194E-04	+	2.266E-04	G
			270.23	0.000E+00	&	2.234E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	7.262E-04	+	5.376E-04	G
		95.35	1.657E-04	-	1.800E-04	X
		327.64	8.145E-04	&	3.090E-04	G
Pb-212	N 4.9439E-04	238.62	4.823E-04	(	1.541E-05	G K
		77.11	5.244E-04	(	3.909E-05	Energy duplication
		74.81	0.000E+00	%	8.675E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.228E-05	G
Th-234	N 4.4539E-04	92.35	2.765E-04	(	1.322E-04	G
		63.29	6.858E-04	*(	1.715E-04	G
Pb-214	N 3.3011E-04	351.92	3.222E-04	*(	1.678E-05	G K

```
                    WI07-0547   D2 Bag# S-058   Grid C2-4   072607
                            295.21 3.675E-04  (  3.038E-05          G
                             77.11 0.000E+00 %   1.100E-04Energy duplication
                            241.98 2.734E-04  (  1.128E-04          G
                             74.81 8.909E-04 +   1.931E-04Energy duplication
                             87.30 6.675E-04 +   1.863E-04          X

Pb-210    N   7.6552E-04      46.50 7.655E-04  (  2.387E-04          G

AM-241        2.3055E-03      59.54 2.306E-03  (  3.259E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 09:58:16 Page    5
 4714781                          Spectrum name: Win00343.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214 #     9.6255E-01     2.680E-01    2.704E-01
 K-40   #     4.5157E+00     1.597E+00    1.605E+00
 Ac-228       1.0733E+00     3.349E-01    3.374E-01
 Pb-212       1.5846E+00     2.123E-01    2.204E-01
 CS-137  <    3.9355E-02
 Th-234       1.4275E+00     8.604E-01    8.610E-01
 Pb-214       1.0581E+00     2.741E-01    2.770E-01
 Pb-210       2.4536E+00     2.095E+00    2.096E+00
 AM-241       7.3896E+00     5.197E-01    5.872E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0547 D2 Bag# S-058 Grid C2-4 072607

< - 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 (2.7 to 1999.3 keV) 2.0464800E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0548 D2 Bag# S-059 Grid C2-1,4 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:25:49 Page 1
4714781 Spectrum name: Win00344.An1

Sample description
WI07-0548 D2 Bag #S-059 Grid C2-1,4 07-26-07

Spectrum Filename: C:\User\Win00344.An1

Acquisition information
Start time: 26-Jul-2007 10:15:39
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6330E+02) = 2.7525E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:25:49 Page 2
4714781 Spectrum name: Win00344.An1

WI07-0548 D2 Bag# S-059 Grid C2-1,4 072607

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0852

********** 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	
14.54	3.82	3699.	24133.	40.222	1.64	2.156	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.73	46.61	48.	32.	0.053	82.92	0.371s
AM-241	237.58	59.57	89.	664.	1.107	9.33	0.765
Th-234	252.18	63.22	75.	58.	0.097	62.48	1.253s
Pb-214	298.54	74.81	63.	100.	0.166	30.15	0.917D
Pb-212	298.56	74.81	104.	0.	0.000	295.30	0.392D
Pb-212	307.74	77.11	71.	152.	0.253	22.62	0.919D
Pb-214	307.74	77.11	262.	0.	0.000	87.18	0.225D
Pb-214	348.23	87.23	46.	79.	0.132	37.29	0.900
Th-234	368.72	92.35	47.	42.	0.070	55.66	0.933D
Ac-228	380.72	95.35	41.	7.	0.012	253.59	0.935D
Ac-228	835.46	209.01	17.	24.	0.039	74.90	1.472s
Pb-212	953.94	238.62	20.	298.	0.497	12.33	1.057D
Pb-214	967.37	241.98	25.	46.	0.077	42.30	1.060D
Ac-228	1082.25	270.69	12.	46.	0.076	44.19	0.398s

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:25:49 Page 3
4714781 Spectrum name: Win00344.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.22	295.18	14.	64.	0.107	35.22	0.642s
Ac-228	1310.00	327.62	6.	1.	0.002	590.40	0.000s
Ac-228	1353.27	338.43	3.	64.	0.107	26.76	0.655s
Pb-214	1406.62	351.77	0.	128.	0.213	17.68	1.010s
Ac-228	1851.94	463.07	5.	17.	0.028	69.10	0.333s

WI07-0548 D2 Bag# S-059 Grid C2-1,4 072607

Bi-214	2437.15	609.32	0.	78.	0.130	22.65	1.458s
CS-137	2647.63	661.92	0.	20.	0.033	44.72	0.292s
Bi-214	3072.85	768.19	2.	11.	0.019	72.45	0.793s
Ac-228	3171.86	792.93	6.	2.	0.004	340.20	0.226s
Ac-228	3645.51	911.30	0.	49.	0.082	28.57	1.015s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	5.	0.009	125.11	1.595D
Ac-228	3876.86	969.11	0.	31.	0.052	35.65	1.598D
Bi-214	4482.39	1120.42	0.	18.	0.030	47.14	0.875s
Bi-214	4954.00	1238.27	0.	4.	0.007	100.00	0.250s
Bi-214	5509.00	1376.94	0.	4.	0.007	100.00	0.250s
K-40	5845.96	1461.13	0.	45.	0.075	29.81	0.593s
Ac-228	6350.83	1587.28	1.	1.	0.001	366.67	0.223s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.8447E-04	609.31	3.627E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.380E-04	?(	2.433E-05	G
			1238.11	2.712E-04	-	2.286E-04	G
			768.36	5.819E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	(	4.403E-05	G
Ac-228	N	6.0167E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	6.112E-04	(	1.942E-05	G
			338.32	7.540E-04	(	3.355E-05	G
			964.60	3.237E-04	-	2.797E-04	G
			794.70	0.000E+00	&	2.664E-04	G
			463.00	6.626E-04	(	1.443E-04	G
			209.28	5.008E-04	(	1.356E-04	G
			270.23	1.422E-03	+	3.496E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	1.986E-04	X
		327.64	0.000E+00	%	1.741E-04	G
Pb-212	N 6.8550E-04	238.62	6.855E-04	(	1.571E-05	G K
		77.11	5.806E-04	-	8.278E-05	Energy duplication
		74.81	0.000E+00	%	9.671E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 7.6572E-04	92.35	5.230E-04	(	1.275E-04	G
		63.29	1.111E-03	*(	2.425E-04	G
Pb-214	N 4.7407E-04	351.92	4.741E-04	*(	3.704E-06	G K

WI07-0548 D2 Bag# S-059 Grid C2-1,4 072607

			295.21	4.009E-04	-	8.144E-05	G
			77.11	0.000E+00	?	1.535E-04	Energy duplication
			241.98	6.396E-04	+	1.718E-04	G
			74.81	1.110E-03	+	2.067E-04	Energy duplication
			87.30	1.146E-03	+	2.368E-04	X
Pb-210	N	6.5324E-04	46.50	6.532E-04	(	2.105E-04	G
AM-241		1.3680E-03	59.54	1.368E-03	(	2.847E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:25:49 Page 5
4714781 Spectrum name: Win00344.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	1.0583E+00	2.397E-01	2.429E-01
K-40	5.4535E+00	1.626E+00	1.639E+00
Ac-228	1.6561E+00	3.804E-01	3.854E-01
Pb-212	1.8869E+00	2.327E-01	2.432E-01
CS-137 #	1.4918E-01	6.672E-02	6.696E-02
Th-234	2.1077E+00	8.818E-01	8.832E-01
Pb-214	1.3049E+00	2.307E-01	2.358E-01
Pb-210	1.7981E+00	1.491E+00	1.491E+00
AM-241	3.7654E+00	3.512E-01	3.779E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-0548 D2 Bag# S-059 Grid C2-1,4 072607

< - 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 (2.7 to 1999.3 keV) 1.9179955E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Tum
EnergySolutions

Reviewed by: [illegible]
Supervisor

Laboratory: 4714781

WI07-0556 D2 Bag# S-060 Grid C2-4 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:39:22 Page 1
4714781 Spectrum name: Win00345.An1

Sample description
WI07-0556 D2 Bag #S-060 Grid C2-4 07-26-07

Spectrum Filename: C:\User\win00345.An1

Acquisition information
Start time: 26-Jul-2007 10:29:11
Live time: 600
Real time: 602
Dead time: 0.34 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.3370E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3370E+02) = 2.9967E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:39:22 Page 2
4714781 Spectrum name: Win00345.An1

WI07-0556 D2 Bag# S-060 Grid C2-4 072607

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1279

********** 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	
14.65	3.85	4962.	24089.	40.148	1.74	2.160	CU-64	s
70.58	17.83	174.	61.	0.102	79.17	0.593	MO-99	s
105.18	26.48	123.	97.	0.162	50.04	0.973	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.00	46.68	148.	0.	0.000	0.00	0.000s
AM-241	237.62	59.58	595.	6337.	10.562	3.00	0.848
Th-234	252.62	63.33	51.	27.	0.044	98.39	0.753
Pb-214	298.54	74.81	47.	71.	0.119	35.99	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	2645.12	0.405D
Pb-212	307.74	77.11	42.	96.	0.160	27.84	0.919D
Pb-214	307.74	77.11	129.	0.	0.000	155.12	0.000D
Pb-214	347.69	87.09	35.	35.	0.058	70.37	0.623s
Th-234	368.72	92.35	45.	42.	0.070	54.94	0.933D
Ac-228	380.72	95.35	20.	7.	0.012	187.29	0.935D
Ac-228	833.56	208.54	17.	32.	0.054	63.25	0.257s
Pb-212	953.94	238.62	27.	131.	0.218	20.77	1.057D

0

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:39:22 Page 3
4714781 Spectrum name: Win00345.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	15.	28.	0.047	53.68	1.060D
Ac-228	1081.18	270.43	10.	20.	0.034	75.62	0.360s
Pb-214	1180.93	295.36	9.	45.	0.074	38.98	1.141
Ac-228	1310.00	327.62	2.	0.	0.000	0.00	0.000s
Ac-228	1351.71	338.04	6.	35.	0.058	43.89	1.117

WI07-0556 D2 Bag# S-060 Grid C2-4 072607

Pb-214	1406.79	351.81	0.	98.	0.163	20.20	1.201s
Ac-228	1854.29	463.65	0.	18.	0.030	47.14	0.333s
Bi-214	2436.69	609.21	0.	74.	0.123	23.25	0.619s
CS-137	2645.79	661.46	0.	14.	0.023	53.45	0.562s
Bi-214	3072.33	768.06	1.	0.	0.001	240.37	0.197s
Ac-228	3179.80	794.92	0.	5.	0.008	89.44	0.625s
Ac-228	3646.67	911.59	0.	30.	0.050	36.51	0.354s
Bi-214	3732.00	932.91	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	1.	2.	0.003	242.14	1.595D
Ac-228	3876.86	969.11	0.	20.	0.034	44.39	1.598D
Bi-214	4483.45	1120.69	0.	20.	0.033	44.72	0.750s
Bi-214	4949.00	1237.02	0.	14.	0.023	53.45	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.37	1460.99	0.	35.	0.058	33.81	0.500s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.4072E-04	609.31	3.441E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	9.491E-04	&	3.942E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	2.915E-04	&(	9.716E-05	G
K-40	N	1.5410E-03	1460.81	1.541E-03	?(	4.403E-05	G
Ac-228	N	3.6028E-04	911.07	3.304E-04	?(	1.101E-05	G K
			969.11	3.942E-04	(	1.942E-05	G
			338.32	4.102E-04	(	4.688E-05	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	2.940E-04	?(	5.880E-05	G
			463.00	7.016E-04	&	2.542E-04	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:39:22 Page 4
4714781 Spectrum name: Win00345.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	6.842E-04	&	2.203E-04	G
		270.23	6.405E-04	+	2.581E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.406E-04	-	1.515E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 3.2045E-04	238.62	3.010E-04	(	1.808E-05	G K
		77.11	3.686E-04	(	3.693E-05	Energy duplication
		74.81	0.000E+00	%	8.549E-05	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G
Th-234	N 5.1632E-04	92.35	5.221E-04	(	1.250E-04	G
		63.29	5.080E-04	?(	2.028E-04	G

WI07-0556 D2 Bag# S-060 Grid C2-4 072607

```
Pb-214    N   3.6772E-04     351.92 3.630E-04 @(  3.704E-06          G K
                             295.21 2.798E-04 -   6.831E-05          G
                              77.11 0.000E+00 ?   1.087E-04Energy duplication
                             241.98 3.913E-04  (  8.220E-05          G
                              74.81 7.959E-04 +   1.771E-04Energy duplication
                              87.30 5.079E-04 +   1.791E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   3.651E-04          G

AM-241        1.3049E-02      59.54 1.305E-02  (  7.207E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 10:39:22 Page    5
 4714781                          Spectrum name: Win00345.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0210E+00	2.374E-01	2.405E-01
K-40 #	4.6178E+00	1.561E+00	1.571E+00
Ac-228	1.0796E+00	3.105E-01	3.131E-01
Pb-212	9.6029E-01	1.668E-01	1.706E-01
CS-137 #	1.1369E-01	6.077E-02	6.093E-02
Th-234	1.5473E+00	8.500E-01	8.508E-01
Pb-214	1.1019E+00	2.226E-01	2.264E-01
Pb-210 <	1.0941E+00		
AM-241	3.9103E+01	1.172E+00	1.862E+00

- All peaks for activity calculation had bad shape.

WI07-0556 D2 Bag# S-060 Grid C2-4 072607

* - 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 (2.7 to 1999.3 keV) 4.9544945E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0557 D2 Bag# S-061 Grid C2-4 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:52:54 Page 1
4714781 Spectrum name: Win00346.An1

Sample description
WI07-0556 D2 Bag #S-061 Grid C2-4 07-26-07

Spectrum Filename: C:\User\Win00346.An1

Acquisition information
Start time: 26-Jul-2007 10:42:43
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5000E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5000E+02) = 2.8571E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:52:54 Page 2
4714781 Spectrum name: Win00346.An1

WI07-0557 D2 Bag# S-061 Grid C2-4 072607

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1249

********** 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	
14.72	3.87	3135.	22871.	38.118	1.65	2.279	CU-64	s
372.03	93.20	54.	65.	0.109	40.25	0.933	U-235	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.71	46.61	130.	52.	0.087	74.14	1.171s
AM-241	237.61	59.58	540.	4769.	7.948	3.54	0.832
Th-234	253.32	63.51	55.	47.	0.078	65.85	0.823s
Pb-214	298.54	74.81	72.	107.	0.179	29.50	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	299.33	0.433D
Pb-212	307.74	77.11	56.	154.	0.257	21.11	0.919D
Pb-214	307.74	77.11	150.	0.	0.000	2413.24	0.489D
Pb-214	347.64	87.08	43.	74.	0.123	39.43	0.726s
Th-234	368.72	92.35	85.	22.	0.036	128.63	0.933D
Ac-228	380.72	95.35	23.	7.	0.012	209.64	0.935D
Ac-228	837.28	209.47	20.	44.	0.073	51.96	1.427s
Pb-212	953.94	238.62	14.	227.	0.378	14.10	1.057D
Pb-214	967.37	241.98	24.	37.	0.062	49.60	1.060D

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:52:54 Page 3
4714781 Spectrum name: Win00346.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.49	269.75	8.	30.	0.051	52.08	1.037s
Pb-214	1180.79	295.32	13.	52.	0.086	38.82	0.360s
Ac-228	1312.01	328.12	13.	25.	0.041	73.62	0.343s
Ac-228	1353.33	338.45	11.	53.	0.088	38.54	0.626s
Pb-214	1407.28	351.93	8.	110.	0.184	22.01	1.132

WI07-0557 D2 Bag# S-061 Grid C2-4 072607

Ac-228	1850.00	462.58	0.	18.	0.030	47.14	0.750s
Bi-214	2437.49	609.41	0.	72.	0.120	23.57	1.375
CS-137	2647.20	661.82	0.	10.	0.017	63.25	0.500s
Bi-214	3073.00	768.23	0.	8.	0.013	70.71	0.500s
Ac-228	3180.00	794.97	0.	8.	0.013	70.71	0.292s
Ac-228	3645.61	911.32	0.	44.	0.073	30.15	0.927s
Bi-214	3736.00	933.91	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	7.	0.012	94.72	1.595D
Ac-228	3876.86	969.11	0.	24.	0.039	41.10	1.598D
Bi-214	4483.06	1120.59	0.	17.	0.028	48.51	0.937s
Bi-214	4955.00	1238.52	0.	3.	0.005	115.47	0.750s
Bi-214	5513.50	1378.07	0.	3.	0.005	115.47	0.500s
K-40	5845.61	1461.05	0.	46.	0.077	29.49	0.812s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7057.52	1763.84	4.	2.	0.004	305.73	0.311s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5697E-04	609.31	3.348E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	4.169E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	5.0979E-04	911.07	4.846E-04	?(	1.101E-05	G K
			969.11	4.598E-04	(	1.942E-05	G
			338.32	6.211E-04	(	6.114E-05	G
			964.60	4.322E-04	(	1.581E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	7.016E-04	(	3.898E-05	G
			209.28	9.310E-04	+	2.502E-04	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 10:52:54 Page 4
4714781 Spectrum name: Win00346.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.529E-04	+	2.920E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	1.005E-03	+	3.760E-04	G
Pb-212	N 5.4095E-04	238.62	5.207E-04	(	1.348E-05	G K
		77.11	5.911E-04	(	4.232E-05	Energy duplication
		74.81	0.000E+00	%	9.805E-05	Energy duplication
CS-137	2.7099E-05	661.66	2.710E-05	?(	2.710E-06	G
Th-234	N 5.2751E-04	92.35	2.691E-04	(	1.694E-04	G
		63.29	8.954E-04	*(	2.096E-04	G

```
                    WI07-0557   D2 Bag# S-061   Grid C2-4   072607
Pb-214   N   4.2623E-04     351.92 4.086E-04  (  1.647E-05         G K
                            295.21 3.237E-04 -   7.462E-05         G
                             77.11 0.000E+00 %   1.172E-04Energy duplication
                            241.98 5.136E-04  (  1.027E-04         G
                             74.81 1.198E-03 +   2.168E-04Energy duplication
                             87.30 1.069E-03 +   2.293E-04         X

Pb-210   N   1.0717E-03      46.50 1.072E-03  (  3.402E-04         G

AM-241       9.8200E-03      59.54 9.820E-03  (  6.871E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 10:52:54 Page    5
 4714781                          Spectrum name: Win00346.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214        1.0199E+00    2.404E-01    2.434E-01
 K-40    #     5.7865E+00    1.706E+00    1.720E+00
 Ac-228        1.4565E+00    3.457E-01    3.500E-01
 Pb-212        1.5456E+00    1.962E-01    2.045E-01
 CS-137  #     7.7425E-02    4.897E-02    4.906E-02
 Th-234        1.5072E+00    9.925E-01    9.932E-01
 Pb-214        1.2178E+00    2.680E-01    2.719E-01
 Pb-210        3.0621E+00    2.270E+00    2.271E+00
 AM-241        2.8057E+01    9.921E-01    1.436E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0557 D2 Bag# S-061 Grid C2-4 072607

& - 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 (2.7 to 1999.3 keV) 4.3730244E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0659 D2 Bag# S-076 Grid B3-3.4 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:54:24 Page 1
4714781 Spectrum name: Win00381.An1

Sample description
WI07-0659 D2 Bag # S-076 Grid B3-3,4 07-29-07

Spectrum Filename: C:\User\Win00381.An1

Acquisition information
Start time: 29-Jul-2007 10:44:14
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5110E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5110E+02) = 2.8482E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:54:24 Page 2
4714781 Spectrum name: Win00381.An1

WI07-0659 D2 Bag# S-076 Grid B3-3.4 072907

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1597

********** 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	
11.73	2.91	6104.	11736.	19.559	2.64	0.854	-	D
16.69	4.15	15854.	9839.	16.399	4.14	0.855	-	D
70.81	17.89	16.	32.	0.053	58.61	0.283	MO-99	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.08	46.45	61.	20.	0.033	129.75	0.344s
AM-241	237.67	59.59	171.	2814.	4.690	4.12	0.935
Th-234	251.12	62.96	9.	24.	0.041	59.14	0.426s
Pb-214	298.54	74.81	13.	25.	0.042	56.22	0.917D
Pb-212	298.56	74.81	21.	0.	0.000	312.41	0.244D
Pb-212	307.74	77.11	21.	41.	0.069	43.87	0.919D
Pb-214	307.74	77.11	50.	0.	0.000	585.95	0.218D
Pb-214	342.12	85.70	19.	17.	0.029	106.86	0.288s
Th-234	370.83	92.88	18.	34.	0.058	56.73	0.387s
Ac-228	380.72	95.35	3.	0.	0.000	0.00	0.000D
Ac-228	837.42	209.50	3.	1.	0.002	360.56	0.211s
Pb-212	953.94	238.62	15.	25.	0.041	59.88	1.057D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:54:24 Page 3
4714781 Spectrum name: Win00381.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	6.	18.	0.030	61.93	1.060D
Ac-228	1077.74	269.57	0.	27.	0.045	38.49	0.375s
Pb-214	1179.62	295.03	5.	34.	0.056	43.34	0.844s
Ac-228	1310.00	327.62	0.	4.	0.007	100.00	0.750s
Ac-228	1353.80	338.56	0.	9.	0.015	66.67	0.375s

WI07-0659 D2 Bag# S-076 Grid B3-3.4 072907

Pb-214	1406.84	351.82	3.	52.	0.087	30.12	0.805s
Ac-228	1853.00	463.33	1.	1.	0.001	388.73	0.000s
Bi-214	2437.35	609.37	0.	37.	0.062	32.88	1.177
CS-137	2645.00	661.27	0.	5.	0.008	89.44	0.750s
Bi-214	3073.00	768.23	0.	1.	0.002	200.00	0.250s
Ac-228	3179.00	794.72	0.	5.	0.008	89.44	0.250s
Ac-228	3641.00	910.17	0.	7.	0.012	75.59	0.250s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.100D
Ac-228	3872.33	967.98	1.	0.	0.001	240.37	0.197s
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.60	1461.05	0.	8.	0.013	70.71	0.375s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

S - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.7207E-04	609.31	1.721E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	?	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.5222E-04	1460.81	3.522E-04	?(	4.403E-05	G
Ac-228	N	1.1112E-04	911.07	7.709E-05	&(	1.101E-05	G K
			969.11	0.000E+00	&	3.884E-05	G
			338.32	1.055E-04	?(	1.172E-05	G
			964.60	0.000E+00	%	9.988E-05	G
			794.70	2.940E-04	?(	5.880E-05	G
			463.00	0.000E+00	%	9.984E-05	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:54:24 Page 4
4714781 Spectrum name: Win00381.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	7.136E-05	G
		270.23	8.435E-04	&	2.457E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	?	5.779E-05	X
		327.64	1.629E-04	?(	4.072E-05	G
Pb-212	N 5.7021E-05	238.62	5.702E-05	(	1.387E-05	G K
		77.11	1.586E-04	+	4.459E-05	Energy duplication
		74.81	0.000E+00	%	4.517E-05	Energy duplication
CS-137	1.3549E-05	661.66	1.355E-05	?(	2.710E-06	G
Th-234	N 4.4412E-04	92.35	4.305E-04	&(	8.032E-05	G
		63.29	4.636E-04	$(	8.941E-05	G

Pb-214	N	2.1437E-04	351.92	1.938E-04	(	1.060E-05		G K
			295.21	2.109E-04	@(	2.383E-05		G
			77.11	0.000E+00	%	6.899E-05	Energy duplication	
			241.98	2.456E-04	(	5.625E-05		G
			74.81	2.826E-04	(	6.205E-05	Energy duplication	
			87.30	2.515E-04	&(	9.622E-05		X
Pb-210	N	4.0147E-04	46.50	4.015E-04	?(	2.365E-04		G
AM-241		5.7941E-03	59.54	5.794E-03	(	3.914E-05		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

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

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:54:24 Page 5
4714781 Spectrum name: Win00381.An1

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 pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.9008E-01	1.611E-01	1.622E-01
K-40 #	1.0032E+00	7.094E-01	7.104E-01
Ac-228 #	3.1648E-01	1.328E-01	1.333E-01
Pb-212	1.6241E-01	9.725E-02	9.744E-02
CS-137 #	3.8591E-02	3.452E-02	3.455E-02
Th-234	1.2649E+00	5.183E-01	5.191E-01
Pb-214	6.1058E-01	1.778E-01	1.793E-01
Pb-210 #	1.1435E+00	1.484E+00	1.484E+00
AM-241	1.6503E+01	6.795E-01	9.137E-01

- All peaks for activity calculation had bad shape.

WI07-0659 D2 Bag# S-076 Grid B3-3.4 072907

* - 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 (2.7 to 1999.3 keV) 2.1532354E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0660 D2 Bag# S-077 Grid B1-2 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:14:13 Page 1
4714781 Spectrum name: Win00382.An1

Sample description
WI07-0660 D2 Bag # S-077 Grid B1-2 07-29-07

Spectrum Filename: C:\User\Win00382.An1

Acquisition information
Start time: 29-Jul-2007 11:04:02
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 kev
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9720E+02) = 3.3647E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:14:13 Page 2
4714781 Spectrum name: Win00382.An1

WI07-0660 D2 Bag# S-077 Grid B1-2 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1111

********** 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	
14.39	3.78	3375.	24920.	41.533	1.57	2.077	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.40	46.53	40.	22.	0.037	103.12	0.638s
AM-241	237.65	59.59	94.	900.	1.501	7.88	0.904
Th-234	253.02	63.43	24.	23.	0.038	84.75	0.443s
Pb-214	298.54	74.81	30.	52.	0.087	40.51	0.917D
Pb-212	298.56	74.81	56.	0.	0.000	714.92	0.417D
Pb-212	307.74	77.11	33.	71.	0.118	33.16	0.919D
Pb-214	307.74	77.11	59.	0.	0.000	226.27	0.882D
Pb-214	346.66	86.84	38.	28.	0.047	88.70	0.619s
Th-234	368.72	92.35	44.	12.	0.020	163.01	0.933D
Ac-228	380.72	95.35	28.	17.	0.028	101.19	0.935D
Ac-228	839.33	209.98	5.	17.	0.028	69.10	0.589s
Pb-212	953.94	238.62	12.	63.	0.105	29.66	1.057D
Pb-214	967.37	241.98	9.	18.	0.030	67.49	1.060D
Ac-228	1077.78	269.58	7.	16.	0.027	82.34	0.458s

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:14:13 Page 3
4714781 Spectrum name: Win00382.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.22	295.18	4.	38.	0.062	38.92	0.587s
Ac-228	1311.00	327.87	7.	1.	0.002	616.44	0.000s
Ac-228	1350.33	337.70	6.	19.	0.032	69.03	0.434s
Pb-214	1407.58	352.01	4.	38.	0.063	38.06	1.333
Ac-228	1852.00	463.08	1.	0.	0.000	0.00	0.000s

WI07-0660 D2 Bag# S-077 Grid B1-2 072907

Bi-214	2437.32	609.36	0.	41.	0.068	31.23	0.750s
CS-137	2638.86	659.73	6.	2.	0.004	340.20	0.226s
Bi-214	3074.25	768.54	0.	5.	0.008	89.44	0.375s
Ac-228	3178.67	794.63	1.	0.	0.001	240.37	0.197s
Ac-228	3647.43	911.78	0.	16.	0.027	50.00	0.250s
Bi-214	3738.00	934.41	1.	1.	0.001	388.73	0.000s
Ac-228	3858.81	964.60	0.	1.	0.001	277.56	1.595D
Ac-228	3876.86	969.11	1.	7.	0.011	90.32	1.598D
Bi-214	4481.36	1120.17	0.	11.	0.018	60.30	1.000s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.40	1461.00	0.	77.	0.128	22.79	1.624
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7061.00	1764.71	0.	7.	0.012	75.59	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2031E-04	609.31	1.907E-04	?(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	2.606E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	3.3901E-03	1460.81	3.390E-03	?(	4.403E-05	G
Ac-228	N	1.8126E-04	911.07	1.762E-04	?(	1.101E-05	G K
			969.11	1.309E-04	(	4.204E-05	G
			338.32	2.227E-04	&(	4.688E-05	G
			964.60	0.000E+00	%	1.235E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	?	7.795E-05	G
			209.28	3.597E-04	&	1.513E-04	G
			270.23	5.103E-04	&	2.281E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:14:13 Page 4
4714781 Spectrum name: Win00382.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	3.255E-04	(	1.544E-04	X
		327.64	0.000E+00	%	1.845E-04	G
Pb-212	N 1.4462E-04	238.62	1.446E-04	(	1.250E-05	G K
		77.11	2.706E-04	+	5.716E-05	Energy duplication
		74.81	0.000E+00	%	7.186E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.228E-05	G
Th-234	N 2.7060E-04	92.35	1.529E-04	(	1.231E-04	G
		63.29	4.382E-04	?(	1.419E-04	G
Pb-214	N 1.3951E-04	351.92	1.395E-04	?(	1.291E-05	G K

```
                    WI07-0660   D2 Bag# S-077   Grid B1-2  072907
                            295.21 2.349E-04 +   5.994E-05          G
                             77.11 0.000E+00 %   7.465E-05Energy duplication
                            241.98 2.465E-04 +   1.088E-04          G
                             74.81 5.826E-04 +   1.486E-04Energy duplication
                             87.30 4.136E-04 +   1.741E-04          X

Pb-210   N   4.4910E-04     46.50 4.491E-04 ?(  1.931E-04          G

AM-241       1.8543E-03     59.54 1.854E-03  (  2.921E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 11:14:13 Page    5
4714781                          Spectrum name: Win00382.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #      7.4129E-01    2.315E-01    2.332E-01
K-40   #      1.1407E+01    2.600E+00    2.635E+00
Ac-228        6.0990E-01    2.443E-01    2.453E-01
Pb-212        4.8659E-01    1.443E-01    1.455E-01
CS-137   <    4.1315E-02
Th-234   C    9.1048E-01    7.717E-01    7.720E-01
Pb-214        4.6940E-01    1.787E-01    1.795E-01
Pb-210 #      1.5111E+00    1.558E+00    1.559E+00
AM-241        6.2391E+00    4.917E-01    5.432E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0660 D2 Bag# S-077 Grid B1-2 072907

< - 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 (2.7 to 1999.3 keV) 2.2374783E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0661 D2 Bag# S-078 Grid B1-1,2 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:32:15 Page 1
4714781 Spectrum name: Win00383.An1

Sample description
WI07-0661 D2 Bag # S-078 Grid B1-1,2 07-29-07

Spectrum Filename: C:\User\Win00383.An1

Acquisition information
Start time: 29-Jul-2007 11:22:02
Live time: 600
Real time: 602
Dead time: 0.37 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8020E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8020E+02) = 3.5689E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:32:15 Page 2
4714781 Spectrum name: Win00383.An1

WI07-0661 D2 Bag# S-078 Grid B1-1,2 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1824

********** 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	
14.57	3.83	4335.	19119.	31.865	2.00	2.199	CU-64	s
70.14	17.72	94.	138.	0.229	32.39	0.546	MO-99	s
104.50	26.31	48.	206.	0.343	19.37	1.000	U-237	s
128.01	32.19	92.	156.	0.260	29.73	0.805	XE-138	s
198.35	49.68	956.	294.	0.490	31.94	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	410.	30.	0.050	193.47	0.893D
AM-241	237.59	59.57	1141.	12738.	21.230	2.10	0.882
Th-234	252.18	63.22	21.	28.	0.047	64.09	0.628s
Pb-214	298.54	74.81	44.	56.	0.094	42.57	0.917D
Pb-212	298.56	74.81	54.	0.	0.000	351.56	0.275D
Pb-212	307.74	77.11	37.	126.	0.210	22.42	0.919D
Pb-214	307.74	77.11	143.	0.	0.000	148.08	0.473D
Pb-214	348.11	87.20	33.	55.	0.092	46.32	0.983s
Th-234	368.72	92.35	47.	51.	0.084	47.60	0.933D
Ac-228	380.72	95.35	48.	2.	0.003	1139.14	0.936D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:32:15 Page 3
4714781 Spectrum name: Win00383.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	837.47	209.51	4.	27.	0.044	47.66	1.088
Pb-212	953.94	238.62	13.	137.	0.229	18.57	1.057D
Pb-214	967.37	241.98	18.	23.	0.039	65.48	1.060D
Ac-228	1078.60	269.78	10.	16.	0.027	89.27	0.244s
Pb-214	1180.39	295.22	8.	49.	0.082	37.68	0.631s

WI07-0661 D2 Bag# S-078 Grid B1-1,2 072907

Ac-228	1307.80	327.07	2.	16.	0.026	61.81	0.599s
Ac-228	1353.78	338.56	8.	26.	0.043	56.42	0.725s
Pb-214	1406.53	351.74	7.	70.	0.117	28.33	1.004
Ac-228	1850.00	462.58	0.	0.	0.000	0.00	0.000s
Bi-214	2437.33	609.37	0.	48.	0.080	28.87	1.000s
CS-137	2648.50	662.14	0.	34.	0.057	34.30	0.750s
Bi-214	3072.00	767.98	0.	1.	0.002	200.00	0.250s
Ac-228	3178.67	794.63	0.	3.	0.005	115.47	0.375s
Ac-228	3646.18	911.46	0.	28.	0.047	37.80	0.476s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	5.	0.009	99.24	1.595D
Ac-228	3876.86	969.11	2.	14.	0.023	61.03	1.598D
Bi-214	4480.58	1119.97	0.	19.	0.032	45.88	0.875s
Bi-214	4951.33	1237.60	1.	2.	0.003	200.00	0.720s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5846.41	1461.25	0.	34.	0.057	34.30	0.593s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7058.33	1764.04	0.	5.	0.008	89.44	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1199E-04	609.31	2.232E-04	(	4.650E-06	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	0.000E+00	%	2.034E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	2.9716E-04	911.07	3.084E-04	?(	1.101E-05	G K
			969.11	2.705E-04	(	5.039E-05	G
			338.32	2.988E-04	(	5.163E-05	G
			964.60	3.234E-04	(	1.130E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	1.764E-04	-	1.764E-04	G
		463.00	0.000E+00	?	3.898E-05	G
		209.28	5.643E-04	+	1.775E-04	G
		270.23	4.999E-04	+	2.415E-04	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	6.380E-04	&	2.655E-04	G
Pb-212	N 3.1565E-04	238.62	3.156E-04	(	1.277E-05	G K
		77.11	4.829E-04	+	7.106E-05	Energy duplication
		74.81	0.000E+00	%	7.073E-05	Energy duplication
CS-137	9.2136E-05	661.66	9.214E-05	(	2.710E-06	G

```
                    WI07-0661   D2 Bag# S-078   Grid B1-1,2  072907
Th-234    N   5.9134E-04      92.35 6.320E-04  (  1.278E-04          G
                              63.29 5.334E-04 ?(  1.334E-04          G

Pb-214    N   2.8245E-04     351.92 2.605E-04  (  1.550E-05          G K
                             295.21 3.090E-04 @(  2.786E-05          G
                              77.11 0.000E+00 ?   1.144E-04Energy duplication
                             241.98 3.233E-04  (  8.928E-05          G
                              74.81 6.285E-04 +   1.635E-04Energy duplication
                              87.30 8.029E-04 +   1.999E-04          X

Pb-210    N   6.1519E-04      46.50 6.152E-04  (  5.948E-04          G

AM-241        2.6229E-02      59.54 2.623E-02  (  9.940E-05          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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 11:32:15 Page    5
 4714781                          Spectrum name: Win00383.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214       7.5655E-01    2.184E-01    2.202E-01
 K-40    #    5.3424E+00    1.832E+00    1.843E+00
 Ac-228       1.0605E+00    4.008E-01    4.028E-01
 Pb-212       1.1265E+00    2.092E-01    2.134E-01
 CS-137       3.2882E-01    1.128E-01    1.135E-01
 Th-234       2.1104E+00    8.424E-01    8.438E-01
 Pb-214       1.0080E+00    2.711E-01    2.737E-01
 Pb-210  C    2.1956E+00    4.248E+00    4.248E+00
 AM-241       9.3609E+01    1.965E+00    3.983E+00
```

WI07-0661 D2 Bag# S-078 Grid B1-1,2 072907

- 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 (2.7 to 1999.3 keV) 1.0753803E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0662 D2 Bag# S-079 Grid B1-2,3 072907

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 11:51:52 Page    1
4714781                          Spectrum name: Win00384.An1

Sample description
     WI07-0662   D2  Bag # S-079  Grid  B1-2,3   07-29-07


Spectrum Filename: C:\User\Win00384.An1

Acquisition information
       Start time:                 29-Jul-2007 11:41:41
       Live time:                600
       Real time:                602
       Dead time:                  0.33 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8070E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8070E+02) =
                                   3.5625E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 11:51:52 Page    2
4714781                          Spectrum name: Win00384.An1
```

WI07-0662 D2 Bag# S-079 Grid B1-2,3 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1151

********** 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	
11.61	2.91	6877.	10626.	17.710	2.94	0.854	-	D
15.61	3.91	14659.	9341.	15.568	4.21	0.855	-	D
105.26	26.50	21.	102.	0.170	25.72	0.401	AM-241	s
128.93	32.41	37.	103.	0.172	28.74	0.995	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.47	46.80	172.	20.	0.033	205.26	0.338s
AM-241	237.63	59.58	515.	7509.	12.516	2.58	0.875
Th-234	251.86	63.14	25.	23.	0.038	82.34	0.532s
Pb-214	298.54	74.81	53.	48.	0.080	51.67	0.917D
Pb-212	298.56	74.81	60.	0.	0.000	739.37	0.476D
Pb-212	307.74	77.11	38.	103.	0.172	25.95	0.919D
Pb-214	307.74	77.11	119.	0.	0.000	232.84	0.577D
Pb-214	347.54	87.06	24.	28.	0.047	69.46	0.961
Th-234	368.72	92.35	40.	35.	0.058	61.68	0.933D
Ac-228	380.72	95.35	25.	8.	0.014	179.42	0.935D
Ac-228	835.45	209.01	8.	30.	0.051	49.40	0.672s

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:51:52 Page 3
4714781 Spectrum name: Win00384.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	5.	121.	0.202	18.86	1.057D
Pb-214	967.37	241.98	18.	36.	0.060	46.98	1.060D
Ac-228	1082.57	270.77	9.	14.	0.023	97.93	0.358s
Pb-214	1179.65	295.04	8.	51.	0.085	37.41	0.633s
Ac-228	1308.67	327.28	2.	2.	0.002	328.86	0.210s

WI07-0662 D2 Bag# S-079 Grid B1-2,3 072907

Ac-228	1351.83	338.07	7.	18.	0.030	71.43	0.888
Pb-214	1408.25	352.17	4.	80.	0.132	24.55	0.883
Ac-228	1851.67	463.00	0.	26.	0.043	39.22	0.583s
Bi-214	2437.65	609.45	0.	57.	0.095	26.49	0.950s
CS-137	2646.94	661.75	0.	16.	0.027	50.00	0.666s
Bi-214	3075.00	768.73	0.	5.	0.008	89.44	0.375s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3645.07	911.19	0.	30.	0.050	36.51	0.718s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	5.	4.	0.006	204.95	1.595D
Ac-228	3876.86	969.11	1.	14.	0.023	57.22	1.598D
Bi-214	4481.77	1120.27	0.	14.	0.023	53.45	0.417s
Bi-214	4953.50	1238.14	0.	4.	0.007	100.00	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.80	1460.85	0.	45.	0.075	29.81	0.843s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7056.88	1763.68	2.	2.	0.003	311.13	0.422s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.8103E-04	609.31	2.651E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	2.606E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	?(	4.403E-05	G
Ac-228	N	3.1727E-04	911.07	3.304E-04	?(	1.101E-05	G K
			969.11	2.716E-04	(	3.901E-05	G
			338.32	2.110E-04	-	8.894E-05	G
			964.60	0.000E+00	%	2.946E-04	G
			794.70	0.000E+00	%	1.176E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:51:52 Page 4
4714781 Spectrum name: Win00384.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	1.013E-03	+	3.012E-04	G
		209.28	6.454E-04	+	1.953E-04	G
		270.23	4.270E-04	&(	1.515E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.629E-04	-	1.664E-04	X
		327.64	0.000E+00	%	1.373E-04	G
Pb-212	N 2.7826E-04	238.62	2.783E-04	(	8.263E-06	G K
		77.11	3.957E-04	+	6.637E-05	Energy duplication
		74.81	0.000E+00	&	7.427E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 4.3584E-04	92.35	4.342E-04	(	1.183E-04	G

WI07-0662 D2 Bag# S-079 Grid B1-2,3 072907

			63.29	4.382E-04	?(	1.446E-04		G
Pb-214	N	3.0297E-04	351.92	2.944E-04	(	1.182E-05		G K
			295.21	3.195E-04	@(	2.838E-05		G
			77.11	0.000E+00	%	1.044E-04	Energy duplication	
			241.98	4.991E-04	+	1.508E-04		G
			74.81	5.360E-04	+	1.643E-04	Energy duplication	
			87.30	4.087E-04	+	1.554E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.104E-04		G
AM-241		1.5463E-02	59.54	1.546E-02	(	6.710E-05		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

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

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 11:51:52 Page 5
4714781 Spectrum name: Win00384.An1

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 Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.0012E+00	2.652E-01	2.679E-01
K-40	#	7.0582E+00	2.104E+00	2.121E+00
Ac-228		1.1303E+00	4.127E-01	4.149E-01
Pb-212		9.9129E-01	1.870E-01	1.906E-01
CS-137	#	1.5446E-01	7.723E-02	7.746E-02
Th-234		1.5527E+00	7.987E-01	7.995E-01
Pb-214		1.0793E+00	2.415E-01	2.448E-01
Pb-210	<	1.4619E+00		
AM-241		5.5086E+01	1.422E+00	2.486E+00

WI07-0662 D2 Bag# S-079 Grid B1-2,3 072907

- 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 (2.7 to 1999.3 keV) 6.8053886E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0663 D2 Bag# S-080 Grid B2-2,4,5 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:11:58 Page 1
4714781 Spectrum name: Win00385.An1

Sample description
WI07-0663 D2 Bag # S-080 Grid B2-2,4,5 07-29-07

Spectrum Filename: C:\User\Win00385.An1

Acquisition information
Start time: 29-Jul-2007 12:01:46
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2400E+02) = 3.0864E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:11:58 Page 2
4714781 Spectrum name: Win00385.An1

WI07-0663 D2 Bag# S-080 Grid B2-2,4,5 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0961

********** 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	
11.79	2.91	5851.	13222.	22.037	2.39	0.854	-	D
17.84	4.42	16954.	9836.	16.394	4.25	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.35	46.27	95.	15.	0.024	230.12	0.307s
AM-241	237.64	59.59	185.	2907.	4.845	4.10	0.880
Th-234	252.86	63.39	28.	31.	0.051	76.97	0.937s
Pb-214	298.54	74.81	21.	30.	0.050	55.97	0.917D
Pb-212	298.56	74.81	27.	0.	0.000	748.33	0.437D
Pb-212	307.74	77.11	22.	40.	0.067	45.69	0.919D
Pb-214	307.74	77.11	60.	0.	0.000	513.81	0.000D
Pb-214	348.70	87.35	12.	23.	0.039	67.61	0.725s
Th-234	368.72	92.35	19.	26.	0.043	62.48	0.933D
Ac-228	380.72	95.35	11.	2.	0.004	448.41	0.936D
Ac-228	838.00	209.65	3.	0.	0.000	0.00	0.125s
Pb-212	953.94	238.62	11.	32.	0.054	45.14	1.057D
Pb-214	967.37	241.98	9.	15.	0.025	75.31	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:11:58 Page 3
4714781 Spectrum name: Win00385.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.57	269.52	4.	2.	0.002	401.85	0.284s
Pb-214	1181.71	295.55	2.	31.	0.051	39.82	0.823s
Ac-228	1309.00	327.37	1.	0.	0.000	0.00	0.000s
Ac-228	1340.83	335.32	0.	20.	0.033	44.72	0.312s
Pb-214	1407.10	351.89	3.	64.	0.106	27.76	0.494s

WI07-0663 D2 Bag# S-080 Grid B2-2,4,5 072907

Ac-228	1850.00	462.58	0.	0.	0.000	0.00	0.000s
Bi-214	2437.05	609.30	0.	42.	0.070	30.86	1.427
CS-137	2645.33	661.35	0.	6.	0.010	81.65	0.375s
Bi-214	3075.33	768.81	0.	4.	0.007	100.00	0.375s
Ac-228	3179.33	794.80	1.	0.	0.001	240.37	0.197s
Ac-228	3645.00	911.17	0.	5.	0.008	89.44	0.250s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	1.	0.002	310.94	1.595D
Ac-228	3876.86	969.11	2.	2.	0.003	253.80	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.001	223.61	0.100s
Bi-214	4946.00	1236.27	0.	5.	0.008	89.44	0.250s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.250s
K-40	5845.40	1461.00	0.	15.	0.025	51.64	0.333s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.9661E-04	609.31	1.953E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	%	4.867E-05	G
			1238.11	3.390E-04	&	2.509E-04	G
			768.36	2.084E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	+	3.246E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	6.6042E-04	1460.81	6.604E-04	?(	4.403E-05	G
Ac-228	N	1.0735E-04	911.07	5.506E-05	?(	1.101E-05	G K
			969.11	0.000E+00	%	6.548E-05	G
			338.32	2.344E-04	&(	1.172E-05	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	?	3.898E-05	G
			209.28	0.000E+00	?	6.348E-05	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:11:58 Page 4
4714781 Spectrum name: Win00385.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	&	1.156E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.083E-04	X
		327.64	0.000E+00	?	8.145E-05	G
Pb-212	N 7.4532E-05	238.62	7.453E-05	(	1.178E-05	G K
		77.11	1.534E-04	+	4.456E-05	Energy duplication
		74.81	0.000E+00	%	5.095E-05	Energy duplication
CS-137	1.6259E-05	661.66	1.626E-05	?(	2.710E-06	G
Th-234	N 4.2921E-04	92.35	3.203E-04	(	8.406E-05	G
		63.29	5.842E-04	@(	1.533E-04	G

```
                    WI07-0663   D2 Bag# S-080   Grid B2-2,4,5  072907
Pb-214    N   2.1999E-04     351.92 2.358E-04  (  1.159E-05          G K
                             295.21 1.931E-04  (  1.654E-05          G
                              77.11 0.000E+00 %   7.525E-05Energy duplication
                             241.98 2.103E-04  (  6.530E-05          G
                              74.81 3.378E-04 +   1.184E-04Energy duplication
                              87.30 3.386E-04 +   1.289E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   3.132E-04          G

AM-241        5.9859E-03      59.54 5.986E-03  (  4.065E-05          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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 12:11:58 Page    5
 4714781                          Spectrum name: Win00385.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        6.0681E-01    1.873E-01    1.886E-01
 K-40    #     2.0383E+00    1.053E+00    1.055E+00
 Ac-228  #     3.3132E-01    1.482E-01    1.487E-01
 Pb-212        2.3004E-01    1.038E-01    1.042E-01
 CS-137  #     5.0183E-02    4.097E-02    4.102E-02
 Th-234        1.3247E+00    6.566E-01    6.573E-01
 Pb-214        6.7899E-01    1.885E-01    1.902E-01
 Pb-210  <     9.6656E-01
 AM-241        1.8475E+01    7.578E-01    1.021E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0663 D2 Bag# S-080 Grid B2-2,4,5 072907

& - 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 (2.7 to 1999.3 keV) 2.3735432E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0664 D2 Bag# S-081 Grid B1-4,5 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:30:00 Page 1
4714781 Spectrum name: Win00386.An1

Sample description
WI07-0664 D2 Bag # S-081 Grid B1-4,5 07-29-07

Spectrum Filename: C:\User\Win00386.An1

Acquisition information
Start time: 29-Jul-2007 12:19:49
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9560E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9560E+02) =
3.3829E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:30:00 Page 2
4714781 Spectrum name: Win00386.An1

WI07-0664 D2 Bag# S-081 Grid B1-4,5 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0856

********** 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
14.59	3.83	3885.	22329.	37.215	1.74	2.161	CU-64 s
105.12	26.46	20.	68.	0.113	32.40	0.695	AM-241

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	194.	0.	0.000	0.00	0.000s
AM-241	237.58	59.57	533.	5663.	9.438	3.15	0.895
Th-234	252.73	63.36	18.	38.	0.063	50.26	0.954
Pb-214	298.54	74.81	41.	62.	0.103	39.09	0.917D
Pb-212	298.56	74.81	62.	0.	0.000	1122.50	0.191D
Pb-212	307.74	77.11	44.	83.	0.139	31.42	0.919D
Pb-214	307.74	77.11	83.	0.	0.000	2090.46	0.656D
Pb-214	347.56	87.06	28.	30.	0.049	69.15	0.658s
Th-234	370.89	92.89	23.	51.	0.084	44.74	0.428s
Ac-228	380.72	95.35	7.	0.	0.000	0.00	0.104D
Ac-228	836.56	209.29	10.	14.	0.023	100.00	0.513s
Pb-212	953.94	238.62	11.	115.	0.192	20.32	1.057D
Pb-214	967.37	241.98	18.	25.	0.041	63.69	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:30:00 Page 3
4714781 Spectrum name: Win00386.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.93	269.62	4.	32.	0.054	43.49	0.909
Pb-214	1180.69	295.30	10.	37.	0.062	44.25	0.460s
Ac-228	1307.00	326.87	5.	2.	0.003	450.78	0.000s
Ac-228	1353.26	338.43	5.	42.	0.069	37.56	0.744s
Pb-214	1407.56	352.00	11.	54.	0.089	36.72	0.484s

WI07-0664 D2 Bag# S-081 Grid B1-4,5 072907

Ac-228	1850.08	462.60	6.	2.	0.002	626.57	0.136s
Bi-214	2436.76	609.22	0.	46.	0.077	29.49	0.425s
CS-137	2641.67	660.43	3.	1.	0.002	583.10	0.210s
Bi-214	3075.33	768.81	0.	14.	0.023	53.45	0.375s
Ac-228	3180.25	795.03	0.	10.	0.017	63.25	0.375s
Ac-228	3648.29	911.99	0.	25.	0.042	40.00	0.312s
Bi-214	3733.50	933.28	0.	4.	0.007	100.00	0.500s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.750D
Ac-228	3875.00	968.64	0.	0.	0.001	223.61	0.100s
Bi-214	4480.00	1119.83	0.	6.	0.010	81.65	0.750s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.71	1460.82	0.	41.	0.068	31.23	0.593s
Ac-228	6354.67	1588.24	1.	1.	0.001	366.67	0.181s
Bi-214	7061.00	1764.71	0.	9.	0.015	66.67	0.625s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1392E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	3.203E-04	+	1.698E-04	G
			1120.29	1.460E-04	-	9.733E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	2.7819E-04	911.07	2.753E-04	&(	1.101E-05	G K
			969.11	0.000E+00	%	3.884E-05	G
			338.32	4.883E-04	+	1.196E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	5.880E-04	+	2.940E-04	G
			463.00	0.000E+00	%	1.766E-04	G
			209.28	2.962E-04	?(	1.058E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:30:00 Page 4
4714781 Spectrum name: Win00386.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.010E-03	&	2.812E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	8.234E-05	X
		327.64	0.000E+00	&	1.741E-04	G
Pb-212	N 2.8031E-04	238.62	2.649E-04	(	1.196E-05	G K
		77.11	3.185E-04	(	3.780E-05	Energy duplication
		74.81	0.000E+00	%	7.544E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	9.139E-06	G
Th-234	N 6.6740E-04	92.35	6.322E-04	&(	9.170E-05	G
		63.29	7.176E-04	$(	1.253E-04	G

WI07-0664 D2 Bag# S-081 Grid B1-4,5 072907

Pb-214	N	2.1000E-04	351.92	1.988E-04	(	1.958E-05	G K
			295.21	2.318E-04	(	3.132E-05	G
			77.11	0.000E+00	%	8.773E-05	Energy duplication
			241.98	3.402E-04	+	1.353E-04	G
			74.81	6.864E-04	+	1.659E-04	Energy duplication
			87.30	4.305E-04	+	1.637E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.131E-04	G
AM-241		1.1660E-02	59.54	1.166E-02	(	6.829E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:30:00 Page 5
4714781 Spectrum name: Win00386.An1

R - Coincidence Corrected
H - Halflife limit exceeded
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
Bi-214		7.2368E-01	2.134E-01	2.151E-01
K-40	#	6.1067E+00	1.907E+00	1.921E+00
Ac-228		9.4110E-01	3.764E-01	3.781E-01
Pb-212		9.4826E-01	1.774E-01	1.809E-01
CS-137	<	3.0915E-02		
Th-234		2.2578E+00	7.596E-01	7.614E-01
Pb-214		7.1043E-01	2.043E-01	2.060E-01
Pb-210	<	1.3976E+00		
AM-241		3.9446E+01	1.244E+00	1.918E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0664 D2 Bag# S-081 Grid B1-4,5 072907

& - 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 (2.7 to 1999.3 keV) 5.1133881E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0665 D2 Bag# S-082 Grid B2-3,4,5 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:47:35 Page 1
4714781 Spectrum name: Win00387.An1

Sample description
WI07-0665 D2 Bag # S-082 Grid B2-3,4,5 07-29-07

Spectrum Filename: C:\User\Win00387.An1

Acquisition information
Start time: 29-Jul-2007 12:37:24
Live time: 600
Real time: 602
Dead time: 0.30 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0440E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0440E+02) =
3.2852E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:47:35 Page 2
4714781 Spectrum name: Win00387.An1

WI07-0665 D2 Bag# S-082 Grid B2-3,4,5 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1747

********** 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	
14.61	3.84	4737.	24765.	41.275	1.69	2.205	CU-64	s
105.15	26.47	12.	47.	0.079	39.23	0.655	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.07	46.20	90.	34.	0.057	94.67	0.477s
AM-241	237.52	59.56	298.	3908.	6.512	3.64	0.874
Th-234	253.41	63.53	11.	12.	0.021	98.94	0.466s
Pb-214	298.54	74.81	23.	31.	0.051	57.42	0.917D
Pb-212	298.56	74.81	44.	0.	0.000	1480.28	0.000D
Pb-212	307.74	77.11	28.	46.	0.077	43.95	0.919D
Pb-214	307.74	77.11	76.	0.	0.000	3026.55	0.399D
Pb-214	347.35	87.01	19.	25.	0.042	73.87	0.460s
Th-234	370.17	92.71	20.	31.	0.052	61.54	0.783
Ac-228	380.72	95.35	8.	0.	0.000	0.00	0.271D
Ac-228	835.22	208.95	3.	20.	0.034	55.24	0.321s
Pb-212	953.94	238.62	12.	44.	0.074	37.22	1.057D
Pb-214	967.37	241.98	11.	22.	0.037	59.58	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:47:35 Page 3
4714781 Spectrum name: Win00387.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.08	269.40	0.	13.	0.022	55.47	0.500s
Pb-214	1180.95	295.36	6.	43.	0.071	38.95	0.612s
Ac-228	1309.00	327.37	0.	0.	0.000	0.00	0.000s
Ac-228	1352.89	338.34	0.	15.	0.025	51.64	0.312s
Pb-214	1408.00	352.11	0.	51.	0.085	28.01	0.812s

WI07-0665 D2 Bag# S-082 Grid B2-3,4,5 072907

Ac-228	1847.00	461.83	0.	5.	0.008	89.44	0.250s
Bi-214	2436.69	609.21	0.	32.	0.053	35.36	1.458
CS-137	2647.77	661.96	0.	13.	0.022	55.47	0.416s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.00	911.17	4.	0.	0.001	568.62	0.000s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.750D
Ac-228	3879.89	969.87	0.	9.	0.015	66.67	0.375s
Bi-214	4481.75	1120.26	0.	6.	0.010	81.65	0.375s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.65	0.	10.	0.017	63.25	0.375s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.80	1764.66	0.	5.	0.008	89.44	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5422E-04	609.31	1.488E-04	(	4.650E-06	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	1.460E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	4.4028E-04	1460.81	4.403E-04	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	3.714E-05	G K
			969.11	1.748E-04	?	9.266E-05	G
			338.32	1.758E-04	?	7.032E-05	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	1.949E-04	&	1.443E-04	G
			209.28	4.267E-04		1.545E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:47:35 Page 4
4714781 Spectrum name: Win00387.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.062E-04	&	1.757E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	&	8.485E-05	X
		327.64	0.000E+00	?	4.072E-05	G
Pb-212	N 1.0165E-04	238.62	1.017E-04	(	1.236E-05	G K
		77.11	1.760E-04	+	4.853E-05	Energy duplication
		74.81	0.000E+00	%	6.431E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 3.8678E-04	92.35	3.868E-04	(	8.539E-05	G
		63.29	2.350E-04	-	1.391E-04	G

WI07-0665 D2 Bag# S-082 Grid B2-3,4,5 072907

```
Pb-214   N   1.8889E-04    351.92 1.889E-04  (  3.704E-06          G K
                           295.21 2.673E-04 +   6.522E-05          G
                            77.11 0.000E+00 %   8.426E-05Energy duplication
                           241.98 3.071E-04 +   1.195E-04          G
                            74.81 3.419E-04 +   1.217E-04Energy duplication
                            87.30 3.676E-04 +   1.436E-04          X

Pb-210   N   6.9407E-04     46.50 6.941E-04 ?(  2.843E-04          G

AM-241       8.0461E-03     59.54 8.046E-03  (  5.127E-05          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

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

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 12:47:35 Page 5
4714781 Spectrum name: Win00387.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	5.0663E-01	1.791E-01	1.801E-01
K-40 #	1.4464E+00	9.148E-01	9.164E-01
Ac-228 B<	1.2201E-01		
Pb-212	3.3395E-01	1.243E-01	1.249E-01
CS-137 #	1.1573E-01	6.420E-02	6.435E-02
Th-234	1.2706E+00	7.820E-01	7.826E-01
Pb-214	6.2053E-01	1.738E-01	1.753E-01
Pb-210 #	2.2801E+00	2.159E+00	2.159E+00
AM-241	2.6433E+01	9.612E-01	1.372E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0665 D2 Bag# S-082 Grid B2-3,4,5 072907

& - 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 (2.7 to 1999.3 keV) 3.3006577E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0666 D2 Bag# S-083 Grid B2-3,4 072907

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 13:03:06 Page    1
4714781                          Spectrum name: Win00388.An1

Sample description
     WI07-0666   D2  Bag # S-083  Grid  B2-3,4   07-29-07


Spectrum Filename: C:\User\Win00388.An1

Acquisition information
       Start time:                 29-Jul-2007 12:52:56
       Live time:                600
       Real time:                602
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.4730E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.4730E+02) =
                                   2.8794E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 13:03:06 Page    2
4714781                          Spectrum name: Win00388.An1
```

WI07-0666 D2 Bag# S-083 Grid B2-3,4 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0697

********** 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	
14.56	3.83	4395.	23412.	39.020	1.73	2.157	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.52	46.56	75.	29.	0.048	101.48	0.642s
AM-241	237.55	59.56	246.	3372.	5.619	3.90	0.880
Th-234	252.84	63.39	26.	35.	0.059	62.24	1.232s
Pb-214	298.54	74.81	60.	61.	0.102	44.02	0.917D
Pb-212	298.56	74.81	86.	0.	0.000	1179.59	0.224D
Pb-212	307.74	77.11	43.	73.	0.122	34.37	0.919D
Pb-214	307.74	77.11	65.	0.	0.000	464.76	0.425D
Pb-214	348.46	87.29	20.	42.	0.069	48.97	0.637s
Th-234	368.72	92.35	50.	28.	0.046	82.36	0.933D
Ac-228	380.72	95.35	41.	5.	0.008	412.58	0.935D
Ac-228	835.26	208.96	14.	14.	0.023	101.84	0.548s
Pb-212	953.94	238.62	15.	140.	0.233	18.65	1.057D
Pb-214	967.37	241.98	22.	34.	0.057	52.12	1.060D
Ac-228	1080.24	270.19	4.	15.	0.025	69.28	0.434s

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:03:06 Page 3
4714781 Spectrum name: Win00388.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.55	295.26	13.	46.	0.076	44.54	0.884
Ac-228	1310.00	327.62	2.	0.	0.000	0.00	0.000s
Ac-228	1352.62	338.27	3.	29.	0.049	42.64	0.635s
Pb-214	1406.59	351.76	7.	71.	0.118	28.52	1.233s
Ac-228	1850.88	462.80	0.	16.	0.027	50.00	1.500s

WI07-0666 D2 Bag# S-083 Grid B2-3,4 072907

Bi-214	2437.78	609.48	3.	45.	0.074	34.43	0.739s
CS-137	2645.53	661.40	0.	19.	0.032	45.88	0.562s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.47	1.	0.	0.000	0.00	0.000s
Ac-228	3644.39	911.02	0.	33.	0.055	34.82	0.437s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	1.	6.	0.010	90.06	1.595D
Ac-228	3876.86	969.11	0.	17.	0.028	49.10	1.598D
Bi-214	4478.60	1119.48	0.	11.	0.018	60.30	0.375s
Bi-214	4950.50	1237.39	3.	2.	0.003	282.84	0.202s
Bi-214	5512.50	1377.82	0.	2.	0.003	141.42	0.500s
K-40	5845.93	1461.13	0.	29.	0.048	37.14	0.437s
Ac-228	6354.33	1588.15	0.	3.	0.005	115.47	0.375s
Bi-214	7061.83	1764.92	0.	6.	0.010	81.65	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2041E-04	609.31	2.077E-04	(	1.456E-05	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.509E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	3.5627E-04	911.07	3.634E-04	?(	1.101E-05	G K
			969.11	3.222E-04	(	1.942E-05	G
			338.32	3.438E-04	(	3.355E-05	G
			964.60	3.828E-04	(	1.148E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	6.236E-04	+	2.408E-04	G
			209.28	2.857E-04	?(	1.210E-04	G
			270.23	4.686E-04	(	1.054E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:03:06 Page 4
4714781 Spectrum name: Win00388.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.946E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 3.0973E-04	238.62	3.215E-04	(	1.384E-05	G K
		77.11	2.806E-04	(	3.734E-05	Energy duplication
		74.81	0.000E+00	%	8.841E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	(	2.710E-06	G
Th-234	N 4.7945E-04	92.35	3.434E-04	(	1.318E-04	G
		63.29	6.731E-04	(	1.464E-04	G
Pb-214	N 2.7083E-04	351.92	2.630E-04	*(	1.583E-05	G K

```
                    WI07-0666   D2 Bag# S-083   Grid B2-3,4  072907
                              295.21 2.861E-04  (  3.563E-05          G
                               77.11 0.000E+00 %   7.818E-05Energy duplication
                              241.98 4.689E-04 +   1.534E-04          G
                               74.81 6.820E-04 +   1.793E-04Energy duplication
                               87.30 6.022E-04 +   1.677E-04          X

Pb-210    N    5.9200E-04      46.50 5.920E-04 ?(  2.604E-04          G

AM-241         6.9424E-03      59.54 6.942E-03  (  4.676E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 13:03:06 Page    5
 4714781                          Spectrum name: Win00388.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	6.3464E-01	2.185E-01	2.198E-01
K-40 #	3.6764E+00	1.365E+00	1.372E+00
Ac-228	1.0258E+00	3.005E-01	3.030E-01
Pb-212	8.9183E-01	1.663E-01	1.696E-01
CS-137	1.4825E-01	6.802E-02	6.826E-02
Th-234	1.3805E+00	7.126E-01	7.133E-01
Pb-214	7.7981E-01	2.062E-01	2.083E-01
Pb-210 #	1.7046E+00	1.730E+00	1.730E+00
AM-241	1.9990E+01	7.791E-01	1.074E+00

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0666 D2 Bag# S-083 Grid B2-3,4 072907

< - 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 (2.7 to 1999.3 keV) 3.0231421E+01 pCi/g

The library has energies which are not separable.

Analyzed by: M.C. Fann
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0668 D2 Bag# S-084 Grid B2-3,4,5 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:16:39 Page 1
4714781 Spectrum name: Win00389.An1

Sample description
WI07-0668 D2 Bag # S-084 Grid B2-3,4,5 07-29-07

Spectrum Filename: C:\User\Win00389.An1

Acquisition information
Start time: 29-Jul-2007 13:06:28
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2310E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2310E+02) =
3.0950E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:16:39 Page 2
4714781 Spectrum name: Win00389.An1

WI07-0668 D2 Bag# S-084 Grid B2-3,4,5 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1358

********** 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	
14.70	3.86	5001.	24956.	41.593	1.70	2.273	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	178.85	44.89	58.	30.	0.050	95.22	0.223s
AM-241	237.51	59.55	124.	1966.	3.277	4.96	0.903
Th-234	253.48	63.55	17.	30.	0.051	66.77	0.545s
Pb-214	298.54	74.81	30.	29.	0.048	64.94	0.917D
Pb-212	298.56	74.81	40.	0.	0.000	1857.72	0.394D
Pb-212	307.74	77.11	28.	45.	0.075	45.01	0.919D
Pb-214	307.74	77.11	39.	0.	0.000	187.62	0.403D
Pb-214	349.67	87.59	6.	1.	0.002	663.32	0.181s
Th-234	368.72	92.35	12.	21.	0.035	63.26	0.933D
Ac-228	380.72	95.35	5.	5.	0.008	160.82	0.936D
Ac-228	837.00	209.40	12.	2.	0.003	565.69	0.000s
Pb-212	953.94	238.62	8.	30.	0.050	45.71	1.057D
Pb-214	967.37	241.98	12.	26.	0.044	53.89	1.060D
Ac-228	1076.94	269.37	2.	3.	0.004	208.42	0.318s

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:16:39 Page 3
4714781 Spectrum name: Win00389.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.55	295.01	8.	43.	0.072	39.56	0.544s
Ac-228	1309.33	327.45	1.	0.	0.001	240.37	0.197s
Ac-228	1352.49	338.24	2.	17.	0.028	59.33	0.492s
Pb-214	1406.88	351.83	5.	53.	0.088	31.68	0.976
Ac-228	1853.00	463.33	1.	0.	0.000	0.00	0.000s

WI07-0668 D2 Bag# S-084 Grid B2-3,4,5 072907

Bi-214	2436.89	609.26	0.	45.	0.075	29.81	1.349
CS-137	2647.00	661.77	0.	11.	0.018	60.30	0.625s
Bi-214	3074.00	768.48	0.	0.	0.001	223.61	0.000s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.10	911.19	0.	14.	0.023	53.45	0.375s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	2.	0.003	351.44	1.595D
Ac-228	3876.86	969.11	1.	4.	0.007	121.19	1.598D
Bi-214	4476.67	1118.99	0.	10.	0.017	63.25	0.375s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.50	1461.02	0.	6.	0.010	81.65	0.250s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.96	0.	6.	0.010	81.65	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1680E-04	609.31	2.093E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	2.433E-04	&(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	2.6417E-04	1460.81	2.642E-04	?(	4.403E-05	G
Ac-228	N	1.6618E-04	911.07	1.542E-04	?(	1.101E-05	G K
			969.11	8.083E-05	-	7.345E-05	G
			338.32	1.953E-04	(	3.185E-05	G
			964.60	0.000E+00	%	2.285E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	0.000E+00	?	7.795E-05	G
			209.28	0.000E+00	%	1.230E-04	G
			270.23	0.000E+00	&	1.156E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:16:39 Page 4
4714781 Spectrum name: Win00389.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	9.326E-05	-	9.631E-05	X
		327.64	0.000E+00	%	8.145E-05	G
Pb-212	N 6.8380E-05	238.62	6.838E-05	(	1.055E-05	G K
		77.11	1.712E-04	+	4.821E-05	Energy duplication
		74.81	0.000E+00	%	6.102E-05	Energy duplication
CS-137	2.9809E-05	661.66	2.981E-05	?(	2.710E-06	G
Th-234	N 3.9358E-04	92.35	2.641E-04	(	6.725E-05	G
		63.29	5.779E-04	*(	1.199E-04	G
Pb-214	N 2.3139E-04	351.92	1.963E-04	(	1.371E-05	G K

```
                    WI07-0668   D2 Bag# S-084   Grid B2-3,4,5  072907
                              295.21 2.694E-04 @(  2.838E-05         G
                               77.11 0.000E+00 ?   6.133E-05Energy duplication
                              241.98 3.621E-04 +   1.276E-04         G
                               74.81 3.242E-04  (  9.214E-05Energy duplication
                               87.30 0.000E+00 %   6.203E-05         X

Pb-210   N   6.1241E-04      46.50 6.124E-04 &(  2.303E-04         G

AM-241       4.0490E-03      59.54 4.049E-03  (  3.343E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 13:16:39 Page    5
4714781                          Spectrum name: Win00389.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        6.7099E-01     2.001E-01     2.016E-01
K-40    #     8.1760E-01     6.676E-01     6.683E-01
Ac-228        5.1432E-01     2.054E-01     2.063E-01
Pb-212        2.1164E-01     9.674E-02     9.706E-02
CS-137 #      9.2259E-02     5.563E-02     5.575E-02
Th-234        1.2181E+00     5.602E-01     5.609E-01
Pb-214        7.1615E-01     1.966E-01     1.985E-01
Pb-210 #      1.8954E+00     1.805E+00     1.805E+00
AM-241        1.2532E+01     6.216E-01     7.756E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0668 D2 Bag# S-084 Grid B2-3,4,5 072907

< - 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 (2.7 to 1999.3 keV) 1.8668097E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0669 D2 Bag# S-085 Grid B2-1 B1-4 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:29:28 Page 1
4714781 Spectrum name: Win00390.An1

Sample description
WI07-0669 D2 Bag # S-085 Grid B2-1 B1-4 07-29-07

Spectrum Filename: C:\User\Win00390.An1

Acquisition information
Start time: 29-Jul-2007 13:19:16
Live time: 600
Real time: 602
Dead time: 0.37 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9100E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9100E+02) = 3.4364E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:29:28 Page 2
4714781 Spectrum name: Win00390.An1

WI07-0669 D2 Bag# S-085 Grid B2-1 B1-4 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0665

********** 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	
11.64	2.91	7277.	11841.	19.735	2.74	0.854	-	D
15.91	3.98	16069.	10273.	17.121	4.01	0.855	-	D
197.77	49.68	341.	94.	0.157	59.30	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	186.	41.	0.068	99.82	0.892D
AM-241	237.46	59.54	370.	2986.	4.977	4.54	0.883
Th-234	252.40	63.28	104.	51.	0.085	76.48	1.153s
Pb-214	298.54	74.81	82.	58.	0.096	51.73	0.917D
Pb-212	298.56	74.81	82.	0.	0.000	292.29	0.267D
Pb-212	307.74	77.11	69.	92.	0.153	33.15	0.919D
Pb-214	307.74	77.11	90.	0.	0.000	198.98	0.349D
Pb-214	347.62	87.08	60.	40.	0.067	79.06	0.994s
Th-234	368.72	92.35	64.	23.	0.039	104.43	0.933D
Ac-228	380.72	95.35	32.	18.	0.031	98.08	0.935D
Ac-228	833.59	208.54	21.	29.	0.048	76.64	0.303s
Pb-212	953.94	238.62	16.	77.	0.129	26.91	1.057D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:29:28 Page 3
4714781 Spectrum name: Win00390.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	9.	28.	0.047	47.61	1.060D
Ac-228	1086.41	271.73	7.	24.	0.041	59.96	0.233s
Pb-214	1180.76	295.31	0.	33.	0.055	34.82	0.848
Ac-228	1310.00	327.62	3.	7.	0.012	108.80	0.403s
Ac-228	1352.36	338.21	0.	24.	0.040	40.82	0.281s

Pb-214	N	2.3730E-04	351.92	2.531E-04	(	1.446E-05	G K	
			295.21	2.067E-04	(	6.264E-06	G	
			77.11	0.000E+00	?	9.139E-05	Energy duplication	
			241.98	3.923E-04	+	1.261E-04	G	
			74.81	6.434E-04	+	1.924E-04	Energy duplication	
			87.30	5.804E-04	+	2.126E-04	X	
Pb-210	N	8.3149E-04	46.50	8.315E-04	(	4.044E-04	G	
AM-241		6.1486E-03	59.54	6.149E-03	(	5.705E-05	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

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

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 13:29:28 Page 5
4714781 Spectrum name: Win00390.An1

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 pCi/g	2 Sigma Total pCi/g
Bi-214		7.5086E-01	2.290E-01	2.307E-01
K-40	<	6.0519E-01		
Ac-228		9.2683E-01	3.357E-01	3.375E-01
Pb-212		6.1151E-01	1.646E-01	1.662E-01
CS-137	#	1.2106E-01	6.715E-02	6.731E-02
Th-234		1.9693E+00	1.275E+00	1.275E+00
Pb-214		8.1547E-01	1.816E-01	1.842E-01
Pb-210		2.8573E+00	2.852E+00	2.853E+00
AM-241		2.1129E+01	9.587E-01	1.237E+00

- All peaks for activity calculation had bad shape.

WI07-0669 D2 Bag# S-085 Grid B2-1 B1-4 072907

* - 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 (2.7 to 1999.3 keV) 2.9181572E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0670 D2 Bag# S-086 Grid B2-3 B4-1 072907

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 14:06:20 Page    1
4714781                          Spectrum name: Win00391.An1

Sample description
     WI07-0670   D2  Bag # S-086  Grid  B2-3 B4-1   07-29-07


Spectrum Filename: C:\User\Win00391.An1

Acquisition information
       Start time:                 29-Jul-2007 13:56:09
       Live time:                600
       Real time:                602
       Dead time:                  0.27 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.1370E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1370E+02) =
                                   3.1878E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 14:06:20 Page    2
4714781                          Spectrum name: Win00391.An1
```

WI07-0670 D2 Bag# S-086 Grid B2-3 B4-1 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1363

********** 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	
14.68	3.86	4764.	25412.	42.353	1.66	2.244	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.85	46.39	32.	29.	0.049	86.59	0.465s
AM-241	237.49	59.55	31.	320.	0.533	13.11	0.928
Th-234	253.73	63.61	15.	43.	0.072	47.20	1.230s
Pb-214	298.54	74.81	26.	18.	0.030	94.48	0.917D
Pb-212	298.56	74.81	23.	0.	0.000	692.82	0.470D
Pb-212	307.74	77.11	18.	60.	0.100	32.81	0.919D
Pb-214	307.74	77.11	57.	0.	0.000	310.25	0.219D
Pb-214	347.12	86.95	4.	20.	0.034	54.97	0.428s
Th-234	368.72	92.35	13.	29.	0.048	51.16	0.933D
Ac-228	380.72	95.35	16.	3.	0.006	350.71	0.936D
Ac-228	836.18	209.19	5.	6.	0.009	150.20	0.243s
Pb-212	953.94	238.62	3.	42.	0.070	33.10	1.057D
Pb-214	967.37	241.98	9.	16.	0.027	72.13	1.060D
Ac-228	1078.00	269.63	6.	2.	0.002	551.09	0.000s

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:06:20 Page 3
4714781 Spectrum name: Win00391.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.72	295.06	0.	50.	0.083	28.28	1.458s
Ac-228	1309.00	327.37	0.	0.	0.000	0.00	0.000s
Ac-228	1360.00	340.11	0.	25.	0.042	40.00	0.292s
Pb-214	1407.17	351.90	2.	40.	0.066	35.17	0.457s
Ac-228	1851.67	463.00	1.	0.	0.001	240.37	0.197s

WI07-0670 D2 Bag# S-086 Grid B2-3 B4-1 072907

Bi-214	2437.38	609.38	0.	36.	0.060	33.33	0.367s
CS-137	2646.10	661.54	0.	16.	0.027	50.00	0.500s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3178.33	794.55	0.	3.	0.005	115.47	0.250s
Ac-228	3643.89	910.89	0.	11.	0.018	60.30	0.500s
Bi-214	3737.33	934.24	0.	4.	0.007	100.00	0.250s
Ac-228	3859.55	964.78	0.	0.	0.000	0.00	1.595
Ac-228	3877.00	969.14	0.	1.	0.002	200.00	0.250s
Bi-214	4481.80	1120.28	0.	9.	0.015	66.67	0.312s
Bi-214	4951.00	1237.52	0.	4.	0.007	100.00	0.750s
Bi-214	5511.67	1377.61	1.	0.	0.001	240.37	0.197s
K-40	5845.45	1461.01	0.	11.	0.018	60.30	0.333s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	0.	2.	0.003	141.42	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8010E-04	609.31	1.674E-04	?(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	2.190E-04	?(	2.433E-05	G
			1238.11	2.712E-04	+	2.286E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	4.8431E-04	1460.81	4.843E-04	?(	4.403E-05	G
Ac-228	N	1.6704E-04	911.07	1.211E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	3.884E-05	G
			338.32	2.930E-04	&(	1.172E-05	G
			964.60	0.000E+00		6.173E-05	G
			794.70	1.764E-04	?(	5.880E-05	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	1.199E-04	?(	8.049E-05	G
			270.23	0.000E+00	&	1.336E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:06:20 Page 4
4714781 Spectrum name: Win00391.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.288E-04	X
		327.64	0.000E+00	?	4.072E-05	G
Pb-212	N 9.6958E-05	238.62	9.696E-05	(	7.147E-06	G K
		77.11	2.289E-04	+	4.977E-05	Energy duplication
		74.81	0.000E+00	&	4.729E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 3.6178E-04	92.35	3.618E-04	(	7.017E-05	G
		63.29	8.192E-04	+	2.149E-04	G
Pb-214	N 1.6391E-04	351.92	1.463E-04	(	1.034E-05	G K

```
                WI07-0670   D2 Bag# S-086   Grid B2-3 B4-1  072907
                          295.21 3.132E-04 +   6.585E-05          G
                           77.11 0.000E+00 %   7.363E-05Energy duplication
                          241.98 2.231E-04  (  6.554E-05          G
                           74.81 1.980E-04  (  8.665E-05Energy duplication
                           87.30 2.975E-04 +   1.101E-04          X

Pb-210   N   5.9880E-04     46.50 5.988E-04  (  1.730E-04          G

AM-241       6.5858E-04     59.54 6.586E-04  (  1.732E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 14:06:20 Page    5
 4714781                          Spectrum name: Win00391.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.7412E-01	1.914E-01	1.926E-01
K-40 #	1.5438E+00	9.310E-01	9.328E-01
Ac-228 #	5.3249E-01	2.130E-01	2.139E-01
Pb-212	3.0908E-01	1.023E-01	1.030E-01
CS-137 #	1.3822E-01	6.911E-02	6.931E-02
Th-234	1.1533E+00	5.900E-01	5.906E-01
Pb-214	5.2251E-01	1.838E-01	1.848E-01
Pb-210	1.9088E+00	1.653E+00	1.653E+00
AM-241	2.0994E+00	2.752E-01	2.859E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0670 D2 Bag# S-086 Grid B2-3 B4-1 072907

< - 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 (2.7 to 1999.3 keV) 8.7817516E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0671 D2 Bag# S-087 Grid B2-1,3 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:23:11 Page 1
4714781 Spectrum name: Win00392.An1

Sample description
WI07-0671 D2 Bag # S-087 Grid B2-1,3 07-29-07

Spectrum Filename: C:\User\Win00392.An1

Acquisition information
Start time: 29-Jul-2007 14:12:59
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9600E+02) = 3.3784E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:23:11 Page 2
4714781 Spectrum name: Win00392.An1

WI07-0671 D2 Bag# S-087 Grid B2-1,3 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1258

********** 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	
11.72	2.92	6561.	13174.	21.957	2.46	0.854	-	D
16.81	4.19	17745.	10357.	17.262	4.13	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.41	46.78	48.	19.	0.031	130.15	0.830
AM-241	237.53	59.56	78.	1250.	2.083	6.19	0.950
Th-234	251.71	63.10	40.	49.	0.082	60.86	0.928s
Pb-214	298.54	74.81	29.	47.	0.079	43.34	0.917D
Pb-212	298.56	74.81	50.	0.	0.000	245.46	0.229D
Pb-212	307.74	77.11	29.	55.	0.091	38.75	0.919D
Pb-214	307.74	77.11	60.	0.	0.000	271.26	0.269D
Pb-214	347.59	87.07	22.	34.	0.057	59.10	0.877s
Th-234	368.72	92.35	21.	29.	0.049	57.09	0.933D
Ac-228	380.72	95.35	19.	3.	0.006	370.19	0.936D
Ac-228	835.19	208.94	15.	12.	0.020	130.77	0.471s
Pb-212	953.94	238.62	14.	67.	0.111	29.26	1.057D
Pb-214	967.37	241.98	27.	19.	0.032	87.46	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:23:11 Page 3
4714781 Spectrum name: Win00392.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.09	270.66	3.	22.	0.037	53.01	0.305s
Pb-214	1180.16	295.16	3.	42.	0.070	34.99	0.305s
Ac-228	1308.17	327.16	2.	4.	0.006	170.62	0.215s
Ac-228	1352.51	338.24	2.	22.	0.037	47.20	0.340s
Pb-214	1406.95	351.85	5.	50.	0.084	32.25	1.387s

WI07-0671 D2 Bag# S-087 Grid B2-1,3 072907

Ac-228	1850.20	462.63	0.	6.	0.010	81.65	0.500s
Bi-214	2437.03	609.29	0.	36.	0.060	33.33	1.400
CS-137	2647.67	661.93	0.	9.	0.015	66.67	0.500s
Bi-214	3070.50	767.60	0.	11.	0.018	60.30	0.375s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3646.81	911.62	0.	19.	0.032	45.88	0.333s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	2.	0.003	238.68	1.595D
Ac-228	3876.86	969.11	0.	5.	0.009	86.39	1.598D
Bi-214	4482.00	1120.33	4.	1.	0.002	513.57	0.000s
Bi-214	4951.00	1237.52	0.	3.	0.005	115.47	0.750s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.47	1461.26	0.	17.	0.028	48.51	0.500s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7060.67	1764.63	0.	6.	0.010	81.65	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	1.8126E-04	609.31	1.674E-04	?(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	9.007E-05	G
			1238.11	2.034E-04	?(	6.779E-05	G
			768.36	5.732E-04	&	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	7.4847E-04	1460.81	7.485E-04	?(	4.403E-05	G
Ac-228	N	2.2286E-04	911.07	2.092E-04	?(	1.101E-05	G K
			969.11	1.041E-04	-	7.402E-05	G
			338.32	2.598E-04	?(	2.905E-05	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	2.339E-04	?(	3.898E-05	G
			209.28	2.504E-04	?(	1.276E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:23:11 Page 4
4714781 Spectrum name: Win00392.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.873E-04	+	2.371E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.378E-04	X
		327.64	1.561E-04	?(	1.075E-04	G
Pb-212	N 1.6965E-04	238.62	1.533E-04	(	1.349E-05	G K
		77.11	2.101E-04	(	3.119E-05	Energy duplication
		74.81	0.000E+00	%	6.820E-05	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	2.710E-06	G
Th-234	N 3.6720E-04	92.35	3.672E-04	(	8.651E-05	G
		63.29	9.335E-04	+	2.639E-04	G

```
                    WI07-0671   D2 Bag# S-087   Grid B2-1,3  072907
Pb-214   N   2.1918E-04     351.92 1.864E-04  (  1.332E-05          G K
                            295.21 2.631E-04 ?(  1.879E-05          G
                             77.11 0.000E+00 %   7.525E-05Energy duplication
                            241.98 2.693E-04  (  1.079E-04          G
                             74.81 5.272E-04 +   1.433E-04Energy duplication
                             87.30 4.982E-04 +   1.610E-04          X

Pb-210   N   3.8106E-04      46.50 3.811E-04  (  2.112E-04          G

AM-241       2.5739E-03      59.54 2.574E-03  (  2.677E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 14:23:11 Page    5
4714781                          Spectrum name: Win00392.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #      6.1236E-01    2.041E-01    2.054E-01
K-40   #      2.5286E+00    1.227E+00    1.230E+00
Ac-228        7.5289E-01    3.454E-01    3.466E-01
Pb-212        5.7314E-01    1.392E-01    1.408E-01
CS-137 #      8.2395E-02    5.493E-02    5.502E-02
Th-234        1.2405E+00    7.082E-01    7.088E-01
Pb-214        7.4046E-01    2.388E-01    2.404E-01
Pb-210        1.2874E+00    1.675E+00    1.676E+00
AM-241        8.6957E+00    5.383E-01    6.272E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0671 D2 Bag# S-087 Grid B2-1,3 072907

& - 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 (2.7 to 1999.3 keV) 1.6513432E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0673 D2 Bag# S-088 Grid B2-1,3 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:42:48 Page 1
4714781 Spectrum name: Win00393.An1

Sample description
WI07-0673 D2 Bag # S-088 Grid B2-1,3 07-29-07

Spectrum Filename: C:\User\Win00393.An1

Acquisition information
Start time: 29-Jul-2007 14:32:37
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
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

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:42:48 Page 2
4714781 Spectrum name: Win00393.An1

WI07-0673 D2 Bag# S-088 Grid B2-1,3 072907

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0926

********** 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	
11.66	2.91	6497.	12147.	20.245	2.61	0.854	-	D
16.68	4.17	17405.	9397.	15.661	4.48	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.98	46.42	103.	16.	0.026	217.85	0.410s
AM-241	237.50	59.55	280.	3274.	5.457	3.96	0.888
Th-234	252.92	63.41	63.	37.	0.062	91.89	0.807s
Pb-214	298.54	74.81	44.	60.	0.101	40.17	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	383.47	0.418D
Pb-212	307.74	77.11	43.	95.	0.159	28.26	0.919D
Pb-214	307.74	77.11	100.	0.	0.000	284.20	0.000D
Pb-214	347.62	87.08	28.	45.	0.075	50.48	1.108
Th-234	368.72	92.35	35.	25.	0.042	76.91	0.933D
Ac-228	380.72	95.35	29.	0.	0.001	4086.70	0.935D
Ac-228	837.09	209.42	4.	21.	0.034	56.75	1.391s
Pb-212	953.94	238.62	27.	130.	0.217	20.87	1.057D
Pb-214	967.37	241.98	18.	19.	0.031	79.77	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:42:48 Page 3
4714781 Spectrum name: Win00393.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.47	270.00	13.	32.	0.053	56.69	0.377s
Pb-214	1180.24	295.19	12.	36.	0.059	50.15	1.129
Ac-228	1312.35	328.20	3.	15.	0.026	65.36	0.518s
Ac-228	1353.11	338.39	5.	48.	0.079	34.40	0.883s
Pb-214	1407.75	352.05	0.	77.	0.128	22.79	0.889

WI07-0673 D2 Bag# S-088 Grid B2-1,3 072907

Ac-228	1850.59	462.73	2.	12.	0.019	75.59	0.290s
Bi-214	2437.94	609.52	0.	67.	0.112	24.43	0.578s
CS-137	2646.57	661.66	0.	25.	0.042	40.00	0.812s
Bi-214	3075.00	768.73	4.	0.	0.001	685.57	0.000s
Ac-228	3178.25	794.53	0.	9.	0.015	66.67	0.375s
Ac-228	3645.96	911.41	0.	24.	0.040	40.82	0.416s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	7.	0.012	75.47	1.595D
Ac-228	3876.86	969.11	3.	13.	0.022	65.44	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.001	223.61	0.100s
Bi-214	4953.50	1238.14	0.	5.	0.008	89.44	0.500s
Bi-214	5504.00	1375.69	0.	3.	0.005	115.47	0.250s
K-40	5845.07	1460.91	0.	41.	0.068	31.23	0.916s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1541E-04	609.31	3.116E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	%	4.867E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	&(	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.8051E-03	1460.81	1.805E-03	(	4.403E-05	G
Ac-228	N	3.0476E-04	911.07	2.643E-04	(	1.101E-05	G K
			969.11	2.570E-04	(	5.637E-05	G
			338.32	5.586E-04	+	1.267E-04	G
			964.60	4.335E-04	(	6.173E-05	G
			794.70	5.292E-04	+	2.806E-04	G
			463.00	4.547E-04	?(	1.059E-04	G
			209.28	4.373E-04	(	7.376E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 14:42:48 Page 4
4714781 Spectrum name: Win00393.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.893E-04	+	3.124E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.566E-04	X
		327.64	6.244E-04	+	2.655E-04	G
Pb-212	N 3.1760E-04	238.62	2.987E-04	(	1.808E-05	G K
		77.11	3.643E-04	(	3.740E-05	Energy duplication
		74.81	0.000E+00	%	8.121E-05	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 4.7628E-04	92.35	3.157E-04	(	1.104E-04	G
		63.29	7.049E-04	@(	2.236E-04	G

```
                    WI07-0673   D2 Bag# S-088   Grid B2-1,3  072907
Pb-214    N   2.8061E-04     351.92 2.852E-04  (  3.704E-06          G K
                            295.21 2.224E-04 -   6.459E-05          G
                             77.11 0.000E+00 %   9.615E-05Energy duplication
                            241.98 2.579E-04  (  9.096E-05          G
                             74.81 6.749E-04 +   1.666E-04Energy duplication
                             87.30 6.530E-04 +   1.827E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   3.253E-04          G

AM-241        6.7416E-03      59.54 6.742E-03  (  4.977E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 14:42:48 Page    5
 4714781                          Spectrum name: Win00393.Anl

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214       8.7835E-01    2.146E-01    2.171E-01
 K-40         5.0268E+00    1.570E+00    1.581E+00
 Ac-228       8.4868E-01    2.435E-01    2.456E-01
 Pb-212       8.8444E-01    1.554E-01    1.589E-01
 CS-137 #     1.8866E-01    7.546E-02    7.581E-02
 Th-234       1.3263E+00    7.947E-01    7.953E-01
 Pb-214       7.8143E-01    1.781E-01    1.805E-01
 Pb-210  <    9.0588E-01
 AM-241       1.8774E+01    7.439E-01    1.018E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0673 D2 Bag# S-088 Grid B2-1,3 072907

& - 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 (2.7 to 1999.3 keV) 2.8708372E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0696 D2 Bag# S-089 Grid B1-4,5 B2-1,2 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 07:20:40 Page 1
4714781 Spectrum name: Win00396.An1

Sample description
WI07-0696 D2 Bag# S-089 Grid B1-4,5&B2-1,2 07-30-07

Spectrum Filename: C:\User\Win00396.An1

Acquisition information
Start time: 30-Jul-2007 07:10:29
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.5750E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.5750E+02) = 2.1858E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 07:20:40 Page 2
4714781 Spectrum name: Win00396.An1

WI07-0696 D2 Bag# S-089 Grid B1-4,5 B2-1,2 073007

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1793

********** 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	
11.86	2.90	2652.	10899.	18.165	2.34	0.854	-	D
18.13	4.47	11862.	7910.	13.183	4.50	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.59	46.33	80.	30.	0.050	103.99	0.737
AM-241	237.60	59.58	171.	2530.	4.217	4.44	0.934
Th-234	252.05	63.19	40.	28.	0.047	92.58	0.414s
Pb-214	298.54	74.81	51.	61.	0.102	41.73	0.917D
Pb-212	298.56	74.81	59.	0.	0.000	440.46	0.414D
Pb-212	307.74	77.11	43.	87.	0.144	30.45	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	85.59	0.000D
Pb-214	347.78	87.12	20.	40.	0.066	47.57	0.828
Th-234	370.50	92.80	31.	33.	0.055	67.04	0.994
Ac-228	380.72	95.35	19.	0.	0.000	0.00	0.324D
Ac-228	834.00	208.65	12.	27.	0.045	64.15	0.354s
Pb-212	953.94	238.62	23.	87.	0.144	26.66	1.057D
Pb-214	967.37	241.98	25.	23.	0.038	76.01	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 07:20:40 Page 3
4714781 Spectrum name: Win00396.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.93	269.87	13.	27.	0.044	68.92	0.422s
Pb-214	1180.06	295.14	10.	52.	0.087	37.55	1.217
Ac-228	1312.00	328.12	4.	10.	0.017	87.94	0.451s
Ac-228	1353.71	338.54	2.	30.	0.051	41.08	0.688s
Pb-214	1407.83	352.07	8.	85.	0.141	26.70	1.413s

WI07-0696 D2 Bag# S-089 Grid B1-4,5 B2-1,2 073007

Ac-228	1861.83	465.54	0.	18.	0.030	47.14	0.312s
Bi-214	2437.29	609.35	0.	63.	0.105	25.20	1.100
CS-137	2648.70	662.19	0.	20.	0.033	44.72	0.300s
Bi-214	3071.12	767.76	0.	18.	0.030	47.14	0.500s
Ac-228	3171.28	792.79	4.	3.	0.005	258.20	0.456s
Ac-228	3643.00	910.67	10.	2.	0.003	535.41	0.000s
Bi-214	3737.25	934.22	0.	4.	0.007	100.00	0.312s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	1.000D
Ac-228	3877.40	969.24	0.	20.	0.033	44.72	0.469s
Bi-214	4481.89	1120.30	0.	10.	0.017	63.25	0.500s
Bi-214	4954.00	1238.27	0.	2.	0.003	141.42	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.62	1461.05	0.	34.	0.057	34.30	1.083s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7057.00	1763.71	0.	5.	0.008	89.44	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.8077E-04	609.31	2.930E-04	(	4.650E-06	G K
			1764.49	1.779E-04	-	1.317E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	9.380E-04	+	3.398E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.974E-05	G K
			969.11	3.884E-04	?	1.329E-04	G
			338.32	3.574E-04		1.012E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	&	2.514E-04	G
			463.00	7.016E-04	&	2.542E-04	G
			209.28	5.713E-04	&	1.978E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 07:20:40 Page 4
4714781 Spectrum name: Win00396.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.331E-04		2.955E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.277E-04	X
		327.64	4.072E-04	?	2.368E-04	G
Pb-212	N 1.9912E-04	238.62	1.991E-04	(	1.690E-05	G K
		77.11	3.312E-04	+	6.367E-05	Energy duplication
		74.81	0.000E+00	%	7.377E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	(	2.710E-06	G
Th-234	N 4.6072E-04	92.35	4.097E-04	(	1.049E-04	G
		63.29	5.334E-04	(	1.802E-04	G

```
                WI07-0696   D2 Bag# S-089   Grid B1-4,5 B2-1,2  073007
Pb-214    N   3.1703E-04    351.92 3.136E-04 *(  1.709E-05          G K
                            295.21 3.257E-04  (  3.132E-05          G
                             77.11 0.000E+00 ?   1.207E-04Energy duplication
                            241.98 3.118E-04  (  1.058E-04          G
                             74.81 6.825E-04 +   1.727E-04Energy duplication
                             87.30 5.732E-04 +   1.651E-04          X

Pb-210    N   6.1241E-04     46.50 6.124E-04  (  2.686E-04          G

AM-241        5.2103E-03     59.54 5.210E-03  (  3.909E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  30-JUL-2007 07:20:40 Page    5
 4714781                          Spectrum name: Win00396.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	6.1370E-01	1.546E-01	1.563E-01
K-40 #	3.2720E+00	1.122E+00	1.129E+00
Ac-228 B<	1.3058E-01		
Pb-212	4.3525E-01	1.160E-01	1.172E-01
CS-137	1.1847E-01	5.298E-02	5.317E-02
Th-234	1.0070E+00	5.756E-01	5.760E-01
Pb-214	6.9296E-01	1.850E-01	1.868E-01
Pb-210	1.3386E+00	1.392E+00	1.392E+00
AM-241	1.1389E+01	5.057E-01	6.584E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0696 D2 Bag# S-089 Grid B1-4,5 B2-1,2 073007

& - 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 (2.7 to 1999.3 keV) 1.8866673E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0697 D2 Bag# S-090 Grid B2-1,3 073007

Sample description
WI07-0697 D2 Bag# S-090 Grid B2-1,3 07-30-07

Spectrum Filename: C:\User\Win00397.An1

Acquisition information
Start time: 30-Jul-2007 08:08:54
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6270E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6270E+02) = 2.7571E+03
Detection limit method: Traditional ORTEC method

WI07-0697 D2 Bag# S-090 Grid B2-1,3 073007

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0767

********** 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	
14.54	3.82	3831.	21426.	35.710	1.79	2.149	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.28	46.25	89.	50.	0.084	73.90	0.779s
AM-241	237.71	59.60	200.	2342.	3.903	4.74	0.858
Th-234	252.62	63.33	35.	36.	0.061	70.37	0.396s
Pb-214	298.54	74.81	36.	46.	0.077	46.83	0.917D
Pb-212	298.56	74.81	53.	0.	0.000	524.40	0.625D
Pb-212	307.74	77.11	41.	91.	0.152	28.79	0.919D
Pb-214	307.74	77.11	126.	0.	0.000	1301.28	0.766D
Pb-214	346.60	86.82	24.	36.	0.060	61.86	1.414s
Th-234	368.72	92.35	33.	8.	0.014	202.22	0.933D
Ac-228	380.72	95.35	15.	1.	0.001	1616.14	0.935D
Ac-228	837.88	209.62	8.	27.	0.046	58.71	0.500s
Pb-212	953.94	238.62	15.	108.	0.180	21.72	1.057D
Pb-214	967.37	241.98	21.	16.	0.027	94.69	1.060D
Ac-228	1079.45	269.99	0.	31.	0.052	35.92	0.437s

0

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:19:07 Page 3
4714781 Spectrum name: Win00397.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.74	295.31	5.	48.	0.080	33.72	1.116
Ac-228	1304.82	326.32	3.	13.	0.022	74.46	0.465s
Ac-228	1353.18	338.41	2.	19.	0.032	52.63	0.648s
Pb-214	1408.03	352.12	6.	57.	0.096	31.02	0.972s
Ac-228	1850.57	462.72	2.	1.	0.002	416.33	0.328s

WI07-0697 D2 Bag# S-090 Grid B2-1,3 073007

Bi-214	2437.06	609.30	0.	36.	0.060	33.33	1.166
CS-137	2647.57	661.91	0.	14.	0.023	53.45	0.500s
Bi-214	3074.25	768.54	0.	9.	0.015	66.67	0.500s
Ac-228	3178.00	794.47	1.	0.	0.000	0.00	0.000s
Ac-228	3644.50	911.04	0.	28.	0.047	37.80	0.625s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	5.	0.009	99.95	1.595D
Ac-228	3876.86	969.11	1.	7.	0.011	87.60	1.598D
Bi-214	4481.00	1120.08	0.	7.	0.012	75.59	0.250s
Bi-214	4950.00	1237.27	0.	4.	0.007	100.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.69	1460.82	0.	29.	0.048	37.14	0.562s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7061.40	1764.81	0.	11.	0.018	60.30	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.6813E-04	609.31	1.674E-04	(	4.650E-06	G K
			1764.49	3.914E-04	+	1.856E-04	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	2.712E-04	+	2.286E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	3.1048E-04	911.07	3.084E-04	?(	1.101E-05	G K
			969.11	1.338E-04	-	8.798E-05	G
			338.32	2.227E-04	-	8.204E-05	G
			964.60	3.218E-04	(	1.142E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	0.000E+00	%	1.169E-04	G
			209.28	5.784E-04	+	1.879E-04	G
			270.23	9.685E-04	+	2.621E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.190E-04	X
		327.64	5.362E-04	&	2.516E-04	G
Pb-212	N 2.4766E-04	238.62	2.477E-04	(	1.362E-05	G K
		77.11	3.495E-04	+	6.415E-05	Energy duplication
		74.81	0.000E+00	%	7.000E-05	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.194E-04	G
		63.29	6.922E-04		2.367E-04	G
Pb-214	N 2.4006E-04	351.92	2.123E-04	@(	1.446E-05	G K

```
                    WI07-0697   D2 Bag# S-090   Grid B2-1,3  073007
                              295.21 3.007E-04  (  2.319E-05          G
                               77.11 0.000E+00 %   1.075E-04Energy duplication
                              241.98 2.223E-04  (  9.663E-05          G
                               74.81 5.188E-04 +   1.490E-04Energy duplication
                               87.30 5.224E-04 +   1.664E-04          X

Pb-210   N   1.0275E-03      46.50 1.027E-03 @(  2.822E-04          G

AM-241       4.8225E-03      59.54 4.823E-03  (  4.223E-05          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

   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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  30-JUL-2007 08:19:07 Page    5
 4714781                          Spectrum name: Win00397.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	4.6356E-01	1.545E-01	1.555E-01
K-40 #	3.5203E+00	1.307E+00	1.314E+00
Ac-228	8.5604E-01	3.236E-01	3.251E-01
Pb-212	6.8283E-01	1.483E-01	1.505E-01
CS-137 #	1.0460E-01	5.591E-02	5.605E-02
Th-234 <	3.2918E-01		
Pb-214	6.6186E-01	2.053E-01	2.068E-01
Pb-210 #	2.8329E+00	2.094E+00	2.095E+00
AM-241	1.3296E+01	6.297E-01	7.992E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0697 D2 Bag# S-090 Grid B2-1,3 073007

< - 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 (2.7 to 1999.3 keV) 2.2418184E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0714 D2 Bag# S-091 Grid B3-3 073007

Sample description
WI07- 0714 D2 Bag S-091 Grid B3-3 073107

Spectrum Filename: C:\User\Win00435.An1

Acquisition information
Start time: 31-Jul-2007 14:08:43
Live time: 600
Real time: 602
Dead time: 0.30 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.3110E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.3110E+02) = 2.3196E+03
Detection limit method: Traditional ORTEC method

WI07-0714 D2 Bag# S-091 Grid B3-3 073007

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1057

********** 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	
11.73	2.91	5868.	10512.	17.521	2.84	0.854	-	D
16.81	4.18	14983.	9272.	15.454	4.27	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.10	46.70	108.	39.	0.064	93.61	0.372s
AM-241	237.36	59.52	273.	3046.	5.077	4.22	0.904
Th-234	253.27	63.49	35.	53.	0.088	49.99	1.019
Pb-214	298.54	74.81	52.	98.	0.163	29.19	0.917D
Pb-212	298.56	74.81	83.	0.	0.000	136.38	0.635D
Pb-212	307.74	77.11	65.	131.	0.218	24.66	0.919D
Pb-214	307.74	77.11	167.	0.	0.000	199.29	0.000D
Pb-214	348.03	87.18	50.	59.	0.099	49.79	1.017
Th-234	368.72	92.35	48.	24.	0.039	92.76	0.933D
Ac-228	380.72	95.35	45.	5.	0.009	370.87	0.935D
Ac-228	833.00	208.40	16.	31.	0.052	61.09	0.625s
Pb-212	953.94	238.62	14.	204.	0.340	14.93	1.057D
Pb-214	967.37	241.98	30.	34.	0.057	56.55	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.85	270.59	12.	19.	0.032	73.47	0.914
Pb-214	1180.52	295.26	9.	48.	0.080	35.92	0.759s
Ac-228	1309.89	327.59	0.	16.	0.027	50.00	0.417s
Ac-228	1353.12	338.39	9.	50.	0.083	37.09	0.760s
Pb-214	1408.11	352.14	4.	94.	0.156	22.36	1.000s

WI07-0714 D2 Bag# S-091 Grid B3-3 073007

Ac-228	1850.74	462.77	4.	29.	0.048	50.20	0.358s
Bi-214	2437.13	609.32	0.	63.	0.105	25.20	0.640s
CS-137	2646.32	661.59	0.	26.	0.043	39.22	0.625s
Bi-214	3068.25	767.04	0.	16.	0.027	50.00	0.375s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3645.23	911.23	0.	48.	0.080	28.87	1.543
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	4.	0.007	158.78	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.54	1.598D
Bi-214	4481.93	1120.31	0.	16.	0.027	50.00	0.417s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5845.43	1461.00	0.	38.	0.063	32.44	0.625s
Ac-228	6344.93	1585.81	2.	2.	0.003	321.67	0.236s
Bi-214	7057.50	1763.83	0.	17.	0.028	48.51	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1667E-04	609.31	2.930E-04	(	4.650E-06	G K
			1764.49	6.049E-04	+	2.260E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	8.338E-04	&	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	?(	4.403E-05	G
Ac-228	N	5.6233E-04	911.07	5.286E-04	(	1.101E-05	G K
			969.11	5.513E-04	(	1.942E-05	G
			338.32	5.860E-04	(	5.593E-05	G
			964.60	2.460E-04	-	2.639E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	1.117E-03	+	3.367E-04	G
			209.28	6.559E-04	&(	1.307E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 14:18:54 Page 4
4714781 Spectrum name: Win00435.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.040E-04	?(	1.673E-04	G
		1588.00	0.000E+00	&	4.898E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	6.516E-04	?(	4.072E-05	G
Pb-212	N 4.7844E-04	238.62	4.691E-04	(	1.336E-05	G K
		77.11	5.015E-04	(	4.560E-05	Energy duplication
		74.81	0.000E+00	?	8.675E-05	Energy duplication
CS-137	7.0457E-05	661.66	7.046E-05	?(	2.710E-06	G
Th-234	N 5.8995E-04	92.35	2.951E-04	(	1.291E-04	G
		63.29	1.010E-03	$(	1.692E-04	G

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                    WI07-0714   D2 Bag# S-091   Grid B3-3  073007
Pb-214    N   3.3041E-04     351.92 3.463E-04 *(  1.182E-05          G K
                             295.21 2.996E-04  (  3.014E-05          G
                              77.11 0.000E+00 ?   1.231E-04Energy duplication
                             241.98 4.735E-04 +   1.635E-04          G
                              74.81 1.088E-03 +   1.990E-04Energy duplication
                              87.30 8.586E-04 +   2.216E-04          X

Pb-210    N   7.8933E-04      46.50 7.893E-04  (  3.109E-04          G

AM-241        6.2721E-03      59.54 6.272E-03  (  4.916E-05          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

   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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  31-JUL-2007 14:18:54 Page    5
4714781                          Spectrum name: Win00435.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        7.3457E-01     1.851E-01    1.871E-01
K-40    #     3.8809E+00     1.259E+00    1.268E+00
Ac-228        1.3044E+00     2.685E-01    2.729E-01
Pb-212        1.1098E+00     1.600E-01    1.653E-01
CS-137 #      1.6344E-01     6.410E-02    6.441E-02
Th-234        1.3685E+00     6.841E-01    6.848E-01
Pb-214        7.6644E-01     1.621E-01    1.647E-01
Pb-210        1.8310E+00     1.714E+00    1.715E+00
AM-241        1.4549E+01     6.145E-01    8.171E-01

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
```

WI07-0714 D2 Bag# S-091 Grid B3-3 073007

& - 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 (2.7 to 1999.3 keV) 2.5708155E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0590 D2 Bag# S-062 Grid C4-2 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:29:33 Page 1
4714781 Spectrum name: Win00360.An1

Sample description
WI07-0590 D2 Bag #S-062 Grid C4-2 07-27-07

Spectrum Filename: C:\User\Win00360.An1

Acquisition information
Start time: 27-Jul-2007 11:19:23
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5010E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5010E+02) = 2.8563E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:29:33 Page 2
4714781 Spectrum name: Win00360.An1

WI07-0590 D2 Bag# S-062 Grid C4-2 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0871

********** 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	
14.54	3.82	4548.	22938.	38.230	1.77	2.155	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	46.88	53.	48.	0.079	65.44	0.482s
AM-241	237.43	59.53	91.	212.	0.354	22.29	1.046s
Th-234	253.93	63.66	85.	47.	0.078	81.27	0.563s
Pb-214	298.54	74.81	71.	114.	0.190	28.04	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	38.34	0.653D
Pb-212	307.74	77.11	62.	170.	0.284	20.13	0.919D
Pb-214	307.74	77.11	154.	0.	0.000	462.11	0.399D
Pb-214	348.13	87.20	46.	50.	0.084	53.49	0.796
Th-234	368.72	92.35	67.	60.	0.100	46.58	0.933D
Ac-228	380.72	95.35	36.	3.	0.005	563.45	0.935D
Ac-228	837.85	209.61	23.	59.	0.098	43.09	0.605s
Pb-212	953.94	238.62	15.	245.	0.408	13.56	1.057D
Pb-214	967.37	241.98	35.	39.	0.066	53.03	1.060D
Ac-228	1080.14	270.17	21.	26.	0.043	84.44	1.246s

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:29:33 Page 3
4714781 Spectrum name: Win00360.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.73	295.56	11.	69.	0.115	31.80	0.944s
Ac-228	1310.00	327.62	2.	0.	0.000	0.00	0.000s
Ac-228	1353.35	338.45	10.	69.	0.115	30.72	0.612s
Pb-214	1408.01	352.11	15.	96.	0.161	26.65	0.964
Ac-228	1853.33	463.41	4.	29.	0.049	46.47	0.353s

WI07-0590 D2 Bag# S-062 Grid C4-2 072707

Bi-214	2437.52	609.41	0.	61.	0.102	25.61	0.866s
CS-137	2647.61	661.92	0.	23.	0.038	41.70	0.400s
Bi-214	3068.94	767.21	4.	2.	0.004	296.65	0.311s
Ac-228	3181.10	795.24	0.	17.	0.028	48.51	0.375s
Ac-228	3645.66	911.33	0.	44.	0.073	30.15	0.678s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	15.	0.	0.001	2719.73	1.595D
Ac-228	3876.86	969.11	11.	25.	0.042	54.81	1.598D
Bi-214	4480.00	1119.83	4.	2.	0.004	296.65	0.317s
Bi-214	4949.00	1237.02	0.	6.	0.010	81.65	0.250s
Bi-214	5511.75	1377.63	0.	6.	0.010	81.65	0.375s
K-40	5845.67	1461.06	0.	36.	0.060	33.33	1.124s
Ac-228	6351.78	1587.52	1.	1.	0.002	346.41	0.217s
Bi-214	7060.20	1764.51	0.	7.	0.012	75.59	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7488E-04	609.31	2.837E-04	(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	4.068E-04	&	2.712E-04	G
			768.36	0.000E+00	&	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	+	4.328E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.5850E-03	1460.81	1.585E-03	(	4.403E-05	G
Ac-228	N	4.8666E-04	911.07	4.846E-04	?(	1.101E-05	G K
			969.11	4.902E-04	(	1.026E-04	G
			338.32	8.086E-04	+	1.533E-04	G
			964.60	0.000E+00	%	3.756E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	1.143E-03	+	3.367E-04	G
			209.28	1.241E-03	+	2.818E-04	G
			270.23	8.123E-04	+	3.189E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:29:33 Page 4
4714781 Spectrum name: Win00360.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	1.800E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 5.8818E-04	238.62	5.625E-04	(	1.388E-05	G K
		77.11	6.518E-04	(	4.450E-05	Energy duplication
		74.81	0.000E+00		8.523E-05	Energy duplication
CS-137	6.2327E-05	661.66	6.233E-05	?(	2.710E-06	G
Th-234	N 8.0528E-04	92.35	7.464E-04	(	1.510E-04	G
		63.29	8.890E-04	*(	2.586E-04	G
Pb-214	N 3.8247E-04	351.92	3.568E-04	(	2.200E-05	G K

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                    WI07-0590   D2 Bag# S-062   Grid C4-2   072707
                            295.21 4.322E-04 *(  3.268E-05          G
                             77.11 0.000E+00 &   1.185E-04Energy duplication
                            241.98 5.436E-04 +   1.753E-04          G
                             74.81 1.273E-03 +   2.203E-04Energy duplication
                             87.30 7.280E-04 +   2.085E-04          X

Pb-210   N   9.7306E-04     46.50 9.731E-04  (  2.213E-04          G

AM-241       4.3722E-04     59.54 4.372E-04 @(  2.878E-05          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

   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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:29:33 Page    5
4714781                          Spectrum name: Win00360.An1

   R - Coincidence Corrected              C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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***** 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
Bi-214	7.8513E-01	2.011E-01	2.032E-01
K-40	4.5273E+00	1.509E+00	1.519E+00
Ac-228	1.3901E+00	4.191E-01	4.224E-01
Pb-212	1.6800E+00	2.039E-01	2.134E-01
CS-137 #	1.7803E-01	7.424E-02	7.455E-02
Th-234	2.3001E+00	1.071E+00	1.073E+00
Pb-214	1.0925E+00	2.266E-01	2.303E-01
Pb-210 #	2.7794E+00	1.819E+00	1.820E+00
AM-241 #	1.2489E+00	2.783E-01	2.822E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-0590 D2 Bag# S-062 Grid C4-2 072707

< - 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 (2.7 to 1999.3 keV) 1.5981388E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
Energysolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0591 D2 Bag# S-063 Grid C4-2 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:45:54 Page    1
4714781                          Spectrum name: Win00361.An1

Sample description
     WI07-0591  D2  Bag #S-063  Grid C4-2  07-27-07


Spectrum Filename: C:\User\Win00361.An1

Acquisition information
       Start time:                 27-Jul-2007 11:35:44
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3460E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3460E+02) =
                                   2.9886E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:45:54 Page    2
4714781                          Spectrum name: Win00361.An1
```

WI07-0591 D2 Bag# S-063 Grid C4-2 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0879

********** 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	
14.56	3.83	4998.	26896.	44.827	1.61	2.121	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.05	46.69	32.	48.	0.080	50.00	0.654s
AM-241	237.41	59.53	83.	453.	0.754	12.60	0.950s
Th-234	252.63	63.33	50.	37.	0.062	75.14	1.499s
Pb-214	298.54	74.81	86.	95.	0.158	34.51	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	949.85	0.599D
Pb-212	307.74	77.11	75.	182.	0.304	19.97	0.919D
Pb-214	307.74	77.11	250.	0.	0.000	113.68	0.259D
Pb-214	347.91	87.15	58.	82.	0.136	41.26	1.067s
Th-234	368.72	92.35	55.	28.	0.046	85.41	0.933D
Ac-228	380.72	95.35	44.	13.	0.022	153.97	0.935D
Ac-228	835.88	209.12	19.	45.	0.076	47.06	0.789s
Pb-212	953.94	238.62	19.	259.	0.431	13.30	1.057D
Pb-214	967.37	241.98	29.	35.	0.058	55.53	1.060D
Ac-228	1077.90	269.61	23.	25.	0.041	90.93	0.301s

0

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:45:54 Page 3
4714781 Spectrum name: Win00361.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.45	295.49	6.	77.	0.128	26.10	0.902s
Ac-228	1310.14	327.65	15.	21.	0.036	88.83	0.316s
Ac-228	1353.36	338.45	9.	63.	0.106	30.09	0.813s
Pb-214	1407.39	351.96	7.	85.	0.142	24.49	0.753s
Ac-228	1852.42	463.18	4.	34.	0.057	41.78	1.214s

WI07-0591 D2 Bag# S-063 Grid C4-2 072707

Bi-214	2437.04	609.29	0.	75.	0.125	23.09	0.450s
CS-137	2647.50	661.89	0.	34.	0.057	34.30	0.843s
Bi-214	3067.00	766.73	6.	4.	0.006	249.63	0.323s
Ac-228	3174.50	793.59	0.	17.	0.028	48.51	0.292s
Ac-228	3645.52	911.30	0.	58.	0.097	26.26	0.381s
Bi-214	3736.00	933.91	0.	12.	0.020	57.74	0.250s
Ac-228	3858.81	964.60	3.	11.	0.019	73.78	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.67	1.598D
Bi-214	4482.44	1120.43	0.	17.	0.028	48.51	0.750s
Bi-214	4956.00	1238.77	0.	8.	0.013	70.71	0.625s
Bi-214	5508.83	1376.90	2.	2.	0.003	311.13	0.223s
K-40	5843.32	1460.48	15.	2.	0.004	518.24	0.359s
Ac-228	6354.33	1588.15	0.	7.	0.012	75.59	0.250s
Bi-214	7059.33	1764.29	1.	0.	0.001	240.37	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.6474E-04	609.31	3.488E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	0.000E+00	&	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	3.649E-04	G
			934.06	1.166E-03	+	5.271E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.797E-04	G
Ac-228	N	6.5541E-04	911.07	6.388E-04	?(	1.101E-05	G K
			969.11	5.475E-04	(	1.942E-05	G
			338.32	7.422E-04	?(	5.500E-05	G
			964.60	6.872E-04	(	1.819E-04	G
			794.70	9.995E-04	&	3.735E-04	G
			463.00	1.338E-03	+	3.598E-04	G
			209.28	9.592E-04	+	2.502E-04	G
			270.23	7.706E-04	&(	2.296E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:45:54 Page 4
4714781 Spectrum name: Win00361.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	2.514E-04	-	2.155E-04	X
		327.64	8.688E-04	?(	2.419E-04	G
Pb-212	N 5.9441E-04	238.62	5.944E-04	(	1.524E-05	G K
		77.11	6.982E-04	+	8.873E-05	Energy duplication
		74.81	0.000E+00	%	9.490E-05	Energy duplication
CS-137	9.2136E-05	661.66	9.214E-05	(	2.710E-06	G
Th-234	N 4.9408E-04	92.35	3.438E-04	(	1.378E-04	G
		63.29	7.081E-04	*(	2.000E-04	G
Pb-214	N 3.1481E-04	351.92	3.148E-04	(	1.583E-05	G K

```
                    WI07-0591   D2 Bag# S-063   Grid C4-2   072707
                            295.21 4.824E-04 +   8.390E-05          G
                             77.11 0.000E+00 ?   1.501E-04Energy duplication
                            241.98 4.808E-04 +   1.635E-04          G
                             74.81 1.057E-03 +   2.180E-04Energy duplication
                             87.30 1.183E-03 +   2.493E-04          X

Pb-210   N   9.7986E-04     46.50 9.799E-04 ?(  1.738E-04          G

AM-241       9.3210E-04     59.54 9.321E-04 @(  2.763E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:45:54 Page    5
4714781                          Spectrum name: Win00361.Anl

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.0901E+00	2.517E-01	2.550E-01
K-40	<	8.3586E-01		
Ac-228		1.9588E+00	5.122E-01	5.174E-01
Pb-212		1.7765E+00	2.363E-01	2.455E-01
CS-137		2.7536E-01	9.445E-02	9.503E-02
Th-234		1.4766E+00	8.399E-01	8.406E-01
Pb-214		9.4087E-01	2.304E-01	2.331E-01
Pb-210	#	2.9285E+00	1.464E+00	1.466E+00
AM-241	#	2.7857E+00	3.511E-01	3.659E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0591 D2 Bag# S-063 Grid C4-2 072707

< - 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 (2.7 to 1999.3 keV) 1.3232377E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Lam
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0592 D2 Bag# S-064 Grid C4-1,2,3 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:03:58 Page    1
4714781                          Spectrum name: Win00362.An1

Sample description
     WI07-0592  D2  Bag #S-064  Grid C4-1,2,3  07-27-07


Spectrum Filename: C:\User\Win00362.An1

Acquisition information
       Start time:                 27-Jul-2007 11:53:47
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.5150E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5150E+02) =
                                   2.8450E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:03:58 Page    2
4714781                          Spectrum name: Win00362.An1
```

WI07-0592 D2 Bag# S-064 Grid C4-1,2,3 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1516

********** 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	
14.56	3.83	5235.	26235.	43.725	1.66	2.119	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.46	46.55	56.	33.	0.054	88.95	0.412s
AM-241	237.74	59.61	99.	571.	0.952	10.89	0.881
Th-234	252.41	63.28	42.	40.	0.067	64.42	0.795
Pb-214	298.54	74.81	76.	123.	0.205	27.03	0.917D
Pb-212	298.56	74.81	115.	0.	0.000	184.90	0.278D
Pb-212	307.74	77.11	76.	148.	0.246	23.47	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	134.10	0.335D
Pb-214	347.89	87.14	54.	64.	0.107	46.98	0.440s
Th-234	368.72	92.35	73.	47.	0.079	58.89	0.933D
Ac-228	380.72	95.35	47.	3.	0.005	609.39	0.935D
Ac-228	835.77	209.09	20.	29.	0.048	68.62	0.923
Pb-212	953.94	238.62	21.	244.	0.407	13.83	1.057D
Pb-214	967.37	241.98	25.	44.	0.073	44.57	1.060D
Ac-228	1072.46	268.25	22.	26.	0.043	80.08	0.207s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.45	294.99	5.	60.	0.099	29.83	1.122s
Ac-228	1311.81	328.07	11.	12.	0.020	109.50	0.399s
Ac-228	1354.20	338.66	13.	58.	0.097	36.14	1.234
Pb-214	1407.12	351.89	7.	89.	0.148	25.00	1.235s
Ac-228	1851.31	462.91	0.	26.	0.043	39.22	1.031s

WI07-0592 D2 Bag# S-064 Grid C4-1,2,3 072707

Bi-214	2437.68	609.45	0.	80.	0.133	22.36	1.874s
CS-137	2646.23	661.57	0.	13.	0.022	55.47	0.937s
Bi-214	3068.98	767.22	2.	8.	0.014	89.52	0.244s
Ac-228	3178.57	794.61	0.	11.	0.018	60.30	0.437s
Ac-228	3646.36	911.51	0.	55.	0.092	26.97	1.645
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	2.	10.	0.017	72.35	1.595D
Ac-228	3876.86	969.11	2.	28.	0.047	40.21	1.598D
Bi-214	4482.09	1120.35	0.	14.	0.023	53.45	0.333s
Bi-214	4955.86	1238.73	0.	14.	0.023	53.45	0.375s
Bi-214	5511.33	1377.53	0.	3.	0.005	115.47	0.250s
K-40	5844.89	1460.87	0.	55.	0.092	26.97	1.083s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.6638E-04	609.31	3.720E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-04	G
			768.36	4.256E-04	&(	1.292E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.4215E-03	1460.81	2.422E-03	?(	4.403E-05	G
Ac-228	N	6.1309E-04	911.07	6.057E-04	(	1.101E-05	G K
			969.11	5.455E-04	(	4.885E-05	G
			338.32	6.836E-04	(	6.514E-05	G
			964.60	6.327E-04	(	1.504E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	1.013E-03	+	3.012E-04	G
			209.28	6.136E-04	(	1.448E-04	G
			270.23	7.967E-04	&(	2.258E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:03:58 Page 4
4714781 Spectrum name: Win00362.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	4.887E-04	(	2.125E-04	G
Pb-212	N 5.6268E-04	238.62	5.616E-04	(	1.594E-05	G K
		77.11	5.653E-04	(	4.926E-05	Energy duplication
		74.81	0.000E+00	?	1.015E-04	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 6.6004E-04	92.35	5.884E-04	(	1.570E-04	G
		63.29	7.620E-04	$(	1.844E-04	G
Pb-214	N 3.4384E-04	351.92	3.284E-04	*(	1.616E-05	G K

```
                    WI07-0592   D2 Bag# S-064   Grid C4-1,2,3   072707
                              295.21 3.738E-04 @(  2.383E-05          G
                               77.11 0.000E+00 ?   1.362E-04Energy duplication
                              241.98 6.028E-04 +   1.695E-04          G
                               74.81 1.370E-03 +   2.283E-04Energy duplication
                               87.30 9.287E-04 +   2.303E-04          X

Pb-210   N   6.6685E-04      46.50 6.669E-04 ?(  2.271E-04          G

AM-241       1.1758E-03      59.54 1.176E-03  (  3.002E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:03:58 Page    5
4714781                          Spectrum name: Win00362.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0423E+00	2.331E-01	2.363E-01
K-40 #	6.8891E+00	1.858E+00	1.876E+00
Ac-228	1.7442E+00	4.116E-01	4.167E-01
Pb-212	1.6008E+00	2.181E-01	2.262E-01
CS-137 #	1.0022E-01	5.559E-02	5.573E-02
Th-234	1.8778E+00	8.195E-01	8.206E-01
Pb-214	9.7821E-01	1.904E-01	1.939E-01
Pb-210 #	1.8972E+00	1.687E+00	1.688E+00
AM-241	3.3450E+00	3.643E-01	3.848E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-0592 D2 Bag# S-064 Grid C4-1,2,3 072707

< - 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 (2.7 to 1999.3 keV) 1.9474815E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0593 D2 Bag# S-065 Grid C4-1,2,3 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:22:25 Page    1
4714781                          Spectrum name: Win00363.An1

Sample description
     WI07-0593  D2  Bag #S-065  Grid C4-1,2,3  07-27-07


Spectrum Filename: C:\User\Win00363.An1

Acquisition information
       Start time:                 27-Jul-2007 12:06:33
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.1480E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1480E+02) =
                                   3.1766E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:22:25 Page    2
4714781                          Spectrum name: Win00363.An1
```

WI07-0593 D2 Bag# S-065 Grid C4-1,2,3 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1129

********** 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	
14.66	3.85	5328.	25639.	42.732	1.69	2.283	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.08	46.70	68.	56.	0.094	60.57	0.500s
AM-241	237.66	59.59	111.	518.	0.864	12.08	0.829
Th-234	253.24	63.49	74.	58.	0.097	63.29	0.989
Pb-214	298.54	74.81	53.	125.	0.209	24.24	0.917D
Pb-212	298.56	74.81	115.	0.	0.000	239.82	0.456D
Pb-212	307.74	77.11	61.	177.	0.296	19.49	0.919D
Pb-214	307.74	77.11	245.	0.	0.000	108.17	0.000D
Pb-214	348.32	87.25	37.	56.	0.094	44.94	1.030
Th-234	368.72	92.35	50.	56.	0.093	44.95	0.933D
Ac-228	380.72	95.35	34.	2.	0.004	785.54	0.935D
Ac-228	835.62	209.05	16.	38.	0.063	48.81	0.741s
Pb-212	953.94	238.62	32.	242.	0.403	14.45	1.057D
Pb-214	967.37	241.98	38.	31.	0.052	66.29	1.060D
Ac-228	1076.00	269.13	20.	8.	0.014	197.21	0.000s

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:22:25 Page 3
4714781 Spectrum name: Win00363.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.78	295.32	17.	45.	0.075	46.65	0.645s
Ac-228	1311.67	328.03	11.	28.	0.047	63.62	0.456s
Ac-228	1352.68	338.28	5.	46.	0.076	35.37	0.704s
Pb-214	1406.92	351.84	21.	83.	0.138	32.10	1.066
Ac-228	1851.94	463.06	0.	22.	0.037	42.64	0.333s

WI07-0593 D2 Bag# S-065 Grid C4-1,2,3 072707

Bi-214	2437.03	609.29	0.	70.	0.117	23.90	1.208
CS-137	2647.67	661.93	0.	21.	0.035	43.64	0.487s
Bi-214	3074.62	768.63	0.	8.	0.013	70.71	0.625s
Ac-228	3179.00	794.72	2.	0.	0.000	0.00	0.000s
Ac-228	3646.47	911.54	0.	46.	0.077	29.49	1.249
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	8.	12.	0.020	85.39	1.595D
Ac-228	3876.86	969.11	13.	4.	0.006	283.80	1.598D
Bi-214	4483.76	1120.77	0.	17.	0.028	48.51	0.333s
Bi-214	4949.00	1237.02	0.	4.	0.007	100.00	0.250s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5844.42	1460.75	0.	40.	0.067	31.62	1.049s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7061.65	1764.87	0.	17.	0.028	48.51	1.062s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5249E-04	609.31	3.255E-04	(	4.650E-06	G K
			1764.49	6.049E-04	+	2.260E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	2.712E-04	&	2.286E-04	G
			768.36	4.169E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	5.1493E-04	911.07	5.066E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.219E-04	G
			338.32	5.352E-04	(	4.458E-05	G
			964.60	7.563E-04	+	4.206E-04	G
			794.70	0.000E+00	?	1.506E-04	G
			463.00	8.575E-04	+	2.788E-04	G
			209.28	8.041E-04	+	2.307E-04	G
			270.23	2.656E-04	&	2.499E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:22:25 Page 4
4714781 Spectrum name: Win00363.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	1.140E-03	+	3.806E-04	G
Pb-212	N 5.5595E-04	238.62	5.560E-04	(	1.949E-05	G K
		77.11	6.790E-04	+	8.546E-05	Energy duplication
		74.81	0.000E+00	%	1.015E-04	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 8.6627E-04	92.35	6.942E-04	(	1.316E-04	G
		63.29	1.111E-03	$(	2.410E-04	G
Pb-214	N 3.1425E-04	351.92	3.074E-04	(	2.593E-05	G K

```
                    WI07-0593   D2 Bag# S-065   Grid C4-1,2,3   072707
                               295.21 2.819E-04  (  3.979E-05          G
                                77.11 0.000E+00 ?   1.486E-04Energy duplication
                               241.98 4.311E-04  (  1.274E-04          G
                                74.81 1.397E-03 +   2.161E-04Energy duplication
                                87.30 8.175E-04 +   2.053E-04          X

Pb-210   N   1.1534E-03      46.50 1.153E-03 *(  2.476E-04          G

AM-241       1.0670E-03      59.54 1.067E-03  (  3.170E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:22:25 Page    5
4714781                          Spectrum name: Win00363.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214        1.1197E+00    2.677E-01    2.709E-01
K-40    #     5.5944E+00    1.769E+00    1.781E+00
Ac-228        1.6357E+00    3.766E-01    3.816E-01
Pb-212        1.7661E+00    2.551E-01    2.636E-01
CS-137  #     1.8077E-01    7.890E-02    7.920E-02
Th-234        2.7518E+00    1.068E+00    1.070E+00
Pb-214        9.9824E-01    2.901E-01    2.925E-01
Pb-210  #     3.6638E+00    2.219E+00    2.221E+00
AM-241        3.3894E+00    4.095E-01    4.283E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0593 D2 Bag# S-065 Grid C4-1,2,3 072707

< - 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 (2.7 to 1999.3 keV) 2.1099943E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0594 D2 Bag# S-066 Grid C4-1,2 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:39:47 Page    1
4714781                          Spectrum name: Win00364.An1

Sample description
     WI07-0594  D2  Bag #S-066 Grid C4-1,2,  07-27-07


Spectrum Filename: C:\User\Win00364.An1

Acquisition information
       Start time:                 27-Jul-2007 12:29:37
       Live time:                600
       Real time:                602
       Dead time:                  0.25 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.1250E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1250E+02) =
                                   3.2000E+03
       Detection limit method:     Traditional ORTEC method

□

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:39:47 Page    2
4714781                          Spectrum name: Win00364.An1
```

WI07-0594 D2 Bag# S-066 Grid C4-1,2 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0823

********** 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	
11.80	2.92	5392.	9478.	15.796	3.00	0.854	-	D
16.83	4.18	14172.	8105.	13.508	4.71	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.61	46.33	49.	48.	0.080	60.57	0.568s
AM-241	237.11	59.45	96.	256.	0.427	19.76	1.210s
Th-234	252.03	63.18	69.	50.	0.083	66.07	1.125s
Pb-214	298.54	74.81	83.	106.	0.177	30.98	0.917D
Pb-212	298.56	74.81	118.	0.	0.000	390.51	0.000D
Pb-212	307.74	77.11	77.	163.	0.272	21.82	0.919D
Pb-214	307.74	77.11	171.	0.	0.000	417.85	0.324D
Pb-214	348.29	87.24	32.	53.	0.088	46.06	0.565s
Th-234	368.72	92.35	49.	45.	0.075	53.26	0.933D
Ac-228	380.72	95.35	44.	23.	0.038	91.63	0.935D
Ac-228	839.50	210.02	16.	5.	0.008	243.31	0.249s
Pb-212	953.94	238.62	16.	201.	0.334	15.23	1.057D
Pb-214	967.37	241.98	33.	18.	0.029	104.77	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:39:47 Page 3
4714781 Spectrum name: Win00364.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.44	270.24	8.	19.	0.031	68.51	0.285s
Pb-214	1181.67	295.54	18.	48.	0.079	47.31	1.269s
Ac-228	1311.73	328.05	8.	26.	0.043	56.42	1.122s
Ac-228	1353.38	338.46	6.	58.	0.097	31.23	1.007s
Pb-214	1407.66	352.03	7.	95.	0.158	23.68	1.179

WI07-0594 D2 Bag# S-066 Grid C4-1,2 072707

Ac-228	1852.00	463.08	3.	0.	0.000	0.00	0.000s
Bi-214	2436.84	609.24	0.	68.	0.113	24.25	1.250s
CS-137	2646.54	661.65	0.	30.	0.050	36.51	0.375s
Bi-214	3074.00	768.48	0.	1.	0.002	200.00	0.250s
Ac-228	3179.00	794.72	4.	1.	0.002	642.91	0.000s
Ac-228	3645.49	911.29	0.	55.	0.092	26.97	1.312
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	10.	0.017	68.67	1.595D
Ac-228	3876.86	969.11	0.	31.	0.051	36.00	1.598D
Bi-214	4480.56	1119.97	3.	2.	0.004	250.71	0.322s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.30	1460.97	0.	43.	0.072	30.50	0.750s
Ac-228	6353.50	1587.95	0.	8.	0.013	70.71	0.375s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	3.1623E-04	609.31	3.162E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	%	9.007E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8932E-03	1460.81	1.893E-03	?(	4.403E-05	G
Ac-228	N	6.1716E-04	911.07	6.057E-04	(	1.101E-05	G K
			969.11	5.994E-04	(	1.942E-05	G
			338.32	6.797E-04	*(	4.688E-05	G
			964.60	6.212E-04	(	1.208E-04	G
			794.70	0.000E+00	%	2.176E-04	G
			463.00	0.000E+00	?	1.169E-04	G
			209.28	0.000E+00	&	1.481E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:39:47 Page 4
4714781 Spectrum name: Win00364.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.832E-04	?(	1.441E-04	G
		1588.00	1.162E-03	+	6.581E-04	G
		95.35	4.429E-04	-	2.328E-04	X
		327.64	1.038E-03	+	3.518E-04	G
Pb-212	N 4.6105E-04	238.62	4.610E-04	(	1.435E-05	G K
		77.11	6.246E-04	+	8.581E-05	Energy duplication
		74.81	0.000E+00	%	1.028E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 7.1962E-04	92.35	5.605E-04	(	1.300E-04	G
		63.29	9.462E-04	$(	2.341E-04	G

```
                    WI07-0594   D2 Bag# S-066   Grid C4-1,2   072707
Pb-214   N   3.3337E-04     351.92 3.519E-04  (  1.583E-05         G K
                            295.21 2.976E-04 *(  4.032E-05         G
                             77.11 0.000E+00 %   1.246E-04Energy duplication
                            241.98 2.426E-04 -   1.467E-04         G
                             74.81 1.187E-03 +   2.226E-04Energy duplication
                             87.30 7.691E-04 +   1.966E-04         X

Pb-210   N   9.7986E-04      46.50 9.799E-04  (  2.126E-04         G

AM-241       5.2714E-04      59.54 5.271E-04  (  2.958E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:39:47 Page    5
 4714781                          Spectrum name: Win00364.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214 #      1.0119E+00    2.454E-01    2.483E-01
 K-40   #      6.0582E+00    1.848E+00    1.862E+00
 Ac-228        1.9749E+00    4.400E-01    4.462E-01
 Pb-212        1.4753E+00    2.247E-01    2.314E-01
 CS-137 #      2.6015E-01    9.499E-02    9.551E-02
 Th-234        2.3028E+00    9.771E-01    9.786E-01
 Pb-214        1.0668E+00    2.526E-01    2.557E-01
 Pb-210 #      3.1356E+00    1.899E+00    1.901E+00
 AM-241        1.6868E+00    3.334E-01    3.392E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0594 D2 Bag# S-066 Grid C4-1,2 072707

& - 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 (2.7 to 1999.3 keV) 1.8972546E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0613 D2 Bag# S-067 Grid C3-1,2 3,5 072807

Sample description
WI07-0613 D2 Bag # S-067 Grid C3-1,2,3,5 07-28-07

Spectrum Filename: C:\User\Win00368.An1

Acquisition information
Start time: 28-Jul-2007 08:50:51
Live time: 600
Real time: 602
Dead time: 0.32 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5590E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5590E+02) = 2.8098E+03
Detection limit method: Traditional ORTEC method

WI07-0613 D2 Bag# S-067 Grid C3-1,2 3,5 072807

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1014

********** 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	
11.59	2.91	7874.	10816.	18.027	3.01	0.854	-	D
15.47	3.88	13996.	10266.	17.110	3.81	0.855	-	D
69.40	17.53	46.	44.	0.072	62.97	0.419	MO-99	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.59	46.58	153.	49.	0.081	87.91	0.660s
AM-241	237.65	59.59	393.	4016.	6.693	3.72	0.952
Th-234	251.36	63.02	52.	61.	0.102	49.25	0.377s
Pb-214	298.54	74.81	92.	128.	0.213	27.71	0.917D
Pb-212	298.56	74.81	127.	0.	0.000	233.87	0.263D
Pb-212	307.74	77.11	67.	202.	0.336	18.18	0.919D
Pb-214	307.74	77.11	188.	0.	0.000	659.22	0.284D
Pb-214	346.58	86.82	76.	41.	0.069	81.48	0.807s
Th-234	368.72	92.35	46.	88.	0.146	30.61	0.933D
Ac-228	380.72	95.35	47.	5.	0.008	430.48	0.936D
Ac-228	836.51	209.27	28.	53.	0.088	48.23	1.182
Pb-212	953.94	238.62	26.	272.	0.453	13.26	1.057D

ORTEC g v - i (63) wan32 GS3W2.06 28-JUL-2007 09:01:03 Page 3
4714781 Spectrum name: Win00368.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	24.	61.	0.102	33.95	1.060D
Ac-228	1078.69	269.80	17.	28.	0.047	68.94	0.542s
Pb-214	1178.69	294.80	13.	87.	0.144	27.74	1.519s
Ac-228	1312.84	328.33	5.	23.	0.039	53.45	1.187
Ac-228	1353.00	338.36	16.	58.	0.097	38.31	0.862

WI07-0613 D2 Bag# S-067 Grid C3-1,2 3,5 072807

Pb-214	1407.26	351.93	13.	135.	0.225	21.18	1.456s
Ac-228	1851.58	462.97	2.	23.	0.038	48.69	0.739s
Bi-214	2438.07	609.55	3.	77.	0.128	24.70	1.124
CS-137	2648.00	662.02	8.	0.	0.001	1150.36	0.000s
Bi-214	3073.30	768.30	0.	11.	0.018	60.30	0.562s
Ac-228	3179.00	794.72	7.	0.	0.001	851.14	0.000s
Ac-228	3645.61	911.32	0.	56.	0.093	26.73	1.447s
Bi-214	3737.50	934.28	0.	4.	0.007	100.00	0.500s
Ac-228	3858.81	964.60	3.	3.	0.005	217.74	1.595D
Ac-228	3876.86	969.11	3.	35.	0.059	36.06	1.598D
Bi-214	4479.95	1119.81	5.	3.	0.005	269.43	0.266s
Bi-214	4950.80	1237.47	2.	2.	0.003	244.95	0.307s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.10	1460.92	0.	42.	0.070	30.86	0.562s
Ac-228	6355.50	1588.45	0.	2.	0.003	141.42	0.500s
Bi-214	7060.17	1764.50	0.	11.	0.018	60.30	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.6710E-04	609.31	3.573E-04	(	1.426E-05	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.103E-04	G
			1238.11	0.000E+00	%	2.286E-04	G
			768.36	5.732E-04	+	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.8492E-03	1460.81	1.849E-03	?(	4.403E-05	G
Ac-228	N	6.7930E-04	911.07	6.167E-04	*(	1.101E-05	G K
			969.11	6.855E-04	(	5.507E-05	G
			338.32	6.817E-04	(	7.207E-05	G
			964.60	0.000E+00	%	2.493E-04	G
			794.70	0.000E+00	%	2.514E-04	G
			463.00	8.835E-04	?(	1.059E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.114E-03	+	2.801E-04	G
		270.23	8.748E-04	(	1.985E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	2.063E-04	X
		327.64	9.502E-04	&	3.258E-04	G
Pb-212	N 6.2439E-04	238.62	6.244E-04	(	1.786E-05	G K
		77.11	7.723E-04	+	9.073E-05	Energy duplication
		74.81	0.000E+00	%	1.065E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.293E-05	G
Th-234	N 1.1225E-03	92.35	1.095E-03	(	1.264E-04	G
		63.29	1.162E-03	*(	2.040E-04	G

Pb-214	N	5.2094E-04	351.92	5.000E-04	(	2.083E-05	G	K
			295.21	5.429E-04	(	3.563E-05	G	
			77.11	0.000E+00	%	1.305E-04	Energy duplication	
			241.98	8.488E-04	+	1.873E-04	G	
			74.81	1.424E-03	+	2.397E-04	Energy duplication	
			87.30	5.974E-04	(	1.861E-04	X	
Pb-210	N	9.9347E-04	46.50	9.935E-04	(	3.678E-04	G	
AM-241		8.2695E-03	59.54	8.269E-03	(	5.877E-05	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

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.0315E+00	2.548E-01	2.577E-01
K-40	#	5.1957E+00	1.603E+00	1.615E+00
Ac-228		1.9087E+00	3.931E-01	3.996E-01
Pb-212		1.7544E+00	2.326E-01	2.417E-01
CS-137	<	3.6335E-02		
Th-234		3.1540E+00	9.145E-01	9.174E-01
Pb-214		1.4637E+00	3.100E-01	3.148E-01
Pb-210		2.7914E+00	2.454E+00	2.455E+00
AM-241		2.3235E+01	8.650E-01	1.220E+00

- All peaks for activity calculation had bad shape.

WI07-0613 D2 Bag# S-067 Grid C3-1,2 3,5 072807

* - 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 (2.7 to 1999.3 keV) 4.0534885E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0614 D2 Bag# S-068 Grid C3-1,2 3,5 072807

```
     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:18:17 Page    1
4714781                          Spectrum name: Win00369.An1

Sample description
     WI07-0614  D2  Bag # S-068 Grid C3-1,2,3,5   07-28-07


Spectrum Filename: C:\User\Win00369.An1

Acquisition information
       Start time:                 28-Jul-2007 09:08:05
       Live time:                600
       Real time:                602
       Dead time:                  0.35 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3020E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3020E+02) =
                                   3.0285E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:18:17 Page    2
4714781                          Spectrum name: Win00369.An1
```

WI07-0614 D2 Bag# S-068 Grid C3-1,2 3,5 072807

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1046

********** 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	
11.72	2.91	5565.	10441.	17.402	2.81	0.854	-	D
16.84	4.19	14913.	8556.	14.261	4.58	0.855	-	D
105.13	26.46	51.	116.	0.193	30.84	0.768	AM-241	
127.85	32.14	83.	133.	0.221	33.50	1.106	XE-138	s
198.74	49.86	908.	236.	0.394	49.40	0.779	EU-155	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

********** 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	185.00	46.43	200.	12.	0.020	364.64	0.000s
AM-241	237.61	59.58	826.	8852.	14.754	2.51	0.887
Th-234	253.48	63.54	58.	34.	0.056	81.72	0.567s
Pb-214	298.54	74.81	83.	87.	0.145	36.62	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	411.07	0.265D
Pb-212	307.74	77.11	76.	182.	0.304	20.02	0.919D
Pb-214	307.74	77.11	214.	0.	0.000	185.89	0.213D
Pb-214	348.96	87.41	56.	67.	0.111	46.96	0.395s
Th-234	368.72	92.35	59.	37.	0.062	66.91	0.933D

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:18:17 Page 3
4714781 Spectrum name: Win00369.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	39.	7.	0.012	255.87	0.935D
Ac-228	835.73	209.08	19.	47.	0.078	47.80	0.507s
Pb-212	953.94	238.62	24.	210.	0.349	15.34	1.057D
Pb-214	967.37	241.98	33.	41.	0.069	50.17	1.060D
Ac-228	1080.00	270.13	13.	4.	0.006	321.67	0.000s

WI07-0614 D2 Bag# S-068 Grid C3-1,2 3,5 072807

Pb-214	1180.19	295.17	15.	61.	0.102	34.93	1.310
Ac-228	1306.54	326.75	14.	4.	0.007	339.12	0.628s
Ac-228	1353.71	338.54	12.	50.	0.083	43.16	0.444s
Pb-214	1407.26	351.93	2.	116.	0.194	19.21	1.126
Ac-228	1851.45	462.94	3.	21.	0.035	53.47	0.424s
Bi-214	2437.90	609.51	0.	61.	0.102	25.61	0.544s
CS-137	2648.60	662.17	0.	5.	0.008	89.44	0.500s
Bi-214	3076.40	769.08	0.	10.	0.017	63.25	0.500s
Ac-228	3180.31	795.04	2.	12.	0.020	70.71	0.720s
Ac-228	3645.36	911.26	0.	50.	0.083	28.28	0.628s
Bi-214	3736.56	934.05	3.	2.	0.003	308.22	0.318s
Ac-228	3858.81	964.60	1.	17.	0.028	52.57	1.595D
Ac-228	3876.86	969.11	0.	43.	0.072	30.35	1.598D
Bi-214	4482.63	1120.48	0.	19.	0.032	45.88	1.249s
Bi-214	4951.50	1237.64	0.	10.	0.017	63.25	0.312s
Bi-214	5509.00	1376.94	0.	4.	0.007	100.00	0.250s
K-40	5844.74	1460.83	0.	46.	0.077	29.49	0.976s
Ac-228	6355.00	1588.32	0.	3.	0.005	115.47	0.250s
Bi-214	7060.33	1764.54	1.	1.	0.001	339.93	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	2.8368E-04	609.31	2.837E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	+	3.649E-04	G
			934.06	0.000E+00	%	3.597E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	5.7464E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	8.434E-04	+	1.910E-04	G
			338.32	5.801E-04	(	6.475E-05	G

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:18:17 Page 4
4714781 Spectrum name: Win00369.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	1.031E-03	+	4.025E-04	G
		794.70	7.056E-04	?(	1.506E-04	G
		463.00	8.250E-04	+	2.902E-04	G
		209.28	9.945E-04	+	2.539E-04	G
		270.23	0.000E+00	%	1.985E-04	G
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	0.000E+00	%	1.946E-04	X
		327.64	0.000E+00	&	2.655E-04	G
Pb-212	N 4.8162E-04	238.62	4.816E-04	(	1.725E-05	G K
		77.11	6.985E-04	+	8.890E-05	Energy duplication
		74.81	0.000E+00	%	9.490E-05	Energy duplication
CS-137	1.3549E-05	661.66	1.355E-05	?(	2.710E-06	G

Th-234	N	5.3720E-04	92.35	4.640E-04	(	1.417E-04	G	
			63.29	6.414E-04	$(	2.155E-04	G	
Pb-214	N	4.1468E-04	351.92	4.315E-04	(	1.034E-05	G K	
			295.21	3.821E-04	(	3.759E-05	G	
			77.11	0.000E+00	?	1.393E-04	Energy duplication	
			241.98	5.696E-04	+	1.753E-04	G	
			74.81	9.698E-04	+	2.114E-04	Energy duplication	
			87.30	9.674E-04	+	2.350E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.307E-04	G	
AM-241		1.8229E-02	59.54	1.823E-02	(	8.475E-05	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

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	#	8.5911E-01	2.200E-01	2.223E-01
K-40	#	6.1335E+00	1.809E+00	1.823E+00
Ac-228		1.7403E+00	4.922E-01	4.965E-01
Pb-212		1.4586E+00	2.238E-01	2.304E-01
CS-137	#	4.1034E-02	3.670E-02	3.674E-02
Th-234		1.6269E+00	8.591E-01	8.600E-01
Pb-214		1.2558E+00	2.413E-01	2.458E-01
Pb-210	<	1.3043E+00		

WI07-0614 D2 Bag# S-068 Grid C3-1,2 3,5 072807

AM-241	5.5204E+01	1.383E+00	2.468E+00

- 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 (2.7 to 1999.3 keV) 6.8319695E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0646 D2 Bag# S-069 Grid C3-4 072807

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:10:00 Page 1
4714781 Spectrum name: Win00372.An1

Sample description
WI07-0646 D2 Bag # S-069 Grid C3-4 07-28-07

Spectrum Filename: C:\User\Win00372.An1

Acquisition information
Start time: 28-Jul-2007 09:59:49
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4750E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4750E+02) = 2.8777E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:10:00 Page 2
4714781 Spectrum name: Win00372.An1

WI07-0646 D2 Bag# S-069 Grid C3-4 072807

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0627

********** 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	
14.58	3.83	4578.	24021.	40.035	1.71	2.146	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.66	46.34	92.	56.	0.094	69.03	0.387s
AM-241	237.68	59.60	176.	1234.	2.057	7.03	0.823
Th-234	254.35	63.76	59.	51.	0.086	63.60	0.558s
Pb-214	298.54	74.81	73.	112.	0.186	28.74	0.917D
Pb-212	298.56	74.81	109.	0.	0.000	498.89	0.363D
Pb-212	307.74	77.11	65.	171.	0.286	20.24	0.919D
Pb-214	307.74	77.11	214.	0.	0.000	108.31	0.000D
Pb-214	347.88	87.14	46.	63.	0.105	45.01	1.322s
Th-234	368.72	92.35	61.	33.	0.055	75.88	0.933D
Ac-228	380.72	95.35	52.	7.	0.011	320.19	0.935D
Ac-228	836.44	209.26	12.	36.	0.061	47.74	0.926s
Pb-212	953.94	238.62	18.	234.	0.390	14.04	1.057D
Pb-214	967.37	241.98	28.	31.	0.052	60.20	1.060D
Ac-228	1080.75	270.32	6.	22.	0.036	56.65	1.241

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:10:00 Page 3
4714781 Spectrum name: Win00372.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.05	295.14	15.	51.	0.085	41.32	0.548s
Ac-228	1313.87	328.58	6.	23.	0.039	57.53	0.573s
Ac-228	1353.03	338.37	7.	51.	0.085	33.81	0.789s
Pb-214	1407.42	351.97	10.	99.	0.165	23.39	1.211
Ac-228	1850.29	462.65	8.	20.	0.034	71.08	0.524s

WI07-0646 D2 Bag# S-069 Grid C3-4 072807

Bi-214	2437.09	609.31	0.	55.	0.092	26.97	1.203
CS-137	2646.83	661.72	2.	32.	0.053	39.67	0.489s
Bi-214	3076.00	768.98	0.	6.	0.010	81.65	0.250s
Ac-228	3178.25	794.53	0.	18.	0.030	47.14	0.437s
Ac-228	3645.47	911.29	0.	39.	0.065	32.03	1.374
Bi-214	3744.00	935.91	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	1.	9.	0.015	75.83	1.595D
Ac-228	3876.86	969.11	0.	41.	0.069	31.10	1.598D
Bi-214	4483.60	1120.72	0.	15.	0.025	51.64	0.500s
Bi-214	4953.00	1238.02	0.	4.	0.007	100.00	0.500s
Bi-214	5511.86	1377.66	0.	11.	0.018	60.30	0.281s
K-40	5845.28	1460.97	0.	50.	0.083	28.28	0.874s
Ac-228	6349.87	1587.04	1.	1.	0.001	388.73	0.227s
Bi-214	7059.33	1764.29	1.	0.	0.001	240.37	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6238E-04	609.31	2.558E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	3.650E-04	+	1.460E-04	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	3.127E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.190E-03	+	5.644E-04	G
			934.06	4.858E-04	&	3.597E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	(	4.403E-05	G
Ac-228	N	5.0021E-04	911.07	4.295E-04	?(	1.101E-05	G K
			969.11	8.031E-04	+	1.866E-04	G
			338.32	5.977E-04	(	5.010E-05	G
			964.60	5.444E-04	(	1.306E-04	G
			794.70	1.058E-03	+	3.834E-04	G
			463.00	7.990E-04	+	3.170E-04	G
			209.28	7.688E-04	+	2.182E-04	G
			270.23	6.717E-04	(	1.204E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	2.191E-04	X
		327.64	9.502E-04	&	3.312E-04	G
Pb-212	N 5.3843E-04	238.62	5.384E-04	(	1.502E-05	G K
		77.11	6.558E-04	+	8.511E-05	Energy duplication
		74.81	0.000E+00	%	9.893E-05	Energy duplication
CS-137	8.5813E-05	661.66	8.581E-05	?(	7.364E-06	G
Th-234	N 6.4411E-04	92.35	4.096E-04	(	1.444E-04	G
		63.29	9.779E-04	@(	2.161E-04	G
Pb-214	N 3.5973E-04	351.92	3.667E-04	(	1.852E-05	G K

```
                    WI07-0646   D2 Bag# S-069   Grid C3-4  072807
                              295.21 3.195E-04  (  3.759E-05          G
                               77.11 0.000E+00 ?   1.393E-04Energy duplication
                              241.98 4.285E-04  (  1.106E-04          G
                               74.81 1.248E-03 +   2.203E-04Energy duplication
                               87.30 9.142E-04 +   2.216E-04          X

Pb-210   N   1.1534E-03      46.50 1.153E-03 @(  2.881E-04          G

AM-241       2.5410E-03      59.54 2.541E-03  (  3.968E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 10:10:00 Page    5
 4714781                          Spectrum name: Win00372.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	7.5504E-01	2.036E-01	2.056E-01
K-40	6.3349E+00	1.792E+00	1.807E+00
Ac-228	1.4395E+00	3.796E-01	3.834E-01
Pb-212	1.5494E+00	2.175E-01	2.251E-01
CS-137 #	2.4694E-01	9.795E-02	9.841E-02
Th-234	1.8536E+00	9.176E-01	9.186E-01
Pb-214	1.0352E+00	2.421E-01	2.452E-01
Pb-210 #	3.3191E+00	2.291E+00	2.292E+00
AM-241	7.3122E+00	5.138E-01	5.807E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0646 D2 Bag# S-069 Grid C3-4 072807

< - 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 (2.7 to 1999.3 keV) 2.3845812E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0645 D2 Bag# S-070 Grid C3-4 072807

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:51:50 Page 1
4714781 Spectrum name: Win00371.An1

Sample description
WI07-0645 D2 Bag # S-070 Grid C3-4 07-28-07

Spectrum Filename: C:\User\Win00371.An1

Acquisition information
Start time: 28-Jul-2007 09:41:39
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6150E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6150E+02) = 2.7663E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:51:50 Page 2
4714781 Spectrum name: Win00371.An1

WI07-0645 D2 Bag# S-070 Grid C3-4 072807

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0962

********** 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
14.64	3.85	3795.	20210.	33.683	1.86	2.258	CU-64 s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.30	46.50	72.	43.	0.072	69.46	0.878
AM-241	237.61	59.58	263.	2703.	4.505	4.56	0.915
Th-234	251.70	63.10	49.	56.	0.093	52.89	0.426s
Pb-214	298.54	74.81	86.	105.	0.175	31.62	0.917D
Pb-212	298.56	74.81	136.	0.	0.000	534.93	0.215D
Pb-212	307.74	77.11	66.	155.	0.258	21.90	0.919D
Pb-214	307.74	77.11	145.	0.	0.000	564.70	0.261D
Pb-214	348.33	87.26	54.	56.	0.093	54.01	0.674s
Th-234	368.72	92.35	67.	45.	0.076	58.83	0.933D
Ac-228	380.72	95.35	29.	1.	0.002	1237.48	0.935D
Ac-228	835.13	208.93	21.	28.	0.046	74.39	0.509s
Pb-212	953.94	238.62	24.	200.	0.334	15.73	1.057D
Pb-214	967.37	241.98	27.	42.	0.070	46.82	1.060D
Ac-228	1079.88	270.10	7.	48.	0.081	36.36	1.181s

0

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:51:50 Page 3
4714781 Spectrum name: Win00371.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.44	295.24	10.	62.	0.102	32.70	0.716s
Ac-228	1310.33	327.70	4.	1.	0.002	529.15	0.375s
Ac-228	1353.48	338.48	5.	48.	0.080	33.72	0.596s
Pb-214	1407.49	351.98	8.	84.	0.141	25.61	1.523s
Ac-228	1851.21	462.88	3.	21.	0.036	52.29	0.597s

WI07-0645 D2 Bag# S-070 Grid C3-4 072807

Bi-214	2437.70	609.46	3.	59.	0.099	28.29	0.990s
CS-137	2646.36	661.61	0.	25.	0.042	40.00	0.544s
Bi-214	3070.00	767.48	0.	7.	0.012	75.59	0.250s
Ac-228	3178.33	794.55	6.	2.	0.002	551.09	0.197s
Ac-228	3645.26	911.24	0.	53.	0.088	27.47	1.387
Bi-214	3736.50	934.03	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	4.	11.	0.018	78.87	1.595D
Ac-228	3876.86	969.11	5.	31.	0.052	40.94	1.598D
Bi-214	4482.31	1120.40	0.	16.	0.027	50.00	0.875s
Bi-214	4952.00	1237.77	0.	5.	0.008	89.44	0.250s
Bi-214	5508.00	1376.69	0.	2.	0.003	141.42	0.250s
K-40	5845.53	1461.03	0.	49.	0.082	28.57	0.650s
Ac-228	6356.20	1588.62	0.	5.	0.008	89.44	0.312s
Bi-214	7055.33	1763.29	0.	9.	0.015	66.67	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1220E-04	609.31	2.752E-04	(	1.364E-05	G K
			1764.49	3.203E-04	&(	3.558E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	3.648E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	&	2.771E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	(	4.403E-05	G
Ac-228	N	6.0030E-04	911.07	5.837E-04	(	1.101E-05	G K
			969.11	6.059E-04	(	7.063E-05	G
			338.32	5.625E-04	(	4.338E-05	G
			964.60	6.816E-04	(	2.073E-04	G
			794.70	0.000E+00	%	2.514E-04	G
			463.00	8.315E-04	+	2.902E-04	G
			209.28	5.854E-04	(	1.492E-04	G
			270.23	1.510E-03	+	3.437E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	0.000E+00	%	1.507E-04	G
Pb-212	N 4.5992E-04	238.62	4.599E-04	(	1.706E-05	G K
		77.11	5.925E-04	+	8.242E-05	Energy duplication
		74.81	0.000E+00	%	1.103E-04	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 7.7313E-04	92.35	5.668E-04	(	1.503E-04	G
		63.29	1.067E-03	$(	1.984E-04	G
Pb-214	N 3.3757E-04	351.92	3.130E-04	(	1.723E-05	G K

```
                    WI07-0645   D2 Bag# S-070   Grid C3-4  072807
                            295.21 3.853E-04  (  3.062E-05         G
                             77.11 0.000E+00 %   1.150E-04Energy duplication
                            241.98 5.791E-04 +   1.695E-04         G
                             74.81 1.174E-03 +   2.238E-04Energy duplication
                             87.30 8.102E-04 +   2.226E-04         X

Pb-210   N   8.7779E-04      46.50 8.778E-04 ?(  2.554E-04         G

AM-241       5.5662E-03      59.54 5.566E-03  (  4.825E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:51:50 Page    5
 4714781                          Spectrum name: Win00371.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214       8.6364E-01    2.443E-01     2.464E-01
 K-40         5.9678E+00    1.705E+00     1.720E+00
 Ac-228       1.6606E+00    4.227E-01     4.272E-01
 Pb-212       1.2723E+00    2.001E-01     2.057E-01
 CS-137 #     1.8741E-01    7.496E-02     7.530E-02
 Th-234       2.1387E+00    8.460E-01     8.474E-01
 Pb-214       9.3381E-01    1.939E-01     1.971E-01
 Pb-210 #     2.4282E+00    1.687E+00     1.687E+00
 AM-241       1.5397E+01    7.021E-01     9.043E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0645 D2 Bag# S-070 Grid C3-4 072807

< - 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 (2.7 to 1999.3 keV) 3.0849857E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0654 D2 Bag# S-071 Grid B4-1 072907

Sample description
WI07-0654 D2 Bag # S-071 Grid B4-1 07-29-07

Spectrum Filename: C:\User\Win00376.An1

Acquisition information
Start time: 29-Jul-2007 09:15:12
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.1880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1880E+02) = 3.1368E+03
Detection limit method: Traditional ORTEC method

WI07-0654 D2 Bag# S-071 Grid B4-1 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0992

********** 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	
11.79	2.92	5309.	11972.	19.953	2.51	0.854	-	D
17.68	4.39	14769.	8077.	13.462	4.80	0.855	-	D
105.12	26.46	26.	48.	0.080	47.57	0.719	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.72	46.61	64.	26.	0.043	99.41	0.561s
AM-241	237.60	59.58	399.	2816.	4.693	4.82	0.918
Th-234	253.35	63.51	28.	49.	0.082	47.07	0.315s
Pb-214	298.54	74.81	59.	79.	0.132	35.31	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	2537.72	0.646D
Pb-212	307.74	77.11	53.	149.	0.248	21.51	0.919D
Pb-214	307.74	77.11	202.	0.	0.000	134.28	0.661D
Pb-214	348.98	87.42	44.	43.	0.072	61.53	0.932
Th-234	368.72	92.35	51.	39.	0.066	60.30	0.933D
Ac-228	380.72	95.35	38.	13.	0.022	141.96	0.935D
Ac-228	837.67	209.56	7.	0.	0.001	708.68	0.750s
Pb-212	953.94	238.62	18.	187.	0.312	15.95	1.057D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 09:25:22 Page 3
4714781 Spectrum name: Win00376.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	23.	28.	0.047	60.62	1.060D
Ac-228	1077.88	269.60	7.	38.	0.063	43.88	0.779s
Pb-214	1180.86	295.34	10.	46.	0.076	40.55	0.496s
Ac-228	1310.32	327.70	10.	24.	0.040	68.38	0.284s
Ac-228	1353.32	338.44	2.	44.	0.072	33.23	0.393s

WI07-0654 D2 Bag# S-071 Grid B4-1 072907

Pb-214	1407.30	351.94	9.	83.	0.138	26.29	1.226
Ac-228	1852.09	463.10	2.	13.	0.021	71.39	0.407s
Bi-214	2436.79	609.23	3.	40.	0.067	35.57	0.613s
CS-137	2647.09	661.79	0.	32.	0.053	35.36	0.301s
Bi-214	3073.50	768.35	0.	9.	0.015	66.67	0.312s
Ac-228	3180.14	795.00	0.	8.	0.013	70.71	0.375s
Ac-228	3645.53	911.30	0.	60.	0.100	25.82	1.229
Bi-214	3738.60	934.56	0.	5.	0.008	89.44	0.500s
Ac-228	3858.81	964.60	4.	6.	0.011	113.55	1.595D
Ac-228	3876.86	969.11	9.	29.	0.049	46.27	1.598D
Bi-214	4481.62	1120.23	0.	13.	0.022	55.47	0.333s
Bi-214	4953.83	1238.23	0.	6.	0.010	81.65	0.625s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5845.74	1461.08	0.	47.	0.078	29.17	0.750s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.80	1764.41	0.	10.	0.017	63.25	0.625s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8679E-04	609.31	1.868E-04	*(	1.364E-05	G K
			1764.49	3.558E-04	+	1.779E-04	G
			1120.29	3.163E-04	+	1.368E-04	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	5.9552E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	5.725E-04	(	9.044E-05	G
			338.32	5.098E-04	(	3.271E-05	G
			964.60	3.998E-04	-	3.086E-04	G
			794.70	4.704E-04	-	2.664E-04	G
			463.00	4.937E-04	?(	1.059E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 09:25:22 Page 4
4714781 Spectrum name: Win00376.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	9.046E-05	G
		270.23	1.187E-03	&	3.124E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.556E-04	-	2.044E-04	X
		327.64	9.774E-04	+	3.568E-04	G
Pb-212	N 4.3017E-04	238.62	4.302E-04	(	1.492E-05	G K
		77.11	5.688E-04	+	7.889E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	8.6716E-05	661.66	8.672E-05	?(	2.710E-06	G
Th-234	N 6.7346E-04	92.35	4.908E-04	(	1.320E-04	G
		63.29	9.335E-04	(	1.524E-04	G

```
Pb-214   N   3.1055E-04    351.92 3.074E-04  (  1.767E-05          G K
                           295.21 2.850E-04  (  3.062E-05          G
                            77.11 0.000E+00 ?   1.351E-04Energy duplication
                           241.98 3.916E-04  (  1.003E-04          G
                            74.81 8.864E-04 +   1.911E-04Energy duplication
                            87.30 6.240E-04 +   1.988E-04          X

Pb-210   N   5.2736E-04     46.50 5.274E-04 ?(  2.417E-04          G

AM-241       5.7985E-03     59.54 5.799E-03  (  5.921E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.8592E-01	2.084E-01	2.096E-01
K-40 #	6.4909E+00	1.894E+00	1.909E+00
Ac-228	1.8680E+00	4.433E-01	4.488E-01
Pb-212	1.3493E+00	2.152E-01	2.211E-01
CS-137 #	2.7201E-01	9.617E-02	9.673E-02
Th-234	2.1125E+00	8.080E-01	8.095E-01
Pb-214	9.7412E-01	2.517E-01	2.543E-01
Pb-210 #	1.6542E+00	1.644E+00	1.645E+00
AM-241	1.8189E+01	8.772E-01	1.106E+00

- All peaks for activity calculation had bad shape.

WI07-0654 D2 Bag# S-071 Grid B4-1 072907

* - 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 (2.7 to 1999.3 keV) 3.3495628E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0655 D2 Bag# S-072 Grid B4-2 072907

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 09:47:37 Page    1
4714781                          Spectrum name: Win00377.An1

Sample description
     WI07-0655  D2  Bag # S-072  Grid B4-2  07-29-07


Spectrum Filename: C:\User\Win00377.An1

Acquisition information
       Start time:                 29-Jul-2007 09:37:25
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.4290E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.4290E+02) =
                                   2.9163E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 09:47:37 Page    2
4714781                          Spectrum name: Win00377.An1
```

WI07-0655 D2 Bag# S-072 Grid B4-2 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1228

********** 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	
14.75	3.87	4425.	26059.	43.432	1.61	2.294	CU-64	s
371.65	93.15	26.	57.	0.096	36.48	0.933	U-235	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.56	46.57	77.	26.	0.043	111.87	0.868
AM-241	237.64	59.59	283.	2532.	4.219	4.75	0.830
Th-234	253.07	63.44	30.	61.	0.102	44.11	0.411s
Pb-214	298.54	74.81	53.	92.	0.154	30.47	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	1776.07	0.298D
Pb-212	307.74	77.11	33.	137.	0.228	20.84	0.919D
Pb-214	307.74	77.11	140.	0.	0.000	457.35	0.441D
Pb-214	347.41	87.02	54.	48.	0.080	66.24	0.503s
Th-234	368.72	92.35	73.	0.	0.000	0.00	0.933D
Ac-228	380.72	95.35	19.	10.	0.017	134.15	0.935D
Ac-228	836.03	209.15	12.	30.	0.049	58.02	0.714s
Pb-212	953.94	238.62	13.	171.	0.286	16.40	1.057D
Pb-214	967.37	241.98	21.	25.	0.042	65.53	1.060D

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 09:47:37 Page 3
4714781 Spectrum name: Win00377.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.08	270.40	12.	28.	0.046	61.39	0.534s
Pb-214	1181.52	295.50	0.	58.	0.097	26.26	0.569s
Ac-228	1311.00	327.87	3.	1.	0.001	498.89	0.281s
Ac-228	1353.48	338.49	4.	35.	0.058	40.13	0.411s
Pb-214	1407.52	351.99	17.	69.	0.116	35.96	0.844s

WI07-0655 D2 Bag# S-072 Grid B4-2 072907

Ac-228	1852.17	463.12	7.	10.	0.016	114.16	0.309s
Bi-214	2437.09	609.31	2.	36.	0.059	36.96	0.618s
CS-137	2642.95	660.75	2.	16.	0.026	63.54	0.291s
Bi-214	3072.33	768.06	2.	1.	0.002	416.33	0.197s
Ac-228	3176.00	793.97	3.	1.	0.002	529.15	0.365s
Ac-228	3643.88	910.89	0.	34.	0.057	34.30	0.875s
Bi-214	3737.10	934.18	0.	10.	0.017	63.25	0.812s
Ac-228	3858.81	964.60	10.	0.	0.000	0.00	1.595
Ac-228	3875.43	968.75	12.	6.	0.010	200.00	0.187s
Bi-214	4483.00	1120.58	0.	10.	0.017	63.25	0.375s
Bi-214	4955.33	1238.60	0.	4.	0.007	100.00	0.250s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5846.09	1461.17	0.	32.	0.053	35.36	0.833s
Ac-228	6350.00	1587.07	0.	3.	0.005	115.47	0.250s
Bi-214	7061.00	1764.71	3.	1.	0.001	520.68	0.281s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.9252E-04	609.31	1.659E-04	?(	1.264E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	3.8695E-04	911.07	3.744E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.266E-04	G
			338.32	4.063E-04	(	4.086E-05	G
			964.60	0.000E+00		3.144E-04	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	3.768E-04	(	1.700E-04	G
			209.28	6.242E-04	+	2.048E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 09:47:37 Page 4
4714781 Spectrum name: Win00377.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.592E-04	+	2.955E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	1.983E-04	-	1.566E-04	X
		327.64	0.000E+00	%	1.373E-04	G
Pb-212	N 3.9381E-04	238.62	3.938E-04	(	1.292E-05	G K
		77.11	5.237E-04	+	7.253E-05	Energy duplication
		74.81	0.000E+00	%	9.505E-05	Energy duplication
CS-137	4.2003E-05	661.66	4.200E-05	&(	7.564E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	!	1.571E-04	G
		63.29	1.162E-03	*	2.667E-04	G

```
                    WI07-0655   D2 Bag# S-072   Grid B4-2  072907
Pb-214   N   2.9920E-04    351.92 2.568E-04  (  2.332E-05         G K
                           295.21 3.633E-04  (  6.264E-06         G
                            77.11 0.000E+00 %   1.131E-04Energy duplication
                           241.98 3.455E-04  (  9.682E-05         G
                            74.81 1.030E-03 +   1.957E-04Energy duplication
                            87.30 6.989E-04 +   2.146E-04         X

Pb-210   N   5.2395E-04     46.50 5.240E-04 ?(  2.643E-04         G

AM-241       5.2131E-03     59.54 5.213E-03  (  5.006E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 09:47:37 Page    5
4714781                          Spectrum name: Win00377.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #      5.6146E-01    2.075E-01    2.086E-01
K-40   #      4.1087E+00    1.453E+00    1.461E+00
Ac-228        1.1285E+00    3.871E-01    3.894E-01
Pb-212        1.1485E+00    1.883E-01    1.932E-01
CS-137 #      1.2249E-01    7.783E-02    7.797E-02
Th-234  <     4.5823E-01
Pb-214        8.7257E-01    2.291E-01    2.315E-01
Pb-210 #      1.5280E+00    1.709E+00    1.710E+00
AM-241        1.5203E+01    7.224E-01    9.157E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0655 D2 Bag# S-072 Grid B4-2 072907

& - 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 (2.7 to 1999.3 keV) 2.4673035E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0656 D2 Bag# S-073 Grid B4-2,B3-1 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:01:48 Page 1
4714781 Spectrum name: Win00378.An1

Sample description
WI07-0656 D2 Bag # S-073 Grid B4-2,B3-1 07-29-07

Spectrum Filename: C:\User\Win00378.An1

Acquisition information
Start time: 29-Jul-2007 09:51:37
Live time: 600
Real time: 602
Dead time: 0.32 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6430E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6430E+02) = 2.7450E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:01:48 Page 2
4714781 Spectrum name: Win00378.An1

WI07-0656 D2 Bag# S-073 Grid B4-2,B3-1 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1676

********** 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	
11.83	2.91	2977.	12596.	20.993	2.16	0.854	-	D
18.06	4.46	16019.	8917.	14.862	4.54	0.855	-	D
104.87	26.40	21.	80.	0.133	31.54	0.803	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.99	46.18	214.	30.	0.050	172.82	0.450s
AM-241	237.63	59.58	525.	6803.	11.338	2.77	0.852
Th-234	251.91	63.15	32.	22.	0.036	103.76	0.532s
Pb-214	298.54	74.81	31.	43.	0.072	47.09	0.917D
Pb-212	298.56	74.81	42.	0.	0.000	621.83	0.236D
Pb-212	307.74	77.11	19.	58.	0.096	33.91	0.919D
Pb-214	307.74	77.11	57.	0.	0.000	2316.13	0.512D
Pb-214	346.34	86.76	45.	24.	0.039	116.45	0.463s
Th-234	368.72	92.35	21.	27.	0.045	61.24	0.933D
Ac-228	380.72	95.35	16.	4.	0.006	317.38	0.935D
Ac-228	834.12	208.68	6.	8.	0.013	119.90	1.091
Pb-212	953.94	238.62	19.	72.	0.120	29.11	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	23.	9.	0.015	161.56	1.060D
Ac-228	1076.67	269.30	8.	1.	0.002	824.62	0.187s
Pb-214	1182.11	295.65	3.	36.	0.060	39.08	0.805s
Ac-228	1308.67	327.28	6.	2.	0.004	355.18	0.316s
Ac-228	1352.67	338.28	8.	16.	0.027	84.92	0.614s

WI07-0656 D2 Bag# S-073 Grid B4-2,B3-1 072907

Pb-214	1407.28	351.93	4.	67.	0.112	27.30	0.846s
Ac-228	1853.25	463.39	0.	11.	0.018	60.30	0.375s
Bi-214	2437.47	609.40	0.	33.	0.055	34.82	1.516
CS-137	2647.33	661.85	0.	24.	0.040	40.82	1.083
Bi-214	3071.00	767.73	0.	6.	0.010	81.65	0.750s
Ac-228	3175.00	793.72	0.	6.	0.010	81.65	0.250s
Ac-228	3645.09	911.19	0.	23.	0.038	41.70	0.519s
Bi-214	3738.00	934.41	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	2.	3.	0.005	178.43	1.595D
Ac-228	3876.86	969.11	0.	4.	0.007	99.51	1.598D
Bi-214	4482.60	1120.48	0.	8.	0.013	70.71	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5837.92	1459.13	4.	4.	0.007	177.09	0.234s
Ac-228	6351.00	1587.32	0.	4.	0.007	100.00	0.250s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA microCi	Value Comments
Bi-214	N	1.6512E-04	609.31	1.535E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.127E-04	+	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	1.943E-04	?(	9.716E-05	G
K-40	N	1.9079E-04	1460.81	1.908E-04	&(	1.433E-04	G
Ac-228	N	2.4126E-04	911.07	2.533E-04	?(	1.101E-05	G K
			969.11	7.844E-05	-	6.575E-05	G
			338.32	1.934E-04	*(	5.453E-05	G
			964.60	1.834E-04	(	1.590E-04	G
			794.70	3.528E-04	&(	5.880E-05	G
			463.00	4.288E-04	+	2.033E-04	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:01:48 Page 4
4714781 Spectrum name: Win00378.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.693E-04	&	1.230E-04	G
		270.23	0.000E+00	&	1.491E-04	G
		1588.00	5.810E-04	+	4.898E-04	G
		95.35	0.000E+00	%	1.318E-04	X
		327.64	0.000E+00	%	1.845E-04	G
Pb-212	N 1.8164E-04	238.62	1.656E-04	(	1.534E-05	G K
		77.11	2.214E-04	(	2.569E-05	Energy duplication
		74.81	0.000E+00	%	6.269E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 3.6767E-04	92.35	3.382E-04	(	8.713E-05	G
		63.29	4.096E-04	$(	1.634E-04	G

Pb-214	N	2.4090E-04	351.92	2.494E-04	@(	1.205E-05	G	K
			295.21	2.245E-04	(	1.921E-05	G	
			77.11	0.000E+00	%	7.363E-05	Energy duplication	
			241.98	1.267E-04	-	1.177E-04	G	
			74.81	4.847E-04	+	1.415E-04	Energy duplication	
			87.30	3.434E-04	&	1.779E-04	X	
Pb-210	N	6.1241E-04	46.50	6.124E-04	?(	4.327E-04	G	
AM-241		1.4008E-02	59.54	1.401E-02	(	6.776E-05	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

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
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 pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.5326E-01	1.578E-01	1.587E-01
K-40 #C	5.2371E-01	9.274E-01	9.276E-01
Ac-228	6.6225E-01	2.762E-01	2.773E-01
Pb-212	4.9859E-01	1.114E-01	1.130E-01
CS-137 #	1.7853E-01	7.288E-02	7.320E-02
Th-234	1.0093E+00	6.080E-01	6.084E-01
Pb-214	6.6127E-01	1.576E-01	1.595E-01
Pb-210 #C	1.6811E+00	2.905E+00	2.905E+00
AM-241	3.8453E+01	1.067E+00	1.779E+00

- All peaks for activity calculation had bad shape.

WI07-0656 D2 Bag# S-073 Grid B4-2,B3-1 072907

* - 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 (2.7 to 1999.3 keV) 4.4120621E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0657 D2 Bag# S-074 Grid B3-1,2 072907

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:18:50 Page 1
4714781 Spectrum name: Win00379.An1

Sample description
WI07-0657 D2 Bag # S-074 Grid B3-1,2 07-29-07

Spectrum Filename: C:\User\Win00379.An1

Acquisition information
Start time: 29-Jul-2007 10:08:39
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4450E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4450E+02) = 2.9028E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:18:50 Page 2
4714781 Spectrum name: Win00379.An1

WI07-0657 D2 Bag# S-074 Grid B3-1,2 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0305

********** 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	
11.70	2.91	5931.	13349.	22.249	2.38	0.854	-	D
17.52	4.37	15969.	9102.	15.169	4.45	0.855	-	D
105.20	26.48	23.	45.	0.074	49.55	0.410	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.02	46.68	81.	33.	0.056	97.10	0.670
AM-241	237.67	59.59	145.	2203.	3.672	4.73	0.846
Th-234	251.33	63.01	28.	28.	0.047	75.59	0.503s
Pb-214	298.54	74.81	42.	50.	0.083	46.23	0.917D
Pb-212	298.56	74.81	44.	0.	0.000	244.95	0.265D
Pb-212	307.74	77.11	38.	67.	0.112	35.82	0.919D
Pb-214	307.74	77.11	108.	0.	0.000	573.46	0.337D
Pb-214	347.33	87.00	14.	24.	0.039	64.39	0.954
Th-234	368.72	92.35	26.	35.	0.059	52.45	0.933D
Ac-228	380.72	95.35	11.	5.	0.009	202.23	0.936D
Ac-228	839.00	209.90	5.	1.	0.002	663.32	0.400s
Pb-212	953.94	238.62	4.	63.	0.105	26.94	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	14.	24.	0.040	60.65	1.060D
Ac-228	1081.41	270.48	7.	24.	0.040	62.08	0.233s
Pb-214	1179.67	295.04	14.	44.	0.073	47.02	0.347s
Ac-228	1306.00	326.62	0.	10.	0.017	63.25	0.250s
Ac-228	1351.22	337.92	2.	14.	0.023	65.77	0.514s

WI07-0657 D2 Bag# S-074 Grid B3-1,2 072907

Pb-214	1407.18	351.91	2.	62.	0.102	27.26	1.137
Ac-228	1847.33	461.91	0.	6.	0.010	81.65	0.375s
Bi-214	2437.31	609.36	0.	50.	0.083	28.28	1.162
CS-137	2647.46	661.88	0.	13.	0.022	55.47	0.312s
Bi-214	3071.00	767.73	0.	3.	0.005	115.47	0.250s
Ac-228	3178.67	794.63	1.	0.	0.001	240.37	0.197s
Ac-228	3645.44	911.28	0.	16.	0.027	50.00	0.400s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	3.	0.006	109.58	1.595D
Ac-228	3876.86	969.11	1.	11.	0.019	64.08	1.598D
Bi-214	4482.71	1120.50	0.	15.	0.025	51.64	0.937s
Bi-214	4954.00	1238.27	0.	2.	0.003	141.42	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5844.60	1460.80	0.	16.	0.027	50.00	0.337s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.33	1764.29	0.	8.	0.013	70.71	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4579E-04	609.31	2.325E-04	(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	3.650E-04	+	1.460E-04	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G
Ac-228	N	1.9035E-04	911.07	1.762E-04	?(	1.101E-05	G K
			969.11	2.170E-04	(	3.645E-05	G
			338.32	1.621E-04	(	3.095E-05	G
			964.60	2.056E-04	(	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	2.339E-04	&(	3.898E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:18:50 Page 4
4714781 Spectrum name: Win00379.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	&	8.464E-05	G
		270.23	7.498E-04	+	2.621E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.190E-04	X
		327.64	4.072E-04	&	2.036E-04	G
Pb-212	N 1.4415E-04	238.62	1.442E-04	(	8.011E-06	G K
		77.11	2.562E-04	+	5.750E-05	Energy duplication
		74.81	0.000E+00	%	6.409E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 4.8005E-04	92.35	4.426E-04	(	9.561E-05	G
		63.29	5.334E-04	(	1.524E-04	G

```
Pb-214   N   2.5999E-04    351.92 2.278E-04  (  1.034E-05          G K
                           295.21 2.756E-04 ?(  3.643E-05          G
                            77.11 0.000E+00 %   9.986E-05Energy duplication
                           241.98 3.294E-04  (  8.086E-05          G
                            74.81 5.572E-04 +   1.567E-04Energy duplication
                            87.30 3.410E-04 ?(  8.301E-05          X

Pb-210   N   6.8046E-04     46.50 6.805E-04 ?(  2.697E-04          G

AM-241       4.5363E-03     59.54 4.536E-03  (  3.611E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	7.1347E-01	2.018E-01	2.036E-01
K-40 #	2.0448E+00	1.022E+00	1.025E+00
Ac-228	5.5255E-01	1.901E-01	1.913E-01
Pb-212	4.1844E-01	1.127E-01	1.138E-01
CS-137 #	1.0226E-01	5.672E-02	5.686E-02
Th-234	1.3935E+00	6.410E-01	6.419E-01
Pb-214	7.5469E-01	1.959E-01	1.979E-01
Pb-210 #	1.9752E+00	1.918E+00	1.918E+00
AM-241	1.3168E+01	6.224E-01	7.905E-01

- All peaks for activity calculation had bad shape.

WI07-0657 D2 Bag# S-074 Grid B3-1,2 072907

* - 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 (2.7 to 1999.3 keV) 2.1122639E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0658 D2 Bag# S-075 Grid B3-1,2 072907

```
     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 10:33:31 Page    1
4714781                          Spectrum name: Win00380.An1

Sample description
     WI07-0658   D2  Bag # S-075  Grid B3-1,2   07-29-07


Spectrum Filename: C:\User\Win00380.An1

Acquisition information
       Start time:                 29-Jul-2007 10:23:20
       Live time:                600
       Real time:                602
       Dead time:                  0.28 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.9620E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.9620E+02) =
                                   3.3761E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 10:33:31 Page    2
4714781                          Spectrum name: Win00380.An1
```

WI07-0658 D2 Bag# S-075 Grid B3-1,2 072907

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1378

********** 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	
14.58	3.83	4053.	23317.	38.862	1.71	2.188	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.32	46.76	72.	39.	0.066	77.19	0.766
AM-241	237.66	59.59	227.	2870.	4.784	4.26	0.879
Th-234	253.77	63.62	9.	43.	0.071	40.26	0.336s
Pb-214	298.54	74.81	21.	37.	0.061	48.37	0.917D
Pb-212	298.56	74.81	39.	0.	0.000	894.43	0.658D
Pb-212	307.74	77.11	30.	54.	0.091	39.30	0.919D
Pb-214	307.74	77.11	98.	0.	0.000	123.95	0.206D
Pb-214	347.94	87.16	28.	16.	0.026	129.45	0.301s
Th-234	371.48	93.04	20.	34.	0.057	59.99	0.777s
Ac-228	380.72	95.35	5.	0.	0.000	0.00	0.125D
Ac-228	837.00	209.40	12.	12.	0.020	115.47	0.312s
Pb-212	953.94	238.62	7.	79.	0.132	24.21	1.057D
Pb-214	967.37	241.98	10.	21.	0.035	60.99	1.060D
Ac-228	1081.00	270.38	1.	0.	0.000	0.00	0.000s

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:33:31 Page 3
4714781 Spectrum name: Win00380.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.25	294.94	0.	32.	0.053	35.36	0.812s
Ac-228	1306.33	326.70	2.	1.	0.001	478.42	0.197s
Ac-228	1354.52	338.74	0.	27.	0.045	38.49	1.000
Pb-214	1406.91	351.84	0.	46.	0.077	29.49	1.489s
Ac-228	1852.67	463.25	1.	0.	0.001	240.37	0.197s

WI07-0658 D2 Bag# S-075 Grid B3-1,2 072907

Bi-214	2436.80	609.23	3.	43.	0.071	34.95	0.310s
CS-137	2649.00	662.27	0.	7.	0.012	75.59	0.500s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3647.83	911.88	0.	14.	0.023	53.45	0.312s
Bi-214	3737.00	934.16	0.	3.	0.005	115.47	0.750s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3875.57	968.79	2.	1.	0.002	416.33	0.328s
Bi-214	4481.50	1120.20	0.	6.	0.010	81.65	0.500s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5839.90	1459.62	7.	2.	0.003	568.51	0.402s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.20	1764.26	0.	5.	0.008	89.44	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8443E-04	609.31	1.992E-04	(	1.426E-05	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	1.460E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	2.915E-04	+	2.915E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	&	2.101E-04	G
Ac-228	N	2.0679E-04	911.07	1.542E-04	&(	1.101E-05	G K
			969.11	0.000E+00	%	5.825E-05	G
			338.32	3.164E-04	$(	1.172E-05	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	2.539E-04	?(	1.148E-04	G
			270.23	0.000E+00	?	6.248E-05	G

ORTEC g v - i (63) wan32 G53W2.06 29-JUL-2007 10:33:31 Page 4
4714781 Spectrum name: Win00380.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	&	7.130E-05	X
		327.64	0.000E+00	&	1.222E-04	G
Pb-212	N 1.8989E-04	238.62	1.826E-04	(	9.539E-06	G K
		77.11	2.079E-04	(	3.154E-05	Energy duplication
		74.81	0.000E+00	%	6.053E-05	Energy duplication
CS-137	1.8969E-05	661.66	1.897E-05	?(	2.710E-06	G
Th-234	N 5.8456E-04	92.35	4.242E-04	&(	8.539E-05	G
		63.29	8.128E-04	*(	9.238E-05	G
Pb-214	N 1.8437E-04	351.92	1.704E-04	(	3.704E-06	G K

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                    WI07-0658   D2 Bag# S-075   Grid B3-1,2  072907
                            295.21 2.005E-04  (  6.264E-06          G
                             77.11 0.000E+00 ?   9.522E-05Energy duplication
                            241.98 2.903E-04 +   1.160E-04          G
                             74.81 4.110E-04 +   1.260E-04Energy duplication
                             87.30 2.298E-04 ?(  1.164E-04          X

Pb-210   N   8.0294E-04      46.50 8.029E-04  (  2.548E-04          G

AM-241       5.9104E-03      59.54 5.910E-03  (  4.488E-05          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

   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
```

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      ORTEC g v - i (  63) wan32  G53W2.06  29-JUL-2007 10:33:31 Page    5
 4714781                          Spectrum name: Win00380.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214        6.2267E-01    2.176E-01     2.189E-01
 K-40     <    7.0932E-01
 Ac-228        6.9814E-01    2.687E-01     2.700E-01
 Pb-212        6.4109E-01    1.480E-01     1.499E-01
 CS-137 #      6.4042E-02    4.841E-02     4.847E-02
 Th-234 #      1.9735E+00    7.129E-01     7.144E-01
 Pb-214        6.2245E-01    1.836E-01     1.850E-01
 Pb-210        2.7108E+00    2.092E+00     2.093E+00
 AM-241        1.9954E+01    8.502E-01     1.126E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0658 D2 Bag# S-075 Grid B3-1,2 072907

< - 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 (2.7 to 1999.3 keV) 2.7286854E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fann
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0426 D2 Bag# S-029 (Grid D2-1,C2-2) 072107

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 08:37:03 Page    1
EnergySolutions                  Spectrum name: Win00259.An1

Sample description
     WI07- 0426  D2   Bag# S-029 Grid D2-1,C2-2    072107


Spectrum Filename: C:\User\Win00259.An1

Acquisition information
       Start time:                 21-Jul-2007 08:26:53
       Live time:                600
       Real time:                602
       Dead time:                  0.28 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.5200E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5200E+02) =
                                   2.8409E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 08:37:03 Page    2
EnergySolutions                  Spectrum name: Win00259.An1
```

WI07-0426 D2 Bag# S-029 (Grid D2-1,C2-2) 072107

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1168

********** 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	
11.85	2.92	4538.	10404.	17.340	2.68	0.854	-	D
17.90	4.44	13422.	7757.	12.928	4.80	0.855	-	D
105.31	26.51	37.	74.	0.124	39.57	0.418	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.94	46.66	150.	34.	0.056	127.36	0.364s
AM-241	237.61	59.58	446.	4682.	7.804	3.45	0.927
Th-234	253.30	63.50	51.	35.	0.059	84.17	0.421s
Pb-214	298.54	74.81	48.	92.	0.153	29.89	0.917D
Pb-212	298.56	74.81	95.	0.	0.000	1385.64	0.411D
Pb-212	307.74	77.11	51.	140.	0.233	22.22	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	476.10	0.359D
Pb-214	347.65	87.08	37.	51.	0.084	52.24	0.825s
Th-234	368.72	92.35	49.	31.	0.051	73.63	0.933D
Ac-228	380.72	95.35	35.	6.	0.011	269.33	0.935D
Ac-228	835.33	208.98	19.	33.	0.056	60.53	0.494s
Pb-212	953.94	238.62	23.	134.	0.223	20.04	1.057D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:37:03 Page 3
EnergySolutions Spectrum name: Win00259.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	28.	36.	0.061	52.47	1.060D
Ac-228	1080.30	270.21	5.	18.	0.029	69.07	0.279s
Pb-214	1181.55	295.51	9.	69.	0.115	29.70	1.213s
Ac-228	1307.99	327.11	8.	14.	0.023	93.40	0.445s
Ac-228	1354.84	338.83	7.	36.	0.061	44.46	0.743s

WI07-0426 D2 Bag# S-029 (Grid D2-1,C2-2) 072107

Pb-214	1407.53	351.99	6.	90.	0.150	23.73	0.906
Ac-228	1848.57	462.22	7.	13.	0.022	97.47	0.274s
Bi-214	2437.29	609.36	0.	79.	0.132	22.50	0.762s
CS-137	2646.71	661.69	0.	25.	0.042	40.00	0.531s
Bi-214	3074.33	768.56	1.	0.	0.001	240.37	0.197s
Ac-228	3181.11	795.24	0.	10.	0.017	63.25	0.312s
Ac-228	3645.50	911.29	0.	30.	0.050	36.51	0.292s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	2.	11.	0.019	66.75	1.595D
Ac-228	3876.86	969.11	1.	19.	0.031	49.80	1.598D
Bi-214	4485.25	1121.14	0.	16.	0.027	50.00	0.333s
Bi-214	4950.78	1237.46	1.	1.	0.002	346.41	0.217s
Bi-214	5514.20	1378.24	0.	5.	0.008	89.44	0.375s
K-40	5845.53	1461.03	0.	58.	0.097	26.26	0.458s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.46	4.	0.	0.001	568.62	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7278E-04	609.31	3.674E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	3.893E-04	&(	2.433E-05	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.5536E-03	1460.81	2.554E-03	?(	4.403E-05	G
Ac-228	N	3.8907E-04	911.07	3.304E-04	(	1.101E-05	G K
			969.11	3.609E-04	(	4.380E-05	G
			338.32	4.258E-04	@(	4.905E-05	G
			964.60	7.059E-04	+	3.471E-04	G
			794.70	5.880E-04	+	2.940E-04	G
			463.00	5.197E-04	&(	1.631E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:37:03 Page 4
EnergySolutions Spectrum name: Win00259.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.053E-04	+	2.266E-04	G
		270.23	5.519E-04	(	1.188E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.843E-04	X
		327.64	5.498E-04	(	1.794E-04	G
Pb-212	N 3.0774E-04	238.62	3.077E-04	(	1.681E-05	G K
		77.11	5.361E-04	+	7.676E-05	Energy duplication
		74.81	0.000E+00	%	9.258E-05	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 5.0395E-04	92.35	3.851E-04	(	1.301E-04	G
		63.29	6.731E-04	$(	2.015E-04	G

```
Pb-214   N   3.6700E-04    351.92 3.333E-04  (  1.481E-05          G K
                           295.21 4.322E-04 @(  2.989E-05          G
                            77.11 0.000E+00 %   1.178E-04Energy duplication
                           241.98 5.042E-04 +   1.635E-04          G
                            74.81 1.026E-03 +   1.927E-04Energy duplication
                            87.30 7.352E-04 +   1.999E-04          X

Pb-210   N   6.8726E-04     46.50 6.873E-04  (  3.643E-04          G

AM-241       9.6419E-03     59.54 9.642E-03  (  6.257E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:37:03 Page 5
EnergySolutions Spectrum name: Win00259.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0590E+00	2.383E-01	2.416E-01
K-40 #	7.2546E+00	1.905E+00	1.924E+00
Ac-228	1.1053E+00	3.126E-01	3.153E-01
Pb-212	8.7425E-01	1.752E-01	1.783E-01
CS-137 #	1.9246E-01	7.699E-02	7.734E-02
Th-234	1.4317E+00	8.005E-01	8.012E-01
Pb-214	1.0426E+00	1.982E-01	2.020E-01
Pb-210	1.9525E+00	2.487E+00	2.487E+00
AM-241	2.7392E+01	9.464E-01	1.387E+00

- All peaks for activity calculation had bad shape.

WI07-0426 D2 Bag# S-029 (Grid D2-1,C2-2) 072107

* - 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 (2.7 to 1999.3 keV) 4.2304199E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0427 D2 Bag# S-030 (Grid C1-4 ,C2-2) 072107

Sample description
WI07- 0427 D2 Bag# S-030 Grid C1-4,C2-2 072107

Spectrum Filename: C:\User\Win00260.An1

Acquisition information
Start time: 21-Jul-2007 08:40:49
Live time: 600
Real time: 606
Dead time: 1.04 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5550E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5550E+02) = 2.8129E+03
Detection limit method: Traditional ORTEC method

WI07-0427 D2 Bag# S-030 (Grid C1-4 ,C2-2) 072107

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1505

********** 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	
11.75	2.91	5241.	8906.	14.843	3.13	0.854	-	D
16.96	4.21	13424.	8114.	13.523	4.61	0.855	-	D
55.27	14.00	136.	66.	0.111	60.73	0.712	PU-239	
69.72	17.62	270.	854.	1.423	10.30	0.934	MO-99	s
84.05	21.20	246.	681.	1.135	11.98	1.074	TC-99M	s
104.99	26.43	196.	1130.	1.883	7.94	0.903	AM-241	
128.40	32.28	291.	648.	1.080	13.14	0.957	XE-138	s
145.78	36.63	350.	137.	0.228	52.71	0.573	CE-144	s
197.61	49.58	7545.	2192.	3.653	15.43	1.087	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	46.56	4234.	0.	0.000	0.00	0.893
AM-241	237.63	59.58	6553.	85681.	142.801	0.79	0.925
Th-234	253.62	63.58	50.	41.	0.068	67.42	0.420s
Pb-214	298.54	74.81	75.	95.	0.159	32.75	0.917D
Pb-212	298.56	74.81	121.	0.	0.000	262.10	0.256D
Pb-212	307.74	77.11	56.	121.	0.202	25.11	0.919D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:51:04 Page 3
EnergySolutions Spectrum name: Win00260.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	307.74	77.11	99.	0.	0.000	84.03	0.826D
Pb-214	347.67	87.09	70.	47.	0.078	71.25	0.691s
Th-234	368.72	92.35	58.	35.	0.059	69.27	0.933D
Ac-228	380.72	95.35	33.	4.	0.007	393.05	0.935D
Ac-228	835.76	209.09	28.	32.	0.053	69.12	0.315s

WI07-0427 D2 Bag# S-030 (Grid C1-4 ,C2-2) 072107

Pb-212	953.94	238.62	21.	188.	0.314	16.13	1.057D
Pb-214	967.37	241.98	27.	36.	0.061	52.05	1.060D
Ac-228	1080.86	270.35	8.	30.	0.050	48.99	0.942
Pb-214	1181.54	295.51	8.	58.	0.096	33.01	1.138s
Ac-228	1309.46	327.48	11.	25.	0.042	63.38	0.341s
Ac-228	1352.39	338.21	10.	42.	0.070	41.79	0.811s
Pb-214	1407.03	351.87	6.	109.	0.181	21.39	1.168s
Ac-228	1851.07	462.85	6.	24.	0.039	59.79	1.090
Bi-214	2437.34	609.37	8.	88.	0.146	24.38	0.646s
CS-137	2648.17	662.06	0.	39.	0.065	32.03	0.716s
Bi-214	3071.67	767.89	0.	3.	0.005	115.47	0.375s
Ac-228	3178.10	794.49	0.	13.	0.022	55.47	0.375s
Ac-228	3646.50	911.54	0.	40.	0.067	31.62	0.687s
Bi-214	3737.60	934.31	0.	5.	0.008	89.44	0.312s
Ac-228	3858.81	964.60	0.	7.	0.012	73.12	1.595D
Ac-228	3876.86	969.11	0.	34.	0.056	34.49	1.598D
Bi-214	4481.31	1120.15	0.	17.	0.028	48.51	0.500s
Bi-214	4950.50	1237.39	3.	2.	0.003	282.84	0.202s
Bi-214	5511.25	1377.51	0.	5.	0.008	89.44	0.312s
K-40	5845.91	1461.12	0.	44.	0.073	30.15	0.348s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.2010E-04	609.31	4.069E-04	?(	2.049E-05	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.509E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	?(	1.082E-04	G
			934.06	4.858E-04	?(	9.716E-05	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:51:04 Page 4
EnergySolutions Spectrum name: Win00260.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	4.5633E-04	911.07	4.405E-04	(	1.101E-05	G K
			969.11	6.528E-04	+	1.692E-04	G
			338.32	4.922E-04	(	5.860E-05	G
			964.60	4.619E-04	(	6.173E-05	G
			794.70	7.644E-04	+	3.306E-04	G
			463.00	9.225E-04	+	3.220E-04	G
			209.28	6.736E-04	+	2.426E-04	G
			270.23	9.373E-04	+	2.884E-04	G
			1588.00	2.905E-04	-	3.720E-04	G
			95.35	0.000E+00	%	1.756E-04	X
			327.64	1.032E-03	+	3.665E-04	G
Pb-212	N	4.4230E-04	238.62	4.332E-04	(	1.617E-05	G K
			77.11	4.649E-04	(	4.231E-05	Energy duplication

```
                                 74.81 0.000E+00 %   1.042E-04Energy duplication

CS-137        1.0569E-04       661.66 1.057E-04  (  2.710E-06          G

Th-234    N   5.8192E-04        92.35 4.420E-04  (  1.403E-04          G
                               63.29 7.811E-04 $(  2.003E-04          G

Pb-214    N   3.8808E-04       351.92 4.025E-04 @(  1.516E-05          G K
                              295.21 3.602E-04 @(  2.915E-05          G
                               77.11 0.000E+00 ?   9.576E-05Energy duplication
                              241.98 5.029E-04 +   1.623E-04          G
                               74.81 1.066E-03 +   2.114E-04Energy duplication
                               87.30 6.820E-04 +   2.293E-04          X

Pb-210    N   0.0000E+00        46.50 0.000E+00     1.889E-03          G

AM-241        1.7643E-01        59.54 1.764E-01  (  2.368E-04          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

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214 #      1.1817E+00    2.881E-01    2.915E-01
 K-40   #      5.4493E+00    1.643E+00    1.656E+00
 Ac-228        1.2836E+00    3.849E-01    3.879E-01
 Pb-212        1.2442E+00    1.857E-01    1.914E-01
 CS-137        2.9729E-01    9.521E-02    9.588E-02
```

WI07-0427 D2 Bag# S-030 (Grid C1-4 ,C2-2) 072107

Th-234		1.6369E+00	7.911E-01	7.920E-01
Pb-214		1.0916E+00	2.147E-01	2.186E-01
Pb-210	<	5.3129E+00		
AM-241		4.9628E+02	3.913E+00	1.878E+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 (2.7 to 1999.3 keV) 5.0846680E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0451 D2 Bag# S-031 (Grid D1-2) 072207

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 07:52:22 Page    1
EnergySolutions                  Spectrum name: Win00278.An1

Sample description
     WI07-0451  D2  Bag #S-031 Grid A1-2  072207


Spectrum Filename: C:\User\Win00278.An1

Acquisition information
       Start time:                 22-Jul-2007 07:42:10
       Live time:                600
       Real time:                602
       Dead time:                  0.36 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                1.3760E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  1.3760E+02) =
                                   7.2674E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 07:52:22 Page    2
EnergySolutions                  Spectrum name: Win00278.An1
```

WI07-0451 D2 Bag# S-031 (Grid D1-2) 072207

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1689

********** 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	
11.80	2.92	7018.	11747.	19.578	2.73	0.854	-	D
16.52	4.10	16922.	10339.	17.232	4.07	0.855	-	D
198.89	49.90	465.	170.	0.284	51.87	0.573	EU-154	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

********** 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	185.00	46.43	121.	4.	0.006	923.70	0.000s
AM-241	237.67	59.59	394.	4368.	7.280	3.51	0.945
Th-234	251.62	63.08	26.	18.	0.031	93.81	0.284s
Pb-214	298.54	74.81	41.	36.	0.059	60.99	0.918D
Pb-212	298.56	74.81	54.	0.	0.000	349.67	0.184D
Pb-212	307.74	77.11	54.	49.	0.082	50.90	0.920D
Pb-214	307.74	77.11	75.	0.	0.000	411.07	0.376D
Pb-214	345.95	86.66	55.	25.	0.042	117.98	0.789
Th-234	368.72	92.35	18.	34.	0.057	49.56	0.933D
Ac-228	380.72	95.35	25.	12.	0.020	133.55	0.935D
Ac-228	836.21	209.20	19.	12.	0.021	145.75	0.344s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	5.	60.	0.100	27.93	1.057D
Pb-214	967.37	241.98	11.	10.	0.016	120.02	1.060D
Ac-228	1080.23	270.19	2.	10.	0.018	83.57	0.657s
Pb-214	1182.54	295.76	3.	23.	0.038	51.44	1.113
Ac-228	1310.56	327.76	2.	3.	0.005	176.38	0.326s

WI07-0451 D2 Bag# S-031 (Grid D1-2) 072207

Ac-228	1353.59	338.51	2.	23.	0.039	45.98	0.795s
Pb-214	1406.54	351.75	3.	27.	0.046	44.57	0.981
Ac-228	1846.75	461.77	0.	10.	0.017	63.25	0.312s
Bi-214	2436.67	609.20	0.	21.	0.035	43.64	0.625s
CS-137	2641.00	660.27	13.	0.	0.000	0.00	0.000s
Bi-214	3075.00	768.73	1.	0.	0.000	260.34	0.000s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3645.60	911.32	0.	13.	0.022	55.47	0.500s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	1.	0.001	419.98	1.595D
Ac-228	3876.86	969.11	1.	10.	0.017	69.84	1.598D
Bi-214	4480.00	1119.83	0.	1.	0.002	200.00	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5847.25	1461.46	0.	12.	0.020	57.74	0.500s
Ac-228	6352.50	1587.70	0.	2.	0.003	141.42	0.500s
Bi-214	7059.67	1764.38	0.	4.	0.007	100.00	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.0903E-04	609.31	9.766E-05	(	4.650E-06	G K
			1764.49	1.423E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	4.867E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	5.2833E-04	1460.81	5.283E-04	?(	4.403E-05	G
Ac-228	N	2.1469E-04	911.07	1.432E-04	?(	1.101E-05	G K
			969.11	1.931E-04	(	3.956E-05	G
			338.32	2.715E-04	(	2.905E-05	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	0.000E+00	%	1.176E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	3.898E-04	&(	3.898E-05	G
		209.28	2.610E-04	?(	1.403E-04	G
		270.23	3.280E-04	?(	8.721E-05	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	2.275E-04	(	1.467E-04	X
		327.64	1.222E-04	-	1.507E-04	G
Pb-212	N 1.5229E-04	238.62	1.377E-04	(	8.554E-06	G K
		77.11	1.884E-04	(	4.167E-05	Energy duplication
		74.81	0.000E+00	%	7.042E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.559E-05	G
Th-234	N 3.9330E-04	92.35	4.242E-04	(	8.239E-05	G

WI07-0451 D2 Bag# S-031 (Grid D1-2) 072207

```
                                 63.29 3.493E-04 ?(  1.464E-04          G

Pb-214    N   1.1764E-04       351.92 1.012E-04  (  1.060E-05          G K
                               295.21 1.441E-04  (  1.879E-05          G
                                77.11 0.000E+00 &   8.373E-05Energy duplication
                               241.98 1.314E-04  (  7.358E-05          G
                                74.81 3.981E-04 +   1.442E-04Energy duplication
                                87.30 3.628E-04 &   1.909E-04          X

Pb-210    N   0.0000E+00        46.50 0.000E+00 %   3.331E-04          G

AM-241        8.9947E-03        59.54 8.995E-03  (  5.883E-05          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

   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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 07:52:22 Page    5
EnergySolutions                    Spectrum name: Win00278.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214        7.9234E-01     3.458E-01    3.471E-01
K-40    #     3.8396E+00     2.217E+00    2.221E+00
Ac-228        1.5602E+00     5.521E-01    5.552E-01
Pb-212        1.1068E+00     3.091E-01    3.119E-01
CS-137    <   1.1328E-01
Th-234        2.8583E+00     1.417E+00    1.418E+00
Pb-214        8.5495E-01     3.811E-01    3.824E-01
Pb-210    <   2.4211E+00
AM-241        6.5368E+01     2.295E+00    3.335E+00
```

WI07-0451 D2 Bag# S-031 (Grid D1-2) 072207

- 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 (2.7 to 1999.3 keV) 7.6380333E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0452 D2 Bag# S-032 (Grid D1-2) 072207

Sample description
WI07-0452 D2 Bag #S-032 Grid A1-2 072207

Spectrum Filename: C:\User\Win00279.An1

Acquisition information
Start time: 22-Jul-2007 07:57:31
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.8040E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 1.8040E+02) = 5.5432E+03
Detection limit method: Traditional ORTEC method

WI07-0452 D2 Bag# S-032 (Grid D1-2) 072207

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1054

********** 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	
11.70	2.90	3986.	11648.	19.413	2.41	0.854	-	D
16.61	4.12	15547.	10276.	17.126	3.96	0.855	-	D
253.16	63.47	13.	37.	0.061	50.45	0.418	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.76	46.62	61.	35.	0.058	76.92	0.723
AM-241	237.64	59.59	167.	2867.	4.778	4.13	0.957
Th-234	252.38	63.27	43.	0.	0.000	0.00	0.907
Pb-214	298.54	74.81	36.	31.	0.051	66.11	0.917D
Pb-212	298.56	74.81	32.	0.	0.000	253.40	0.154D
Pb-212	307.74	77.11	40.	71.	0.118	34.62	0.919D
Pb-214	307.74	77.11	120.	0.	0.000	194.94	0.000D
Pb-214	348.01	87.17	20.	30.	0.050	62.52	0.750
Th-234	368.72	92.35	32.	18.	0.029	103.60	0.933D
Ac-228	380.72	95.35	19.	2.	0.003	660.31	0.935D
Ac-228	830.27	207.71	19.	18.	0.030	117.88	0.208s
Pb-212	953.94	238.62	14.	85.	0.142	25.01	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	16.	18.	0.031	76.13	1.060D
Ac-228	1077.03	269.39	2.	9.	0.015	86.07	0.610s
Pb-214	1180.35	295.21	6.	26.	0.043	54.39	0.805s
Ac-228	1308.00	327.12	2.	0.	0.001	450.92	0.190s
Ac-228	1354.19	338.66	10.	16.	0.027	89.27	0.267s

WI07-0452 D2 Bag# S-032 (Grid D1-2) 072207

Pb-214	1407.00	351.86	7.	38.	0.063	43.88	0.694s
Ac-228	1848.00	462.08	0.	5.	0.008	89.44	0.250s
Bi-214	2437.16	609.32	0.	31.	0.052	35.92	1.112
CS-137	2645.70	661.44	0.	16.	0.027	50.00	0.312s
Bi-214	3073.50	768.35	0.	2.	0.003	141.42	0.500s
Ac-228	3178.20	794.52	0.	7.	0.012	75.59	0.375s
Ac-228	3646.90	911.64	0.	31.	0.052	35.92	0.594s
Bi-214	3733.00	933.16	0.	6.	0.010	81.65	0.250s
Ac-228	3858.37	964.49	2.	0.	0.000	0.00	1.595
Ac-228	3875.22	968.70	0.	12.	0.020	57.74	0.875s
Bi-214	4481.71	1120.25	0.	7.	0.012	75.59	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.69	1460.82	0.	16.	0.027	50.00	1.749
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7060.00	1764.46	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5060E-04	609.31	1.442E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	1.042E-04	-	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	5.830E-04	&	3.887E-04	G
K-40	N	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G
Ac-228	N	3.4796E-04	911.07	3.414E-04	?(	1.101E-05	G K
			969.11	2.330E-04	-	1.053E-04	G
			338.32	1.875E-04	-	9.057E-05	G
			964.60	0.000E+00		1.554E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	1.949E-04	&	1.443E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:07:41 Page 4
EnergySolutions Spectrum name: Win00279.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	3.773E-04	&(	1.420E-04	G
		270.23	2.812E-04	&(	8.003E-05	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.348E-04	X
		327.64	0.000E+00	%	1.222E-04	G
Pb-212	N 1.9536E-04	238.62	1.954E-04	(	1.336E-05	G K
		77.11	2.719E-04	+	5.901E-05	Energy duplication
		74.81	0.000E+00	%	5.489E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 2.1874E-04	92.35	2.187E-04	(	1.070E-04	G
		63.29	0.000E+00		1.865E-04	G

```
Pb-214   N   1.6086E-04    351.92 1.407E-04  (  1.583E-05         G K
                           295.21 1.629E-04  (  2.506E-05         G
                            77.11 0.000E+00 ?   1.050E-04Energy duplication
                           241.98 2.556E-04  (  8.424E-05         G
                            74.81 3.418E-04 +   1.345E-04Energy duplication
                            87.30 4.329E-04 +   1.525E-04         X

Pb-210   N   7.0768E-04     46.50 7.077E-04 ?(  2.365E-04         G

AM-241       5.9032E-03     59.54 5.903E-03  (  3.869E-05         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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 08:07:41 Page    5
 EnergySolutions                    Spectrum name: Win00279.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        8.3480E-01    2.999E-01    3.015E-01
 K-40    #     3.9049E+00    1.952E+00    1.958E+00
 Ac-228  #     1.9288E+00    6.928E-01    6.966E-01
 Pb-212        1.0829E+00    2.708E-01    2.739E-01
 CS-137  #     2.4035E-01    1.202E-01    1.205E-01
 Th-234        1.2125E+00    1.256E+00    1.256E+00
 Pb-214        8.9167E-01    3.071E-01    3.090E-01
 Pb-210  #     3.9228E+00    3.018E+00    3.019E+00
 AM-241        3.2723E+01    1.352E+00    1.815E+00

   # - All peaks for activity calculation had bad shape.
```

WI07-0452 D2 Bag# S-032 (Grid D1-2) 072207

* - 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 (2.7 to 1999.3 keV) 4.6741676E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Lynn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0453 D2 Bag# S-033 (Grid A1-5) 072207

Sample description
WI07-0453 D2 Bag #S-033 Grid A1-5 072207

Spectrum Filename: C:\User\Win00280.An1

Acquisition information
Start time: 22-Jul-2007 08:25:23
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.7010E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7010E+02) = 3.7023E+03
Detection limit method: Traditional ORTEC method

WI07-0453 D2 Bag# S-033 (Grid A1-5) 072207

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1113

********** 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	
11.72	2.92	6103.	11885.	19.808	2.61	0.854	-	D
16.87	4.20	17032.	9736.	16.226	4.30	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.69	46.60	106.	49.	0.081	80.36	0.254s
AM-241	237.60	59.58	253.	2465.	4.108	4.84	0.885
Th-234	253.98	63.67	48.	38.	0.063	76.99	0.871
Pb-214	298.54	74.81	59.	62.	0.103	43.31	0.917D
Pb-212	298.56	74.81	70.	0.	0.000	271.26	0.709D
Pb-212	307.74	77.11	49.	106.	0.177	26.87	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	115.04	0.000D
Pb-214	349.26	87.49	42.	39.	0.065	68.61	0.425s
Th-234	368.72	92.35	57.	39.	0.065	63.96	0.933D
Ac-228	380.72	95.35	19.	12.	0.020	119.67	0.935D
Ac-228	835.09	208.92	20.	17.	0.028	109.73	0.226s
Pb-212	953.94	238.62	15.	158.	0.263	17.42	1.057D
Pb-214	967.37	241.98	22.	21.	0.035	76.99	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:35:33 Page 3
EnergySolutions Spectrum name: Win00280.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.66	270.30	5.	13.	0.022	78.95	0.365s
Pb-214	1180.64	295.29	9.	39.	0.065	44.41	0.667s
Ac-228	1314.44	328.73	3.	22.	0.036	54.21	0.312s
Ac-228	1353.12	338.40	12.	38.	0.062	51.46	0.538s
Pb-214	1407.66	352.03	8.	63.	0.106	31.64	0.552s

WI07-0453 D2 Bag# S-033 (Grid A1-5) 072207

Ac-228	1845.33	461.41	0.	11.	0.018	60.30	0.250s
Bi-214	2437.23	609.34	0.	35.	0.058	33.81	1.468
CS-137	2648.29	662.09	0.	17.	0.028	48.51	0.375s
Bi-214	3073.33	768.31	0.	7.	0.012	75.59	0.250s
Ac-228	3179.00	794.72	3.	1.	0.001	520.68	0.281s
Ac-228	3645.89	911.39	0.	27.	0.045	38.49	0.843s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	5.	0.008	93.19	1.595D
Ac-228	3876.86	969.11	2.	18.	0.030	53.25	1.598D
Bi-214	4482.85	1120.54	0.	15.	0.025	51.64	0.750s
Bi-214	4957.33	1239.10	0.	5.	0.008	89.44	0.250s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.92	1461.13	0.	37.	0.062	32.88	0.321s
Ac-228	6354.33	1588.15	0.	3.	0.005	115.47	0.375s
Bi-214	7061.00	1764.71	2.	1.	0.001	478.42	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.6277E-04	609.31	1.628E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	3.650E-04	+	1.460E-04	G
			1238.11	3.390E-04	&	2.509E-04	G
			768.36	3.648E-04	+	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	3.5128E-04	911.07	2.973E-04	(	1.101E-05	G K
			969.11	3.442E-04	(	5.224E-05	G
			338.32	4.395E-04	@(	6.237E-05	G
			964.60	3.002E-04	(	7.548E-05	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	4.288E-04	&(	3.898E-05	G
			209.28	3.597E-04	?(	1.448E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:35:33 Page 4
EnergySolutions Spectrum name: Win00280.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.062E-04	(	1.156E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	2.280E-04	-	1.616E-04	X
		327.64	8.891E-04	&	3.090E-04	G
Pb-212	N 3.7496E-04	238.62	3.621E-04	(	1.397E-05	G K
		77.11	4.068E-04	(	3.976E-05	Energy duplication
		74.81	0.000E+00	%	7.995E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 5.8244E-04	92.35	4.831E-04	(	1.399E-04	G
		63.29	7.239E-04	(	1.964E-04	G

WI07-0453 D2 Bag# S-033 (Grid A1-5) 072207

```
Pb-214    N   2.4396E-04    351.92 2.346E-04 @(  1.647E-05          G K
                            295.21 2.443E-04  (  2.989E-05          G
                             77.11 0.000E+00 ?   1.205E-04Energy duplication
                            241.98 2.897E-04  (  9.899E-05          G
                             74.81 6.915E-04 +   1.793E-04Energy duplication
                             87.30 5.659E-04 +   1.921E-04          X

Pb-210    N   9.9687E-04     46.50 9.969E-04 ?(  3.078E-04          G

AM-241        5.0751E-03     59.54 5.075E-03  (  4.739E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:35:33 Page 5
EnergySolutions Spectrum name: Win00280.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	6.0261E-01	2.037E-01	2.050E-01
K-40 #	6.0312E+00	1.983E+00	1.996E+00
Ac-228	1.3005E+00	3.667E-01	3.700E-01
Pb-212	1.3882E+00	2.223E-01	2.283E-01
CS-137 #	1.7056E-01	8.273E-02	8.299E-02
Th-234	2.1564E+00	1.079E+00	1.080E+00
Pb-214	9.0321E-01	2.840E-01	2.861E-01
Pb-210 #	3.6908E+00	2.966E+00	2.967E+00
AM-241	1.8790E+01	9.100E-01	1.145E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0453 D2 Bag# S-033 (Grid A1-5) 072207

& - 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 (2.7 to 1999.3 keV) 3.5033188E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Lipin
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0454 D2 Bag# S-034 (Grid A1-5) 072207

Sample description
WI07-0454 D2 Bag #S-034 Grid A1-5 072207

Spectrum Filename: C:\User\Win00281.An1

Acquisition information
Start time: 22-Jul-2007 08:38:48
Live time: 600
Real time: 602
Dead time: 0.33 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.9400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 1.9400E+02) = 5.1546E+03
Detection limit method: Traditional ORTEC method

WI07-0454 D2 Bag# S-034 (Grid A1-5) 072207

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0815

********** 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	
12.11	3.37	6805.	10745.	17.908	2.90	0.854	-	D
17.36	4.68	12162.	8987.	14.978	4.06	0.855	-	D
68.99	17.43	55.	106.	0.177	32.60	0.865	MO-99	s
83.80	21.13	40.	96.	0.161	32.72	0.341	TC-99M	s
104.62	26.34	37.	150.	0.250	22.73	0.625	U-237	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.35	46.52	194.	28.	0.046	164.44	0.479s
AM-241	237.63	59.58	788.	9992.	16.654	2.31	0.945
Th-234	252.86	63.39	16.	34.	0.057	53.27	0.796
Pb-214	298.54	74.81	30.	61.	0.102	35.94	0.917D
Pb-212	298.56	74.81	63.	0.	0.000	1131.37	0.247D
Pb-212	307.74	77.11	30.	71.	0.118	32.28	0.919D
Pb-214	307.74	77.11	81.	0.	0.000	291.55	0.226D
Pb-214	347.77	87.11	22.	42.	0.069	52.85	1.311s
Th-234	372.36	93.26	34.	6.	0.011	296.33	0.417s
Ac-228	380.72	95.35	19.	0.	0.000	0.00	0.935

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:48:59 Page 3
EnergySolutions Spectrum name: Win00281.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	834.91	208.87	13.	26.	0.043	71.18	0.555s
Pb-212	953.94	238.62	20.	99.	0.165	23.78	1.057D
Pb-214	967.37	241.98	20.	16.	0.027	91.68	1.060D
Ac-228	1079.81	270.08	11.	16.	0.027	91.18	0.464s
Pb-214	1179.66	295.04	21.	2.	0.003	860.70	0.237s

WI07-0454 D2 Bag# S-034 (Grid A1-5) 072207

Ac-228	1307.78	327.06	7.	12.	0.020	99.07	0.311s
Ac-228	1352.65	338.28	3.	23.	0.039	49.32	0.351s
Pb-214	1407.46	351.98	5.	53.	0.088	31.68	1.210
Ac-228	1852.13	463.11	0.	15.	0.025	51.64	0.364s
Bi-214	2437.82	609.49	0.	38.	0.063	32.44	1.500
CS-137	2646.75	661.70	0.	17.	0.028	48.51	0.625s
Bi-214	3063.00	765.73	0.	8.	0.013	70.71	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3646.16	911.46	0.	25.	0.042	40.00	0.375s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	5.	5.	0.008	156.67	1.595D
Ac-228	3876.86	969.11	4.	13.	0.022	69.10	1.598D
Bi-214	4481.50	1120.20	0.	6.	0.010	81.65	1.000s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.64	1460.81	0.	23.	0.038	41.70	0.400s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7058.50	1764.08	0.	5.	0.008	89.44	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.7095E-04	609.31	1.767E-04	?(	4.650E-06	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	1.460E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	4.169E-04	&	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.0126E-03	1460.81	1.013E-03	?(	4.403E-05	G
Ac-228	N	2.7238E-04	911.07	2.753E-04	(	1.101E-05	G K
			969.11	2.563E-04	(	6.411E-05	G
			338.32	2.735E-04	(	3.355E-05	G
			964.60	3.057E-04	(	2.294E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	0.000E+00	?	5.880E-05	G
		463.00	5.847E-04	+	2.339E-04	G
		209.28	5.431E-04	+	1.978E-04	G
		270.23	5.103E-04	+	2.457E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.288E-04	X
		327.64	4.887E-04	&	2.722E-04	G
Pb-212	N 2.4038E-04	238.62	2.278E-04	(	1.569E-05	G K
		77.11	2.716E-04	(	3.166E-05	Energy duplication
		74.81	0.000E+00	%	7.602E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G

WI07-0454 D2 Bag# S-034 (Grid A1-5) 072207

Th-234	N	0.0000E+00	92.35	0.000E+00	&	1.194E-04		G
			63.29	6.477E-04		2.003E-04		G
Pb-214	N	2.0113E-04	351.92	1.963E-04	(	1.371E-05		G K
			295.21	0.000E+00	%	4.573E-05		G
			77.11	0.000E+00	%	8.688E-05	Energy duplication	
			241.98	2.251E-04	(	9.401E-05		G
			74.81	6.802E-04	+	1.558E-04	Energy duplication	
			87.30	6.022E-04	+	1.716E-04		X
Pb-210	N	5.6138E-04	46.50	5.614E-04	?(	4.119E-04		G
AM-241		2.0576E-02	59.54	2.058E-02	(	8.281E-05		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

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

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 08:48:59 Page 5
EnergySolutions Spectrum name: Win00281.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	8.8120E-01	2.859E-01	2.878E-01
K-40 #	5.2198E+00	2.177E+00	2.186E+00
Ac-228	1.4040E+00	5.616E-01	5.641E-01
Pb-212	1.2391E+00	2.484E-01	2.527E-01
CS-137 #	2.3746E-01	1.152E-01	1.155E-01
Th-234 <	6.1543E-01		
Pb-214	1.0368E+00	3.285E-01	3.308E-01
Pb-210 #C	2.8937E+00	4.758E+00	4.759E+00
AM-241	1.0606E+02	2.446E+00	4.626E+00

WI07-0454 D2 Bag# S-034 (Grid A1-5) 072207

- 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 (2.7 to 1999.3 keV) 1.1897355E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0455 D2 Bag# S-035 (Grid A1-5) 072207

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 09:03:34 Page    1
EnergySolutions                  Spectrum name: Win00282.An1

Sample description
     WI07-0455  D2  Bag #S-035 Grid A1-5  072207


Spectrum Filename: C:\User\Win00282.An1

Acquisition information
       Start time:                 22-Jul-2007 08:53:23
       Live time:                600
       Real time:                602
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3460E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3460E+02) =
                                   2.9886E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 09:03:34 Page    2
EnergySolutions                  Spectrum name: Win00282.An1
```

WI07-0455 D2 Bag# S-035 (Grid A1-5) 072207

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1010

********** 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	
11.75	2.91	5721.	10281.	17.135	2.87	0.854	-	D
16.96	4.22	15480.	8564.	14.274	4.64	0.855	-	D
743.74	186.09	19.	48.	0.081	43.51	0.665	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.19	46.48	104.	18.	0.030	167.04	0.446s
AM-241	237.65	59.59	465.	4955.	8.258	3.33	0.963
Th-234	252.34	63.26	42.	58.	0.096	49.95	1.469s
Pb-214	298.54	74.81	64.	65.	0.108	42.94	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	248.19	0.384D
Pb-212	307.74	77.11	59.	123.	0.206	25.12	0.919D
Pb-214	307.74	77.11	129.	0.	0.000	1048.05	0.330D
Pb-214	348.20	87.22	50.	44.	0.074	64.35	0.836
Th-234	368.72	92.35	57.	51.	0.085	50.24	0.933D
Ac-228	380.72	95.35	38.	2.	0.003	918.82	0.936D
Ac-228	835.82	209.10	28.	34.	0.056	73.67	0.602s
Pb-212	953.94	238.62	12.	175.	0.291	16.17	1.057D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:03:34 Page 3
EnergySolutions Spectrum name: Win00282.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	20.	22.	0.036	73.13	1.060D
Ac-228	1077.78	269.58	20.	24.	0.040	87.67	0.284s
Pb-214	1180.94	295.36	4.	63.	0.105	28.62	0.977s
Ac-228	1308.04	327.13	8.	22.	0.037	69.01	0.337s
Ac-228	1353.94	338.60	3.	60.	0.100	28.56	1.237

WI07-0455 D2 Bag# S-035 (Grid A1-5) 072207

Pb-214	1407.85	352.07	0.	96.	0.160	20.41	0.454s
Ac-228	1856.50	464.20	0.	21.	0.035	43.64	0.250s
Bi-214	2437.85	609.50	0.	48.	0.080	28.87	0.800s
CS-137	2647.25	661.83	0.	16.	0.027	50.00	0.750s
Bi-214	3068.22	767.03	7.	2.	0.003	503.32	0.173s
Ac-228	3180.69	795.14	0.	13.	0.022	55.47	0.562s
Ac-228	3645.66	911.33	0.	39.	0.065	32.03	0.357s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.73	964.58	11.	0.	0.000	0.00	1.595
Ac-228	3876.43	969.00	4.	29.	0.049	47.36	0.730s
Bi-214	4484.12	1120.86	0.	13.	0.022	55.47	0.500s
Bi-214	4953.50	1238.14	0.	12.	0.020	57.74	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.44	1461.01	0.	31.	0.052	35.92	0.375s
Ac-228	6352.00	1587.57	0.	6.	0.010	81.65	0.250s
Bi-214	7055.94	1763.45	1.	3.	0.004	180.28	0.238s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2322E-04	609.31	2.232E-04	(	4.650E-06	G K
			1764.49	9.489E-05	&	1.200E-04	G
			1120.29	3.163E-04	+	1.368E-04	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	0.000E+00	&	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	5.6555E-04	911.07	4.295E-04	?(	1.101E-05	G K
			969.11	5.663E-04	(	6.434E-05	G
			338.32	7.012E-04	(	3.593E-05	G
			964.60	0.000E+00		3.220E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	8.185E-04	&	2.728E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:03:34 Page 4
EnergySolutions Spectrum name: Win00282.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.088E-04	(	1.707E-04	G
		270.23	7.498E-04	&(	2.138E-04	G
		1588.00	8.715E-04	+	5.810E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	9.095E-04	+	3.365E-04	G
Pb-212	N 4.2182E-04	238.62	4.013E-04	(	1.264E-05	G K
		77.11	4.727E-04	(	4.338E-05	Energy duplication
		74.81	0.000E+00	&	8.103E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 8.2658E-04	92.35	6.377E-04	(	1.395E-04	G
		63.29	1.095E-03	*(	1.854E-04	G

```
Pb-214   N   3.6922E-04    351.92 3.556E-04  (  3.704E-06          G K
                           295.21 3.957E-04 *(  2.076E-05          G
                            77.11 0.000E+00 %   1.089E-04Energy duplication
                           241.98 2.987E-04 -   1.338E-04          G
                            74.81 7.226E-04 +   1.849E-04Energy duplication
                            87.30 6.409E-04 +   2.064E-04          X

Pb-210   N   3.6745E-04     46.50 3.674E-04 ?(  3.048E-04          G

AM-241       1.0203E-02     59.54 1.020E-02  (  6.383E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:03:34 Page 5
EnergySolutions Spectrum name: Win00282.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	6.6713E-01	1.926E-01	1.942E-01
K-40 #	4.0791E+00	1.465E+00	1.473E+00
Ac-228	1.6902E+00	4.011E-01	4.061E-01
Pb-212	1.2607E+00	1.883E-01	1.942E-01
CS-137 #	1.2958E-01	6.479E-02	6.498E-02
Th-234	2.4703E+00	8.751E-01	8.770E-01
Pb-214	1.1035E+00	1.939E-01	1.983E-01
Pb-210 #C	1.0982E+00	1.834E+00	1.835E+00
AM-241	3.0493E+01	1.016E+00	1.519E+00

- All peaks for activity calculation had bad shape.

WI07-0455 D2 Bag# S-035 (Grid A1-5) 072207

* - 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 (2.7 to 1999.3 keV) 4.2991879E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0456 D2 Bag# S-036 (Grid A2-2) 072207

Sample description
WI07-0456 D2 Bag #S-036 Grid A2-2 072207

Spectrum Filename: C:\User\Win00283.An1

Acquisition information

Start time:	22-Jul-2007 09:06:16
Live time:	600
Real time:	601
Dead time:	0.25 %
Detector ID:	2

Detector system
MCB 06325561

Calibration

Filename:	250 ml Soil ReGe.Clb

250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.3790E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.3790E+02) = 4.2034E+03
Detection limit method:	Traditional ORTEC method

WI07-0456 D2 Bag# S-036 (Grid A2-2) 072207

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1175

********** 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	
11.70	2.91	5837.	10692.	17.820	2.80	0.854	-	D
16.89	4.21	15608.	9199.	15.332	4.37	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.20	46.73	40.	24.	0.040	95.26	0.517s
AM-241	237.61	59.58	56.	498.	0.830	10.65	0.813s
Th-234	252.24	63.24	40.	31.	0.052	84.37	1.072s
Pb-214	298.54	74.81	38.	62.	0.104	37.55	0.917D
Pb-212	298.56	74.81	71.	0.	0.000	1362.66	0.449D
Pb-212	307.74	77.11	42.	89.	0.149	29.46	0.919D
Pb-214	307.74	77.11	123.	0.	0.000	167.83	0.318D
Pb-214	348.72	87.35	14.	38.	0.063	48.43	0.711s
Th-234	371.26	92.98	28.	69.	0.114	38.78	1.096s
Ac-228	380.72	95.35	28.	0.	0.000	0.00	0.935
Ac-228	837.51	209.52	17.	14.	0.023	121.17	0.259s
Pb-212	953.94	238.62	21.	119.	0.198	21.36	1.057D
Pb-214	967.37	241.98	21.	23.	0.039	69.64	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:16:27 Page 3
EnergySolutions Spectrum name: Win00283.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.95	270.62	8.	18.	0.030	76.44	0.219s
Pb-214	1180.47	295.24	7.	40.	0.067	41.26	0.513s
Ac-228	1310.85	327.83	6.	15.	0.025	83.27	0.270s
Ac-228	1354.23	338.67	0.	35.	0.058	33.81	0.750s
Pb-214	1408.24	352.17	10.	54.	0.089	36.07	0.583s

WI07-0456 D2 Bag# S-036 (Grid A2-2) 072207

Ac-228	1846.08	461.60	3.	4.	0.007	169.56	0.331s
Bi-214	2438.14	609.57	0.	42.	0.070	30.86	0.384s
CS-137	2645.91	661.49	0.	15.	0.025	51.64	0.417s
Bi-214	3074.00	768.48	0.	0.	0.001	223.61	0.000s
Ac-228	3176.00	793.97	0.	4.	0.007	100.00	0.250s
Ac-228	3645.54	911.30	0.	26.	0.043	39.22	0.812s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	4.	0.007	111.90	1.595D
Ac-228	3876.86	969.11	2.	20.	0.033	50.52	1.598D
Bi-214	4482.00	1120.33	2.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5846.13	1461.18	0.	23.	0.038	41.70	0.364s
Ac-228	6354.50	1588.20	0.	3.	0.005	115.47	0.500s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.9532E-04	609.31	1.953E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	0.000E+00	?	6.233E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.0126E-03	1460.81	1.013E-03	?(	4.403E-05	G
Ac-228	N	3.3554E-04	911.07	2.863E-04	?(	1.101E-05	G K
			969.11	3.800E-04	(	5.362E-05	G
			338.32	4.102E-04	(	1.172E-05	G
			964.60	2.640E-04	(	1.113E-04	G
			794.70	2.352E-04	-	1.983E-04	G
			463.00	1.559E-04	&	1.666E-04	G
			209.28	2.892E-04	?(	1.356E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:16:27 Page 4
EnergySolutions Spectrum name: Win00283.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.624E-04	+	2.415E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00		1.541E-04	X
		327.64	6.109E-04	+	2.851E-04	G
Pb-212	N 2.9285E-04	238.62	2.732E-04	(	1.613E-05	G K
		77.11	3.416E-04	(	3.695E-05	Energy duplication
		74.81	0.000E+00	%	8.058E-05	Energy duplication
CS-137	4.0648E-05	661.66	4.065E-05	?(	2.710E-06	G
Th-234	N 8.5674E-04	92.35	8.567E-04	&(	1.004E-04	G
		63.29	5.906E-04	-	2.367E-04	G

```
                    WI07-0456 D2 Bag# S-036 ( Grid A2-2 )  072207
Pb-214   N   2.2879E-04    351.92 1.981E-04 @(  1.810E-05         G K
                           295.21 2.527E-04  (  2.622E-05         G
                            77.11 0.000E+00 ?   1.064E-04Energy duplication
                           241.98 3.198E-04  (  9.651E-05         G
                            74.81 6.971E-04 +   1.635E-04Energy duplication
                            87.30 5.514E-04 +   1.554E-04         X

Pb-210   N   4.8993E-04     46.50 4.899E-04 ?(  1.931E-04         G

AM-241       1.0255E-03     59.54 1.025E-03 @(  2.285E-05         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 09:16:27 Page    5
 EnergySolutions                  Spectrum name: Win00283.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        8.2101E-01    2.534E-01     2.552E-01
 K-40    #     4.2566E+00    1.775E+00     1.782E+00
 Ac-228        1.4104E+00    4.768E-01     4.797E-01
 Pb-212        1.2310E+00    2.240E-01     2.287E-01
 CS-137  #     1.7086E-01    8.823E-02     8.847E-02
 Th-234  #     3.6013E+00    1.397E+00     1.399E+00
 Pb-214        9.6172E-01    2.841E-01     2.864E-01
 Pb-210  #     2.0594E+00    1.962E+00     1.962E+00
 AM-241  #     4.3104E+00    4.591E-01     4.860E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0456 D2 Bag# S-036 (Grid A2-2) 072207

& - 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 (2.7 to 1999.3 keV) 1.8822672E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0460 D2 Bag# S-037 (Grid A1-2) 072207

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 12:46:07 Page 1
EnergySolutions Spectrum name: Win00289.An1

Sample description
WI07-0460 D2 Bag# S-037 Grid A1-2. 072207

Spectrum Filename: C:\User\Win00289.An1

Acquisition information
Start time: 22-Jul-2007 12:35:56
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2540E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2540E+02) = 3.0731E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 12:46:07 Page 2
EnergySolutions Spectrum name: Win00289.An1

WI07-0460 D2 Bag# S-037 (Grid A1-2) 072207

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1034

********** 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	
14.76	3.88	5922.	22924.	38.207	1.88	2.198	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.30	46.25	24.	67.	0.112	38.11	0.930s
AM-241	236.65	59.34	61.	49.	0.082	64.30	1.475s
Th-234	253.60	63.58	70.	57.	0.095	59.79	1.350s
Pb-214	298.54	74.81	97.	130.	0.217	27.67	0.917D
Pb-212	298.56	74.81	140.	0.	0.000	842.61	0.401D
Pb-212	307.74	77.11	89.	160.	0.266	23.00	0.919D
Pb-214	307.74	77.11	274.	0.	0.000	73.33	0.000D
Pb-214	348.24	87.23	39.	84.	0.140	34.30	1.000s
Th-234	368.72	92.35	80.	40.	0.067	69.87	0.933D
Ac-228	380.72	95.35	38.	7.	0.011	278.59	0.935D
Ac-228	834.33	208.73	28.	46.	0.077	57.02	0.984s
Pb-212	953.94	238.62	44.	232.	0.387	15.38	1.057D
Pb-214	967.37	241.98	27.	24.	0.041	72.04	1.060D
Ac-228	1081.42	270.49	11.	39.	0.065	48.74	0.558s

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 12:46:07 Page 3
EnergySolutions Spectrum name: Win00289.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1182.01	295.63	10.	66.	0.109	31.30	1.158s
Ac-228	1308.73	327.30	10.	28.	0.047	60.33	0.453s
Ac-228	1352.14	338.15	6.	54.	0.091	30.72	1.356
Pb-214	1407.36	351.95	4.	84.	0.141	23.89	1.452s
Ac-228	1852.00	463.08	13.	4.	0.007	305.57	0.000s

WI07-0460 D2 Bag# S-037 (Grid A1-2) 072207

Bi-214	2437.71	609.46	0.	65.	0.108	24.81	0.694s
CS-137	2649.46	662.38	0.	13.	0.022	55.47	0.417s
Bi-214	3073.81	768.43	3.	13.	0.022	74.46	0.349s
Ac-228	3176.00	793.97	0.	12.	0.020	57.74	0.500s
Ac-228	3645.24	911.23	0.	63.	0.105	25.20	1.265
Bi-214	3737.00	934.16	0.	4.	0.007	100.00	0.750s
Ac-228	3858.81	964.60	2.	13.	0.022	60.67	1.595D
Ac-228	3876.86	969.11	2.	43.	0.072	31.78	1.598D
Bi-214	4477.07	1119.09	3.	19.	0.031	61.65	0.406s
Bi-214	4953.75	1238.20	0.	13.	0.022	55.47	0.375s
Bi-214	5516.00	1378.69	0.	4.	0.007	100.00	0.250s
K-40	5845.51	1461.02	0.	49.	0.082	28.57	0.387s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.33	1764.29	1.	1.	0.001	339.93	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0788E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	4.542E-04	&	1.740E-04	G
			1238.11	8.813E-04	+	3.812E-04	G
			768.36	6.861E-04	+	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	&	3.649E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.1574E-03	1460.81	2.157E-03	(	4.403E-05	G
Ac-228	N	7.4719E-04	911.07	6.938E-04	(	1.101E-05	G K
			969.11	8.368E-04	(	4.881E-05	G
			338.32	6.387E-04	(	4.517E-05	G
			964.60	8.286E-04	(	1.448E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	0.000E+00	%	2.476E-04	G
			209.28	9.733E-04	&(	1.693E-04	G
			270.23	1.218E-03	+	3.284E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 12:46:07 Page 4
EnergySolutions Spectrum name: Win00289.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	1.140E-03	+	3.760E-04	G
Pb-212	N 5.5657E-04	238.62	5.341E-04	(	2.263E-05	G K
		77.11	6.121E-04	(	5.305E-05	Energy duplication
		74.81	0.000E+00	%	1.117E-04	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	&(	2.710E-06	G
Th-234	N 7.4439E-04	92.35	5.045E-04	(	1.638E-04	G
		63.29	1.086E-03	$(	2.351E-04	G
Pb-214	N 3.4480E-04	351.92	3.123E-04	(	1.205E-05	G K

```
                    WI07-0460 D2 Bag# S-037 ( Grid A1-2 )  072207
                              295.21 4.103E-04 *(  3.062E-05          G
                               77.11 0.000E+00 ?   1.569E-04Energy duplication
                              241.98 3.380E-04  (  1.079E-04          G
                               74.81 1.452E-03 +   2.434E-04Energy duplication
                               87.30 1.219E-03 +   2.350E-04          X

Pb-210   N   1.3677E-03      46.50 1.368E-03 *(  1.520E-04          G

AM-241       1.0158E-04      59.54 1.016E-04  (  2.373E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 12:46:07 Page    5
 EnergySolutions                    Spectrum name: Win00289.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214       9.4616E-01    2.347E-01    2.374E-01
 K-40         6.6299E+00    1.894E+00    1.910E+00
 Ac-228       2.2962E+00    4.339E-01    4.423E-01
 Pb-212       1.7104E+00    2.366E-01    2.452E-01
 CS-137 #     1.0826E-01    6.005E-02    6.020E-02
 Th-234       2.2876E+00    1.052E+00    1.053E+00
 Pb-214       1.0596E+00    2.531E-01    2.562E-01
 Pb-210 #     4.2032E+00    1.602E+00    1.605E+00
 AM-241       3.1218E-01    2.007E-01    2.011E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0460 D2 Bag# S-037 (Grid A1-2) 072207

< - 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 (2.7 to 1999.3 keV) 1.9553555E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Lenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:54:52 Page 1
4714781 Spectrum name: Win00359.An1

Sample description
WI07-0589 D2 Bag #S-001 Grid C4-2 07-27-07

Spectrum Filename: C:\User\Win00359.An1

Acquisition information
Start time: 27-Jul-2007 10:44:41
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.3900E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3900E+02) = 2.9499E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:54:52 Page 2
4714781 Spectrum name: Win00359.An1

WI07-0589 D2 Bag# S-001 Grid C4-2 072707

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1075

********** 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	
14.64	3.85	3807.	24615.	41.025	1.62	2.254	CU-64	s
2332.98	583.29	0.	66.	0.110	24.62	0.793	TL-208	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.12	46.71	26.	43.	0.072	52.40	0.606s
AM-241	237.31	59.50	98.	136.	0.227	35.32	0.451s
Th-234	252.20	63.23	52.	61.	0.102	48.30	0.781s
Pb-214	298.54	74.81	62.	126.	0.209	25.20	0.917D
Pb-212	298.56	74.81	128.	0.	0.000	406.20	0.141D
Pb-212	307.74	77.11	60.	158.	0.263	21.17	0.919D
Pb-214	307.74	77.11	208.	0.	0.000	121.05	0.241D
Pb-214	348.17	87.21	50.	61.	0.102	48.38	1.052
Th-234	368.72	92.35	40.	51.	0.085	45.19	0.933D
Ac-228	380.72	95.35	37.	3.	0.005	609.91	0.935D
Ac-228	835.60	209.04	32.	38.	0.062	71.40	0.546s
Pb-212	953.94	238.62	28.	210.	0.349	15.58	1.057D
Pb-214	967.37	241.98	31.	40.	0.067	50.01	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:54:52 Page 3
4714781 Spectrum name: Win00359.Anl

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.09	270.16	21.	22.	0.037	93.60	0.862
Pb-214	1180.14	295.16	11.	72.	0.120	30.85	0.558s
Ac-228	1312.00	328.12	4.	25.	0.041	50.24	0.319s
Ac-228	1352.08	338.14	9.	71.	0.119	30.40	0.891
Pb-214	1407.80	352.06	11.	111.	0.185	22.96	0.602s

WI07-0589 D2 Bag# S-001 Grid C4-2 072707

Ac-228	1849.12	462.36	4.	28.	0.046	50.48	0.324s
Bi-214	2436.97	609.28	0.	73.	0.122	23.41	1.041
CS-137	2647.24	661.83	3.	30.	0.050	43.20	1.705s
Bi-214	3073.29	768.30	2.	10.	0.018	71.90	0.483s
Ac-228	3176.67	794.13	2.	1.	0.002	447.21	0.628s
Ac-228	3645.56	911.31	0.	43.	0.072	30.50	0.821s
Bi-214	3738.60	934.56	0.	5.	0.008	89.44	0.500s
Ac-228	3858.81	964.60	4.	8.	0.013	104.48	1.595D
Ac-228	3876.86	969.11	1.	34.	0.056	35.76	1.598D
Bi-214	4481.50	1120.20	2.	0.	0.000	0.00	0.292s
Bi-214	4954.25	1238.33	0.	5.	0.008	89.44	0.375s
Bi-214	5503.93	1375.68	2.	3.	0.005	219.78	0.236s
K-40	5844.97	1460.89	0.	64.	0.107	25.00	1.312s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7055.50	1763.33	0.	9.	0.015	66.67	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3497E-04	609.31	3.395E-04	(	4.650E-06	G K
			1764.49	3.203E-04	&(	3.558E-05	G
			1120.29	0.000E+00	?	6.233E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	5.472E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	&	4.005E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.8178E-03	1460.81	2.818E-03	(	4.403E-05	G
Ac-228	N	5.4489E-04	911.07	4.736E-04	(	1.101E-05	G K
			969.11	6.544E-04	(	4.249E-05	G
			338.32	8.360E-04	+	1.542E-04	G
			964.60	4.767E-04	(	2.140E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	1.085E-03	&	3.319E-04	G
			209.28	7.935E-04	+	2.594E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:54:52 Page 4
4714781 Spectrum name: Win00359.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.873E-04	?(	2.187E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	1.005E-03	+	3.312E-04	G
Pb-212	N 4.8159E-04	238.62	4.816E-04	(	1.852E-05	G K
		77.11	6.034E-04	+	8.187E-05	Energy duplication
		74.81	0.000E+00	%	1.069E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	(	8.130E-06	G
Th-234	N 6.3275E-04	92.35	6.327E-04	(	1.184E-04	G
		63.29	1.162E-03	+	2.961E-04	G

```
                    WI07-0589   D2 Bag# S-001   Grid C4-2   072707
Pb-214   N   4.2470E-04    351.92 4.111E-04  (  1.932E-05          G K
                           295.21 4.510E-04  (  3.268E-05          G
                            77.11 0.000E+00 ?   1.373E-04Energy duplication
                           241.98 5.576E-04 +   1.718E-04          G
                            74.81 1.402E-03 +   2.221E-04Energy duplication
                            87.30 8.876E-04 +   2.236E-04          X

Pb-210   N   8.8460E-04     46.50 8.846E-04 ?(  1.568E-04          G

AM-241       2.8004E-04     59.54 2.800E-04  (  2.988E-05          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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 10:54:52 Page    5
4714781                          Spectrum name: Win00359.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214        9.8812E-01    2.313E-01    2.342E-01
K-40          8.3120E+00    2.078E+00    2.101E+00
Ac-228        1.6073E+00    4.902E-01    4.939E-01
Pb-212        1.4206E+00    2.213E-01    2.276E-01
CS-137        2.3981E-01    1.036E-01    1.040E-01
Th-234        1.8665E+00    8.434E-01    8.445E-01
Pb-214        1.2528E+00    2.409E-01    2.454E-01
Pb-210 #      2.6094E+00    1.367E+00    1.369E+00
AM-241        8.2608E-01    2.918E-01    2.934E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0589 D2 Bag# S-001 Grid C4-2 072707

& - 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 (2.7 to 1999.3 keV) 1.9122757E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fina
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0270 D2 Bag# S-003 (from Grids D1-2,3) 071307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:02:16 Page    1
EnergySolutions                  Spectrum name: Win00173.An1

Sample description
     WI07 -0270  D2 Bag # S-003 (contents) Grid D1-2,3  071307


Spectrum Filename: C:\User\Win00173.An1

Acquisition information
       Start time:                 13-Jul-2007 07:52:05
       Live time:                600
       Real time:                602
       Dead time:                  0.41 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3340E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3340E+02) =
                                   2.9994E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:02:16 Page    2
EnergySolutions                  Spectrum name: Win00173.An1
```

WI07-0270 D2 Bag# S-003 (from Grids D1-2,3) 071307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1257

********** 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	
11.66	2.90	3540.	10503.	17.505	2.53	0.854	-	D
16.73	4.16	15118.	9088.	15.147	4.36	0.855	-	D
105.03	26.44	79.	190.	0.316	23.43	0.753	AM-241	
128.16	32.22	132.	325.	0.542	17.97	1.028	XE-138	s
145.87	36.65	139.	104.	0.174	47.45	0.510	CE-144	s
198.14	49.62	1127.	279.	0.465	36.10	0.895	EU-155	D
742.96	185.89	34.	55.	0.092	49.50	0.656	RA-226	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	438.	32.	0.053	188.63	0.893D
AM-241	237.63	59.59	1200.	14565.	24.275	1.92	0.868
Th-234	251.76	63.12	65.	39.	0.065	83.72	0.667s
Pb-214	298.54	74.81	52.	118.	0.197	25.15	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	224.06	0.289D
Pb-212	307.74	77.11	66.	168.	0.281	20.55	0.919D
Pb-214	307.74	77.11	184.	0.	0.000	522.81	0.238D
Pb-214	348.23	87.23	67.	80.	0.134	44.87	0.592s

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:02:16 Page 3
EnergySolutions Spectrum name: Win00173.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	69.	56.	0.093	50.16	0.933D
Ac-228	380.72	95.35	29.	1.	0.001	1708.78	0.935D
Ac-228	834.91	208.87	20.	32.	0.053	63.12	0.663s
Pb-212	953.94	238.62	23.	197.	0.328	15.85	1.057D
Pb-214	967.37	241.98	36.	27.	0.045	72.86	1.060D

WI07-0270 D2 Bag# S-003 (from Grids D1-2,3) 071307

Ac-228	1080.23	270.19	18.	30.	0.050	67.33	0.667s
Pb-214	1180.58	295.27	10.	78.	0.131	28.57	0.736s
Ac-228	1312.12	328.15	17.	21.	0.035	88.41	0.294s
Ac-228	1352.50	338.24	10.	68.	0.114	30.35	0.403s
Pb-214	1407.64	352.02	13.	110.	0.184	23.15	0.718s
Ac-228	1852.36	463.17	6.	22.	0.037	59.44	0.749s
Bi-214	2437.64	609.44	4.	88.	0.147	23.25	1.483
CS-137	2646.00	661.52	2.	22.	0.036	49.07	0.338s
Bi-214	3075.43	768.83	0.	7.	0.012	75.59	0.500s
Ac-228	3184.80	796.17	0.	9.	0.015	66.67	0.312s
Ac-228	3646.31	911.50	0.	45.	0.075	29.81	0.600s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	6.	0.011	106.55	1.595D
Ac-228	3876.86	969.11	4.	19.	0.032	53.12	1.598D
Bi-214	4485.00	1121.07	0.	12.	0.020	57.74	0.375s
Bi-214	4953.50	1238.14	0.	2.	0.003	141.42	0.500s
Bi-214	5513.00	1377.94	0.	2.	0.003	141.42	0.250s
K-40	5846.22	1461.20	0.	64.	0.107	25.00	0.435s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	2.	1.	0.001	478.42	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.0627E-04	609.31	4.108E-04	(	1.513E-05	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	2.920E-04	-	1.320E-04	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	3.648E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.8178E-03	1460.81	2.818E-03	(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:02:16 Page 4
EnergySolutions Spectrum name: Win00173.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	5.0582E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	3.770E-04	-	1.418E-04	G
			338.32	8.028E-04	+	1.524E-04	G
			964.60	3.947E-04	(	1.751E-04	G
			794.70	5.292E-04	&(	5.880E-05	G
			463.00	8.705E-04	+	3.118E-04	G
			209.28	6.771E-04	*(	1.448E-04	G
			270.23	9.373E-04	+	3.221E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.591E-04	X
			327.64	8.552E-04	+	3.760E-04	G
Pb-212	N	4.5226E-04	238.62	4.523E-04	(	1.685E-05	G K
			77.11	6.449E-04	+	8.475E-05	Energy duplication
			74.81	0.000E+00	%	1.019E-04	Energy duplication

WI07-0270 D2 Bag# S-003 (from Grids D1-2,3) 071307

CS-137		5.9166E-05	661.66	5.917E-05	?(	7.156E-06	G	
Th-234	N	7.1401E-04	92.35	6.937E-04	(	1.534E-04	G	
			63.29	7.430E-04	?(	2.269E-04	G	
Pb-214	N	4.2992E-04	351.92	4.086E-04	(	2.059E-05	G	K
			295.21	4.917E-04	(	3.201E-05	G	
			77.11	0.000E+00	%	1.292E-04	Energy duplication	
			241.98	3.771E-04	(	1.240E-04	G	
			74.81	1.321E-03	+	2.114E-04	Energy duplication	
			87.30	1.166E-03	+	2.562E-04	X	
Pb-210	N	6.5199E-04	46.50	6.520E-04	(	6.143E-04	G	
AM-241		2.9991E-02	59.54	2.999E-02	(	1.019E-04	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

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:02:16 Page 5
EnergySolutions Spectrum name: Win00173.An1

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 pCi/g	2 Sigma Total pCi/g
Bi-214	1.2186E+00	2.833E-01	2.870E-01
K-40	8.4516E+00	2.113E+00	2.137E+00
Ac-228	1.5171E+00	4.523E-01	4.559E-01
Pb-212	1.3565E+00	2.150E-01	2.209E-01
CS-137 #	1.7746E-01	8.708E-02	8.734E-02
Th-234	2.1416E+00	1.045E+00	1.046E+00
Pb-214	1.2895E+00	2.985E-01	3.024E-01

WI07-0270 D2 Bag# S-003 (from Grids D1-2,3) 071307

Pb-210	C	1.9556E+00	3.689E+00	3.689E+00
AM-241		8.9955E+01	1.728E+00	3.751E+00

- 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 (2.7 to 1999.3 keV) 1.0806305E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lann
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0270QC D1 QC recount Bag# S-003 (from Grids D1-2,3) 071307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:54:17 Page    1
EnergySolutions                  Spectrum name: Win00175.An1

Sample description
     WI07-0270QC    D1  QC-recount Bag #S-003 (contents)  071307


Spectrum Filename: C:\User\Win00175.An1

Acquisition information
       Start time:                 13-Jul-2007 08:44:06
       Live time:                600
       Real time:                603
       Dead time:                  0.53 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3340E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3340E+02) =
                                   2.9994E+03
       Detection limit method:     Traditional ORTEC method

[]

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:54:17 Page    2
EnergySolutions                  Spectrum name: Win00175.An1
```

WI07-0270QC D1 QC recount Bag# S-003 (from Grids D1-2,3) 071307

Ac-228	1312.70	328.25	8.	16.	0.026	83.37	0.274s
Ac-228	1353.80	338.52	13.	49.	0.082	40.97	0.400s
Pb-214	1408.03	352.07	8.	92.	0.153	25.32	1.380
Ac-228	1853.69	463.45	0.	15.	0.025	51.64	0.552s
Bi-214	2437.00	609.22	3.	44.	0.073	34.46	0.620s
CS-137	2645.99	661.45	2.	12.	0.020	70.71	0.443s
Bi-214	3072.60	768.06	0.	5.	0.008	89.44	0.500s
Ac-228	3169.93	792.38	4.	4.	0.006	227.45	0.236s
Ac-228	3647.15	911.63	0.	39.	0.065	32.03	0.354s
Bi-214	3733.83	933.29	1.	1.	0.001	366.67	0.223s
Ac-228	3859.13	964.60	9.	7.	0.012	140.31	1.588D
Ac-228	3877.18	969.11	23.	3.	0.005	507.80	1.591D
Bi-214	4479.67	1119.66	2.	1.	0.002	447.21	0.628s
Bi-214	4952.20	1237.73	0.	7.	0.012	75.59	0.375s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.09	1461.34	0.	33.	0.055	34.82	0.500s
Ac-228	6357.00	1588.74	4.	2.	0.003	470.74	0.000s
Bi-214	7058.38	1763.98	0.	10.	0.017	63.25	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3021E-04	609.31	2.243E-04	@(	1.569E-05	G K
			1764.49	3.783E-04	+	1.891E-04	G
			1120.29	0.000E+00	%	7.871E-05	G
			1238.11	5.100E-04	+	3.115E-04	G
			768.36	2.844E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.699E-04	G
K-40	N	1.5534E-03	1460.81	1.553E-03	?(	4.707E-05	G
Ac-228	N	5.6177E-04	911.07	4.662E-04	?(	1.195E-05	G K
			969.11	0.000E+00	%	1.611E-04	G
			338.32	6.499E-04	(	7.322E-05	G
			964.60	4.747E-04	(	3.167E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:54:17 Page 4
EnergySolutions Spectrum name: Win00175.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	0.000E+00	&	2.905E-04	G
		463.00	6.497E-04	?(	4.331E-05	G
		209.28	7.511E-04	(	1.098E-04	G
		270.23	6.729E-04	(	1.921E-04	G
		1588.00	0.000E+00	%	6.196E-04	G
		95.35	2.829E-04	-	2.433E-04	X
		327.64	7.104E-04	&(	2.019E-04	G
Pb-212	N 3.8177E-04	238.62	3.818E-04	(	2.392E-05	G K
		77.11	5.668E-04	+	9.576E-05	Energy duplication
		74.81	0.000E+00	%	1.182E-04	Energy duplication
CS-137	3.5682E-05	661.66	3.568E-05	?(	7.617E-06	G

WI07-0270QC D1 QC recount Bag# S-003 (from Grids D1-2,3) 071307

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1578

********** 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	
28.18	7.22	142.	982.	1.637	7.95	1.237	CU-64	s
69.90	17.65	99.	321.	0.535	16.50	1.013	MO-99	s
84.09	21.20	91.	201.	0.336	22.95	1.176	TC-99M	s
105.77	26.62	121.	186.	0.309	26.17	0.549	AM-241	s
128.35	32.26	98.	294.	0.491	17.12	1.342	XE-133M	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.03	46.42	266.	30.	0.051	172.78	0.387s
AM-241	237.78	59.61	987.	11476.	19.127	2.19	1.087
Th-234	251.71	63.09	43.	28.	0.046	92.83	0.622s
Pb-214	298.61	74.81	74.	84.	0.140	36.35	0.971D
Pb-212	298.63	74.81	106.	0.	0.000	3034.43	0.206D
Pb-212	307.80	77.11	81.	123.	0.204	27.58	0.972D
Pb-214	307.80	77.11	159.	0.	0.000	164.44	0.000D
Pb-214	348.00	87.15	42.	54.	0.090	51.59	0.819
Th-234	368.79	92.35	53.	38.	0.063	63.41	0.985D
Ac-228	380.79	95.35	40.	13.	0.021	153.84	0.987D

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:54:17 Page 3
EnergySolutions Spectrum name: Win00175.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	835.01	208.87	8.	31.	0.052	50.11	0.550s
Pb-212	954.08	238.62	37.	146.	0.243	20.35	1.099D
Pb-214	967.50	241.98	28.	24.	0.040	74.32	1.101D
Ac-228	1079.08	269.86	12.	19.	0.032	86.16	0.801s
Pb-214	1179.67	295.00	10.	44.	0.072	43.80	0.335s

```
          WI07-0270QC D1   QC recount Bag# S-003 (from Grids D1-2,3) 071307
Th-234    N   5.8985E-04     92.35 5.561E-04  (  1.589E-04          G
                             63.29 6.379E-04 *(  2.265E-04          G

Pb-214    N   3.5879E-04    351.92 3.811E-04  (  1.918E-05          G K
                            295.21 3.079E-04 *(  3.616E-05          G
                             77.11 0.000E+00 ?   1.454E-04Energy duplication
                            241.98 3.788E-04  (  1.258E-04          G
                             74.81 1.133E-03 +   2.470E-04Energy duplication
                             87.30 9.322E-04 +   2.480E-04          X

Pb-210    N   7.1448E-04     46.50 7.145E-04 ?(  5.516E-04          G

AM-241        2.8452E-02     59.54 2.845E-02  (  1.114E-04          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:54:17 Page    5
 EnergySolutions                    Spectrum name: Win00175.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	6.9050E-01	2.379E-01	2.388E-01
K-40 #	4.6594E+00	1.622E+00	1.628E+00
Ac-228	1.6850E+00	4.930E-01	4.955E-01
Pb-212	1.1451E+00	2.330E-01	2.354E-01
CS-137 #	1.0702E-01	7.568E-02	7.575E-02
Th-234	1.7692E+00	9.945E-01	9.953E-01
Pb-214	1.0762E+00	2.725E-01	2.744E-01
Pb-210 #C	2.1430E+00	3.703E+00	3.703E+00
AM-241	8.5339E+01	1.867E+00	3.669E+00

WI07-0270QC D1 QC recount Bag# S-003 (from Grids D1-2,3) 071307

- 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 (2.7 to 1999.2 keV) 9.8614044E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-027 D2 Bag# S-004 (from Grids D1-2,3) 071307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:17:21 Page    1
EnergySolutions                  Spectrum name: Win00174.An1

Sample description
     WI07 -0271  D2 Bag # S-004 (contents) Grid D1-2,3  071307


Spectrum Filename: C:\User\Win00174.An1

Acquisition information
       Start time:                 13-Jul-2007 08:06:45
       Live time:                600
       Real time:                626
       Dead time:                  4.23 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.8700E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.8700E+02) =
                                   2.5840E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 08:17:21 Page    2
EnergySolutions                  Spectrum name: Win00174.An1
```

WI07-027 D2 Bag# S-004 (from Grids D1-2,3) 071307

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0825

********** 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	
14.57	3.83	2994.	9563.	15.938	3.07	2.239	CU-64	s
42.72	10.87	1962.	467.	0.778	35.88	1.727	PB-214	s
69.50	17.56	963.	2071.	3.452	7.43	0.992	MO-99	s
84.43	21.29	975.	2968.	4.946	5.65	1.262	TC-99M	s
104.96	26.42	856.	5984.	9.974	3.22	0.852	AM-241	
128.21	32.23	2213.	9038.	15.063	3.02	0.963	XE-138	s
145.76	36.62	2020.	2678.	4.463	7.62	0.904	CE-144	s
173.55	43.54	5979.	476.	0.794	46.82	0.890	EU-155	D
197.99	49.65	28547.	8496.	14.161	6.03	0.895	EU-155	D
395.10	98.94	132.	259.	0.432	19.76	0.890	PA-234	M
411.16	102.96	58.	300.	0.499	14.70	0.851	GD-153	
475.20	118.97	56.	174.	0.290	23.72	1.156	NP-239	s
501.07	125.43	43.	92.	0.154	34.16	0.894	PA-234	

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

********** 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	185.28	46.50	12723.	0.	0.000	0.00	0.893D
AM-241	237.69	59.60	31267.	453024.	755.041	0.34	0.857
Th-234	247.73	62.11	81.	22.	0.036	134.23	0.194s
Pb-214	298.54	74.81	115.	86.	0.143	41.38	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	1555.63	0.540D
Pb-212	307.74	77.11	99.	132.	0.221	27.47	0.919D
Pb-214	307.74	77.11	242.	0.	0.000	125.73	0.305D

Pb-214	348.14	87.21	84.	56.	0.093	65.47	0.872
Th-234	368.72	92.35	92.	34.	0.057	87.04	0.933D
Ac-228	380.72	95.35	82.	6.	0.011	405.00	0.935D
Ac-228	833.88	208.62	14.	44.	0.073	45.20	0.625s
Pb-212	953.94	238.62	21.	203.	0.339	15.38	1.057D
Pb-214	967.37	241.98	33.	27.	0.045	72.10	1.060D
Ac-228	1079.29	269.95	14.	35.	0.058	56.57	0.472s
Pb-214	1181.29	295.45	11.	68.	0.113	32.13	0.905s
Ac-228	1310.17	327.66	10.	30.	0.049	59.39	1.191
Ac-228	1353.34	338.45	8.	44.	0.073	38.92	0.878
Pb-214	1407.45	351.97	3.	115.	0.191	19.82	1.207
Ac-228	1851.26	462.89	3.	13.	0.022	72.11	0.454s
Bi-214	2437.13	609.32	0.	75.	0.125	23.09	1.284
CS-137	2647.00	661.77	0.	30.	0.050	36.51	0.750s
Bi-214	3073.00	768.23	0.	14.	0.023	53.45	0.375s
Ac-228	3176.78	794.16	1.	1.	0.002	346.41	0.218s
Ac-228	3643.67	910.84	12.	4.	0.007	308.72	0.411s
Bi-214	3735.50	933.78	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	2.	7.	0.012	96.03	1.595D
Ac-228	3876.86	969.11	3.	23.	0.039	45.47	1.598D
Bi-214	4482.43	1120.43	0.	14.	0.023	53.45	0.281s
Bi-214	4955.83	1238.72	0.	6.	0.010	81.65	0.500s
Bi-214	5510.50	1377.32	0.	3.	0.005	115.47	0.500s
K-40	5845.87	1461.11	0.	62.	0.103	25.40	1.499
Ac-228	6353.50	1587.95	0.	4.	0.007	100.00	0.500s
Bi-214	7059.29	1764.28	0.	11.	0.018	60.30	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:17:21 Page 4
EnergySolutions Spectrum name: Win00174.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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5790E-04	609.31	3.488E-04	(	4.650E-06	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.7297E-03	1460.81	2.730E-03	(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	6.996E-05	G K
			969.11	4.561E-04		1.501E-04	G
			338.32	5.157E-04		1.255E-04	G
			964.60	4.277E-04		2.946E-04	G
			794.70	0.000E+00	%	1.506E-04	G
			463.00	5.197E-04	?	2.408E-04	G
			209.28	9.275E-04	&	2.387E-04	G
			270.23	1.093E-03	@	3.253E-04	G
			1588.00	5.810E-04	?	4.898E-04	G
			95.35	0.000E+00	%	2.653E-04	X
			327.64	1.201E-03		3.852E-04	G

```
Pb-212    N   4.7866E-04    238.62 4.674E-04  (  1.595E-05          G K
                             77.11 5.065E-04  (  5.582E-05Energy duplication
                             74.81 0.000E+00 %   1.036E-04Energy duplication

CS-137        8.1297E-05    661.66 8.130E-05  (  2.710E-06          G

Th-234    N   4.1898E-04     92.35 4.233E-04  (  1.757E-04          G
                             63.29 4.128E-04 &(  2.527E-04          G

Pb-214    N   4.1870E-04    351.92 4.247E-04  (  1.159E-05          G K
                            295.21 4.260E-04 @(  3.268E-05          G
                             77.11 0.000E+00 ?   1.476E-04Energy duplication
                            241.98 3.703E-04  (  1.198E-04          G
                             74.81 9.589E-04 +   2.294E-04Energy duplication
                             87.30 8.126E-04 +   2.502E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   3.267E-03          G
```

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:17:21 Page 5
EnergySolutions Spectrum name: Win00174.An1

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       9.3284E-01     59.54 9.328E-01  (  5.160E-04          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

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214       9.2482E-01     2.136E-01     2.164E-01
```

WI07-027 D2 Bag# S-004 (from Grids D1-2,3) 071307

K-40	7.0535E+00	1.792E+00	1.811E+00
Ac-228 B<	1.8077E-01		
Pb-212	1.2368E+00	1.902E-01	1.958E-01
CS-137 #	2.1007E-01	7.671E-02	7.713E-02
Th-234	1.0826E+00	8.660E-01	8.664E-01
Pb-214	1.0819E+00	2.144E-01	2.182E-01
Pb-210 <	8.4409E+00		
AM-241	2.4104E+03	8.164E+00	8.960E+01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 08:17:21 Page 6
EnergySolutions Spectrum name: Win00174.An1

< - 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 (2.7 to 1999.3 keV) 2.4220283E+03 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0279 D2 Bag# S-005 (from Grids D1-2,3,5) 071307

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:46:21 Page 1
EnergySolutions Spectrum name: Win00176.An1

Sample description
WI07 -0279 D2 Bag # S-005 (grid D-1-2,3,5) 071307

Spectrum Filename: C:\User\Win00176.An1

Acquisition information
Start time: 13-Jul-2007 11:36:08
Live time: 600
Real time: 605
Dead time: 0.79 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6010E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6010E+02) = 2.7770E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:46:21 Page 2
EnergySolutions Spectrum name: Win00176.An1

WI07-0279 D2 Bag# S-005 (from Grids D1-2,3,5) 071307

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1921

********** 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	
11.65	2.90	2830.	7731.	12.885	2.99	0.854	-	D
16.81	4.19	11824.	6192.	10.321	5.58	0.855	-	D
69.80	17.64	170.	573.	0.955	12.21	0.918	MO-99	s
84.39	21.28	133.	520.	0.866	12.35	1.141	TC-99M	s
104.93	26.42	130.	738.	1.230	9.36	0.813	AM-241	
128.05	32.20	453.	1949.	3.248	6.42	1.068	XE-138	s
145.95	36.67	382.	590.	0.984	15.36	1.029	CE-144	s
197.00	49.43	4288.	1178.	1.964	20.62	1.427	EU-155	s
396.08	99.19	45.	74.	0.123	42.05	0.703	AC-228	s
410.70	102.84	24.	53.	0.089	41.33	0.680	GD-153	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.48	46.55	1832.	0.	0.000	0.00	0.893
AM-241	237.60	59.58	4690.	56731.	94.552	0.97	0.941
Th-234	251.61	63.08	46.	28.	0.047	92.03	1.387s
Pb-214	298.54	74.81	32.	72.	0.120	32.51	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	1256.98	0.244D

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:46:21 Page 3
EnergySolutions Spectrum name: Win00176.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	307.74	77.11	54.	103.	0.171	28.24	0.919D
Pb-214	307.74	77.11	134.	0.	0.000	492.61	0.458D
Pb-214	347.31	87.00	47.	29.	0.049	92.71	0.482s
Th-234	368.72	92.35	47.	30.	0.049	75.52	0.933D
Ac-228	380.72	95.35	21.	1.	0.001	2545.74	0.935D

WI07-0279 D2 Bag# S-005 (from Grids D1-2,3,5) 071307

Ac-228	835.34	208.98	8.	26.	0.044	58.01	0.292s
Pb-212	953.94	238.62	31.	103.	0.172	24.80	1.057D
Pb-214	967.37	241.98	33.	21.	0.036	86.73	1.060D
Ac-228	1080.17	270.17	8.	36.	0.060	48.43	0.389s
Pb-214	1181.31	295.45	11.	38.	0.064	45.91	0.864
Ac-228	1312.92	328.35	0.	15.	0.025	51.64	0.364s
Ac-228	1352.63	338.27	4.	30.	0.049	44.41	0.517s
Pb-214	1407.56	352.00	11.	86.	0.143	27.25	1.073
Ac-228	1851.50	462.95	0.	13.	0.022	55.47	0.250s
Bi-214	2437.25	609.34	0.	62.	0.103	25.40	0.928s
CS-137	2647.82	661.97	0.	13.	0.022	55.47	0.375s
Bi-214	3072.00	767.98	0.	0.	0.001	223.61	0.100s
Ac-228	3174.00	793.47	0.	2.	0.003	141.42	0.250s
Ac-228	3645.42	911.27	0.	38.	0.063	32.44	0.496s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	4.	0.007	143.28	1.595D
Ac-228	3876.86	969.11	1.	9.	0.015	74.90	1.598D
Bi-214	4481.33	1120.16	0.	5.	0.008	89.44	0.250s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5845.78	1461.09	0.	73.	0.122	23.41	0.634s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7057.50	1763.83	0.	9.	0.015	66.67	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9645E-04	609.31	2.883E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	1.217E-04	-	9.007E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:46:21 Page 4
EnergySolutions Spectrum name: Win00176.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	3.2140E-03	1460.81	3.214E-03	?(	4.403E-05	G
Ac-228	N	4.3458E-04	911.07	4.185E-04	?(	1.101E-05	G K
			969.11	1.728E-04	-	9.709E-05	G
			338.32	3.477E-04	?(	4.086E-05	G
			964.60	2.443E-04	-	2.469E-04	G
			794.70	1.176E-04	&	1.506E-04	G
			463.00	5.067E-04	?(	3.898E-05	G
			209.28	5.607E-04	(	9.846E-05	G
			270.23	1.125E-03	+	3.091E-04	G
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	0.000E+00	%	1.354E-04	X
			327.64	6.109E-04	&(	4.072E-05	G
Pb-212	N	2.3776E-04	238.62	2.378E-04	(	1.915E-05	G K

WI07-0279 D2 Bag# S-005 (from Grids D1-2,3,5) 071307

			77.11	3.939E-04	+	6.978E-05	Energy duplication	
			74.81	0.000E+00	%	8.420E-05	Energy duplication	
CS-137		3.5229E-05	661.66	3.523E-05	?(	2.710E-06		G
Th-234	N	4.3661E-04	92.35	3.686E-04	(	1.280E-04		G
			63.29	5.334E-04	$(	1.925E-04		G
Pb-214	N	3.2533E-04	351.92	3.185E-04	(	1.932E-05		G K
			295.21	2.401E-04	-	6.522E-05		G
			77.11	0.000E+00	%	1.106E-04	Energy duplication	
			241.98	2.966E-04	(	1.187E-04		G
			74.81	8.013E-04	+	1.666E-04	Energy duplication	
			87.30	4.257E-04	(	1.476E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		1.246E-03		G
AM-241		1.1682E-01	59.54	1.168E-01	(	2.005E-04		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

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 pCi/g	2 Sigma Total pCi/g
Bi-214		8.2324E-01	2.091E-01	2.114E-01
K-40	#	8.9254E+00	2.089E+00	2.116E+00
Ac-228		1.2068E+00	2.659E-01	2.697E-01
Pb-212		6.6027E-01	1.637E-01	1.656E-01

WI07-0279 D2 Bag# S-005 (from Grids D1-2,3,5) 071307

CS-137 #	9.7830E-02	5.427E-02	5.440E-02
Th-234	1.2125E+00	7.217E-01	7.223E-01
Pb-214	9.0346E-01	2.462E-01	2.485E-01
Pb-210 <	3.4599E+00		
AM-241	3.2440E+02	3.158E+00	1.242E+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 (2.7 to 1999.3 keV) 3.3823193E+02 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0280 D2 Bag# S-006 (from Grids D1-5) 071307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 12:05:53 Page    1
EnergySolutions                  Spectrum name: Win00177.An1

Sample description
     WI07 -0280  D2  Bag # S-006 (grid  D-1-5)  071307


Spectrum Filename: C:\User\Win00177.An1

Acquisition information
       Start time:                 13-Jul-2007 11:55:28
       Live time:                600
       Real time:                614
       Dead time:                  2.26 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.7670E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.7670E+02) =
                                   2.6546E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 12:05:53 Page    2
EnergySolutions                  Spectrum name: Win00177.An1
```

WI07-0280 D2 Bag# S-006 (from Grids D1-5) 071307

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1386

********** 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	
11.69	2.89	2063.	7729.	12.881	2.82	0.854	-	D
17.76	4.41	10052.	5404.	9.007	5.91	0.855	-	D
55.51	14.06	255.	77.	0.128	69.43	0.605	PU-239	s
69.78	17.63	462.	1217.	2.028	9.10	0.940	MO-99	s
84.65	21.35	434.	1284.	2.139	8.46	1.241	TC-99M	s
104.90	26.41	453.	2334.	3.889	5.47	0.834	AM-241	
128.05	32.19	1393.	4568.	7.613	4.56	0.967	XE-138	s
145.90	36.66	1245.	1443.	2.405	10.56	0.955	CE-144	s
197.44	49.54	20012.	4956.	8.259	11.05	1.414	EU-155	s
395.10	98.68	57.	120.	0.200	25.49	0.938	PA-234	D
411.07	102.94	70.	155.	0.259	28.22	0.783	GD-153	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.36	46.52	7613.	0.	0.000	0.00	0.893
AM-241	237.56	59.57	19913.	203380.	338.966	0.53	0.880
Th-234	252.43	63.28	56.	27.	0.044	107.40	0.527s
Pb-214	298.54	74.81	61.	64.	0.106	42.71	0.917D

0

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 12:05:53 Page 3
EnergySolutions Spectrum name: Win00177.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	298.56	74.81	58.	0.	0.000	161.55	0.621D
Pb-212	307.74	77.11	60.	97.	0.162	30.21	0.919D
Pb-214	307.74	77.11	93.	0.	0.000	348.21	0.154D
Pb-214	347.87	87.14	75.	41.	0.068	84.98	0.447s
Th-234	368.72	92.35	43.	33.	0.055	66.42	0.933D

WI07-0280 D2 Bag# S-006 (from Grids D1-5) 071307

Pb-212	N	2.8003E-04	238.62	2.800E-04	(	1.258E-05		G K
			77.11	3.730E-04	+	6.978E-05	Energy duplication	
			74.81	0.000E+00	?	7.277E-05	Energy duplication	
CS-137		1.8969E-05	661.66	1.897E-05	?(	2.710E-06		G
Th-234	N	4.5047E-04	92.35	4.100E-04	(	1.223E-04		G
			63.29	5.080E-04	$(	2.120E-04		G
Pb-214	N	2.3781E-04	351.92	2.167E-04	(	1.034E-05		G K
			295.21	2.788E-04	?(	1.749E-05		G
			77.11	0.000E+00	%	9.285E-05	Energy duplication	
			241.98	1.576E-04	-	1.069E-04		G
			74.81	7.130E-04	+	1.821E-04	Energy duplication	
			87.30	5.950E-04	+	2.284E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		2.529E-03		G
AM-241		4.1879E-01	59.54	4.188E-01	(	4.120E-04		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

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
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P - Photon Reaction
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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 pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.0908E-01	1.522E-01	1.530E-01
K-40	8.5321E+00	1.997E+00	2.023E+00
Ac-228	6.1202E-01	2.359E-01	2.370E-01

WI07-0280 D2 Bag# S-006 (from Grids D1-5) 071307

Pb-212	7.4339E-01	1.476E-01	1.502E-01
CS-137 #	5.0356E-02	3.807E-02	3.811E-02
Th-234	1.1958E+00	7.550E-01	7.556E-01
Pb-214	6.3129E-01	1.362E-01	1.382E-01
Pb-210 <	6.7141E+00		
AM-241	1.1117E+03	5.884E+00	4.157E+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 (2.7 to 1999.3 keV) 1.1238992E+03 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0286 D2 Bag# S-007 (from Grids D1-1,2,3) 071307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 16:36:44 Page    1
EnergySolutions                  Spectrum name: Win00178.An1

Sample description
     WI07 - 0286  D2    Bag #S-007  (Grid D1-1,2,3)  071307


Spectrum Filename: C:\User\Win00178.An1

Acquisition information
       Start time:                 13-Jul-2007 16:26:18
       Live time:                600
       Real time:                617
       Dead time:                  2.77 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.8890E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.8890E+02) =
                                   2.5714E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUL-2007 16:36:44 Page    2
EnergySolutions                  Spectrum name: Win00178.An1
```

WI07-0286 D2 Bag# S-007 (from Grids D1-1,2,3) 071307

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1768

********** 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	
11.97	3.37	4344.	7030.	11.717	3.57	0.854	-	D
18.52	5.01	6508.	5613.	9.355	4.86	0.856	-	D
43.55	10.97	730.	46.	0.077	168.15	0.861	PB-214	D
55.41	13.94	891.	93.	0.156	92.65	0.864	PU-239	D
69.65	17.60	1086.	1982.	3.303	8.03	1.111	MO-99	s
84.27	21.25	939.	1758.	2.930	8.45	1.226	TC-99M	s
104.78	26.38	858.	2824.	4.707	5.54	1.053	AM-241	s
127.89	32.15	1545.	3551.	5.918	5.56	1.101	XE-138	s
145.47	36.55	1586.	867.	1.445	17.70	1.205	XE-133M	s
197.86	49.64	26522.	6112.	10.186	10.29	1.620	EU-155	s
394.97	98.83	90.	136.	0.227	26.09	0.938	PA-234	D
410.95	102.91	54.	173.	0.288	21.16	0.744	GD-153	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.68	46.60	15343.	0.	0.000	0.00	0.893
AM-241	237.36	59.52	25000.	256822.	428.038	0.47	1.038
Th-234	252.95	63.41	112.	28.	0.047	136.28	0.560s
Pb-214	298.54	74.81	94.	74.	0.123	43.87	0.917D
Pb-212	298.56	74.81	94.	0.	0.000	189.97	0.289D
Pb-212	307.74	77.11	81.	114.	0.190	29.07	0.919D
Pb-214	307.74	77.11	230.	0.	0.000	108.81	0.268D
Pb-214	348.04	87.18	65.	33.	0.055	93.66	0.419s
Th-234	368.72	92.35	73.	13.	0.022	195.65	0.933D

WI07-0286 D2 Bag# S-007 (from Grids D1-1,2,3) 071307

Ac-228	380.72	95.35	76.	2.	0.003	1395.45	0.935D
Ac-228	837.25	209.46	27.	22.	0.037	98.14	0.462s
Pb-212	953.94	238.62	39.	104.	0.173	25.96	1.057D
Pb-214	967.37	241.98	32.	16.	0.027	111.15	1.060D
Ac-228	1081.14	270.42	9.	4.	0.006	284.84	0.350s
Pb-214	1180.81	295.33	12.	35.	0.058	52.06	0.382s
Ac-228	1310.94	327.85	3.	22.	0.037	50.75	0.648s
Ac-228	1352.77	338.31	11.	26.	0.043	64.78	0.290s
Pb-214	1408.06	352.13	7.	55.	0.092	33.17	0.444s
Ac-228	1852.91	463.31	0.	13.	0.022	55.47	0.375s
Bi-214	2437.18	609.33	0.	38.	0.063	32.44	0.819s
CS-137	2646.14	661.55	0.	22.	0.037	42.64	0.979s
Bi-214	3073.83	768.43	1.	1.	0.001	339.93	0.339s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3644.52	911.05	0.	25.	0.042	40.00	0.365s
Bi-214	3736.33	933.99	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	0.	7.	0.011	83.15	1.595D
Ac-228	3876.86	969.11	3.	13.	0.022	64.66	1.598D
Bi-214	4479.00	1119.58	0.	7.	0.012	75.59	0.250s
Bi-214	4953.00	1238.02	0.	6.	0.010	81.65	0.500s
Bi-214	5508.33	1376.78	0.	6.	0.010	81.65	0.375s
K-40	5846.38	1461.24	0.	41.	0.068	31.23	0.393s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	4.	0.007	100.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 16:36:44 Page 4
EnergySolutions Spectrum name: Win00178.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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.6843E-04	609.31	1.767E-04	?(	4.650E-06	G K
			1764.49	1.423E-04	?(	3.558E-05	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	0.000E+00	%	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	+	4.328E-04	G
			934.06	2.915E-04	+	2.915E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	2.9932E-04	911.07	2.753E-04	?(	1.101E-05	G K
			969.11	2.593E-04	(	5.541E-05	G
			338.32	3.008E-04	@(	6.196E-05	G
			964.60	4.050E-04	(	9.646E-05	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	5.067E-04	+	2.192E-04	G
			209.28	4.726E-04	(	1.655E-04	G
			270.23	0.000E+00	%	1.757E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	2.497E-04	X
			327.64	9.095E-04	+	3.090E-04	G
Pb-212	N	2.3886E-04	238.62	2.389E-04	(	2.149E-05	G K

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			77.11	4.373E-04	+	7.754E-05	Energy duplication	
			74.81	0.000E+00	?	9.211E-05	Energy duplication	
CS-137		5.9618E-05	661.66	5.962E-05	?(	2.710E-06		G
Th-234	N	3.1464E-04	92.35	1.610E-04	(	1.573E-04		G
			63.29	5.334E-04	(	2.948E-04		G
Pb-214	N	2.1129E-04	351.92	2.049E-04	(	1.550E-05		G K
			295.21	2.193E-04	(	3.398E-05		G
			77.11	0.000E+00	?	1.441E-04	Energy duplication	
			241.98	2.224E-04	(	1.176E-04		G
			74.81	8.238E-04	+	2.102E-04	Energy duplication	
			87.30	4.789E-04	+	2.105E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		3.586E-03		G

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 16:36:44 Page 5
EnergySolutions Spectrum name: Win00178.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
AM-241	5.2883E-01	59.54	5.288E-01	(	4.615E-04	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

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 pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.3309E-01	1.405E-01	1.414E-01
K-40 #	4.6417E+00	1.450E+00	1.460E+00
Ac-228	7.6965E-01	2.507E-01	2.524E-01

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Pb-212		6.1420E-01	1.595E-01	1.611E-01
CS-137	#	1.5330E-01	6.537E-02	6.563E-02
Th-234	C	8.0906E-01	9.645E-01	9.647E-01
Pb-214		5.4329E-01	1.802E-01	1.814E-01
Pb-210	<	9.2215E+00		
AM-241		1.3598E+03	6.435E+00	5.075E+01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 16:36:44 Page 6
EnergySolutions Spectrum name: Win00178.An1

< - 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 (2.7 to 1999.3 keV) 1.3677816E+03 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenx
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:00:51 Page    1
EnergySolutions                  Spectrum name: Win00181.An1

Sample description
     WI07 - 0287   D2   BAG # S-008  (grid D1-1,4,)  071407


Spectrum Filename: C:\User\Win00181.An1

Acquisition information
       Start time:                 14-Jul-2007 07:50:39
       Live time:                600
       Real time:                603
       Dead time:                  0.43 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.6500E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.6500E+02) =
                                   2.7397E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:00:51 Page    2
EnergySolutions                  Spectrum name: Win00181.An1
```

WI07-0287 D2 Bag# S-008 (from Grids D1-4) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0896

********** 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	
14.57	3.83	4971.	21582.	35.970	1.89	2.135	CU-64	s
70.22	17.74	84.	122.	0.203	35.08	0.470	MO-99	s
84.01	21.19	51.	91.	0.151	35.69	0.643	TC-99M	s
104.50	26.31	68.	158.	0.262	25.20	0.674	U-237	
127.91	32.16	127.	378.	0.631	15.91	0.876	XE-138	s
145.14	36.47	123.	142.	0.237	35.46	1.113	XE-133M	s
197.23	49.48	1359.	418.	0.697	26.79	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	621.	44.	0.074	162.34	0.893D
AM-241	237.62	59.58	1612.	17780.	29.634	1.76	0.843
Th-234	251.82	63.13	33.	36.	0.059	62.58	0.705
Pb-214	298.54	74.81	60.	59.	0.098	45.69	0.917D
Pb-212	298.56	74.81	64.	0.	0.000	574.46	0.000D
Pb-212	307.74	77.11	39.	130.	0.217	22.14	0.919D
Pb-214	307.74	77.11	154.	0.	0.000	153.33	0.264D
Pb-214	348.17	87.21	42.	60.	0.101	47.82	1.227s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 08:00:51 Page 3
EnergySolutions Spectrum name: Win00181.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	62.	29.	0.048	85.27	0.933D
Ac-228	380.72	95.35	27.	1.	0.002	1101.05	0.935D
Ac-228	836.13	209.18	28.	22.	0.038	96.86	0.533s
Pb-212	953.94	238.62	16.	146.	0.243	18.27	1.057D
Pb-214	967.37	241.98	26.	27.	0.045	66.05	1.060D

WI07-0287 D2 Bag# S-008 (from Grids D1-4) 071407

Ac-228	1080.00	270.13	5.	0.	0.000	0.00	0.000s
Pb-214	1179.98	295.12	10.	56.	0.093	36.53	0.889s
Ac-228	1310.24	327.68	5.	2.	0.004	272.55	0.329s
Ac-228	1354.43	338.72	4.	42.	0.071	35.92	1.121s
Pb-214	1407.44	351.97	4.	73.	0.121	26.94	0.864s
Ac-228	1851.96	463.07	0.	23.	0.038	41.70	0.791s
Bi-214	2437.82	609.49	0.	56.	0.093	26.73	0.604s
CS-137	2646.36	661.61	0.	22.	0.037	42.64	1.749s
Bi-214	3072.67	768.14	2.	1.	0.002	416.33	0.225s
Ac-228	3175.67	793.88	2.	1.	0.002	447.21	0.187s
Ac-228	3644.91	911.15	0.	33.	0.055	34.82	0.450s
Bi-214	3736.50	934.03	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	0.	12.	0.020	57.56	1.595D
Ac-228	3876.86	969.11	1.	27.	0.045	40.46	1.598D
Bi-214	4481.89	1120.30	0.	19.	0.032	45.88	0.333s
Bi-214	4954.00	1238.27	0.	6.	0.010	81.65	0.750s
Bi-214	5514.40	1378.29	0.	5.	0.008	89.44	0.500s
K-40	5845.54	1461.03	0.	69.	0.115	24.08	0.770s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7059.08	1764.23	1.	2.	0.004	177.42	0.331s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	2.6042E-04	609.31	2.604E-04	@(	4.650E-06	G K
			1764.49	7.710E-05	-	1.068E-04	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	3.0379E-03	1460.81	3.038E-03	?(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 08:00:51 Page 4
EnergySolutions Spectrum name: Win00181.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	4.4023E-04	911.07	3.634E-04	?(	1.101E-05	G K
			969.11	5.192E-04	(	4.206E-05	G
			338.32	4.981E-04	*(	3.742E-05	G
			964.60	7.453E-04	+	3.358E-04	G
			794.70	0.000E+00	&	1.764E-04	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	4.761E-04	?(	1.679E-04	G
			270.23	0.000E+00	?	1.156E-04	G
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	0.000E+00	%	1.541E-04	X
			327.64	0.000E+00	%	1.741E-04	G
Pb-212	N	3.3559E-04	238.62	3.356E-04	(	1.419E-05	G K
			77.11	4.984E-04	+	7.232E-05	Energy duplication
			74.81	0.000E+00	%	7.659E-05	Energy duplication

CS-137		5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G	
Th-234	N	4.9297E-04	92.35	3.620E-04	(	1.453E-04	G	
			63.29	6.795E-04	?(	1.654E-04	G	
Pb-214	N	3.0483E-04	351.92	2.691E-04	*(	1.291E-05	G	K
			295.21	3.477E-04	@(	3.201E-05	G	
			77.11	0.000E+00	?	1.187E-04	Energy duplication	
			241.98	3.723E-04	(	1.070E-04	G	
			74.81	6.542E-04	+	1.778E-04	Energy duplication	
			87.30	8.779E-04	+	2.157E-04	X	
Pb-210	N	9.0180E-04	46.50	9.018E-04	(	7.296E-04	G	
AM-241		3.6612E-02	59.54	3.661E-02	(	1.179E-04	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

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 pCi/g	2 Sigma Total pCi/g
Bi-214		7.1349E-01	1.907E-01	1.926E-01
K-40	#	8.3231E+00	2.004E+00	2.028E+00
Ac-228		1.2061E+00	3.506E-01	3.535E-01
Pb-212		9.1941E-01	1.680E-01	1.715E-01
CS-137	#	1.6334E-01	6.965E-02	6.993E-02
Th-234		1.3506E+00	7.143E-01	7.150E-01
Pb-214		8.3515E-01	2.231E-01	2.253E-01

WI07-0287 D2 Bag# S-008 (from Grids D1-4) 071407

Pb-210	C	2.4707E+00	4.011E+00	4.011E+00
AM-241		1.0031E+02	1.766E+00	4.112E+00

- 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 (2.7 to 1999.3 keV) 1.1628822E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:19:09 Page    1
EnergySolutions                  Spectrum name: Win00182.An1

Sample description
     WI07 - 0288   D2   BAG # S-009  (grid D1-9&C1-2,5)  071407


Spectrum Filename: C:\User\Win00182.An1

Acquisition information
       Start time:                 14-Jul-2007 08:08:56
       Live time:                600
       Real time:                604
       Dead time:                  0.61 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.6500E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.6500E+02) =
                                   2.7397E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:19:09 Page    2
EnergySolutions                  Spectrum name: Win00182.An1
```

WI07-0288 D2 Bag# S-009 (from Grids D1-9&C1-2,5) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0922

********** 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	
14.68	3.86	4791.	23533.	39.222	1.76	2.345	CU-64	s
69.80	17.63	99.	316.	0.527	16.46	0.747	MO-99	s
84.18	21.23	85.	282.	0.469	17.31	1.166	TC-99M	s
104.82	26.39	96.	473.	0.788	12.28	0.884	AM-241	
127.95	32.17	198.	777.	1.295	10.20	1.016	XE-138	s
145.71	36.61	242.	236.	0.394	27.86	0.967	CE-144	s
198.28	49.75	3500.	977.	1.628	23.54	1.137	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.96	46.42	1268.	0.	0.000	0.00	0.892
AM-241	237.63	59.58	3087.	35518.	59.197	1.25	0.855
Th-234	252.90	63.40	38.	58.	0.097	44.26	0.897s
Pb-214	298.54	74.81	69.	70.	0.117	41.18	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	288.89	0.641D
Pb-212	307.74	77.11	66.	131.	0.219	24.77	0.919D
Pb-214	307.74	77.11	158.	0.	0.000	350.10	0.582D
Pb-214	347.52	87.05	48.	50.	0.084	56.37	0.957s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 08:19:09 Page 3
EnergySolutions Spectrum name: Win00182.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	77.	35.	0.059	77.93	0.933D
Ac-228	380.72	95.35	42.	8.	0.013	239.04	0.935D
Ac-228	835.43	209.00	14.	45.	0.075	44.42	1.433s
Pb-212	953.94	238.62	19.	170.	0.284	16.90	1.057D
Pb-214	967.37	241.98	30.	36.	0.061	53.61	1.060D

WI07-0288 D2 Bag# S-009 (from Grids D1-9&C1-2,5) 071407

Ac-228	1079.67	270.05	13.	21.	0.035	75.09	0.616s
Pb-214	1180.66	295.29	7.	38.	0.063	41.22	0.821s
Ac-228	1310.50	327.74	12.	20.	0.034	78.20	0.577s
Ac-228	1352.75	338.30	12.	51.	0.085	36.58	1.078
Pb-214	1406.83	351.82	15.	85.	0.141	29.77	0.987
Ac-228	1850.93	462.81	0.	17.	0.028	48.51	0.417s
Bi-214	2436.19	609.08	0.	63.	0.105	25.20	1.599
CS-137	2646.61	661.67	0.	23.	0.038	41.70	0.333s
Bi-214	3074.00	768.48	1.	0.	0.000	0.00	0.000s
Ac-228	3181.44	795.33	0.	9.	0.015	66.67	0.375s
Ac-228	3644.83	911.13	0.	36.	0.060	33.33	1.374
Bi-214	3735.58	933.81	2.	1.	0.002	447.21	0.336s
Ac-228	3858.81	964.60	3.	3.	0.005	215.57	1.595D
Ac-228	3876.86	969.11	2.	27.	0.045	41.93	1.598D
Bi-214	4482.78	1120.52	0.	21.	0.035	43.64	0.417s
Bi-214	4953.56	1238.16	3.	1.	0.002	412.31	0.322s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5845.63	1461.05	0.	65.	0.108	24.81	1.024s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7058.67	1764.13	1.	0.	0.000	260.34	0.210s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9298E-04	609.31	2.930E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	5.110E-04	+	1.703E-04	G
			1238.11	0.000E+00	%	2.286E-04	G
			768.36	0.000E+00	?	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	2.915E-04	G
K-40	N	2.8618E-03	1460.81	2.862E-03	?(	4.403E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ac-228	N 5.0016E-04	911.07	3.965E-04	?(	1.101E-05	G K
		969.11	5.213E-04	(	5.346E-05	G
		338.32	5.977E-04	(	6.357E-05	G
		964.60	0.000E+00	%	2.432E-04	G
		794.70	5.292E-04	?(	5.880E-05	G
		463.00	6.626E-04	?(	3.898E-05	G
		209.28	9.487E-04	+	2.407E-04	G
		270.23	6.561E-04	?(	1.757E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	8.348E-04	+	3.518E-04	G
Pb-212	N 3.9175E-04	238.62	3.918E-04	(	1.519E-05	G K
		77.11	5.024E-04	+	7.807E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication

CS-137		6.2327E-05	661.66	6.233E-05	?(	2.710E-06		G
Th-234	N	7.1824E-04	92.35	4.399E-04	(	1.609E-04		G
			63.29	1.114E-03	(	1.770E-04		G
Pb-214	N	3.1358E-04	351.92	3.136E-04	(	2.245E-05		G K
			295.21	2.380E-04	-	6.264E-05		G
			77.11	0.000E+00	%	1.198E-04	Energy duplication	
			241.98	5.042E-04	+	1.659E-04		G
			74.81	7.807E-04	+	1.915E-04	Energy duplication	
			87.30	7.304E-04	+	2.105E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		1.038E-03		G
AM-241		7.3137E-02	59.54	7.314E-02	(	1.628E-04		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

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 pCi/g	2 Sigma Total pCi/g
Bi-214		8.0268E-01	2.023E-01	2.045E-01
K-40	#	7.8406E+00	1.945E+00	1.967E+00
Ac-228		1.3703E+00	2.946E-01	2.991E-01
Pb-212		1.0733E+00	1.814E-01	1.858E-01
CS-137	#	1.7076E-01	7.121E-02	7.151E-02
Th-234		1.9678E+00	8.709E-01	8.721E-01
Pb-214		8.5912E-01	2.557E-01	2.577E-01

WI07-0288 D2 Bag# S-009 (from Grids D1-9&C1-2,5) 071407

Pb-210	<	2.8442E+00		
AM-241		2.0038E+02	2.495E+00	7.826E+00

- 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 (2.7 to 1999.3 keV) 2.1446024E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:49:40 Page    1
EnergySolutions                  Spectrum name: Win00183.An1

Sample description
     WI07 - 0298   D2   BAG # S-010  (grid D1-2,4&C1-5)  071407


Spectrum Filename: C:\User\Win00183.An1

Acquisition information
       Start time:                 14-Jul-2007 08:39:28
       Live time:                600
       Real time:                603
       Dead time:                  0.43 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3830E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3830E+02) =
                                   2.9560E+03
       Detection limit method:     Traditional ORTEC method

```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 08:49:40 Page    2
EnergySolutions                  Spectrum name: Win00183.An1
```

WI07-0298 D2 Bag# S-010 (from Grids D1-2,4&C1-5) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1274

********** 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	
11.73	2.91	5679.	10663.	17.771	2.78	0.854	-	D
16.85	4.19	15256.	9041.	15.069	4.40	0.855	-	D
70.16	17.72	99.	139.	0.232	33.28	0.770	MO-99	s
84.67	21.35	48.	127.	0.212	26.20	1.009	TC-99M	s
104.74	26.37	65.	190.	0.317	21.51	0.697	AM-241	
128.16	32.22	138.	476.	0.793	13.47	1.131	XE-138	s
197.83	49.70	1421.	493.	0.821	23.45	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	571.	56.	0.093	123.93	0.892D
AM-241	237.59	59.57	1630.	18605.	31.008	1.72	0.863
Th-234	252.79	63.37	38.	40.	0.067	62.05	0.726s
Pb-214	298.54	74.81	37.	104.	0.173	25.69	0.917D
Pb-212	298.56	74.81	95.	0.	0.000	313.48	0.609D
Pb-212	307.74	77.11	43.	150.	0.250	20.46	0.919D
Pb-214	307.74	77.11	172.	0.	0.000	229.27	0.339D
Pb-214	348.50	87.30	59.	60.	0.101	55.02	0.975

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 08:49:40 Page 3
EnergySolutions Spectrum name: Win00183.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	50.	41.	0.069	57.76	0.933D
Ac-228	380.72	95.35	20.	7.	0.011	199.79	0.935D
Ac-228	835.81	209.10	12.	34.	0.057	49.22	0.735s
Pb-212	953.94	238.62	19.	157.	0.261	17.83	1.057D
Pb-214	967.37	241.98	28.	39.	0.065	50.40	1.060D

WI07-0298 D2 Bag# S-010 (from Grids D1-2,4&C1-5) 071407

Ac-228	1078.62	269.79	13.	3.	0.004	435.89	0.241s
Pb-214	1180.74	295.31	13.	66.	0.111	32.91	0.882
Ac-228	1312.20	328.17	4.	18.	0.031	58.47	0.639s
Ac-228	1352.32	338.20	6.	59.	0.098	31.44	0.978
Pb-214	1408.32	352.19	7.	82.	0.137	25.98	1.030
Ac-228	1847.31	461.91	4.	19.	0.032	58.61	0.216s
Bi-214	2437.45	609.40	0.	65.	0.108	24.81	0.587s
CS-137	2645.48	661.39	0.	26.	0.043	39.22	0.365s
Bi-214	3073.33	768.31	0.	3.	0.005	115.47	0.375s
Ac-228	3179.00	794.72	0.	7.	0.012	75.59	0.375s
Ac-228	3646.28	911.49	0.	46.	0.077	29.49	0.401s
Bi-214	3736.67	934.08	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	8.	0.014	74.29	1.595D
Ac-228	3876.86	969.11	2.	28.	0.047	39.86	1.598D
Bi-214	4482.17	1120.37	0.	12.	0.020	57.74	0.937s
Bi-214	4956.89	1238.99	0.	9.	0.015	66.67	0.500s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5846.11	1461.17	0.	72.	0.120	23.57	1.312s
Ac-228	6352.50	1587.70	0.	7.	0.012	75.59	0.999s
Bi-214	7061.83	1764.92	1.	1.	0.001	339.93	0.339s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9975E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.1700E-03	1460.81	3.170E-03	(	4.403E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
Ac-228	N 5.8268E-04	911.07	5.066E-04	?(	1.101E-05	G K
		969.11	5.488E-04	(	4.717E-05	G
		338.32	6.875E-04	(	4.798E-05	G
		964.60	5.160E-04	(	1.073E-04	G
		794.70	4.116E-04	-	2.514E-04	G
		463.00	7.406E-04	&(	1.314E-04	G
		209.28	7.194E-04	(	1.148E-04	G
		270.23	0.000E+00	%	1.930E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	1.324E-04	-	1.515E-04	X
		327.64	7.466E-04	(	1.325E-04	G
Pb-212	N 3.5998E-04	238.62	3.600E-04	(	1.542E-05	G K
		77.11	5.747E-04	+	7.715E-05	Energy duplication
		74.81	0.000E+00	%	9.258E-05	Energy duplication

CS-137		7.0457E-05	661.66	7.046E-05	(	2.710E-06		G
Th-234	N	6.1565E-04	92.35	5.128E-04	(	1.310E-04		G
			63.29	7.620E-04	(	1.759E-04		G
Pb-214	N	3.0370E-04	351.92	3.037E-04	(	1.583E-05		G K
			295.21	4.155E-04	+	8.194E-05		G
			77.11	0.000E+00	%	1.252E-04	Energy duplication	
			241.98	5.355E-04	+	1.671E-04		G
			74.81	1.160E-03	+	1.931E-04	Energy duplication	
			87.30	8.755E-04	+	2.312E-04		X
Pb-210	N	1.1403E-03	46.50	1.140E-03	(	7.002E-04		G
AM-241		3.8310E-02	59.54	3.831E-02	(	1.186E-04		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

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 pCi/g	2 Sigma Total pCi/g
Bi-214	8.8604E-01	2.198E-01	2.223E-01
K-40	9.3704E+00	2.209E+00	2.236E+00
Ac-228	1.7224E+00	3.323E-01	3.385E-01
Pb-212	1.0641E+00	1.897E-01	1.938E-01
CS-137	2.0827E-01	8.169E-02	8.208E-02
Th-234	1.8198E+00	7.713E-01	7.725E-01
Pb-214	8.9773E-01	2.333E-01	2.357E-01

WI07-0298 D2 Bag# S-010 (from Grids D1-2,4&C1-5) 071407

Pb-210	3.3706E+00	4.177E+00	4.178E+00
AM-241	1.1324E+02	1.950E+00	4.623E+00

< - 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 (2.7 to 1999.3 keV) 1.3258284E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0299 D2 Bag# S-011 (from Grids C1-3,5) 071407

Sample description
WI07 - 0299 D2 BAG # S-011 (grid C1-3,5) 071407

Spectrum Filename: C:\User\Win00184.An1

Acquisition information
Start time: 14-Jul-2007 08:53:07
Live time: 600
Real time: 602
Dead time: 0.35 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2770E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2770E+02) = 3.0516E+03
Detection limit method: Traditional ORTEC method

WI07-0299 D2 Bag# S-011 (from Grids C1-3,5) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1228

********** 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	
11.61	2.90	4303.	9943.	16.572	2.74	0.854	-	D
15.88	3.97	13370.	9312.	15.520	4.08	0.855	-	D
105.18	26.48	35.	120.	0.201	26.14	0.614	AM-241	s
128.35	32.27	72.	231.	0.385	19.72	1.060	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.65	46.59	210.	43.	0.072	103.79	0.458s
AM-241	237.63	59.58	930.	9756.	16.260	2.38	0.872
Th-234	251.57	63.07	54.	39.	0.065	74.70	0.706s
Pb-214	298.54	74.81	61.	103.	0.171	29.26	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	437.99	0.336D
Pb-212	307.74	77.11	64.	120.	0.201	26.12	0.920D
Pb-214	307.74	77.11	206.	0.	0.000	103.38	0.000D
Pb-214	348.46	87.29	26.	44.	0.074	48.81	1.114s
Th-234	368.72	92.35	53.	21.	0.035	107.76	0.933D
Ac-228	380.72	95.35	18.	9.	0.015	146.97	0.935D
Ac-228	836.40	209.25	14.	21.	0.035	75.59	0.876

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EnergySolutions Spectrum name: Win00184.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	26.	167.	0.279	17.66	1.057D
Pb-214	967.37	241.98	34.	27.	0.045	72.15	1.060D
Ac-228	1080.93	270.37	10.	21.	0.035	68.01	0.328s
Pb-214	1179.86	295.09	7.	75.	0.124	27.95	0.842
Ac-228	1310.73	327.80	8.	16.	0.026	83.37	0.756s

WI07-0299 D2 Bag# S-011 (from Grids C1-3,5) 071407

Ac-228	1352.65	338.28	7.	33.	0.055	45.49	0.928
Pb-214	1407.12	351.89	5.	103.	0.171	21.54	0.826s
Ac-228	1852.12	463.11	0.	20.	0.033	44.72	0.375s
Bi-214	2437.97	609.53	0.	76.	0.127	22.94	0.387s
CS-137	2646.29	661.59	0.	24.	0.040	40.82	0.364s
Bi-214	3075.59	768.87	2.	8.	0.014	89.52	0.523s
Ac-228	3178.67	794.63	0.	15.	0.025	51.64	0.375s
Ac-228	3646.60	911.57	3.	30.	0.051	41.76	0.639s
Bi-214	3734.46	933.53	1.	2.	0.004	177.42	0.229s
Ac-228	3858.81	964.60	4.	5.	0.009	134.36	1.595D
Ac-228	3876.86	969.11	1.	24.	0.040	42.87	1.598D
Bi-214	4482.65	1120.49	0.	17.	0.028	48.51	0.812s
Bi-214	4953.00	1238.02	2.	2.	0.003	244.95	0.089s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5846.05	1461.16	0.	61.	0.102	25.61	1.749
Ac-228	6356.00	1588.57	0.	4.	0.007	100.00	0.750s
Bi-214	7057.83	1763.92	0.	11.	0.018	60.30	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7621E-04	609.31	3.534E-04	(	4.650E-06	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.286E-04	G
			768.36	4.256E-04	?(	1.292E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	2.105E-04	-	2.915E-04	G
K-40	N	2.6857E-03	1460.81	2.686E-03	?(	4.403E-05	G
Ac-228	N	4.1566E-04	911.07	3.341E-04	(	3.153E-05	G K
			969.11	4.632E-04	(	4.066E-05	G
			338.32	3.867E-04	(	5.010E-05	G
			964.60	3.274E-04	(	2.015E-04	G
			794.70	8.820E-04	+	3.528E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 09:03:19 Page 4
EnergySolutions Spectrum name: Win00184.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.795E-04	+	2.668E-04	G
		209.28	4.443E-04	?(	1.230E-04	G
		270.23	6.561E-04	(	1.562E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	1.756E-04	-	1.515E-04	X
		327.64	6.312E-04	?(	1.794E-04	G
Pb-212	N 4.0674E-04	238.62	3.848E-04	(	1.762E-05	G K
		77.11	4.611E-04	(	4.511E-05	Energy duplication
		74.81	0.000E+00	%	1.011E-04	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	(	2.710E-06	G
Th-234	N 4.5857E-04	92.35	2.610E-04	(	1.349E-04	G

WI07-0299 D2 Bag# S-011 (from Grids C1-3,5) 071407

```
                                63.29 7.398E-04  (  2.080E-04          G

Pb-214    N   4.0575E-04       351.92 3.802E-04  (  1.409E-05          G K
                               295.21 4.677E-04  (  2.733E-05          G
                                77.11 0.000E+00 ?   1.365E-04Energy duplication
                               241.98 3.735E-04  (  1.211E-04          G
                                74.81 1.145E-03 +   2.078E-04Energy duplication
                                87.30 6.433E-04 +   1.791E-04          X

Pb-210    N   8.7779E-04        46.50 8.778E-04 ?(  4.287E-04          G

AM-241        2.0089E-02        59.54 2.009E-02  (  8.984E-05          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

   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
```

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EnergySolutions Spectrum name: Win00184.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.1480E+00	2.634E-01	2.669E-01
K-40 #	8.1956E+00	2.099E+00	2.121E+00
Ac-228	1.2684E+00	3.580E-01	3.612E-01
Pb-212	1.2412E+00	1.957E-01	2.011E-01
CS-137	1.9847E-01	8.102E-02	8.138E-02
Th-234	1.3994E+00	9.174E-01	9.180E-01
Pb-214	1.2382E+00	2.667E-01	2.707E-01
Pb-210 #	2.6786E+00	2.780E+00	2.781E+00
AM-241	6.1303E+01	1.459E+00	2.698E+00

WI07-0299 D2 Bag# S-011 (from Grids C1-3,5) 071407

- 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 (2.7 to 1999.3 keV) 7.8670776E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K. Funn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0300 D2 Bag# S-012 (from Grids D1-1,2,4) 071407

Sample description
WI07 - 0300 D2 BAG # S-012 (grid D1-1,2)) 071407

Spectrum Filename: C:\User\Win00185.An1

Acquisition information

Start time:	14-Jul-2007 09:07:36
Live time:	600
Real time:	602
Dead time:	0.34 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.1850E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.1850E+02) = 3.1397E+03
Detection limit method:	Traditional ORTEC method

WI07-0300 D2 Bag# S-012 (from Grids D1-1,2,4) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2246

********** 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	
12.04	3.41	9279.	12369.	20.615	2.84	0.854	-	D
17.08	4.67	12794.	9568.	15.947	3.92	0.855	-	D
69.99	17.68	40.	112.	0.187	27.20	0.903	MO-99	s
83.84	21.14	60.	94.	0.157	38.88	0.742	TC-99M	s
104.71	26.36	45.	136.	0.226	25.61	0.929	AM-241	
127.74	32.12	62.	130.	0.218	28.64	1.055	XE-138	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.21	46.23	227.	26.	0.044	190.75	0.366s
AM-241	237.67	59.59	706.	8531.	14.218	2.51	0.857
Th-234	254.42	63.78	33.	28.	0.046	78.04	0.465s
Pb-214	298.54	74.81	59.	66.	0.109	41.33	0.917D
Pb-212	298.56	74.81	67.	0.	0.000	218.94	0.366D
Pb-212	307.74	77.11	40.	140.	0.233	21.20	0.919D
Pb-214	307.74	77.11	145.	0.	0.000	304.00	0.338D
Pb-214	346.97	86.91	30.	49.	0.081	50.29	0.676s
Th-234	368.72	92.35	49.	37.	0.062	62.19	0.933D

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 09:17:47 Page 3
EnergySolutions Spectrum name: Win00185.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	29.	3.	0.005	531.69	0.935D
Ac-228	835.78	209.09	20.	20.	0.033	88.47	0.336s
Pb-212	953.94	238.62	22.	151.	0.251	18.56	1.057D
Pb-214	967.37	241.98	30.	31.	0.052	61.28	1.060D
Ac-228	1075.86	269.10	11.	25.	0.042	63.38	0.618s

WI07-0300 D2 Bag# S-012 (from Grids D1-1,2,4) 071407

Pb-214	1181.62	295.53	6.	57.	0.095	31.58	1.206
Ac-228	1312.04	328.13	6.	15.	0.025	76.59	0.577s
Ac-228	1354.28	338.68	4.	35.	0.058	42.38	0.801s
Pb-214	1407.07	351.88	3.	91.	0.151	22.62	0.954
Ac-228	1852.67	463.25	3.	0.	0.001	437.16	0.643s
Bi-214	2437.03	609.29	0.	58.	0.097	26.26	1.089
CS-137	2648.38	662.11	0.	32.	0.053	35.36	0.833s
Bi-214	3070.00	767.48	0.	5.	0.008	89.44	0.250s
Ac-228	3181.00	795.22	4.	1.	0.002	642.91	0.000s
Ac-228	3644.74	911.10	0.	36.	0.060	33.33	0.716s
Bi-214	3735.50	933.78	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	2.	5.	0.008	129.56	1.595D
Ac-228	3876.86	969.11	1.	22.	0.037	43.74	1.598D
Bi-214	4474.04	1118.34	6.	2.	0.003	447.21	0.327s
Bi-214	4952.50	1237.89	0.	5.	0.008	89.44	0.500s
Bi-214	5514.50	1378.32	0.	8.	0.013	70.71	0.375s
K-40	5845.67	1461.06	0.	66.	0.110	24.62	0.807s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7056.67	1763.63	2.	1.	0.002	447.21	0.187s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7692E-04	609.31	2.697E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	0.000E+00	&	1.103E-04	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	2.606E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	+	4.902E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	2.9058E-03	1460.81	2.906E-03	?(	4.403E-05	G
Ac-228	N	4.2083E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	4.325E-04	(	3.506E-05	G
			338.32	4.102E-04	*(	3.952E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 09:17:47 Page 4
EnergySolutions Spectrum name: Win00185.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	2.905E-04	-	2.639E-04	G
		794.70	0.000E+00	%	2.176E-04	G
		463.00	0.000E+00	%	1.169E-04	G
		209.28	4.197E-04	?(	1.454E-04	G
		270.23	7.915E-04	&	2.812E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.640E-04	X
		327.64	6.109E-04	(	1.629E-04	G
Pb-212	N 3.4624E-04	238.62	3.462E-04	(	1.657E-05	G K
		77.11	5.357E-04	+	7.458E-05	Energy duplication
		74.81	0.000E+00	%	7.829E-05	Energy duplication
CS-137	8.6716E-05	661.66	8.672E-05	(	2.710E-06	G

```
Th-234   N   4.9098E-04     92.35 4.656E-04  (  1.295E-04         G
                            63.29 5.271E-04 $(  1.654E-04         G

Pb-214   N   3.5326E-04    351.92 3.358E-04  (  1.159E-05         G K
                           295.21 3.571E-04  (  2.506E-05         G
                            77.11 0.000E+00 %   1.152E-04Energy duplication
                           241.98 4.302E-04  (  1.140E-04         G
                            74.81 7.332E-04 +   1.821E-04Energy duplication
                            87.30 7.062E-04 +   1.898E-04         X

Pb-210   N   5.3756E-04     46.50 5.376E-04 ?(  4.450E-04         G

AM-241       1.7566E-02     59.54 1.757E-02  (  7.842E-05         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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	8.6944E-01	2.283E-01	2.306E-01
K-40 #	9.1235E+00	2.246E+00	2.272E+00
Ac-228	1.3213E+00	3.596E-01	3.630E-01
Pb-212	1.0871E+00	2.018E-01	2.058E-01
CS-137	2.7227E-01	9.626E-02	9.682E-02
Th-234	1.5415E+00	7.692E-01	7.700E-01
Pb-214	1.1091E+00	2.508E-01	2.543E-01
Pb-210 #C	1.6878E+00	3.219E+00	3.220E+00

WI07-0300 D2 Bag# S-012 (from Grids D1-1,2,4) 071407

AM-241	5.5153E+01	1.385E+00	2.467E+00

- 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 (2.7 to 1999.3 keV) 7.2164871E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0280 D2 Bag# S-006 (from Grids D1-5) 071307

Ac-228	380.72	95.35	56.	1.	0.002	1972.30	0.936D
Ac-228	836.63	209.30	15.	16.	0.026	100.94	0.297s
Pb-212	953.94	238.62	12.	122.	0.203	19.86	1.057D
Pb-214	967.37	241.98	15.	11.	0.019	111.80	1.060D
Ac-228	1080.67	270.30	0.	17.	0.028	48.51	0.500s
Pb-214	1180.03	295.13	2.	44.	0.074	32.80	1.192
Ac-228	1309.00	327.37	3.	0.	0.000	0.00	0.125s
Ac-228	1352.46	338.23	0.	37.	0.062	32.88	1.437s
Pb-214	1407.87	352.08	2.	58.	0.097	28.04	0.933
Ac-228	1846.06	461.59	3.	15.	0.025	67.28	0.305s
Bi-214	2437.55	609.42	2.	34.	0.057	37.20	0.678s
CS-137	2648.00	662.02	0.	7.	0.012	75.59	0.250s
Bi-214	3071.38	767.82	0.	9.	0.015	66.67	0.375s
Ac-228	3175.00	793.72	0.	6.	0.010	81.65	0.250s
Ac-228	3645.18	911.21	0.	17.	0.028	48.51	1.000s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	7.	0.011	108.00	1.595D
Ac-228	3876.86	969.11	3.	12.	0.021	67.47	1.598D
Bi-214	4480.33	1119.91	2.	1.	0.002	416.33	0.197s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5508.00	1376.69	0.	4.	0.007	100.00	0.250s
K-40	5845.90	1461.12	0.	73.	0.122	23.41	0.429s
Ac-228	6356.33	1588.65	0.	6.	0.010	81.65	0.250s
Bi-214	7060.75	1764.65	0.	4.	0.007	100.00	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5410E-04	609.31	1.581E-04	?(	1.191E-05	G K
			1764.49	1.423E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	7.300E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	&	3.649E-04	G
			934.06	0.000E+00	?	9.716E-05	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 12:05:53 Page 4
EnergySolutions Spectrum name: Win00177.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	3.2140E-03	1460.81	3.214E-03	(	4.403E-05	G
Ac-228	N	2.3055E-04	911.07	1.872E-04	?(	1.101E-05	G K
			969.11	2.413E-04	(	5.482E-05	G
			338.32	4.336E-04	+	1.068E-04	G
			964.60	4.162E-04	+	3.086E-04	G
			794.70	3.528E-04	&(	5.880E-05	G
			463.00	5.912E-04	&	2.542E-04	G
			209.28	3.350E-04	?(	1.276E-04	G
			270.23	5.311E-04	+	1.985E-04	G
			1588.00	8.715E-04	+	5.810E-04	G
			95.35	0.000E+00	%	2.155E-04	X
			327.64	0.000E+00	?	1.222E-04	G

WI07-0301 D2 Bag# S-013 (from Grids C1-3-5) 071407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 09:42:28 Page    1
EnergySolutions                  Spectrum name: Win00186.An1

Sample description
     WI07 - 0301   D2   BAG # S-013  (grid C1-3,4,5) 071407


Spectrum Filename: C:\User\Win00186.An1

Acquisition information
       Start time:                 14-Jul-2007 09:32:18
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8180E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8180E+02) =
                                   3.5486E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 09:42:28 Page    2
EnergySolutions                  Spectrum name: Win00186.An1
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WI07-0301 D2 Bag# S-013 (from Grids C1-3-5) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1221

********** 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	
11.99	3.27	6737.	11717.	19.528	2.71	0.854	-	D
17.24	4.59	11142.	8953.	14.921	3.95	0.855	-	D
105.57	26.58	16.	73.	0.122	31.44	0.761	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.40	46.53	138.	19.	0.031	210.93	0.684
AM-241	237.68	59.60	346.	4459.	7.432	3.41	0.850
Th-234	252.07	63.19	28.	26.	0.043	79.76	0.401s
Pb-214	298.54	74.81	41.	81.	0.135	31.61	0.917D
Pb-212	298.56	74.81	60.	0.	0.000	184.09	0.301D
Pb-212	307.74	77.11	37.	94.	0.156	27.71	0.919D
Pb-214	307.74	77.11	109.	0.	0.000	229.04	0.000D
Pb-214	348.37	87.26	23.	39.	0.064	51.95	1.121s
Th-234	368.72	92.35	14.	32.	0.054	47.72	0.933D
Ac-228	380.72	95.35	18.	7.	0.011	193.65	0.935D
Ac-228	834.17	208.69	13.	42.	0.071	46.07	1.116s
Pb-212	953.94	238.62	21.	91.	0.151	25.52	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	19.	23.	0.038	68.76	1.060D
Ac-228	1081.02	270.39	11.	22.	0.037	77.85	0.491s
Pb-214	1180.57	295.27	4.	48.	0.080	34.36	1.324s
Ac-228	1311.00	327.87	2.	0.	0.000	0.00	0.000s
Ac-228	1353.29	338.44	3.	29.	0.049	43.38	0.733s

WI07-0301 D2 Bag# S-013 (from Grids C1-3-5) 071407

Pb-214	1408.04	352.12	3.	94.	0.156	22.20	1.242s
Ac-228	1853.25	463.39	2.	10.	0.018	83.57	0.232s
Bi-214	2437.24	609.34	0.	56.	0.093	26.73	0.708s
CS-137	2646.07	661.53	0.	24.	0.040	40.82	0.281s
Bi-214	3074.50	768.60	0.	8.	0.013	70.71	0.375s
Ac-228	3177.44	794.33	2.	2.	0.003	311.13	0.181s
Ac-228	3645.64	911.33	0.	28.	0.047	37.80	0.292s
Bi-214	3734.78	933.60	1.	1.	0.002	346.41	0.218s
Ac-228	3858.81	964.60	3.	2.	0.004	268.64	1.595D
Ac-228	3876.86	969.11	2.	9.	0.014	86.02	1.598D
Bi-214	4483.07	1120.59	0.	15.	0.025	51.64	1.062s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5846.08	1461.17	0.	78.	0.130	22.65	0.833s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7061.83	1764.92	1.	1.	0.001	339.93	0.339s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6042E-04	609.31	2.604E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.650E-04	+	1.460E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	4.169E-04	+	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	3.4342E-03	1460.81	3.434E-03	(	4.403E-05	G
Ac-228	N	3.2734E-04	911.07	3.084E-04	(	1.101E-05	G K
			969.11	1.657E-04	-	1.013E-04	G
			338.32	3.418E-04	?(	3.437E-05	G
			964.60	0.000E+00	%	2.299E-04	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	4.093E-04	?(	1.088E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 09:42:28 Page 4
EnergySolutions Spectrum name: Win00186.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.958E-04	&	2.328E-04	G
		270.23	6.873E-04	+	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.308E-04	-	1.462E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 2.0807E-04	238.62	2.081E-04	(	1.625E-05	G K
		77.11	3.585E-04	+	6.391E-05	Energy duplication
		74.81	0.000E+00	?	7.427E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 4.3766E-04	92.35	4.038E-04	(	7.168E-05	G
		63.29	4.858E-04	(	1.511E-04	G

```
Pb-214    N   3.2925E-04     351.92 3.469E-04 @(  1.159E-05          G K
                             295.21 3.007E-04  (  2.113E-05          G
                              77.11 0.000E+00 %   1.004E-04Energy duplication
                             241.98 3.147E-04  (  9.296E-05          G
                              74.81 9.021E-04 +   1.800E-04Energy duplication
                              87.30 5.611E-04 +   1.690E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   3.721E-04          G

AM-241        9.1824E-03      59.54 9.182E-03  (  5.518E-05          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

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------------
 Bi-214       9.2415E-01    2.470E-01     2.494E-01
 K-40         1.2187E+01    2.760E+00     2.797E+00
 Ac-228       1.1616E+00    3.929E-01     3.953E-01
 Pb-212       7.3834E-01    1.884E-01     1.904E-01
 CS-137 #     2.3079E-01    9.422E-02     9.463E-02
 Th-234       1.5531E+00    7.217E-01     7.226E-01
 Pb-214       1.1684E+00    2.594E-01     2.631E-01
 Pb-210  <    1.3204E+00
 AM-241       3.2585E+01    1.111E+00     1.640E+00

   # - All peaks for activity calculation had bad shape.
```

WI07-0301 D2 Bag# S-013 (from Grids C1-3-5) 071407

* - 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 (2.7 to 1999.3 keV) 5.0547630E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0307 D2 Bag# S-014 (from Grid D3 - 4)) 071407

Sample description
WI07 - 0307 D2 BAG # S-014 (grid D3-4) 071407

Spectrum Filename: C:\User\Win00187.An1

Acquisition information
Start time: 14-Jul-2007 12:41:04
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9840E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9840E+02) = 3.3512E+03
Detection limit method: Traditional ORTEC method

WI07-0307 D2 Bag# S-014 (from Grid D3 - 4)) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1503

********** 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	
11.63	2.90	4484.	10774.	17.956	2.61	0.854	-	D
15.92	3.97	15003.	9645.	16.074	4.13	0.855	-	D
69.97	17.68	45.	126.	0.209	27.54	0.645	MO-99	s
105.18	26.48	37.	162.	0.270	21.48	0.874	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	187.00	46.93	297.	11.	0.018	499.09	0.000s
AM-241	237.65	59.59	1054.	12900.	21.501	2.04	0.866
Th-234	252.10	63.20	35.	43.	0.072	54.31	1.262s
Pb-214	298.54	74.81	60.	100.	0.166	29.74	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	355.32	0.457D
Pb-212	307.74	77.11	52.	161.	0.269	20.15	0.919D
Pb-214	307.74	77.11	149.	0.	0.000	474.77	0.432D
Pb-214	348.24	87.23	56.	50.	0.083	59.06	0.717
Th-234	368.72	92.35	52.	42.	0.070	57.11	0.933D
Ac-228	380.72	95.35	32.	10.	0.017	173.62	0.935D
Ac-228	835.61	209.05	34.	32.	0.054	86.87	0.458s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 12:51:16 Page 3
EnergySolutions Spectrum name: Win00187.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	6.	223.	0.371	13.79	1.057D
Pb-214	967.37	241.98	36.	25.	0.042	77.62	1.060D
Ac-228	1082.45	270.74	12.	20.	0.033	82.46	0.307s
Pb-214	1179.56	295.01	8.	38.	0.064	43.80	0.670s
Ac-228	1312.32	328.20	6.	18.	0.031	63.11	1.067

WI07-0307 D2 Bag# S-014 (from Grid D3 - 4)) 071407

Ac-228	1353.23	338.42	7.	45.	0.076	35.05	0.757s
Pb-214	1407.19	351.91	10.	83.	0.138	27.08	0.814s
Ac-228	1853.06	463.35	3.	15.	0.025	67.28	0.482s
Bi-214	2437.84	609.49	0.	73.	0.122	23.41	0.896s
CS-137	2647.05	661.78	0.	22.	0.037	42.64	0.531s
Bi-214	3076.20	769.03	0.	10.	0.017	63.25	0.562s
Ac-228	3179.83	794.92	0.	6.	0.010	81.65	0.500s
Ac-228	3645.30	911.24	0.	48.	0.080	28.87	1.427
Bi-214	3736.67	934.08	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	0.	17.	0.028	49.01	1.595D
Ac-228	3876.86	969.11	3.	25.	0.042	43.50	1.598D
Bi-214	4481.79	1120.27	0.	19.	0.032	45.88	0.375s
Bi-214	4956.00	1238.77	0.	12.	0.020	57.74	0.312s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5846.14	1461.18	0.	50.	0.083	28.28	0.949s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7060.50	1764.58	0.	5.	0.008	89.44	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3948E-04	609.31	3.395E-04	(	4.650E-06	G K
			1764.49	1.779E-04	-	1.317E-04	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	(	4.403E-05	G
Ac-228	N	5.4953E-04	911.07	5.286E-04	(	1.101E-05	G K
			969.11	4.936E-04	(	5.485E-05	G
			338.32	5.313E-04	?(	4.905E-05	G
			964.60	1.028E-03	+	3.884E-04	G
			794.70	3.528E-04	-	2.352E-04	G

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EnergySolutions Spectrum name: Win00187.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	5.912E-04	?(	1.143E-04	G
		209.28	6.877E-04	@(	1.867E-04	G
		270.23	6.248E-04	(	1.695E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.910E-04	-	1.864E-04	X
		327.64	7.534E-04	(	1.570E-04	G
Pb-212	N 5.1140E-04	238.62	5.114E-04	(	9.495E-06	G K
		77.11	6.179E-04	+	8.095E-05	Energy duplication
		74.81	0.000E+00	%	9.351E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 6.4781E-04	92.35	5.274E-04	(	1.333E-04	G

```
                                63.29 8.192E-04 $(  1.692E-04          G

Pb-214   N   3.1459E-04        351.92 3.074E-04  (  1.852E-05          G K
                               295.21 2.412E-04 -   6.395E-05          G
                                77.11 0.000E+00 %   1.167E-04Energy duplication
                               241.98 3.503E-04  (  1.239E-04          G
                                74.81 1.114E-03 +   2.053E-04Energy duplication
                                87.30 7.255E-04 +   2.187E-04          X

Pb-210   N   0.0000E+00         46.50 0.000E+00 %   5.170E-04          G

AM-241       2.6564E-02         59.54 2.656E-02  (  9.560E-05          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

   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
0

      ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 12:51:16 Page    5
 EnergySolutions                    Spectrum name: Win00187.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214       1.1377E+00     2.663E-01     2.697E-01
 K-40         7.3773E+00     2.087E+00     2.105E+00
 Ac-228       1.8416E+00     4.308E-01     4.363E-01
 Pb-212       1.7138E+00     2.364E-01     2.449E-01
 CS-137 #     1.9979E-01     8.519E-02     8.553E-02
 Th-234       2.1709E+00     8.555E-01     8.570E-01
 Pb-214       1.0543E+00     2.855E-01     2.883E-01
 Pb-210  <    1.7325E+00
 AM-241       8.9021E+01     1.815E+00     3.762E+00
```

WI07-0307 D2 Bag# S-014 (from Grid D3 - 4)) 071407

- 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 (2.7 to 1999.3 keV) 1.0451651E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0308 D2 Bag# S-015 (from Grids D3 - 2,5)) 071407

Sample description
WI07 - 0308 D2 BAG # S-015 (grid D3-2,5) 071407

Spectrum Filename: C:\User\Win00188.An1

Acquisition information
Start time: 14-Jul-2007 12:56:35
Live time: 600
Real time: 602
Dead time: 0.32 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4800E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4800E+02) = 2.8736E+03
Detection limit method: Traditional ORTEC method

WI07-0308 D2 Bag# S-015 (from Grids D3 - 2,5)) 071407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1561

********** 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	
11.76	2.90	2761.	10066.	16.776	2.48	0.854	-	D
17.84	4.42	12898.	7850.	13.083	4.67	0.855	-	D
104.89	26.41	34.	79.	0.132	36.63	0.803	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	187.00	46.93	197.	7.	0.011	648.38	0.000s
AM-241	237.61	59.58	726.	6322.	10.537	3.04	0.844
Th-234	252.95	63.41	58.	49.	0.081	64.08	0.568s
Pb-214	298.54	74.81	94.	126.	0.211	28.04	0.917D
Pb-212	298.56	74.81	122.	0.	0.000	246.63	0.497D
Pb-212	307.74	77.11	76.	165.	0.276	21.50	0.919D
Pb-214	307.74	77.11	242.	0.	0.000	100.26	0.000D
Pb-214	347.74	87.11	48.	71.	0.119	41.80	1.293s
Th-234	368.72	92.35	72.	41.	0.068	66.46	0.933D
Ac-228	380.72	95.35	36.	7.	0.011	271.11	0.935D
Ac-228	837.50	209.52	42.	42.	0.070	74.93	0.700s
Pb-212	953.94	238.62	20.	237.	0.395	14.05	1.057D

0

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EnergySolutions Spectrum name: Win00188.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	30.	44.	0.073	46.29	1.060D
Ac-228	1078.45	269.74	9.	2.	0.003	561.43	0.249s
Pb-214	1179.48	295.00	15.	64.	0.107	34.80	0.985s
Ac-228	1310.85	327.83	11.	11.	0.018	118.07	0.575s
Ac-228	1354.80	338.82	11.	68.	0.113	32.13	0.406s

WI07-0308 D2 Bag# S-015 (from Grids D3 - 2,5)) 071407

Pb-214	1408.20	352.16	7.	107.	0.179	21.75	1.418s
Ac-228	1853.87	463.55	0.	24.	0.040	40.82	0.364s
Bi-214	2437.11	609.31	0.	70.	0.117	23.90	1.118
CS-137	2647.00	661.77	7.	0.	0.000	0.00	0.000s
Bi-214	3075.50	768.85	0.	6.	0.010	81.65	0.375s
Ac-228	3179.41	794.82	0.	20.	0.033	44.72	0.375s
Ac-228	3645.40	911.27	0.	47.	0.078	29.17	1.416
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	14.	0.024	61.04	1.595D
Ac-228	3876.86	969.11	0.	37.	0.061	32.99	1.598D
Bi-214	4481.20	1120.13	0.	15.	0.025	51.64	0.875s
Bi-214	4951.82	1237.72	0.	16.	0.027	50.00	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.69	1461.32	0.	48.	0.080	28.87	1.000s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.83	1764.92	1.	1.	0.001	339.93	0.339s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3352E-04	609.31	3.255E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	1.085E-03	+	4.189E-04	G
			768.36	3.127E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	2.1133E-03	1460.81	2.113E-03	(	4.403E-05	G
Ac-228	N	6.7092E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	7.136E-04	(	1.942E-05	G
			338.32	7.969E-04	*(	6.114E-05	G
			964.60	8.936E-04	(	1.729E-04	G
			794.70	1.176E-03	+	4.024E-04	G
			463.00	9.355E-04	+	2.902E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.852E-04	(	2.052E-04	G
		270.23	0.000E+00	%	1.630E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.885E-04	X
		327.64	4.480E-04	-	2.913E-04	G
Pb-212	N 5.7010E-04	238.62	5.445E-04	(	1.575E-05	G K
		77.11	6.336E-04	(	4.900E-05	Energy duplication
		74.81	0.000E+00	%	1.045E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.182E-05	G
Th-234	N 6.8257E-04	92.35	5.108E-04	(	1.562E-04	G
		63.29	9.271E-04	@(	2.155E-04	G

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Pb-214	N	3.9868E-04	351.92	3.975E-04	(	1.550E-05	G K
			295.21	4.009E-04	@(	3.759E-05	G
			77.11	0.000E+00	?	1.476E-04	Energy duplication
			241.98	6.091E-04	+	1.753E-04	G
			74.81	1.410E-03	+	2.397E-04	Energy duplication
			87.30	1.035E-03	+	2.312E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.227E-04	G
AM-241		1.3018E-02	59.54	1.302E-02	(	7.950E-05	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

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
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 pCi/g	2 Sigma Total pCi/g
Bi-214		9.5840E-01	2.291E-01	2.319E-01
K-40		6.0728E+00	1.753E+00	1.768E+00
Ac-228		1.9279E+00	4.278E-01	4.339E-01
Pb-212		1.6382E+00	2.104E-01	2.192E-01
CS-137	<	3.3969E-02		
Th-234		1.9614E+00	9.054E-01	9.065E-01
Pb-214		1.1456E+00	2.351E-01	2.390E-01
Pb-210	<	1.2146E+00		
AM-241		3.7408E+01	1.137E+00	1.792E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.

WI07-0308 D2 Bag# S-015 (from Grids D3 - 2,5)) 071407

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 (2.7 to 1999.3 keV) 5.1112072E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0309 D2 Bag# S-016 (from Grid D3 - 2,5)) 071407

Sample description
WI07 - 0309 D2 BAG # S-016 (grid D3-2,5) 071407

Spectrum Filename: C:\User\Win00189.An1

Acquisition information
Start time: 14-Jul-2007 13:15:06
Live time: 600
Real time: 602
Dead time: 0.34 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0840E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0840E+02) = 3.2425E+03
Detection limit method: Traditional ORTEC method

WI07-0309 D2 Bag# S-016 (from Grid D3 - 2,5)) 071407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1222

********** 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	
14.56	3.83	4314.	26244.	43.740	1.59	2.173	CU-64	s
105.24	26.49	28.	47.	0.078	50.41	0.839	AM-241	
128.27	32.25	54.	136.	0.227	27.89	0.952	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.89	46.40	120.	9.	0.015	350.66	0.663s
AM-241	237.63	59.58	516.	5630.	9.384	3.10	0.849
Th-234	253.74	63.61	46.	41.	0.068	65.26	1.003
Pb-214	298.54	74.81	68.	113.	0.188	27.98	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	240.81	0.568D
Pb-212	307.74	77.11	45.	183.	0.306	18.01	0.919D
Pb-214	307.74	77.11	168.	0.	0.000	768.37	0.590D
Pb-214	347.48	87.04	42.	76.	0.127	38.68	0.905s
Th-234	368.72	92.35	55.	36.	0.060	66.57	0.933D
Ac-228	380.72	95.35	46.	4.	0.006	528.88	0.935D
Ac-228	837.22	209.45	12.	40.	0.067	43.59	0.818
Pb-212	953.94	238.62	6.	228.	0.380	13.58	1.057D

0

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EnergySolutions Spectrum name: Win00189.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	20.	42.	0.069	43.54	1.060D
Ac-228	1080.00	270.13	10.	18.	0.030	80.89	0.457s
Pb-214	1182.00	295.63	0.	77.	0.128	22.79	0.958s
Ac-228	1309.14	327.40	10.	26.	0.043	64.05	1.042s
Ac-228	1353.69	338.54	11.	42.	0.069	44.28	1.050

WI07-0309 D2 Bag# S-016 (from Grid D3 - 2,5)) 071407

Pb-214	1407.66	352.03	10.	114.	0.189	21.80	0.905
Ac-228	1850.38	462.68	5.	22.	0.036	59.27	0.486s
Bi-214	2437.68	609.45	7.	67.	0.112	29.63	1.702s
CS-137	2647.57	661.91	3.	10.	0.017	86.80	0.536s
Bi-214	3070.50	767.60	0.	7.	0.012	75.59	1.499
Ac-228	3184.00	795.97	0.	7.	0.012	75.59	0.250s
Ac-228	3646.26	911.48	0.	54.	0.090	27.22	0.834s
Bi-214	3735.86	933.87	0.	11.	0.018	60.30	0.375s
Ac-228	3858.81	964.60	2.	10.	0.016	78.71	1.595D
Ac-228	3876.86	969.11	4.	24.	0.041	46.26	1.598D
Bi-214	4479.00	1119.58	3.	1.	0.002	529.15	0.364s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.00	1461.15	0.	49.	0.082	28.57	0.537s
Ac-228	6355.00	1588.32	0.	2.	0.003	141.42	0.250s
Bi-214	7056.88	1763.68	2.	2.	0.003	311.13	0.422s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1680E-04	609.31	3.116E-04	@(	1.988E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	0.000E+00	%	8.206E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.648E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	1.069E-03	+	5.069E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	?(	4.403E-05	G
Ac-228	N	5.4262E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	4.725E-04	(	6.319E-05	G
			338.32	4.883E-04	(	6.196E-05	G
			964.60	5.945E-04	(	1.687E-04	G
			794.70	4.116E-04	&	2.514E-04	G
			463.00	8.445E-04	+	3.066E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:25:18 Page 4
EnergySolutions Spectrum name: Win00189.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.464E-04	+	2.266E-04	G
		270.23	5.624E-04	?(	1.562E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	1.059E-03	+	3.665E-04	G
Pb-212	N 5.2346E-04	238.62	5.235E-04	(	8.978E-06	G K
		77.11	7.024E-04	+	8.372E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	2.8002E-05	661.66	2.800E-05	?(	7.758E-06	G
Th-234	N 5.8807E-04	92.35	4.525E-04	(	1.369E-04	G
		63.29	7.811E-04	$(	1.925E-04	G

WI07-0309 D2 Bag# S-016 (from Grid D3 - 2,5)) 071407

Pb-214	N	4.4147E-04	351.92	4.204E-04	(	1.810E-05	G K
			295.21	4.824E-04	*(	6.264E-06	G
			77.11	0.000E+00	%	1.236E-04	Energy duplication
			241.98	5.762E-04	+	1.610E-04	G
			74.81	1.259E-03	+	2.180E-04	Energy duplication
			87.30	1.103E-03	+	2.303E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	3.383E-04	G
AM-241		1.1594E-02	59.54	1.159E-02	(	6.717E-05	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

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

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:25:18 Page 5
EnergySolutions Spectrum name: Win00189.An1

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 pCi/g	2 Sigma Total pCi/g
Bi-214	#	1.0272E+00	3.043E-01	3.068E-01
K-40	#	6.9953E+00	1.999E+00	2.016E+00
Ac-228		1.7595E+00	4.666E-01	4.712E-01
Pb-212		1.6973E+00	2.305E-01	2.391E-01
CS-137	#	9.0798E-02	7.881E-02	7.889E-02
Th-234		1.9068E+00	8.889E-01	8.899E-01
Pb-214		1.4315E+00	2.257E-01	2.320E-01
Pb-210	<	1.0968E+00		
AM-241		3.7593E+01	1.165E+00	1.815E+00

\# - All peaks for activity calculation had bad shape.

WI07-0309 D2 Bag# S-016 (from Grid D3 - 2,5)) 071407

* - 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 (2.7 to 1999.3 keV) 5.2501350E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0312 D2 Bag# S-017 (from Grid D3 - 2,3,5)) 071407

Sample description
WI07 - 0312 D2 BAG # S-017 (grid D3-2,3,5) 071407

Spectrum Filename: C:\User\Win00190.An1

Acquisition information
Start time: 14-Jul-2007 13:30:36
Live time: 600
Real time: 602
Dead time: 0.40 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9820E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9820E+02) = 3.3535E+03
Detection limit method: Traditional ORTEC method

0

WI07-0312 D2 Bag# S-017 (from Grid D3 - 2,3,5)) 071407

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0839

********** 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	
14.70	3.86	4545.	23701.	39.502	1.73	2.246	CU-64	s
69.37	17.53	68.	131.	0.218	30.21	0.853	MO-99	s
104.79	26.38	37.	192.	0.319	18.91	1.000	AM-241	s
198.80	49.88	1402.	396.	0.661	38.32	0.914	EU-155	sM
743.47	186.02	28.	54.	0.089	47.47	0.750	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

********** 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	184.76	46.37	291.	11.	0.018	494.10	0.307s
AM-241	237.58	59.57	1070.	12495.	20.824	2.08	0.906
Th-234	253.19	63.47	56.	44.	0.073	66.18	0.832
Pb-214	298.54	74.81	70.	130.	0.217	25.26	0.917D
Pb-212	298.56	74.81	133.	0.	0.000	167.46	0.284D
Pb-212	307.74	77.11	59.	188.	0.314	18.59	0.919D
Pb-214	307.74	77.11	192.	0.	0.000	286.90	0.318D
Pb-214	348.24	87.23	60.	76.	0.127	44.50	0.948s
Th-234	368.72	92.35	58.	60.	0.100	44.44	0.933D

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:40:49 Page 3
EnergySolutions Spectrum name: Win00190.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	26.	5.	0.009	291.91	0.935D
Ac-228	834.43	208.75	17.	33.	0.054	57.29	0.942
Pb-212	953.94	238.62	19.	228.	0.380	14.30	1.057D
Pb-214	967.37	241.98	31.	24.	0.041	76.03	1.060D
Ac-228	1080.52	270.26	11.	36.	0.060	51.92	0.950s

WI07-0312 D2 Bag# S-017 (from Grid D3 - 2,3,5)) 071407

Pb-214	1180.54	295.26	8.	57.	0.094	31.35	0.966
Ac-228	1311.99	328.12	8.	22.	0.037	65.13	0.396s
Ac-228	1353.43	338.47	3.	63.	0.105	27.49	0.483s
Pb-214	1407.82	352.07	6.	84.	0.139	24.44	1.047
Ac-228	1850.00	462.58	0.	11.	0.018	60.30	0.500s
Bi-214	2437.12	609.31	6.	73.	0.121	27.39	1.528
CS-137	2647.60	661.92	4.	16.	0.027	70.81	0.710s
Bi-214	3071.67	767.89	0.	3.	0.005	115.47	0.375s
Ac-228	3180.25	795.03	2.	16.	0.026	63.54	0.485s
Ac-228	3646.08	911.44	0.	49.	0.082	28.57	0.364s
Bi-214	3737.00	934.16	2.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	4.	7.	0.012	105.84	1.595D
Ac-228	3876.86	969.11	5.	32.	0.053	41.28	1.598D
Bi-214	4483.17	1120.62	0.	14.	0.023	53.45	0.375s
Bi-214	4955.50	1238.64	0.	5.	0.008	89.44	0.999s
Bi-214	5511.50	1377.57	0.	3.	0.005	115.47	0.500s
K-40	5844.47	1460.76	0.	46.	0.077	29.49	0.625s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.33	1765.04	0.	16.	0.027	50.00	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3783E-04	609.31	3.379E-04	(	1.904E-05	G K
			1764.49	5.693E-04	+	2.199E-04	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	0.000E+00	?	2.489E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	6.0866E-04	911.07	5.396E-04	?(	1.101E-05	G K
			969.11	6.129E-04	(	7.446E-05	G
			338.32	7.383E-04	(	3.516E-05	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:40:49 Page 4
EnergySolutions Spectrum name: Win00190.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	4.479E-04	-	3.220E-04	G
		794.70	9.114E-04	+	3.834E-04	G
		463.00	4.288E-04	-	2.033E-04	G
		209.28	6.912E-04	&(	1.356E-04	G
		270.23	1.125E-03	+	3.189E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	8.959E-04	+	3.365E-04	G
Pb-212	N 5.2345E-04	238.62	5.235E-04	(	1.524E-05	G K
		77.11	7.203E-04	+	8.702E-05	Energy duplication
		74.81	0.000E+00	?	1.089E-04	Energy duplication
CS-137	4.4262E-05	661.66	4.426E-05	?(	8.817E-06	G

WI07-0312 D2 Bag# S-017 (from Grid D3 - 2,3,5)) 071407

```
Th-234   N   7.8374E-04     92.35 7.455E-04  (  1.411E-04         G
                            63.29 8.382E-04 $(  2.114E-04         G

Pb-214   N   3.2621E-04    351.92 3.093E-04  (  1.533E-05         G K
                           295.21 3.550E-04 ?(  2.890E-05         G
                            77.11 0.000E+00 %   1.319E-04Energy duplication
                           241.98 3.366E-04  (  1.154E-04         G
                            74.81 1.452E-03 +   2.289E-04Energy duplication
                            87.30 1.103E-03 +   2.467E-04         X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   5.120E-04         G

AM-241       2.5728E-02     59.54 2.573E-02  (  9.631E-05         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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:40:49 Page 5
EnergySolutions Spectrum name: Win00190.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.1329E+00	3.103E-01	3.132E-01
K-40	#	6.7917E+00	2.003E+00	2.019E+00
Ac-228		2.0411E+00	4.132E-01	4.203E-01
Pb-212		1.7554E+00	2.510E-01	2.594E-01
CS-137	#	1.4843E-01	1.051E-01	1.053E-01
Th-234		2.6282E+00	1.048E+00	1.049E+00
Pb-214		1.0939E+00	2.673E-01	2.704E-01
Pb-210	<	1.7170E+00		

	WI07-0312 D2	Bag# S-017 (from Grid D3 - 2,3,5)) 071407	
AM-241	8.6278E+01	1.798E+00	3.665E+00

- 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 (2.7 to 1999.3 keV) 1.0187012E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0313 D2 Bag# S-018 (from Grid D3 - 1,3,5)) 071407

Sample description
WI07 - 0313 D2 BAG # S-018 (grid D3-1,3,5) 071407

Spectrum Filename: C:\User\Win00191.An1

Acquisition information
Start time: 14-Jul-2007 13:44:41
Live time: 600
Real time: 603
Dead time: 0.46 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2130E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2130E+02) = 3.1124E+03
Detection limit method: Traditional ORTEC method

WI07-0313 D2 Bag# S-018 (from Grid D3 - 1,3,5)) 071407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1080

********** 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	
11.61	2.90	4878.	11933.	19.888	2.47	0.854	-	D
15.90	3.97	15888.	10680.	17.800	3.86	0.855	-	D
70.29	17.76	75.	210.	0.350	21.51	1.210	MO-99	s
84.36	21.27	42.	192.	0.319	19.26	1.127	TC-99M	s
104.95	26.42	41.	227.	0.378	16.66	0.955	AM-241	
128.18	32.23	108.	220.	0.366	24.24	1.017	XE-138	s
197.58	49.57	1790.	425.	0.708	38.49	0.896	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.65	46.59	594.	0.	0.000	0.00	0.893
AM-241	237.62	59.58	1482.	18679.	31.132	1.68	0.875
Th-234	252.93	63.41	81.	61.	0.102	64.33	0.499s
Pb-214	298.54	74.81	54.	89.	0.149	31.37	0.917D
Pb-212	298.56	74.81	104.	0.	0.000	587.24	0.351D
Pb-212	307.74	77.11	52.	180.	0.300	18.73	0.919D
Pb-214	307.74	77.11	166.	0.	0.000	879.68	0.429D
Pb-214	347.85	87.13	38.	71.	0.118	38.31	0.636s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:54:52 Page 3
EnergySolutions Spectrum name: Win00191.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	71.	46.	0.076	60.10	0.933D
Ac-228	380.72	95.35	34.	7.	0.012	249.07	0.935D
Ac-228	834.42	208.75	21.	3.	0.005	464.28	0.295s
Pb-212	953.94	238.62	16.	200.	0.333	15.27	1.057D
Pb-214	967.37	241.98	22.	34.	0.057	51.24	1.060D

WI07-0313 D2 Bag# S-018 (from Grid D3 - 1,3,5)) 071407

Ac-228	1078.88	269.85	18.	24.	0.041	82.95	0.304s
Pb-214	1179.87	295.09	9.	53.	0.088	35.60	1.013s
Ac-228	1309.47	327.48	8.	16.	0.027	84.16	0.409s
Ac-228	1353.33	338.45	9.	52.	0.087	36.08	0.533s
Pb-214	1407.41	351.96	0.	102.	0.170	19.80	0.748s
Ac-228	1851.81	463.03	2.	16.	0.026	60.18	0.306s
Bi-214	2437.44	609.39	4.	68.	0.113	28.16	1.377
CS-137	2644.67	661.18	10.	4.	0.007	291.55	0.225s
Bi-214	3073.36	768.32	0.	16.	0.027	50.00	0.500s
Ac-228	3177.14	794.25	0.	10.	0.017	63.25	0.417s
Ac-228	3646.02	911.42	0.	57.	0.095	26.49	1.083s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	15.	0.025	55.53	1.595D
Ac-228	3876.86	969.11	0.	35.	0.059	33.64	1.598D
Bi-214	4484.40	1120.92	0.	16.	0.027	50.00	0.417s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.62	1461.05	0.	63.	0.105	25.20	0.664s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7059.00	1764.21	1.	0.	0.000	0.00	0.083s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3304E-04	609.31	3.147E-04	(	1.621E-05	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	8.338E-04	+	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	2.7737E-03	1460.81	2.774E-03	(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 13:54:52 Page 4
EnergySolutions Spectrum name: Win00191.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	6.4318E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	6.862E-04	(	1.942E-05	G
			338.32	6.094E-04	(	5.593E-05	G
			964.60	9.194E-04	+	3.814E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	6.171E-04	?(	1.029E-04	G
			209.28	0.000E+00	&	1.576E-04	G
			270.23	7.654E-04	?(	2.011E-04	G
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	0.000E+00	%	1.843E-04	X
			327.64	6.516E-04	?(	1.845E-04	G
Pb-212	N	4.5874E-04	238.62	4.587E-04	(	1.436E-05	G K
			77.11	6.891E-04	+	8.440E-05	Energy duplication
			74.81	0.000E+00	%	9.663E-05	Energy duplication

WI07-0313 D2 Bag# S-018 (from Grid D3 - 1,3,5)) 071407

CS-137		0.0000E+00	661.66	0.000E+00	%	1.576E-05		G
Th-234	N	8.1418E-04	92.35	5.698E-04	(	1.554E-04		G
			63.29	1.162E-03	*(	2.522E-04		G
Pb-214	N	3.6220E-04	351.92	3.778E-04	@(	3.704E-06		G K
			295.21	3.320E-04	*(	2.989E-05		G
			77.11	0.000E+00	%	1.228E-04	Energy duplication	
			241.98	4.754E-04	+	1.534E-04		G
			74.81	9.972E-04	+	1.943E-04	Energy duplication	
			87.30	1.030E-03	+	2.216E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		7.139E-04		G
AM-241		3.8463E-02	59.54	3.846E-02	(	1.131E-04		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

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 pCi/g	2 Sigma Total pCi/g
Bi-214		1.0365E+00	2.919E-01	2.945E-01
K-40		8.6329E+00	2.175E+00	2.199E+00
Ac-228		2.0018E+00	4.496E-01	4.558E-01
Pb-212		1.4278E+00	2.181E-01	2.246E-01
CS-137	<	4.9045E-02		
Th-234		2.5340E+00	1.115E+00	1.117E+00
Pb-214		1.1273E+00	2.232E-01	2.272E-01

WI07-0313 D2 Bag# S-018 (from Grid D3 - 1,3,5)) 071407

Pb-210	<	2.2219E+00		
AM-241		1.1971E+02	2.011E+00	4.866E+00

< - 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 (2.7 to 1999.3 keV) 1.3646973E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0327 D2 Bag #S-019 Grid C3 - 1, D3-2 071507

Sample description
WI07- 0327 D2 Bag# S-019 Grids C3-1, D3-2 071507

Spectrum Filename: C:\User\D1 Samples\WI07-0326 D1 Bag # 029 Grids D3 -4,C3-5 071507.Anl

Acquisition information
Start time: 15-Jul-2007 08:31:11
Live time: 600
Real time: 603
Dead time: 0.46 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9840E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9840E+02) = 3.3512E+03

Detection limit method: Traditional ORTEC method

WI07-0327 D2 Bag #S-019 Grid C3 - 1, D3-2 071507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0995

********** 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	
11.65	2.91	6680.	11193.	18.656	2.80	0.854	-	D
16.84	4.20	17729.	9032.	15.053	4.67	0.855	-	D
105.13	26.47	395.	152.	0.253	45.68	0.886	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.16	46.72	382.	22.	0.037	288.81	0.545s
AM-241	237.63	59.58	1099.	14596.	24.327	1.90	0.872
Th-234	251.56	63.07	54.	32.	0.053	80.77	0.444s
Pb-214	298.54	74.81	82.	94.	0.156	34.35	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	1186.78	0.335D
Pb-212	307.74	77.11	56.	161.	0.268	20.59	0.919D
Pb-214	307.74	77.11	149.	0.	0.000	474.77	0.381D
Pb-214	347.07	86.94	54.	84.	0.140	40.50	0.805s
Th-234	368.72	92.35	66.	35.	0.058	74.72	0.933D
Ac-228	380.72	95.35	49.	6.	0.010	326.86	0.935D
Ac-228	837.49	209.52	15.	43.	0.072	47.20	0.385s

ORTEC g v - i (63) wan32 G53W2.06 15-JUL-2007 08:41:23 Page 3
EnergySolutions Spectrum name: WI07-0326 D1 Bag # 029 Grids D3-

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	19.	214.	0.357	14.85	1.057D
Pb-214	967.37	241.98	30.	41.	0.069	48.75	1.060D
Ac-228	1079.11	269.91	5.	33.	0.054	44.24	1.902s
Pb-214	1181.26	295.44	19.	58.	0.096	42.42	1.069
Ac-228	1307.75	327.05	7.	6.	0.011	155.06	0.339s

WI07-0327 D2 Bag #S-019 Grid C3 - 1, D3-2 071507

Ac-228	1353.36	338.45	15.	56.	0.093	38.47	1.102s
Pb-214	1406.96	351.85	8.	81.	0.134	27.58	1.135
Ac-228	1852.52	463.21	0.	25.	0.042	40.00	0.750s
Bi-214	2437.25	609.34	0.	61.	0.102	25.61	0.531s
CS-137	2639.20	659.82	0.	17.	0.028	48.51	0.250s
Bi-214	3074.43	768.58	4.	14.	0.024	78.24	0.367s
Ac-228	3179.86	794.93	0.	7.	0.012	75.59	0.375s
Ac-228	3645.83	911.38	0.	53.	0.088	27.47	0.650s
Bi-214	3726.67	931.58	0.	12.	0.020	57.74	0.375s
Ac-228	3858.81	964.60	2.	2.	0.003	268.23	1.595D
Ac-228	3876.86	969.11	2.	24.	0.039	45.38	1.598D
Bi-214	4480.08	1119.84	1.	2.	0.004	177.42	0.331s
Bi-214	4953.86	1238.23	0.	10.	0.017	63.25	0.437s
Bi-214	5512.43	1377.80	0.	7.	0.012	75.59	0.625s
K-40	5844.98	1460.89	0.	55.	0.092	26.97	1.017s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7060.00	1764.46	3.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.8368E-04	609.31	2.837E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	1.068E-04	G
			1120.29	5.272E-05	-	7.300E-05	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	7.469E-04	+	3.398E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	+	4.625E-04	G
			934.06	1.166E-03	&	5.271E-04	G
K-40	N	2.4215E-03	1460.81	2.422E-03	(	4.403E-05	G
Ac-228	N	6.0486E-04	911.07	5.837E-04	(	1.101E-05	G K
			969.11	4.567E-04	-	1.501E-04	G
			338.32	6.563E-04	*(	7.032E-05	G
			964.60	0.000E+00	%	2.082E-04	G
			794.70	4.116E-04	-	2.514E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	9.744E-04	+	2.958E-04	G
		209.28	9.099E-04	+	2.387E-04	G
		270.23	1.021E-03	+	2.884E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.119E-04	X
		327.64	2.579E-04	&	2.290E-04	G
Pb-212	N 4.9158E-04	238.62	4.916E-04	(	1.540E-05	G K
		77.11	6.149E-04	+	8.169E-05	Energy duplication
		74.81	0.000E+00	%	1.012E-04	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	&(	2.710E-06	G
Th-234	N 5.0533E-04	92.35	4.321E-04	(	1.501E-04	G

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                WI07-0327  D2  Bag #S-019 Grid  C3 - 1, D3-2     071507
                                63.29 6.096E-04 ?(  2.077E-04          G

Pb-214    N   3.2039E-04     351.92 2.988E-04  (  1.709E-05          G K
                             295.21 3.623E-04  (  4.204E-05          G
                              77.11 0.000E+00 %   1.167E-04Energy duplication
                             241.98 5.695E-04 +   1.718E-04          G
                              74.81 1.044E-03 +   2.150E-04Energy duplication
                              87.30 1.221E-03 +   2.484E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   5.906E-04          G

AM-241        3.0056E-02      59.54 3.006E-02  (  9.757E-05          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

   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
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     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 08:41:23 Page    5
 EnergySolutions                    Spectrum name: WI07-0326 D1 Bag # 029 Grids D3-

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------------
 Bi-214       9.5066E-01    2.434E-01    2.460E-01
 K-40         8.1150E+00    2.188E+00    2.210E+00
 Ac-228       2.0270E+00    4.791E-01    4.851E-01
 Pb-212       1.6474E+00    2.446E-01    2.522E-01
 CS-137 #     1.5438E-01    7.489E-02    7.512E-02
 Th-234       1.6935E+00    9.316E-01    9.325E-01
 Pb-214       1.0737E+00    2.716E-01    2.746E-01
 Pb-210  <    1.9791E+00
 AM-241       1.0072E+02    1.911E+00    4.190E+00
```

WI07-0327 D2 Bag #S-019 Grid C3 - 1, D3-2 071507

- 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 (2.7 to 1999.3 keV) 1.1638385E+02 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07- 0326 Bag# S-020 Grids D3-4, C3-5 D1 071507

```
     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 08:29:16 Page    1
EnergySolutions                  Spectrum name: Win00184.An1

Sample description
     WI07- 0326   D1   Bag# S-020  Grids D3-4,C3-5   071507


Spectrum Filename: C:\User\Win00184.An1

Acquisition information
       Start time:                 15-Jul-2007 08:19:06
       Live time:                600
       Real time:                603
       Dead time:                  0.48 %
       Detector ID:                   1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.3960E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3960E+02) =
                                   2.9446E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 08:29:16 Page    2
EnergySolutions                  Spectrum name: Win00184.An1
```

WI07- 0326 Bag# S-020 Grids D3-4, C3-5 D1 071507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1473

********** 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	
28.49	7.30	94.	366.	0.609	14.72	1.058	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.23	46.22	121.	17.	0.028	223.17	0.464s
AM-241	237.87	59.63	280.	2634.	4.390	4.54	1.130
Th-234	250.43	62.77	42.	25.	0.042	98.31	0.270s
Pb-214	298.61	74.81	67.	59.	0.099	46.90	0.971D
Pb-212	298.63	74.81	65.	0.	0.000	334.42	0.640D
Pb-212	307.80	77.11	64.	113.	0.188	27.58	0.972D
Pb-214	307.80	77.11	162.	0.	0.000	107.18	0.000D
Pb-214	347.95	87.14	51.	50.	0.083	59.83	0.669s
Th-234	370.41	92.76	62.	48.	0.079	71.03	1.300s
Ac-228	380.79	95.35	29.	0.	0.000	0.00	0.471D
Ac-228	833.60	208.52	16.	34.	0.057	58.58	0.319s
Pb-212	954.08	238.62	35.	131.	0.218	21.73	1.099D
Pb-214	967.50	241.98	28.	18.	0.030	96.16	1.101D
Ac-228	1078.91	269.82	5.	23.	0.038	55.34	1.437s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.50	295.46	10.	48.	0.079	39.29	0.990s
Ac-228	1309.99	327.57	2.	24.	0.041	47.07	0.393s
Ac-228	1353.23	338.38	6.	49.	0.082	34.17	0.388s
Pb-214	1407.20	351.87	13.	80.	0.133	29.43	0.872s
Ac-228	1851.75	462.96	5.	1.	0.002	637.70	0.375s

WI07- 0326 Bag# S-020 Grids D3-4, C3-5 D1 071507

Bi-214	2438.18	609.52	0.	61.	0.102	25.61	0.699s
CS-137	2648.70	662.12	2.	12.	0.019	75.59	0.295s
Bi-214	3071.50	767.78	3.	2.	0.003	282.84	0.202s
Ac-228	3178.33	794.48	1.	0.	0.001	240.37	0.197s
Ac-228	3642.00	910.34	19.	1.	0.002	1195.83	0.000s
Bi-214	3737.67	934.25	1.	1.	0.001	366.67	0.181s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.312D
Ac-228	3879.29	969.64	0.	22.	0.037	42.64	0.562s
Bi-214	4476.89	1118.97	3.	3.	0.005	216.02	0.229s
Bi-214	4952.00	1237.68	0.	3.	0.005	115.47	0.250s
Bi-214	5513.00	1377.86	0.	2.	0.003	141.42	0.250s
K-40	5845.59	1460.96	0.	34.	0.057	34.30	1.687
Ac-228	6355.00	1588.24	0.	2.	0.003	141.42	0.250s
Bi-214	7061.17	1764.68	0.	8.	0.013	70.71	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0973E-04	609.31	3.122E-04	(	5.117E-06	G K
			1764.49	3.026E-04	?(	3.783E-05	G
			1120.29	0.000E+00	&	1.049E-04	G
			1238.11	2.186E-04	-	2.186E-04	G
			768.36	0.000E+00	%	2.106E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	-	2.969E-04	G
			934.06	0.000E+00	%	2.699E-04	G
K-40	N	1.6005E-03	1460.81	1.601E-03	?(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	8.182E-05	G K
			969.11	4.628E-04		1.504E-04	G
			338.32	6.499E-04	@	1.449E-04	G
			964.60	0.000E+00	?	6.688E-05	G
			794.70	0.000E+00	%	1.282E-04	G
			463.00	0.000E+00	%	1.732E-04	G
			209.28	8.278E-04	&	2.547E-04	G
			270.23	8.146E-04		2.833E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 15-JUL-2007 08:29:16 Page 4
EnergySolutions Spectrum name: Win00184.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	3.098E-04	?	3.968E-04	G
		95.35	0.000E+00	%	1.841E-04	X
		327.64	1.123E-03		3.605E-04	G
Pb-212	N 3.4194E-04	238.62	3.419E-04	(	2.337E-05	G K
		77.11	5.210E-04	+	8.936E-05	Energy duplication
		74.81	0.000E+00	%	9.341E-05	Energy duplication
CS-137	3.4690E-05	661.66	3.469E-05	?(	8.080E-06	G
Th-234	N 6.4905E-04	92.35	7.001E-04	*(	1.715E-04	G
		63.29	5.764E-04	&(	2.231E-04	G
Pb-214	N 3.2689E-04	351.92	3.312E-04	(	2.365E-05	G K

WI07- 0326 Bag# S-020 Grids D3-4, C3-5 D1 071507

< - 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 (2.7 to 1999.2 keV) 2.8837337E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC-Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

```
                    WI07- 0326 Bag# S-020 Grids D3-4, C3-5 D1  071507
                                295.21 3.362E-04 @(  3.459E-05          G
                                 77.11 0.000E+00 ?   1.469E-04Energy duplication
                                241.98 2.818E-04  (  1.261E-04          G
                                 74.81 8.000E-04 +   2.213E-04Energy duplication
                                 87.30 8.574E-04 +   2.541E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   4.011E-04          G

AM-241       6.5303E-03      59.54 6.530E-03  (  5.991E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 08:29:16 Page    5
 EnergySolutions                    Spectrum name: Win00184.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        9.1204E-01    2.336E-01    2.351E-01
 K-40    #     4.7130E+00    1.617E+00    1.622E+00
 Ac-228  B<    2.4093E-01
 Pb-212        1.0069E+00    2.188E-01    2.208E-01
 CS-137  #     1.0215E-01    7.722E-02    7.728E-02
 Th-234  #     1.9112E+00    1.159E+00    1.160E+00
 Pb-214        9.6258E-01    2.833E-01    2.847E-01
 Pb-210   <    1.1810E+00
 AM-241        1.9229E+01    8.735E-01    1.127E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0328 D2 Bag# S-021 (Grid C1 - 3,C3-4) 071507

```
     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 09:13:57 Page    1
EnergySolutions                  Spectrum name: Win00203.An1

Sample description
     WI07- 0328 D2   Bag# S-021 Grids C3-4,C1-3  071507


Spectrum Filename: C:\User\Win00203.An1

Acquisition information
       Start time:                 15-Jul-2007 09:03:45
       Live time:                600
       Real time:                602
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.1360E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1360E+02) =
                                   3.1888E+03
       Detection limit method:     Traditional ORTEC method

```

```
     ORTEC g v - i (  63) wan32  G53W2.06  15-JUL-2007 09:13:57 Page    2
EnergySolutions                  Spectrum name: Win00203.An1
```

WI07-0328 D2 Bag# S-021 (Grid C1 - 3,C3-4) 071507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0864

********** 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	
11.70	2.92	6257.	12015.	20.024	2.61	0.854	-	D
16.90	4.22	15296.	8618.	14.364	4.60	0.855	-	D
104.44	26.29	16.	77.	0.128	30.25	0.778	U-237	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.87	46.40	113.	70.	0.117	58.77	0.858s
AM-241	237.59	59.57	347.	3375.	5.626	4.14	0.888
Th-234	253.04	63.44	54.	55.	0.092	55.32	0.832s
Pb-214	298.54	74.81	44.	119.	0.198	24.14	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	615.79	0.511D
Pb-212	307.74	77.11	54.	148.	0.246	21.67	0.919D
Pb-214	307.74	77.11	137.	0.	0.000	306.94	0.371D
Pb-214	347.16	86.96	67.	58.	0.097	59.66	0.779s
Th-234	368.72	92.35	60.	37.	0.062	67.79	0.933D
Ac-228	380.72	95.35	43.	10.	0.017	186.42	0.935D
Ac-228	836.34	209.23	28.	46.	0.078	55.29	1.308s
Pb-212	953.94	238.62	18.	196.	0.326	15.59	1.057D

ORTEC g v - i (63) wan32 G53W2.06 15-JUL-2007 09:13:57 Page 3
EnergySolutions Spectrum name: Win00203.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	27.	25.	0.042	70.77	1.060D
Ac-228	1080.66	270.30	9.	29.	0.049	51.38	0.958
Pb-214	1180.39	295.22	10.	57.	0.095	33.65	0.750s
Ac-228	1311.47	327.98	8.	23.	0.038	62.91	0.923
Ac-228	1352.87	338.33	3.	53.	0.088	30.42	1.078

WI07-0328 D2 Bag# S-021 (Grid C1 - 3,C3-4) 071507

Pb-214	1407.45	351.97	3.	72.	0.120	25.25	0.998
Ac-228	1851.50	462.96	4.	22.	0.036	56.77	0.353s
Bi-214	2437.39	609.38	3.	69.	0.115	26.09	1.294
CS-137	2646.48	661.64	0.	31.	0.052	35.92	0.500s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3181.83	795.42	0.	6.	0.010	81.65	0.500s
Ac-228	3644.88	911.14	0.	49.	0.082	28.57	0.845s
Bi-214	3736.00	933.91	2.	0.	0.001	450.92	0.333s
Ac-228	3859.39	964.74	7.	0.	0.000	0.00	1.595
Ac-228	3877.51	969.27	0.	37.	0.062	32.88	0.416s
Bi-214	4483.84	1120.79	0.	20.	0.033	44.72	0.417s
Bi-214	4955.00	1238.52	0.	7.	0.012	75.59	1.749
Bi-214	5511.60	1377.59	0.	6.	0.010	81.65	0.312s
K-40	5846.37	1461.24	0.	47.	0.078	29.17	1.098s
Ac-228	6354.00	1588.07	2.	0.	0.001	450.92	0.333s
Bi-214	7063.11	1765.24	0.	12.	0.020	57.74	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.4788E-04	609.31	3.209E-04	(	1.395E-05	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	4.746E-04	+	2.898E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	+	4.328E-04	G
			934.06	0.000E+00	%	2.915E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	6.2633E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	7.184E-04	?(	1.942E-05	G
			338.32	6.211E-04	(	3.516E-05	G
			964.60	0.000E+00		2.639E-04	G
			794.70	3.528E-04	-	2.352E-04	G
			463.00	8.380E-04	(	1.244E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.839E-04	+	2.699E-04	G
		270.23	9.164E-04	+	2.884E-04	G
		1588.00	0.000E+00	%	4.357E-04	G
		95.35	2.020E-04	-	2.082E-04	X
		327.64	9.366E-04	+	3.417E-04	G
Pb-212	N 4.4955E-04	238.62	4.496E-04	(	1.513E-05	G K
		77.11	5.658E-04	+	7.891E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	(	2.710E-06	G
Th-234	N 7.0588E-04	92.35	4.613E-04	(	1.431E-04	G
		63.29	1.054E-03	(	2.071E-04	G

WI07-0328 D2 Bag# S-021 (Grid C1 - 3,C3-4) 071507

```
Pb-214   N   3.0362E-04    351.92 2.673E-04  (  1.086E-05         G K
                           295.21 3.571E-04  (  3.132E-05         G
                            77.11 0.000E+00 %   1.120E-04Energy duplication
                           241.98 3.471E-04  (  1.086E-04         G
                            74.81 1.327E-03 +   2.068E-04Energy duplication
                            87.30 8.465E-04 +   2.368E-04         X

Pb-210   N   1.4358E-03     46.50 1.436E-03 *(  3.168E-04         G

AM-241       6.9503E-03     59.54 6.950E-03  (  5.526E-05         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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.1093E+00	2.894E-01	2.924E-01
K-40 #	6.5985E+00	1.925E+00	1.941E+00
Ac-228	1.9972E+00	3.883E-01	3.954E-01
Pb-212	1.4335E+00	2.234E-01	2.298E-01
CS-137	2.6788E-01	9.622E-02	9.677E-02
Th-234	2.2509E+00	9.847E-01	9.861E-01
Pb-214	9.6817E-01	2.445E-01	2.472E-01
Pb-210 #	4.5784E+00	2.691E+00	2.693E+00
AM-241	2.2163E+01	9.172E-01	1.231E+00

- All peaks for activity calculation had bad shape.

WI07-0328 D2 Bag# S-021 (Grid C1 - 3,C3-4) 071507

* - 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 (2.7 to 1999.3 keV) 4.1366768E+01 pCi/g

The library has energies which are not separable.

Analyzed by: H.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0346 D2 Bag# S-023 (Grid E1- 4, E2-1) 071607

Sample description
WI07-0346 D2 Bag # S-023 Grid E1- 4, E2-1 071607

Spectrum Filename: C:\User\Win00217.An1

Acquisition information
Start time: 16-Jul-2007 13:46:21
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2700E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2700E+02) = 3.0581E+03
Detection limit method: Traditional ORTEC method

WI07-0346 D2 Bag# S-023 (Grid E1- 4, E2-1) 071607

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0862

********** 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	
11.68	2.91	7631.	11162.	18.603	2.91	0.854	-	D
15.84	3.95	15797.	10614.	17.690	3.87	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.89	46.40	116.	32.	0.053	121.83	0.787
AM-241	237.56	59.57	303.	2441.	4.068	5.02	0.879
Th-234	253.29	63.50	47.	41.	0.069	62.30	0.443s
Pb-214	298.54	74.81	57.	118.	0.197	25.82	0.917D
Pb-212	298.56	74.81	106.	0.	0.000	214.76	0.346D
Pb-212	307.74	77.11	61.	167.	0.278	20.37	0.919D
Pb-214	307.74	77.11	262.	0.	0.000	87.18	0.195D
Pb-214	348.26	87.24	64.	66.	0.110	52.54	0.892s
Th-234	371.42	93.03	48.	91.	0.152	35.91	1.079s
Ac-228	380.72	95.35	42.	0.	0.000	0.00	0.935
Ac-228	837.23	209.45	23.	41.	0.069	54.79	0.376s
Pb-212	953.94	238.62	24.	212.	0.354	15.21	1.057D
Pb-214	967.37	241.98	32.	33.	0.055	60.14	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 13:56:31 Page 3
EnergySolutions Spectrum name: Win00217.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.36	270.22	17.	34.	0.057	60.13	0.574s
Pb-214	1179.92	295.11	10.	60.	0.100	31.62	1.096
Ac-228	1312.26	328.18	8.	14.	0.023	88.06	0.278s
Ac-228	1352.76	338.30	6.	48.	0.079	34.74	1.178
Pb-214	1407.25	351.92	8.	116.	0.193	21.53	1.106

WI07-0346 D2 Bag# S-023 (Grid E1- 4, E2-1) 071607

Ac-228	1851.59	462.98	10.	12.	0.019	124.30	0.264s
Bi-214	2437.62	609.44	0.	69.	0.115	24.08	0.700s
CS-137	2647.26	661.83	0.	40.	0.067	31.62	0.637s
Bi-214	3072.00	767.98	0.	5.	0.008	89.44	0.250s
Ac-228	3180.29	795.04	2.	7.	0.012	93.60	0.361s
Ac-228	3645.76	911.36	0.	51.	0.085	28.01	1.302
Bi-214	3733.00	933.16	0.	7.	0.012	75.59	0.750s
Ac-228	3858.81	964.60	3.	3.	0.004	226.89	1.595D
Ac-228	3876.86	969.11	2.	32.	0.053	37.32	1.598D
Bi-214	4482.00	1120.33	4.	0.	0.001	568.62	0.000s
Bi-214	4954.00	1238.27	1.	0.	0.000	0.00	0.000s
Bi-214	5515.50	1378.57	0.	5.	0.008	89.44	0.375s
K-40	5845.44	1461.01	0.	56.	0.093	26.73	1.731
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.50	1764.33	0.	11.	0.018	60.30	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3883E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	8.206E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	2.606E-04	-	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	6.802E-04	&	4.154E-04	G
K-40	N	2.4656E-03	1460.81	2.466E-03	?(	4.403E-05	G
Ac-228	N	5.7787E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	6.210E-04	(	4.794E-05	G
			338.32	5.567E-04	(	4.852E-05	G
			964.60	0.000E+00	%	2.469E-04	G
			794.70	4.312E-04	-	2.806E-04	G
			463.00	4.482E-04	-	2.728E-04	G
			209.28	8.746E-04	+	2.502E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 13:56:31 Page 4
EnergySolutions Spectrum name: Win00217.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.073E-03	+	3.315E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.864E-04	X
		327.64	5.701E-04	?(	1.845E-04	G
Pb-212	N 4.8805E-04	238.62	4.880E-04	(	1.717E-05	G K
		77.11	6.378E-04	+	8.355E-05	Energy duplication
		74.81	0.000E+00	%	9.760E-05	Energy duplication
CS-137	1.0840E-04	661.66	1.084E-04	(	2.710E-06	G
Th-234	N 1.1354E-03	92.35	1.135E-03	&(	1.286E-04	G
		63.29	7.874E-04	-	2.624E-04	G

```
                WI07-0346 D2 Bag# S-023 ( Grid E1- 4, E2-1 )  071607
Pb-214   N   4.1625E-04    351.92 4.296E-04  (  1.678E-05          G K
                           295.21 3.759E-04  (  3.132E-05          G
                            77.11 0.000E+00 ?   1.535E-04Energy duplication
                           241.98 4.533E-04  (  1.181E-04          G
                            74.81 1.317E-03 +   2.144E-04Energy duplication
                            87.30 9.577E-04 +   2.414E-04          X

Pb-210   N   6.5324E-04     46.50 6.532E-04  (  3.213E-04          G

AM-241       5.0257E-03     59.54 5.026E-03  (  5.176E-05          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

   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
0

     ORTEC g v - i (  63) wan32  G53W2.06  16-JUL-2007 13:56:31 Page    5
 EnergySolutions                  Spectrum name: Win00217.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------------
 Bi-214       1.0362E+00    2.495E-01     2.525E-01
 K-40   #     7.5399E+00    2.015E+00     2.035E+00
 Ac-228       1.7672E+00    4.663E-01     4.710E-01
 Pb-212       1.4925E+00    2.270E-01     2.338E-01
 CS-137       3.3149E-01    1.048E-01     1.056E-01
 Th-234       3.4721E+00    1.247E+00     1.250E+00
 Pb-214       1.2729E+00    2.741E-01     2.782E-01
 Pb-210       1.9977E+00    2.434E+00     2.434E+00
 AM-241       1.5369E+01    7.718E-01     9.588E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0346 D2 Bag# S-023 (Grid E1- 4, E2-1) 071607

& - 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 (2.7 to 1999.3 keV) 3.4279057E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: EnergySolutions

WI07-0347 D2 Bag# S-024 (Grid E1- 4, E2-1) 071607

Sample description
WI07-0347 D2 Bag # S-024 Grid E1- 4, E2-1 071607

Spectrum Filename: C:\User\Win00218.An1

Acquisition information
Start time: 16-Jul-2007 14:01:36
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.3170E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3170E+02) = 3.0148E+03
Detection limit method: Traditional ORTEC method

WI07-0347 D2 Bag# S-024 (Grid E1- 4, E2-1) 071607

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0932

********** 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
11.71	2.91	6600.	12944.	21.573	2.50	0.854	- D
16.84	4.19	17859.	10353.	17.255	4.15	0.855	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.72	46.61	31.	37.	0.061	60.74	0.464s
AM-241	237.06	59.44	111.	161.	0.269	30.97	1.068s
Th-234	252.04	63.19	84.	49.	0.082	74.03	0.812s
Pb-214	298.54	74.81	74.	116.	0.193	28.13	0.917D
Pb-212	298.56	74.81	125.	0.	0.000	1060.40	0.213D
Pb-212	307.74	77.11	87.	166.	0.276	22.26	0.919D
Pb-214	307.74	77.11	218.	0.	0.000	139.40	0.132D
Pb-214	347.54	87.06	58.	92.	0.153	36.36	0.835
Th-234	368.72	92.35	71.	45.	0.075	60.80	0.933D
Ac-228	380.72	95.35	36.	2.	0.003	903.01	0.935D
Ac-228	837.04	209.41	19.	29.	0.049	65.24	0.377s
Pb-212	953.94	238.62	28.	208.	0.346	15.67	1.057D
Pb-214	967.37	241.98	38.	35.	0.058	60.26	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 14:11:46 Page 3
EnergySolutions Spectrum name: Win00218.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.12	270.66	15.	35.	0.058	55.70	0.389s
Pb-214	1180.44	295.24	19.	94.	0.156	29.11	0.958
Ac-228	1311.43	327.97	2.	22.	0.036	50.09	0.288s
Ac-228	1352.66	338.28	21.	62.	0.104	41.92	0.419s
Pb-214	1406.82	351.82	10.	96.	0.161	24.85	1.331

WI07-0347 D2 Bag# S-024 (Grid E1- 4, E2-1) 071607

Ac-228	1856.05	464.09	8.	7.	0.011	161.25	0.377s
Bi-214	2437.33	609.37	2.	86.	0.142	22.71	1.265
CS-137	2645.72	661.45	4.	30.	0.051	45.42	0.423s
Bi-214	3072.62	768.13	0.	8.	0.013	70.71	0.375s
Ac-228	3178.62	794.62	0.	12.	0.020	57.74	0.312s
Ac-228	3644.58	911.06	0.	68.	0.113	24.25	0.944s
Bi-214	3738.00	934.41	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	5.	10.	0.016	93.82	1.595D
Ac-228	3876.86	969.11	2.	24.	0.041	43.13	1.598D
Bi-214	4481.63	1120.23	0.	23.	0.038	41.70	0.500s
Bi-214	4955.42	1238.62	0.	12.	0.020	57.74	0.562s
Bi-214	5510.00	1377.19	0.	2.	0.003	141.42	0.250s
K-40	5845.37	1460.99	0.	43.	0.072	30.50	1.083s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7060.51	1764.59	3.	17.	0.029	60.08	0.489s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.9950E-04	609.31	3.976E-04	(	1.298E-05	G K
			1764.49	6.168E-04	+	2.435E-04	G
			1120.29	5.596E-04	+	1.776E-04	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	4.169E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.8932E-03	1460.81	1.893E-03	(	4.403E-05	G
Ac-228	N	7.3781E-04	911.07	7.489E-04	(	1.101E-05	G K
			969.11	4.733E-04	-	1.501E-04	G
			338.32	7.286E-04	(	8.174E-05	G
			964.60	5.940E-04	-	3.704E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	2.598E-04	&	2.339E-04	G
			209.28	6.207E-04	?(	1.403E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 14:11:46 Page 4
EnergySolutions Spectrum name: Win00218.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.093E-03	+	3.284E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	8.823E-04	(	1.107E-04	G
Pb-212	N 4.7694E-04	238.62	4.769E-04	(	1.853E-05	G K
		77.11	6.346E-04	+	8.805E-05	Energy duplication
		74.81	0.000E+00	%	1.057E-04	Energy duplication
CS-137	8.2200E-05	661.66	8.220E-05	?(	8.817E-06	G
Th-234	N 7.1487E-04	92.35	5.613E-04	(	1.551E-04	G
		63.29	9.335E-04	*(	2.566E-04	G

WI07-0347 D2 Bag# S-024 (Grid E1- 4, E2-1) 071607

```
Pb-214   N   3.5741E-04    351.92 3.574E-04  (  1.893E-05          G K
                           295.21 5.878E-04 +   9.736E-05          G
                            77.11 0.000E+00 ?   1.402E-04Energy duplication
                           241.98 4.835E-04 +   1.741E-04          G
                            74.81 1.290E-03 +   2.232E-04Energy duplication
                            87.30 1.328E-03 +   2.587E-04          X

Pb-210   N   7.5191E-04     46.50 7.519E-04  (  1.717E-04          G

AM-241       3.3186E-04     59.54 3.319E-04 @(  3.170E-05          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

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

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 14:11:46 Page 5
EnergySolutions Spectrum name: Win00218.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.2044E+00	2.735E-01	2.772E-01
K-40	5.7075E+00	1.741E+00	1.754E+00
Ac-228	2.2243E+00	4.963E-01	5.032E-01
Pb-212	1.4379E+00	2.253E-01	2.317E-01
CS-137 #	2.4781E-01	1.125E-01	1.129E-01
Th-234	2.1552E+00	1.032E+00	1.034E+00
Pb-214	1.0775E+00	2.677E-01	2.708E-01
Pb-210	2.2668E+00	1.377E+00	1.378E+00
AM-241 #	1.0005E+00	3.099E-01	3.121E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0347 D2 Bag# S-024 (Grid E1- 4, E2-1) 071607

& - 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 (2.7 to 1999.3 keV) 1.7321980E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0421 D2 Bag# S-025 (Grid D1~~0~~5,D2-2) 072007

RCY 7/20/07

```
     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 09:23:56 Page    1
EnergySolutions                  Spectrum name: Win00253.An1

Sample description
     WI07- 0421 Bag # S-025 grid D1-5, D2-2      072007


Spectrum Filename: C:\User\Win00253.An1

Acquisition information
       Start time:                  20-Jul-2007 09:05:38
       Live time:                 600
       Real time:                 603
       Dead time:                   0.42 %
       Detector ID:                     2

Detector system
     MCB 06325561


Calibration
       Filename:                    250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:                17-May-2007 15:02:20
            Zero offset:            0.187 keV
            Gain:                   0.250 keV/channel
            Quadratic:             -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:                17-May-2007 15:44:56
            Knee Energy:          140.00 keV
            Above the Knee:         Quadratic        Uncertainty =   2.56 %
            Log(Eff):              -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                    ( -5.539954E-02*Log(E)^2 )
            Below the Knee:         Quadratic        Uncertainty =   0.16 %
            Log(Eff):              -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                    ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:       Winnie.Lib
       Library Match Width:         0.500

Analysis parameters
       Analysis engine:             wan32   G53W2.06
       Start channel:              10 (     2.69keV )
       Stop channel:             8000 (  1999.30keV )
       Peak rejection level:      100.000%
       Peak search sensitivity:     4
       Sample Size:                 1.9600E+02
       Activity scaling factor:     1.0000E+06/(  1.0000E+00*  1.9600E+02) =
                                    5.1020E+03
       Detection limit method:      Traditional ORTEC method
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 09:23:56 Page    2
EnergySolutions                  Spectrum name: Win00253.An1
```

WI07-0421 D2 Bag# S-025 (Grid D105,D2-2) 072007

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1669

********** 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	
14.69	3.86	4662.	24164.	40.273	1.71	2.313	CU-64	s
69.79	17.63	93.	240.	0.400	20.62	1.197	MO-99	s
84.04	21.19	75.	230.	0.383	20.02	1.110	TC-99M	s
104.86	26.40	50.	324.	0.540	13.79	0.725	AM-241	
128.72	32.36	75.	331.	0.552	15.18	1.261	XE-138	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.04	46.69	402.	43.	0.072	154.08	0.519s
AM-241	237.64	59.59	1257.	19154.	31.923	1.62	0.932
Th-234	253.19	63.47	24.	37.	0.062	57.11	0.435s
Pb-214	298.54	74.81	46.	45.	0.076	51.45	0.917D
Pb-212	298.56	74.81	60.	0.	0.000	2200.00	0.216D
Pb-212	307.74	77.11	48.	69.	0.116	37.00	0.919D
Pb-214	307.74	77.11	142.	0.	0.000	133.76	0.610D
Pb-214	348.00	87.17	26.	36.	0.060	60.43	0.701
Th-234	368.72	92.35	30.	26.	0.043	72.65	0.933D
Ac-228	380.72	95.35	15.	5.	0.008	243.92	0.935D

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:23:56 Page 3
EnergySolutions Spectrum name: Win00253.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	835.34	208.98	9.	20.	0.034	67.99	0.330s
Pb-212	953.94	238.62	13.	103.	0.171	22.20	1.057D
Pb-214	967.37	241.98	18.	5.	0.008	264.10	1.060D
Ac-228	1078.16	269.67	6.	25.	0.042	56.00	0.417s
Pb-214	1180.65	295.29	7.	37.	0.062	44.74	0.364s

WI07-0421 D2 Bag# S-025 (Grid D105,D2-2) 072007

Ac-228	1307.40	326.97	6.	15.	0.025	83.27	0.222s
Ac-228	1353.00	338.36	8.	15.	0.025	83.27	0.289s
Pb-214	1407.45	351.97	6.	40.	0.066	39.25	0.867s
Ac-228	1849.50	462.45	0.	4.	0.007	100.00	1.000
Bi-214	2437.00	609.28	6.	0.	0.000	0.00	0.000s
CS-137	2645.61	661.42	0.	18.	0.030	47.14	0.550s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3174.00	793.47	0.	2.	0.003	141.42	0.250s
Ac-228	3646.83	911.63	0.	23.	0.038	41.70	0.583s
Bi-214	3738.00	934.41	1.	0.	0.000	260.34	0.000s
Ac-228	3858.81	964.60	0.	4.	0.006	108.55	1.595D
Ac-228	3876.86	969.11	1.	10.	0.016	72.74	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4954.00	1238.27	0.	1.	0.002	200.00	0.250s
Bi-214	5513.83	1378.15	1.	1.	0.001	339.93	0.339s
K-40	5846.43	1461.25	0.	35.	0.058	33.81	0.337s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7060.75	1764.65	0.	4.	0.007	100.00	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	1.860E-05	G K
			1764.49	1.423E-04	?	1.200E-04	G
			1120.29	0.000E+00	?	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.771E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.5410E-03	1460.81	1.541E-03	(	4.403E-05	G
Ac-228	N	2.1876E-04	911.07	2.533E-04	(	1.101E-05	G K
			969.11	1.876E-04	(	4.295E-05	G
			338.32	1.758E-04	?(	5.310E-05	G
			964.60	2.335E-04	(	8.188E-05	G

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:23:56 Page 4
EnergySolutions Spectrum name: Win00253.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	1.176E-04	&	1.506E-04	G
		463.00	1.559E-04	?(	3.898E-05	G
		209.28	4.302E-04	+	1.721E-04	G
		270.23	7.811E-04	&	2.621E-04	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.318E-04	X
		327.64	6.109E-04	&	2.851E-04	G
Pb-212 N	2.4420E-04	238.62	2.356E-04	(	1.314E-05	G K
		77.11	2.655E-04	(	3.933E-05	Energy duplication
		74.81	0.000E+00	%	7.427E-05	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G

```
                WI07-0421 D2 Bag# S-025 ( Grid D105,D2-2 )  072007
Th-234    N   4.7970E-04     92.35 3.193E-04  (  1.037E-04         G
                             63.29 7.081E-04  (  1.414E-04         G

Pb-214    N   1.7540E-04    351.92 1.463E-04 ?(  1.533E-05         G K
                            295.21 2.318E-04 ?(  2.678E-05         G
                             77.11 0.000E+00 ?   1.139E-04Energy duplication
                            241.98 0.000E+00 %   1.009E-04         G
                             74.81 5.070E-04 +   1.562E-04Energy duplication
                             87.30 5.224E-04 +   1.690E-04         X

Pb-210    N   8.8460E-04     46.50 8.846E-04 ?(  5.889E-04         G

AM-241        3.9441E-02     59.54 3.944E-02  (  1.043E-04         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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  20-JUL-2007 09:23:56 Page    5
EnergySolutions                    Spectrum name: Win00253.An1

   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   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214 B<     9.4907E-02
K-40          7.8621E+00    2.658E+00    2.674E+00
Ac-228        1.1161E+00    4.392E-01    4.412E-01
Pb-212        1.2459E+00    2.688E-01    2.728E-01
CS-137 #      2.4887E-01    1.173E-01    1.177E-01
Th-234        2.4475E+00    1.131E+00    1.132E+00
Pb-214        8.9488E-01    2.663E-01    2.684E-01
Pb-210 #C     4.5133E+00    6.954E+00    6.955E+00
AM-241        2.0123E+02    3.267E+00    8.134E+00
```

WI07-0421 D2 Bag# S-025 (Grid D105,D2-2) 072007

- 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 (2.7 to 1999.3 keV) 2.1955682E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Funn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0422 D2 Bag# S-026 (Grid D1~~0~~5,D2-2) 072007
SCS 7/20/07

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:47:52 Page 1
EnergySolutions Spectrum name: Win00254.An1

Sample description
WI07- 0422 Bag # S-026 grid D1-5, D2-2 072007

Spectrum Filename: C:\User\Win00254.An1

Acquisition information
Start time: 20-Jul-2007 09:37:39
Live time: 600
Real time: 603
Dead time: 0.45 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.0100E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.0100E+02) = 4.9751E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:47:52 Page 2
EnergySolutions Spectrum name: Win00254.An1

WI07-0422 D2 Bag# S-026 (Grid D105,D2-2) 072007

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1279

********** 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	
12.02	3.34	7725.	12781.	21.302	2.63	0.854	-	D
17.11	4.61	12778.	10143.	16.905	3.73	0.855	-	D
69.90	17.66	83.	328.	0.547	15.31	0.797	MO-99	s
83.98	21.18	74.	251.	0.419	18.38	1.231	TC-99M	s
105.10	26.46	63.	386.	0.643	13.09	0.851	AM-241	
128.53	32.31	59.	211.	0.352	19.54	1.034	XE-138	s
198.19	49.73	1686.	669.	1.115	25.24	1.459	EU-155	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.35	46.52	708.	0.	0.000	0.00	0.893
AM-241	237.64	59.59	1560.	22314.	37.190	1.53	0.863
Th-234	252.00	63.18	20.	23.	0.038	78.33	0.485s
Pb-214	298.54	74.81	32.	36.	0.060	55.85	0.917D
Pb-212	298.56	74.81	44.	0.	0.000	1886.80	0.000D
Pb-212	307.74	77.11	36.	53.	0.089	42.01	0.919D
Pb-214	307.74	77.11	57.	0.	0.000	191.85	0.706D
Pb-214	348.50	87.30	17.	27.	0.044	61.44	0.916

0

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:47:52 Page 3
EnergySolutions Spectrum name: Win00254.Anl

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	370.86	92.88	28.	42.	0.070	55.40	0.989s
Ac-228	380.72	95.35	6.	0.	0.000	0.00	0.000D
Ac-228	834.85	208.86	9.	16.	0.026	87.31	1.048
Pb-212	953.94	238.62	12.	106.	0.177	21.40	1.057D
Pb-214	967.37	241.98	30.	11.	0.018	156.29	1.060D

WI07-0422 D2 Bag# S-026 (Grid D105,D2-2) 072007

Ac-228	1082.33	270.71	3.	21.	0.036	52.29	1.118
Pb-214	1180.66	295.29	0.	39.	0.065	32.03	0.687s
Ac-228	1305.12	326.40	4.	20.	0.032	68.23	0.589s
Ac-228	1352.88	338.33	3.	33.	0.055	40.66	0.359s
Pb-214	1407.64	352.02	5.	42.	0.069	37.56	1.385s
Ac-228	1852.00	463.08	0.	16.	0.027	50.00	0.750s
Bi-214	2437.64	609.44	2.	26.	0.043	45.06	0.717s
CS-137	2647.06	661.78	0.	18.	0.030	47.14	0.365s
Bi-214	3075.00	768.73	0.	4.	0.007	100.00	0.250s
Ac-228	3178.60	794.62	0.	8.	0.013	70.71	0.500s
Ac-228	3648.67	912.09	0.	18.	0.030	47.14	0.250s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.375D
Ac-228	3876.67	969.06	4.	2.	0.002	476.10	0.177s
Bi-214	4484.00	1120.82	0.	3.	0.005	115.47	0.750s
Bi-214	4954.50	1238.39	0.	6.	0.010	81.65	0.750s
Bi-214	5513.50	1378.07	0.	2.	0.003	141.42	0.500s
K-40	5844.18	1460.69	0.	16.	0.027	50.00	1.124s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3465E-04	609.31	1.194E-04	?(	1.264E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	7.300E-05	-	7.300E-05	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	2.084E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 20-JUL-2007 09:47:52 Page 4
EnergySolutions Spectrum name: Win00254.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	2.1650E-04	911.07	1.982E-04	&(	1.101E-05	G K
			969.11	0.000E+00	%	7.767E-05	G
			338.32	3.867E-04	+	1.055E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	4.704E-04	+	2.664E-04	G
			463.00	6.236E-04	+	2.408E-04	G
			209.28	3.315E-04	?(	1.026E-04	G
			270.23	6.665E-04	+	2.326E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	7.424E-05	X
			327.64	7.941E-04	&	3.032E-04	G
Pb-212	N	2.3273E-04	238.62	2.445E-04	(	1.229E-05	G K
			77.11	2.036E-04	(	3.437E-05	Energy duplication
			74.81	0.000E+00	%	6.409E-05	Energy duplication

WI07-0422 D2 Bag# S-026 (Grid D105,D2-2) 072007

CS-137		4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G	
Th-234	N	4.8729E-04	92.35	5.240E-04	&(	9.981E-05	G	
			63.29	4.350E-04	?(	1.309E-04	G	
Pb-214	N	1.8078E-04	351.92	1.543E-04	(	1.409E-05	G K	
			295.21	2.443E-04	(	6.264E-06	G	
			77.11	0.000E+00	?	7.343E-05	Energy duplication	
			241.98	1.493E-04	(	1.146E-04	G	
			74.81	4.000E-04	+	1.359E-04	Energy duplication	
			87.30	3.870E-04	+	1.436E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00		7.783E-04	G	
AM-241		4.5948E-02	59.54	4.595E-02	(	1.161E-04	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

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 pCi/g	2 Sigma Total pCi/g
Bi-214	#	6.6990E-01	3.019E-01	3.029E-01
K-40	#	3.5047E+00	1.752E+00	1.757E+00
Ac-228		1.0771E+00	5.078E-01	5.094E-01
Pb-212		1.1579E+00	2.478E-01	2.516E-01
CS-137	#	2.4268E-01	1.144E-01	1.148E-01
Th-234	#	2.4243E+00	1.163E+00	1.164E+00
Pb-214		8.9938E-01	2.880E-01	2.900E-01

WI07-0422 D2 Bag# S-026 (Grid D105,D2-2) 072007

Pb-210	<	3.8721E+00		
AM-241		2.2860E+02	3.494E+00	9.155E+00

- 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 (2.7 to 1999.3 keV) 2.3857104E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0423 D2 Bag# S-027 (Grid D2-1,3) 072107

Sample description
WI07- 0423 D2 Bag# S-027 Grid D2-1,3 072107

Spectrum Filename: C:\User\Win00261.An1

Acquisition information
Start time: 21-Jul-2007 08:56:08
Live time: 600
Real time: 602
Dead time: 0.38 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7520E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7520E+02) = 2.6652E+03
Detection limit method: Traditional ORTEC method

0

WI07-0423 D2 Bag# S-027 (Grid D2-1,3) 072107

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0660

********** 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	
11.86	2.90	3250.	10743.	17.905	2.44	0.854	-	D
16.88	4.16	15425.	9878.	16.464	4.09	0.855	-	D
83.59	21.08	70.	78.	0.130	50.07	0.651	TC-99M	s
104.58	26.33	32.	138.	0.231	22.93	0.688	U-237	s
128.17	32.22	80.	120.	0.200	33.33	0.960	XE-138	s
197.77	49.56	858.	237.	0.394	37.35	0.895	EU-155	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.28	46.50	365.	5.	0.008	1182.40	0.893D
AM-241	237.61	59.58	1064.	11991.	19.985	2.14	0.976
Th-234	253.52	63.56	69.	67.	0.112	55.28	1.071s
Pb-214	298.54	74.81	71.	122.	0.203	26.62	0.917D
Pb-212	298.56	74.81	141.	0.	0.000	3003.79	0.633D
Pb-212	307.74	77.11	63.	202.	0.337	17.90	0.919D
Pb-214	307.74	77.11	293.	0.	0.000	72.58	0.000D
Pb-214	349.05	87.43	56.	75.	0.125	43.14	0.656s
Th-234	368.72	92.35	53.	55.	0.092	45.83	0.933D

0

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EnergySolutions Spectrum name: Win00261.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	29.	9.	0.015	187.21	0.935D
Ac-228	830.02	207.65	38.	24.	0.041	114.79	0.450s
Pb-212	953.94	238.62	15.	190.	0.316	15.65	1.057D
Pb-214	967.37	241.98	22.	41.	0.068	45.46	1.060D
Ac-228	1079.00	269.88	20.	10.	0.017	159.16	0.000s

WI07-0423 D2 Bag# S-027 (Grid D2-1,3) 072107

Pb-214	1181.00	295.38	15.	76.	0.127	31.53	1.292s
Ac-228	1313.11	328.39	10.	28.	0.047	61.08	0.594s
Ac-228	1353.32	338.45	12.	76.	0.126	31.35	0.485s
Pb-214	1407.39	351.96	3.	135.	0.224	18.14	0.994s
Ac-228	1852.55	463.22	3.	27.	0.045	46.26	0.321s
Bi-214	2437.26	609.35	3.	96.	0.161	21.39	0.519s
CS-137	2646.70	661.69	3.	28.	0.047	44.36	0.769s
Bi-214	3073.80	768.43	0.	5.	0.008	89.44	0.375s
Ac-228	3179.00	794.72	2.	0.	0.001	331.66	0.000s
Ac-228	3644.80	911.12	0.	51.	0.085	28.01	0.937s
Bi-214	3736.14	933.95	0.	7.	0.012	75.59	0.500s
Ac-228	3854.00	963.40	0.	11.	0.018	60.30	0.250s
Ac-228	3876.86	969.11	19.	0.	0.000	0.00	1.598
Bi-214	4483.83	1120.78	0.	24.	0.040	40.82	0.375s
Bi-214	4954.00	1238.27	0.	6.	0.010	81.65	0.500s
Bi-214	5507.75	1376.63	4.	2.	0.003	336.65	0.215s
K-40	5845.60	1461.05	0.	50.	0.083	28.28	1.249s
Ac-228	6357.33	1588.90	0.	6.	0.010	81.65	0.250s
Bi-214	7059.10	1764.23	0.	12.	0.020	57.74	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.3952E-04	609.31	4.480E-04	?(	1.331E-05	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	2.606E-04	-	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	&	4.328E-04	G
			934.06	6.802E-04	+	4.154E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	(	4.403E-05	G
Ac-228	N	5.7292E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.296E-04	G
			338.32	8.848E-04	+	1.614E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	6.790E-04	&(	6.173E-05	G
		794.70	0.000E+00	%	1.506E-04	G
		463.00	1.052E-03	+	3.220E-04	G
		209.28	5.184E-04	&(	1.966E-04	G
		270.23	3.124E-04	-	2.581E-04	G
		1588.00	8.715E-04	+	5.810E-04	G
		95.35	1.687E-04	-	1.778E-04	X
		327.64	1.161E-03	&	3.806E-04	G
Pb-212	N 4.3597E-04	238.62	4.360E-04	(	1.391E-05	G K
		77.11	7.743E-04	+	9.007E-05	Energy duplication
		74.81	0.000E+00	%	1.121E-04	Energy duplication
CS-137	7.6329E-05	661.66	7.633E-05	?(	7.947E-06	G

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Th-234    N   9.3205E-04     92.35 6.902E-04  (  1.345E-04          G
                             63.29 1.276E-03 *(  2.335E-04          G

Pb-214    N   4.9999E-04    351.92 4.988E-04 *(  1.159E-05          G K
                            295.21 4.782E-04 *(  3.720E-05          G
                             77.11 0.000E+00 ?   1.623E-04Energy duplication
                            241.98 5.620E-04  (  9.962E-05          G
                             74.81 1.362E-03 +   2.249E-04Energy duplication
                             87.30 1.088E-03 +   2.422E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   5.654E-04          G

AM-241        2.4691E-02     59.54 2.469E-02  (  9.602E-05          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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
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     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 09:06:19 Page    5
 EnergySolutions                    Spectrum name: Win00261.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	1.1714E+00	2.505E-01	2.543E-01
K-40	5.8672E+00	1.660E+00	1.674E+00
Ac-228	1.5270E+00	4.276E-01	4.315E-01
Pb-212	1.1620E+00	1.818E-01	1.870E-01
CS-137 #	2.0343E-01	9.024E-02	9.058E-02
Th-234	2.4841E+00	8.919E-01	8.938E-01
Pb-214	1.3326E+00	2.417E-01	2.468E-01
Pb-210 <	1.5070E+00		

WI07-0423 D2 Bag# S-027 (Grid D2-1,3) 072107

AM-241	6.5808E+01	1.407E+00	2.813E+00

- 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 (2.7 to 1999.3 keV) 7.9555672E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Luna
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0424 D2 Bag# S-028 (Grid C2-2,D2-3) 072107

Sample description
WI07- 0424 D2 Bag# S-028 -Grid C2-2, D2-3 072107

Spectrum Filename: C:\User\Win00257.An1

Acquisition information
Start time: 21-Jul-2007 07:55:07
Live time: 600
Real time: 602
Dead time: 0.31 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4440E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4440E+02) = 2.9036E+03
Detection limit method: Traditional ORTEC method

0

WI07-0424 D2 Bag# S-028 (Grid C2-2,D2-3) 072107

Ac-228	1353.18	338.41	5.	24.	0.041	51.91	0.908
Pb-214	1407.08	351.88	4.	38.	0.063	37.22	1.142
Ac-228	1846.12	461.61	0.	18.	0.030	47.14	0.375s
Bi-214	2436.40	609.13	0.	30.	0.050	36.51	1.021s
CS-137	2646.30	661.59	0.	13.	0.022	55.47	0.416s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.72	1.	0.	0.000	0.00	0.000s
Ac-228	3645.04	911.18	0.	26.	0.043	39.22	0.344s
Bi-214	3734.00	933.41	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	0.	8.	0.013	72.18	1.595D
Ac-228	3876.86	969.11	2.	17.	0.029	51.85	1.598D
Bi-214	4482.67	1120.49	0.	9.	0.015	66.67	0.312s
Bi-214	4953.00	1238.02	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5846.13	1461.18	0.	45.	0.075	29.81	0.516s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7055.00	1763.21	0.	3.	0.005	115.47	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3118E-04	609.31	1.395E-04	(	4.650E-06	G K
			1764.49	1.068E-04	&(	3.558E-05	G
			1120.29	2.190E-04	+	1.161E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	(	4.403E-05	G
Ac-228	N	3.3801E-04	911.07	2.863E-04	?(	1.101E-05	G K
			969.11	3.393E-04	(	4.499E-05	G
			338.32	2.852E-04	?(	4.214E-05	G
			964.60	4.871E-04	(	7.312E-05	G
			794.70	0.000E+00	?	1.176E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.016E-04	&	2.542E-04	G
		209.28	4.867E-04	&(	1.058E-04	G
		270.23	4.999E-04	?(	8.003E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.664E-04	X
		327.64	8.416E-04	&	3.203E-04	G
Pb-212	N 1.7133E-04	238.62	1.713E-04	(	1.221E-05	G K
		77.11	2.611E-04	+	5.873E-05	Energy duplication
		74.81	0.000E+00	%	7.930E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 3.7295E-04	92.35	2.424E-04	(	1.056E-04	G

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                WI07-0424 D2 Bag# S-028 ( Grid C2-2,D2-3 )  072107
                                63.29 5.588E-04 $(  1.684E-04          G

Pb-214    N   1.4136E-04     351.92 1.407E-04  (  1.249E-05          G K
                             295.21 2.443E-04 +   5.855E-05          G
                              77.11 0.000E+00 ?   7.565E-05Energy duplication
                             241.98 1.444E-04  (  1.021E-04          G
                              74.81 7.152E-04 +   1.533E-04Energy duplication
                              87.30 2.805E-04 +   1.466E-04          X

Pb-210    N   7.3490E-04      46.50 7.349E-04 &(  5.070E-04          G

AM-241        1.2849E-02      59.54 1.285E-02  (  6.537E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 08:05:19 Page    5
 EnergySolutions                  Spectrum name: Win00257.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	3.8089E-01	1.391E-01	1.398E-01
K-40	5.7528E+00	1.715E+00	1.729E+00
Ac-228	9.8144E-01	2.311E-01	2.340E-01
Pb-212	4.9747E-01	1.317E-01	1.331E-01
CS-137 #	1.0229E-01	5.674E-02	5.687E-02
Th-234	1.0829E+00	6.679E-01	6.684E-01
Pb-214	4.1044E-01	1.528E-01	1.535E-01
Pb-210 C	2.1338E+00	3.970E+00	3.970E+00
AM-241	3.7308E+01	1.071E+00	1.748E+00

WI07-0424 D2 Bag# S-028 (Grid C2-2,D2-3) 072107

- 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 (2.7 to 1999.3 keV) 4.8650455E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0425 D2 RCA East Access 072107

Sample description
WI07- 0425 D2 RCA East Access 072107

Spectrum Filename: C:\User\Win00258.An1

Acquisition information
Start time: 21-Jul-2007 08:10:41
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.0640E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.0640E+02) = 4.8450E+03
Detection limit method: Traditional ORTEC method

WI07-0425 D2 RCA East Access 072107

Random error:	1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0861

********** 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	
11.70	2.90	3557.	10428.	17.380	2.54	0.854	-	D
16.80	4.17	15427.	9049.	15.081	4.42	0.855	-	D
105.32	26.51	17.	80.	0.134	30.75	0.731	AM-241	

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.85	46.39	121.	37.	0.062	105.35	1.136s
AM-241	237.63	59.59	303.	4076.	6.793	3.55	0.895
Th-234	252.24	63.24	28.	26.	0.043	84.03	1.233s
Pb-214	298.54	74.81	25.	31.	0.052	58.10	0.918D
Pb-212	298.56	74.81	44.	0.	0.000	850.21	0.241D
Pb-212	307.74	77.11	34.	56.	0.094	39.37	0.920D
Pb-214	307.74	77.11	84.	0.	0.000	403.11	0.336D
Pb-214	348.33	87.25	10.	27.	0.045	54.26	1.083
Th-234	371.30	92.99	35.	28.	0.047	88.01	0.908
Ac-228	380.72	95.35	4.	0.	0.000	0.00	0.000D
Ac-228	838.35	209.73	2.	6.	0.009	115.57	0.458s
Pb-212	953.94	238.62	9.	74.	0.123	26.05	1.057D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 08:20:53 Page 3
EnergySolutions Spectrum name: Win00258.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	17.	12.	0.019	117.53	1.060D
Ac-228	1080.51	270.26	4.	23.	0.039	55.74	0.319s
Pb-214	1180.29	295.20	2.	30.	0.050	40.00	0.500s
Ac-228	1312.05	328.13	3.	13.	0.022	74.46	0.948s
Ac-228	1354.05	338.63	2.	24.	0.039	48.33	0.296s

Pb-214	1406.73	351.79	2.	35.	0.058	36.59	1.094
Ac-228	1852.00	463.08	1.	0.	0.000	0.00	0.000s
Bi-214	2436.72	609.21	0.	32.	0.053	35.36	0.437s
CS-137	2648.50	662.14	0.	20.	0.033	44.72	0.416s
Bi-214	3072.50	768.10	0.	2.	0.003	141.42	0.500s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3646.83	911.63	7.	0.	0.000	0.00	0.195s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.375D
Ac-228	3877.00	969.14	1.	0.	0.000	0.00	0.000s
Bi-214	4479.00	1119.58	0.	8.	0.013	70.71	0.750s
Bi-214	4953.00	1238.02	0.	3.	0.005	115.47	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.65	0.	22.	0.037	42.64	1.499
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7061.50	1764.83	0.	4.	0.007	100.00	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5981E-04	609.31	1.488E-04	(	4.650E-06	G K
			1764.49	1.423E-04	?(	3.558E-05	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	2.034E-04	?(	6.779E-05	G
			768.36	1.042E-04	-	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	9.6861E-04	1460.81	9.686E-04	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	4.708E-05	G K
			969.11	0.000E+00	?	3.884E-05	G
			338.32	2.754E-04	*	9.057E-05	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	?	7.795E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.199E-04	?	9.588E-05	G
		270.23	7.238E-04	*	2.457E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	?	6.496E-05	X
		327.64	5.362E-04	*	2.516E-04	G
Pb-212	N 1.8305E-04	238.62	1.697E-04	(	1.114E-05	G K
		77.11	2.162E-04	(	3.332E-05	Energy duplication
		74.81	0.000E+00	%	6.431E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 4.1202E-04	92.35	3.535E-04	&(	1.103E-04	G
		63.29	4.953E-04	?(	1.524E-04	G

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Pb-214    N   1.5074E-04     351.92 1.296E-04  (  9.487E-06          G K
                             295.21 1.879E-04  (  1.605E-05          G
                              77.11 0.000E+00 %   8.841E-05Energy duplication
                             241.98 1.603E-04  (  8.879E-05          G
                              74.81 3.482E-04 +   1.245E-04Energy duplication
                              87.30 3.918E-04 +   1.323E-04          X

Pb-210    N   7.5531E-04      46.50 7.553E-04  (  3.279E-04          G

AM-241        8.3927E-03      59.54 8.393E-03  (  5.174E-05          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

   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
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 08:20:53 Page    5
 EnergySolutions                    Spectrum name: Win00258.An1

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

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***** 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
Bi-214	7.7426E-01	2.737E-01	2.753E-01
K-40 #	4.6929E+00	2.001E+00	2.009E+00
Ac-228 B<	2.2810E-01		
Pb-212	8.8687E-01	2.093E-01	2.120E-01
CS-137 #	2.6259E-01	1.174E-01	1.179E-01
Th-234	1.9962E+00	1.215E+00	1.215E+00
Pb-214	7.3035E-01	2.672E-01	2.686E-01
Pb-210	3.6595E+00	3.855E+00	3.856E+00
AM-241	4.0662E+01	1.444E+00	2.086E+00

- All peaks for activity calculation had bad shape.

WI07-0425 D2 RCA East Access 072107

* - 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 (2.7 to 1999.3 keV) 5.3664959E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA 062507

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    1
EnergySolutions                  Spectrum name: WI000114.An1

Sample description
     WI07-0104 D2 IS RCA 062507


Spectrum Filename: C:\User\WI000114.An1

Acquisition information
       Start time:                 25-Jun-2007 08:38:00
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8640E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8640E+02) =
                                   3.4916E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    2
EnergySolutions                  Spectrum name: WI000114.An1
```

WI07-0104 D2 IS RCA 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1903

********** 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	
14.53	3.82	4707.	22189.	36.982	1.83	2.140	CU-64	s
105.55	26.57	19.	70.	0.117	32.74	0.694	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.48	46.55	127.	37.	0.062	103.76	0.921
AM-241	237.51	59.56	295.	4480.	7.467	3.34	0.920
Th-234	252.45	63.29	24.	28.	0.047	76.93	0.323s
Pb-214	298.54	74.81	35.	13.	0.022	139.40	0.917D
Pb-212	298.56	74.81	20.	0.	0.000	331.66	0.359D
Pb-212	307.74	77.11	27.	43.	0.072	45.51	0.919D
Pb-214	307.74	77.11	73.	0.	0.000	173.12	0.000D
Pb-214	347.32	87.00	14.	22.	0.037	75.33	0.812
Th-234	368.72	92.35	13.	25.	0.042	56.37	0.933D
Ac-228	380.72	95.35	23.	6.	0.010	246.13	0.935D
Ac-228	836.00	209.15	1.	0.	0.000	0.00	0.000s
Pb-212	953.94	238.62	11.	19.	0.032	66.78	1.057D
Pb-214	967.37	241.98	11.	18.	0.029	72.68	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1076.67	269.30	0.	18.	0.030	47.14	0.812s
Pb-214	1179.38	294.97	0.	39.	0.065	32.03	0.646s
Ac-228	1300.33	325.20	0.	11.	0.018	60.30	0.375s
Ac-228	1348.00	337.11	0.	15.	0.025	51.64	0.250s
Pb-214	1407.02	351.87	0.	47.	0.078	29.17	1.312

Ac-228	1851.50	462.95	0.	2.	0.003	141.42	0.500s
Bi-214	2436.00	609.03	0.	33.	0.055	34.82	0.537s
CS-137	2647.00	661.77	1.	0.	0.000	0.00	0.000s
Bi-214	3071.83	767.93	0.	6.	0.010	81.65	0.500s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3643.67	910.84	0.	3.	0.005	115.47	0.375s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	2.	0.004	249.63	1.595D
Ac-228	3876.86	969.11	2.	2.	0.004	214.68	1.598D
Bi-214	4480.06	1119.84	0.	17.	0.028	48.51	0.364s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5844.56	1460.78	0.	9.	0.015	66.67	0.375s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5346E-04	609.31	1.535E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.127E-04	+	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.9625E-04	1460.81	3.962E-04	?(	4.403E-05	G
Ac-228	N	1.3360E-04	911.07	3.304E-05	?(	1.101E-05	G K
			969.11	0.000E+00	%	6.548E-05	G
			338.32	1.758E-04	&(	1.172E-05	G
			964.60	0.000E+00	%	2.268E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	7.795E-05	?(	3.898E-05	G
			209.28	0.000E+00	?	4.232E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.624E-04	&(	3.124E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.566E-04	X
		327.64	4.480E-04	&(	4.072E-05	G
Pb-212	N 4.3996E-05	238.62	4.400E-05	(	1.192E-05	G K
		77.11	1.659E-04	+	4.734E-05	Energy duplication
		74.81	0.000E+00	%	4.433E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 4.0542E-04	92.35	3.155E-04	(	6.957E-05	G
		63.29	5.334E-04	*(	1.419E-04	G

```
                                WI07-0104 D2 IS RCA 062507
Pb-214    N   2.0316E-04     351.92 1.741E-04  (  3.704E-06          G K
                             295.21 2.443E-04 *(  6.264E-06          G
                              77.11 0.000E+00 ?   8.283E-05Energy duplication
                             241.98 2.421E-04  (  7.356E-05          G
                              74.81 1.458E-04 -   1.151E-04Energy duplication
                              87.30 3.192E-04 +   1.306E-04          X

Pb-210    N   7.6212E-04      46.50 7.621E-04 ?(  3.353E-04          G

AM-241        9.2256E-03      59.54 9.226E-03  (  5.103E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    5
EnergySolutions                    Spectrum name: WI000114.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #      5.3584E-01    1.866E-01    1.876E-01
K-40   #      1.3836E+00    9.224E-01    9.238E-01
Ac-228 #      4.6649E-01    1.909E-01    1.917E-01
Pb-212        1.5362E-01    1.026E-01    1.027E-01
CS-137   <    1.8924E-02
Th-234        1.4156E+00    6.750E-01    6.758E-01
Pb-214        7.0934E-01    2.001E-01    2.018E-01
Pb-210 #      2.6610E+00    2.761E+00    2.762E+00
AM-241        3.2212E+01    1.077E+00    1.607E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0104 D2 IS RCA 062507

& - 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 (2.7 to 1999.3 keV) 3.9537811E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA QC 061307

Sample description
WI07-0104 D2 IS RCS QC 061307

Spectrum Filename: C:\User\WI000078.An1

Acquisition information
Start time: 13-Jun-2007 14:31:05
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8480E+02) = 3.5112E+03
Detection limit method: Traditional ORTEC method

WI07-0104 D2 IS RCA QC 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0620

********** 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	
14.75	3.87	5409.	25087.	41.812	1.72	2.286	CU-64	s
96.55	24.32	720.	97.	0.162	92.60	0.432	SN-113	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.35	46.02	142.	20.	0.033	174.36	0.273s
AM-241	237.34	59.51	411.	4539.	7.565	3.46	0.984
Th-234	251.92	63.16	38.	24.	0.041	94.35	0.292s
Pb-214	298.54	74.81	44.	29.	0.048	75.02	0.917D
Pb-212	298.56	74.81	34.	0.	0.000	247.44	0.638D
Pb-212	307.74	77.11	40.	43.	0.072	51.60	0.919D
Pb-214	307.74	77.11	55.	0.	0.000	778.52	0.000D
Pb-214	348.85	87.38	25.	26.	0.043	81.95	0.761s
Th-234	368.72	92.35	28.	17.	0.029	98.19	0.933D
Ac-228	380.72	95.35	16.	10.	0.017	130.92	0.935D
Ac-228	839.44	210.01	6.	2.	0.004	355.18	0.257s
Pb-212	953.94	238.62	4.	39.	0.066	34.74	1.057D
Pb-214	967.37	241.98	4.	20.	0.033	54.32	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.96	270.37	4.	4.	0.007	154.49	0.237s
Pb-214	1180.21	295.18	5.	30.	0.049	47.30	1.305s
Ac-228	1309.33	327.45	1.	0.	0.001	240.37	0.197s
Ac-228	1350.00	337.61	2.	3.	0.005	182.62	0.086s
Pb-214	1407.19	351.91	4.	44.	0.072	35.39	0.821s

Ac-228	1851.62	462.99	1.	1.	0.001	339.93	0.375s
Bi-214	2437.48	609.40	0.	31.	0.052	35.92	1.687s
CS-137	2647.50	661.89	0.	4.	0.007	100.00	0.500s
Bi-214	3074.00	768.48	0.	7.	0.012	75.59	0.250s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3645.33	911.25	0.	10.	0.017	63.25	0.292s
Bi-214	3736.67	934.08	1.	1.	0.001	366.67	0.181s
Ac-228	3857.00	964.15	0.	0.	0.000	0.00	0.000s
Ac-228	3876.86	969.11	3.	0.	0.000	0.00	1.598
Bi-214	4476.00	1118.83	0.	7.	0.012	75.59	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5844.33	1460.73	0.	6.	0.010	81.65	0.375s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7059.00	1764.21	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5060E-04	609.31	1.442E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	1.703E-04	&(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.648E-04	+	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	2.6417E-04	1460.81	2.642E-04	?(	4.403E-05	G
Ac-228	N	1.2140E-04	911.07	1.101E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	5.627E-05	G
			338.32	3.711E-05	&	4.338E-05	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	9.984E-05	G
			209.28	0.000E+00	&	9.588E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.406E-04	?(	9.974E-05	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.909E-04	(	1.193E-04	X
		327.64	0.000E+00	%	8.145E-05	G
Pb-212	N 9.0356E-05	238.62	9.036E-05	(	7.478E-06	G K
		77.11	1.646E-04	+	5.128E-05	Energy duplication
		74.81	0.000E+00	&	5.675E-05	Energy duplication
CS-137	1.0840E-05	661.66	1.084E-05	?(	2.710E-06	G
Th-234	N 3.1981E-04	92.35	2.166E-04	(	9.921E-05	G
		63.29	4.667E-04	(	1.770E-04	G

WI07-0104 D2 IS RCA QC 061307

Pb-214	N	1.6953E-04	351.92	1.611E-04	(	1.182E-05		G K
			295.21	1.858E-04	*(	2.383E-05		G
			77.11	0.000E+00	%	7.209E-05	Energy duplication	
			241.98	2.704E-04	+	1.027E-04		G
			74.81	3.220E-04	+	1.405E-04	Energy duplication	
			87.30	3.773E-04	+	1.540E-04		X
Pb-210	N	4.0828E-04	46.50	4.083E-04	?(	3.544E-04		G
AM-241		9.3464E-03	59.54	9.346E-03	(	6.008E-05		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

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

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:41:17 Page 5
EnergySolutions Spectrum name: WI000078.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.2879E-01	1.899E-01	1.910E-01
K-40 #	9.2755E-01	7.573E-01	7.581E-01
Ac-228	4.2628E-01	2.696E-01	2.701E-01
Pb-212	3.1726E-01	1.102E-01	1.109E-01
CS-137 #	3.8060E-02	3.806E-02	3.809E-02
Th-234	1.1229E+00	7.646E-01	7.650E-01
Pb-214	5.9526E-01	1.758E-01	1.772E-01
Pb-210 #C	1.4336E+00	2.499E+00	2.500E+00
AM-241	3.2818E+01	1.137E+00	1.664E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0104 D2 IS RCA QC 061307

& - 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 (2.7 to 1999.3 keV) 3.8207207E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA QC 062507

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    1
EnergySolutions                 Spectrum name: WI000114.An1

Sample description
     WI07-0104 D2 IS RCA QC 062507


Spectrum Filename: C:\User\WI000114.An1

Acquisition information
       Start time:                 25-Jun-2007 09:32:17
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8470E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8470E+02) =
                                   3.5125E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    2
EnergySolutions                 Spectrum name: WI000114.An1
```

WI07-0104 D2 IS RCA QC 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0536

********** 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
11.64	2.91	5247.	10526.	17.544	2.75	0.854	- D
16.81	4.20	14729.	7468.	12.447	5.15	0.855	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.00	45.93	108.	12.	0.019	297.20	0.000s
AM-241	237.60	59.58	298.	3712.	6.186	3.75	0.921
Th-234	252.94	63.41	45.	47.	0.078	64.11	1.039s
Pb-214	298.54	74.81	41.	67.	0.112	36.23	0.917D
Pb-212	298.56	74.81	63.	0.	0.000	329.50	0.750D
Pb-212	307.74	77.11	36.	98.	0.163	26.62	0.919D
Pb-214	307.74	77.11	123.	0.	0.000	190.20	0.244D
Pb-214	347.44	87.03	37.	41.	0.069	65.61	0.385s
Th-234	370.47	92.79	21.	72.	0.120	33.10	0.766s
Ac-228	381.32	95.50	12.	0.	0.000	0.00	0.935
Ac-228	838.42	209.75	12.	33.	0.055	54.55	0.951s
Pb-212	953.94	238.62	19.	122.	0.203	20.76	1.057D
Pb-214	967.37	241.98	26.	34.	0.057	53.64	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.42	270.49	4.	27.	0.045	49.77	0.397s
Pb-214	1179.73	295.06	9.	54.	0.091	36.91	0.854s
Ac-228	1310.57	327.76	5.	8.	0.013	115.47	0.881
Ac-228	1351.78	338.06	4.	34.	0.058	41.09	2.116s
Pb-214	1407.17	351.90	4.	81.	0.134	25.26	1.264s

Ac-228	1852.00	463.08	1.	0.	0.000	0.00	0.000s
Bi-214	2437.09	609.31	4.	58.	0.097	29.78	0.992s
CS-137	2647.00	661.77	3.	0.	0.000	0.00	0.000s
Bi-214	3067.17	766.77	0.	10.	0.017	63.25	0.375s
Ac-228	3177.33	794.30	0.	7.	0.012	75.59	0.250s
Ac-228	3643.83	910.88	0.	23.	0.038	41.70	0.750s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	0.	3.	0.004	142.44	1.595D
Ac-228	3876.86	969.11	4.	7.	0.012	102.69	1.598D
Bi-214	4478.67	1119.49	0.	10.	0.017	63.25	0.375s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5845.00	1460.90	6.	3.	0.005	282.84	0.000s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.67	1764.38	0.	9.	0.015	66.67	0.292s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7583E-04	609.31	2.713E-04	(	1.513E-05	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	5.211E-04	&	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.101E-04	G
Ac-228	N	3.1048E-04	911.07	2.533E-04	(	1.101E-05	G K
			969.11	1.443E-04	-	1.013E-04	G
			338.32	4.043E-04	*(	3.742E-05	G
			964.60	1.600E-04	-	1.852E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	0.000E+00	?	7.795E-05	G
			209.28	6.983E-04	+	2.116E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.488E-04	+	2.621E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.045E-04	X
		327.64	3.258E-04	(	1.507E-04	G
Pb-212	N 2.8009E-04	238.62	2.801E-04	(	1.541E-05	G K
		77.11	3.752E-04	+	6.464E-05	Energy duplication
		74.81	0.000E+00	%	7.602E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	8.130E-06	G
Th-234	N 8.9712E-04	92.35	8.983E-04	*(	8.734E-05	G
		63.29	8.954E-04	*(	1.905E-04	G

```
                                WI07-0104 D2 IS RCA QC 062507
Pb-214    N    3.1293E-04     351.92 2.988E-04 @(  1.291E-05          G K
                              295.21 3.404E-04 @(  2.940E-05          G
                               77.11 0.000E+00 ?   1.063E-04Energy duplication
                              241.98 4.768E-04 +   1.585E-04          G
                               74.81 7.532E-04 +   1.701E-04Energy duplication
                               87.30 5.974E-04 +   1.886E-04          X

Pb-210    N    0.0000E+00      46.50 0.000E+00 &   3.266E-04          G

AM-241         7.6425E-03      59.54 7.642E-03  (  5.127E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    5
EnergySolutions                     Spectrum name: WI000114.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
              pCi/g           pCi/g        pCi/g

Bi-214        9.6885E-01    2.885E-01    2.908E-01
K-40    <     7.3797E-01
Ac-228        1.0905E+00    4.087E-01    4.108E-01
Pb-212        9.8381E-01    2.043E-01    2.076E-01
CS-137  <     2.8555E-02
Th-234 #      3.1511E+00    1.043E+00    1.046E+00
Pb-214        1.0991E+00    2.458E-01    2.492E-01
Pb-210  <     1.1472E+00
AM-241        2.6844E+01    1.008E+00    1.415E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0104 D2 IS RCA QC 062507

& - 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 (2.7 to 1999.3 keV) 3.4137466E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D1 IS RCA 062507

Sample description
WI07-0104 D1 IS RCA 062507

Spectrum Filename: C:\User\Win00099.An1

Acquisition information
Start time: 25-Jun-2007 09:17:50
Live time: 600
Real time: 603
Dead time: 0.47 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8640E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8640E+02) = 3.4916E+03
Detection limit method: Traditional ORTEC method

WI07-0104 D1 IS RCA 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1583

********** 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	
28.75	7.37	128.	402.	0.670	14.69	1.298	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	180.96	45.41	106.	20.	0.033	190.27	0.481s
AM-241	237.77	59.60	260.	3521.	5.869	4.02	1.254s
Th-234	253.60	63.56	11.	20.	0.033	71.53	0.700s
Pb-214	298.61	74.81	16.	23.	0.039	63.13	0.971D
Pb-212	298.63	74.81	17.	0.	0.000	491.56	0.458D
Pb-212	307.80	77.11	18.	31.	0.051	53.53	0.972D
Pb-214	307.80	77.11	54.	0.	0.000	222.80	0.264D
Pb-214	352.40	88.25	15.	3.	0.006	367.70	0.362s
Th-234	368.79	92.35	13.	16.	0.027	81.35	0.985D
Ac-228	380.79	95.35	8.	8.	0.014	120.50	0.987D
Ac-228	836.50	209.24	2.	0.	0.000	0.00	0.292s
Pb-212	954.08	238.62	7.	21.	0.035	55.83	1.099D
Pb-214	967.50	241.98	4.	14.	0.023	68.52	1.101D
Ac-228	1081.00	270.35	1.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.61	295.24	0.	38.	0.063	32.44	0.594s
Ac-228	1312.14	328.11	1.	4.	0.006	142.00	0.349s
Ac-228	1348.87	337.29	1.	2.	0.003	262.30	0.227s
Pb-214	1408.17	352.11	0.	35.	0.058	33.81	0.612s
Ac-228	1851.33	462.86	0.	6.	0.010	81.65	0.250s

Bi-214	2436.18	609.02	0.	22.	0.037	42.64	0.750s
CS-137	2646.67	661.62	0.	3.	0.005	115.47	0.375s
Bi-214	3076.33	768.99	0.	9.	0.015	66.67	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3641.83	910.30	1.	1.	0.001	366.67	0.223s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	0.	0.000	2285.32	1.589D
Ac-228	3877.18	969.11	1.	2.	0.003	280.35	1.591D
Bi-214	4475.00	1118.49	0.	7.	0.012	75.59	0.250s
Bi-214	4954.00	1238.18	0.	4.	0.007	100.00	0.500s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7058.83	1764.10	0.	6.	0.010	81.65	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3006E-04	609.31	1.126E-04	?(	5.117E-06	G K
			1764.49	2.270E-04	+	1.513E-04	G
			1120.29	1.836E-04	&(	2.624E-05	G
			1238.11	2.914E-04	+	2.457E-04	G
			768.36	5.120E-04	+	2.715E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	3.062E-05	G K
			969.11	0.000E+00	%	6.310E-05	G
			338.32	0.000E+00	&	3.952E-05	G
			964.60	0.000E+00	%	1.338E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	2.599E-04	?	1.732E-04	G
			209.28	0.000E+00	?	6.206E-05	G
			270.23	0.000E+00	?	7.084E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	1.826E-04		1.391E-04	X
		327.64	1.680E-04	?	1.696E-04	G
Pb-212	N 5.5363E-05	238.62	5.536E-05	(	1.109E-05	G K
		77.11	1.418E-04	+	4.816E-05	Energy duplication
		74.81	0.000E+00	%	4.936E-05	Energy duplication
CS-137	8.9204E-06	661.66	8.920E-06	?(	2.973E-06	G
Th-234	N 3.2781E-04	92.35	2.342E-04	(	8.275E-05	G
		63.29	4.611E-04	?(	1.203E-04	G
Pb-214	N 1.5765E-04	351.92	1.455E-04	(	4.157E-06	G K

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                              WI07-0104 D1 IS RCA 062507
                            295.21 2.689E-04 +   6.534E-05          G
                             77.11 0.000E+00 %   8.658E-05Energy duplication
                            241.98 2.180E-04  (  5.488E-05          G
                             74.81 3.163E-04 +   1.263E-04Energy duplication
                             87.30 0.000E+00 &   1.126E-04          X

Pb-210   N   4.6461E-04     46.50 4.646E-04 &(  3.533E-04          G

AM-241       8.7300E-03     59.54 8.730E-03  (  5.775E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:28:01 Page    5
 EnergySolutions                  Spectrum name: Win00099.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.5411E-01	1.936E-01	1.941E-01
K-40 <	1.6436E-01		
Ac-228 B<	1.0692E-01		
Pb-212	1.9331E-01	1.079E-01	1.081E-01
CS-137 #	3.1147E-02	3.596E-02	3.598E-02
Th-234	1.1446E+00	6.199E-01	6.205E-01
Pb-214	5.5045E-01	1.861E-01	1.868E-01
Pb-210 C	1.6222E+00	3.087E+00	3.087E+00
AM-241 #	3.0482E+01	1.226E+00	1.666E+00

```
   # - 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 (2.7 to 1999.2 keV) 3.4477760E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D1 IS RCA QC 062507

Sample description
WI07-0104 D1 IS RCA QC 062507

Spectrum Filename: C:\User\Win00098.An1

Acquisition information

Start time:	25-Jun-2007 08:37:08
Live time:	600
Real time:	607
Dead time:	1.12 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.8470E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.8470E+02) = 3.5125E+03
Detection limit method:	Traditional ORTEC method

WI07-0104 D1 IS RCA QC 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1505

********** 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	
28.90	7.40	128.	404.	0.674	14.78	1.270	CU-64	s
105.81	26.62	16.	87.	0.144	27.41	0.992	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.00	46.17	133.	12.	0.019	347.82	0.000s
AM-241	237.78	59.61	272.	3075.	5.126	4.04	1.187s
Th-234	252.33	63.24	35.	27.	0.045	88.79	0.262s
Pb-214	298.61	74.81	49.	36.	0.060	64.22	0.971D
Pb-212	298.63	74.81	50.	0.	0.000	1146.90	0.236D
Pb-212	307.80	77.11	44.	80.	0.133	32.40	0.972D
Pb-214	307.80	77.11	88.	0.	0.000	289.97	0.000D
Pb-214	347.08	86.93	26.	33.	0.055	65.09	0.684s
Th-234	368.79	92.35	30.	26.	0.044	71.00	0.985D
Ac-228	380.79	95.35	22.	6.	0.010	236.59	0.987D
Ac-228	834.71	208.79	14.	16.	0.027	98.95	0.937
Pb-212	954.08	238.62	20.	101.	0.168	23.65	1.099D
Pb-214	967.50	241.98	17.	32.	0.054	50.55	1.101D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.03	270.35	7.	22.	0.037	64.09	0.554s
Pb-214	1181.05	295.35	4.	49.	0.082	33.90	0.295s
Ac-228	1310.00	327.58	0.	15.	0.025	51.64	0.312s
Ac-228	1355.25	338.88	6.	26.	0.043	54.39	0.777s
Pb-214	1406.96	351.81	4.	64.	0.107	28.34	0.921s

Ac-228	1850.90	462.75	2.	14.	0.024	66.51	0.270s
Bi-214	2438.15	609.51	0.	48.	0.080	28.87	0.550s
CS-137	2647.33	661.78	0.	24.	0.040	40.82	0.750s
Bi-214	3073.00	768.16	0.	10.	0.017	63.25	0.375s
Ac-228	3179.86	794.86	0.	7.	0.012	75.59	0.375s
Ac-228	3646.64	911.50	0.	26.	0.043	39.22	0.666s
Bi-214	3737.50	934.21	0.	3.	0.005	115.47	0.500s
Ac-228	3859.13	964.60	2.	4.	0.007	124.98	1.589D
Ac-228	3877.18	969.11	2.	12.	0.020	68.49	1.591D
Bi-214	4482.23	1120.30	0.	13.	0.022	55.47	0.375s
Bi-214	4952.00	1237.68	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.53	1460.70	3.	2.	0.003	322.49	0.248s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.89	0.	6.	0.010	81.65	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4458E-04	609.31	2.456E-04	(	5.117E-06	G K
			1764.49	2.270E-04	?(	3.783E-05	G
			1120.29	3.411E-04	+	1.475E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	5.689E-04	+	2.844E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	3.162E-04	?(	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.742E-04	G
Ac-228	N	3.1367E-04	911.07	3.108E-04	?(	1.195E-05	G K
			969.11	2.475E-04	(	5.621E-05	G
			338.32	3.425E-04	(	5.269E-05	G
			964.60	2.949E-04	(	1.573E-04	G
			794.70	4.488E-04	?(	6.411E-05	G
			463.00	6.280E-04	+	2.751E-04	G
			209.28	3.876E-04	?(	1.409E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUN-2007 08:47:22 Page 4
EnergySolutions Spectrum name: Win00098.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.910E-04	+	2.880E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	1.801E-04	X
		327.64	6.874E-04	+	2.750E-04	G
Pb-212	N 2.6326E-04	238.62	2.633E-04	(	1.810E-05	G K
		77.11	3.700E-04	+	7.518E-05	Energy duplication
		74.81	0.000E+00	%	8.256E-05	Energy duplication
CS-137	7.1363E-05	661.66	7.136E-05	(	2.973E-06	G
Th-234	N 4.8207E-04	92.35	3.834E-04	(	1.211E-04	G
		63.29	6.225E-04	$(	2.048E-04	G

WI07-0104 D1 IS RCA QC 062507

Pb-214	N	2.9399E-04	351.92	2.667E-04	*(	1.377E-05	G K	
			295.21	3.468E-04	@(	2.387E-05	G	
			77.11	0.000E+00	%	1.095E-04	Energy duplication	
			241.98	5.055E-04	+	1.639E-04	G	
			74.81	4.870E-04	+	1.830E-04	Energy duplication	
			87.30	5.697E-04	+	1.964E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.108E-04	G	
AM-241		7.6242E-03	59.54	7.624E-03	(	5.904E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 25-JUN-2007 08:47:22 Page 5
EnergySolutions Spectrum name: Win00098.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		8.5908E-01	2.480E-01	2.493E-01
K-40	<	6.1204E-01		
Ac-228		1.1018E+00	3.687E-01	3.701E-01
Pb-212		9.2469E-01	2.187E-01	2.204E-01
CS-137		2.5066E-01	1.023E-01	1.026E-01
Th-234		1.6932E+00	9.625E-01	9.633E-01
Pb-214		1.0326E+00	2.282E-01	2.302E-01
Pb-210	<	1.4429E+00		
AM-241		2.6780E+01	1.082E+00	1.468E+00

< - 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 (2.7 to 1999.2 keV) 3.2641949E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0105 D1 IS RCA 061307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 14:31:19 Page    1
EnergySolutions                  Spectrum name: Win00052.An1

Sample description
     WI07-0105 D1 IS RCA 061307


Spectrum Filename: C:\User\Win00052.An1

Acquisition information
       Start time:                 13-Jun-2007 14:21:09
       Live time:                600
       Real time:                603
       Dead time:                  0.44 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.5860E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.5860E+02) =
                                   3.8670E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 14:31:19 Page    2
EnergySolutions                  Spectrum name: Win00052.An1
```

WI07-0105 D1 IS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.73	7.36	929.	1963.	3.271	7.57	1.489	CU-64	s
242.80	61.08	74.	38.	0.063	72.24	0.959	AM-241	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.64	46.58	15.	8.	0.013	162.87	0.267s
AM-241	237.51	59.54	129.	23.	0.038	147.99	0.958D
Th-234	252.51	63.29	31.	0.	0.000	0.00	0.961D
Pb-214	298.61	74.81	46.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	58.	0.	0.000	266.50	0.223D
Pb-212	303.60	76.06	56.	23.	0.038	131.40	0.274s
Pb-214	307.80	77.11	25.	0.	0.000	485.34	0.213D
Pb-214	349.00	87.40	8.	1.	0.002	757.19	0.000s
Th-234	368.79	92.35	24.	7.	0.012	198.17	0.985D
Ac-228	380.79	95.35	33.	7.	0.012	246.43	0.987D
Ac-228	835.75	209.05	3.	4.	0.007	158.11	0.434s
Pb-212	949.89	237.58	25.	28.	0.047	76.76	0.467s
Pb-214	967.50	241.98	11.	0.	0.000	0.00	0.000D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.10	1.	0.	0.000	0.00	0.000s
Pb-214	1179.00	294.84	5.	0.	0.000	0.00	0.000s
Ac-228	1308.12	327.11	4.	1.	0.002	600.00	0.144s
Ac-228	1352.67	338.24	1.	0.	0.001	240.37	0.197s
Pb-214	1400.00	350.07	0.	52.	0.087	27.74	0.337s

Ac-228	1851.00	462.78	0.	1.	0.002	200.00	0.250s
Bi-214	2431.62	607.88	0.	24.	0.040	40.82	0.562s
CS-137	2647.33	661.78	1.	0.	0.001	240.37	0.197s
Bi-214	3075.00	768.65	1.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3645.33	911.18	1.	0.	0.001	240.37	0.197s
Bi-214	3736.00	933.83	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	1.	1.	0.001	484.86	1.589D
Ac-228	3877.18	969.11	3.	3.	0.005	193.41	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5839.67	1459.48	3.	1.	0.002	583.10	0.210s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.2282E-04	609.31	1.228E-04	&(	5.117E-06	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	0.000E+00	?	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	?	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	&	1.587E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	2.391E-05	G K
			969.11	6.494E-05		8.414E-05	G
			338.32	0.000E+00	%	2.635E-05	G
			964.60	0.000E+00	%	1.713E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	0.000E+00	%	8.662E-05	G
			209.28	9.691E-05	?	1.036E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	7.084E-05	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.130E-04	X
		327.64	0.000E+00	%	1.696E-04	G
Pb-212	N 8.2810E-05	238.62	7.330E-05	&(	1.987E-05	G K
		77.11	1.064E-04	&(	5.131E-05	X
		74.81	0.000E+00	&	8.883E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	5.947E-06	G
Th-234	N 1.0949E-04	92.35	1.095E-04	(	1.084E-04	G
		63.29	0.000E+00	!	1.933E-04	G

```
Pb-214   N   2.1616E-04    351.92 2.162E-04 &(  4.157E-06          G K
                           295.21 0.000E+00 ?   2.620E-05          G
                            77.11 0.000E+00 %   6.017E-05Energy duplication
                           241.98 0.000E+00 %   8.100E-05          G
                            74.81 0.000E+00 %   1.365E-04Energy duplication
                            87.30 0.000E+00 %   8.238E-05          X

Pb-210   N   1.8350E-04     46.50 1.835E-04 ?(  1.413E-04          G

AM-241       5.6197E-05     59.54 5.620E-05  (  4.113E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:31:19 Page 5
EnergySolutions Spectrum name: Win00052.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.7493E-01	1.939E-01	1.944E-01
K-40 <	6.1387E-01		
Ac-228 B<	9.2454E-02		
Pb-212	3.2022E-01	2.437E-01	2.438E-01
CS-137 <	2.2997E-02		
Th-234 C	4.2341E-01	8.391E-01	8.391E-01
Pb-214 #	8.3589E-01	2.318E-01	2.331E-01
Pb-210 #C	7.0959E-01	1.156E+00	1.156E+00
AM-241 C	2.1731E-01	3.216E-01	3.217E-01

```
  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
```

WI07-0105 D1 IS RCA 061307

& - 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 (2.7 to 1999.2 keV) 2.9813592E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0106 D2 IS RCA 061307

Sample description
WI07-0106 D1 IS RCA 061307

Spectrum Filename: C:\User\Win00053.An1

Acquisition information

Start time:	13-Jun-2007 14:39:32
Live time:	600
Real time:	606
Dead time:	0.96 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.0940E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0940E+02) = 3.2321E+03
Detection limit method:	Traditional ORTEC method

WI07-0106 D2 IS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.3415

********** 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
29.03	7.44	541.	944.	1.573	11.64	1.487	CU-64 s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.00	45.92	11.	3.	0.005	303.08	0.269s
AM-241	239.00	59.91	13.	0.	0.000	0.00	0.000s
Th-234	252.00	63.16	8.	0.	0.000	0.00	0.000s
Pb-214	298.61	74.81	117.	0.	0.000	0.00	0.445D
Pb-212	298.63	74.81	83.	0.	0.000	2304.02	0.000D
Pb-212	306.67	76.83	114.	127.	0.212	40.28	0.526s
Pb-214	307.80	77.11	82.	0.	0.000	91.72	0.333D
Pb-214	348.20	87.20	70.	57.	0.096	65.04	0.393s
Th-234	368.79	92.35	63.	18.	0.030	132.06	0.985D
Ac-228	380.79	95.35	49.	13.	0.022	159.64	0.987D
Ac-228	835.00	208.87	8.	2.	0.003	493.96	0.000s
Pb-212	954.33	238.69	77.	11.	0.018	275.24	0.197s
Pb-214	967.50	241.98	7.	0.	0.000	0.00	0.284D
Ac-228	1081.89	270.57	2.	2.	0.002	328.86	0.294s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.90	295.56	20.	26.	0.043	81.65	0.963
Ac-228	1314.44	328.69	9.	4.	0.007	257.39	0.223s
Ac-228	1354.25	338.63	19.	32.	0.053	70.09	0.302s
Pb-214	1412.33	353.15	24.	6.	0.010	323.18	0.210s
Ac-228	1850.00	462.53	2.	2.	0.002	258.20	0.100s

Bi-214	2436.42	609.08	5.	48.	0.080	36.80	0.292s
CS-137	2641.71	660.38	6.	4.	0.007	235.59	0.311s
Bi-214	3077.23	769.21	2.	7.	0.011	108.31	0.229s
Ac-228	3178.00	794.39	0.	2.	0.003	141.42	0.250s
Ac-228	3642.80	910.54	2.	8.	0.013	89.44	0.592s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3856.00	963.82	1.	0.	0.000	0.00	0.000s
Ac-228	3878.54	969.45	12.	0.	0.000	0.00	1.591
Bi-214	4474.33	1118.33	0.	9.	0.015	66.67	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.00	1461.32	5.	1.	0.002	452.77	0.000s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	0.250s
Bi-214	7060.33	1764.47	0.	7.	0.012	75.59	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA microCi	Value Comments
Bi-214	N	2.5633E-04	609.31	2.456E-04	?(	1.894E-05	G K
			1764.49	2.648E-04	?(	3.783E-05	G
			1120.29	2.361E-04	&(	2.624E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	3.887E-04	&(	1.502E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.883E-04	G
Ac-228	N	1.8842E-04	911.07	8.966E-05	?(	2.753E-05	G K
			969.11	0.000E+00	%	1.141E-04	G
			338.32	4.193E-04	@(	8.841E-05	G
			964.60	0.000E+00	%	1.338E-04	G
			794.70	1.282E-04	?(	6.411E-05	G
			463.00	0.000E+00	%	1.299E-04	G
			209.28	0.000E+00	%	1.211E-04	G
			270.23	0.000E+00	%	1.194E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	2.969E-04	(	2.340E-04	X
		327.64	0.000E+00	&	2.577E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	%	3.606E-05	G K
		77.11	5.889E-04	*	1.039E-04	X
		74.81	0.000E+00	%	1.049E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.487E-05	G
Th-234	N 2.6677E-04	92.35	2.668E-04	(	1.722E-04	G
		63.29	0.000E+00	?	1.045E-04	G
Pb-214	N 0.0000E+00	351.92	0.000E+00	&	3.435E-05	G K

WI07-0106 D2 IS RCA 061307

			295.21	1.840E-04		7.152E-05	G
			77.11	0.000E+00	&	1.058E-04	Energy duplication
			241.98	0.000E+00	&	6.589E-05	G
			74.81	0.000E+00	&	2.138E-04	Energy duplication
			87.30	9.898E-04	?	2.839E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	1.362E-04	G
AM-241		0.0000E+00	59.54	0.000E+00	?	1.394E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:49:46 Page 5
EnergySolutions Spectrum name: Win00053.An1

R - Coincidence Corrected
H - Halflife limit exceeded
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
Bi-214	#	8.2849E-01	3.049E-01	3.059E-01
K-40	<	6.0859E-01		
Ac-228		6.0897E-01	3.679E-01	3.683E-01
Pb-212	B<	1.1656E-01		
CS-137	<	4.8052E-02		
Th-234	C	8.6221E-01	1.139E+00	1.139E+00
Pb-214	B<	1.1101E-01		
Pb-210	<	4.4028E-01		
AM-241	<	4.5060E-02		

\# - 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 (2.7 to 1999.2 keV) 2.2996738E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0108 D2 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:32:32 Page    1
EnergySolutions                  Spectrum name: WI000082.An1

Sample description
     WI07-0108 D2 IS RCA 061407


Spectrum Filename: C:\User\WI000082.An1

Acquisition information
       Start time:                 14-Jun-2007 09:22:20
       Live time:                600
       Real time:                603
       Dead time:                  0.51 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8660E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8660E+02) =
                                   3.4892E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:32:32 Page    2
EnergySolutions                  Spectrum name: WI000082.An1
```

WI07-0108 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1634

********** 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	
14.50	3.81	6285.	25790.	42.983	1.75	2.071	CU-64	s
104.61	26.34	1295.	210.	0.350	64.08	0.464	U-237	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.46	46.54	447.	46.	0.077	142.42	0.263s
AM-241	237.58	59.57	1122.	10443.	17.405	2.34	0.940
Th-234	252.60	63.33	224.	66.	0.110	82.32	0.348s
Pb-214	298.54	74.81	181.	113.	0.188	38.71	0.917D
Pb-212	298.56	74.81	153.	0.	0.000	443.00	0.244D
Pb-212	307.74	77.11	157.	171.	0.285	25.75	0.919D
Pb-214	307.74	77.11	292.	0.	0.000	131.27	0.000D
Pb-214	349.16	87.46	104.	73.	0.122	53.76	1.766s
Th-234	368.72	92.35	103.	61.	0.101	53.77	0.933D
Ac-228	380.72	95.35	109.	9.	0.016	322.49	0.935D
Ac-228	835.44	209.01	22.	32.	0.054	64.91	0.739s
Pb-212	953.94	238.62	10.	228.	0.379	13.81	1.057D
Pb-214	967.37	241.98	35.	36.	0.059	57.97	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.09	269.90	3.	32.	0.053	41.46	0.558s
Pb-214	1179.40	294.98	8.	68.	0.112	29.64	0.761s
Ac-228	1312.32	328.20	6.	10.	0.018	97.28	0.483s
Ac-228	1353.25	338.43	6.	40.	0.066	37.58	0.994
Pb-214	1407.04	351.87	15.	137.	0.228	21.25	1.067

Ac-228	1851.56	462.97	4.	29.	0.048	49.22	0.724s
Bi-214	2437.55	609.42	0.	69.	0.115	24.08	0.955s
CS-137	2645.24	661.33	2.	12.	0.021	73.76	0.610s
Bi-214	3072.92	768.21	0.	13.	0.022	55.47	0.375s
Ac-228	3179.00	794.72	0.	10.	0.017	63.25	0.375s
Ac-228	3645.87	911.39	0.	39.	0.065	32.03	0.750s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	4.	6.	0.010	119.44	1.595D
Ac-228	3876.86	969.11	2.	29.	0.048	39.39	1.598D
Bi-214	4481.00	1120.08	0.	11.	0.018	60.30	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5845.95	1461.13	0.	42.	0.070	30.86	0.437s
Ac-228	6354.00	1588.07	0.	3.	0.005	115.47	0.750s
Bi-214	7062.90	1765.18	0.	10.	0.017	63.25	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1762E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8492E-03	1460.81	1.849E-03	?(	4.403E-05	G
Ac-228	N	4.8306E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	5.570E-04	(	4.597E-05	G
			338.32	4.629E-04	?(	4.517E-05	G
			964.60	3.765E-04	(	1.990E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	1.124E-03	+	3.367E-04	G
			209.28	6.877E-04	(	1.529E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.998E-04	+	2.775E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	3.057E-04	X
		327.64	4.276E-04	(	1.570E-04	G
Pb-212	N 5.2283E-04	238.62	5.228E-04	(	1.127E-05	G K
		77.11	6.548E-04	+	9.998E-05	Energy duplication
		74.81	0.000E+00	%	1.166E-04	Energy duplication
CS-137	3.3874E-05	661.66	3.387E-05	?(	7.564E-06	G
Th-234	N 9.6441E-04	92.35	7.586E-04	(	1.856E-04	G
		63.29	1.257E-03	(	4.129E-04	G

```
Pb-214    N   4.7948E-04    351.92 5.062E-04  (  2.245E-05         G K
                            295.21 4.228E-04  (  2.915E-05         G
                             77.11 0.000E+00 ?   1.618E-04Energy duplication
                            241.98 4.921E-04  (  1.235E-04         G
                             74.81 1.257E-03 +   2.763E-04Energy duplication
                             87.30 1.059E-03 +   2.804E-04         X

Pb-210    N   9.4584E-04     46.50 9.458E-04 ?(  6.204E-04         G

AM-241        2.1504E-02     59.54 2.150E-02  (  9.858E-05         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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:32:32 Page   5
EnergySolutions   Spectrum name: WI000082.An1

```
   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        1.1082E+00    2.668E-01    2.701E-01
K-40    #     6.4521E+00    1.991E+00    2.006E+00
Ac-228        1.6855E+00    4.676E-01    4.719E-01
Pb-212        1.8242E+00    2.519E-01    2.610E-01
CS-137  #     1.1819E-01    8.717E-02    8.729E-02
Th-234        3.3650E+00    1.654E+00    1.656E+00
Pb-214        1.6730E+00    3.554E-01    3.609E-01
Pb-210  #C    3.3002E+00    4.700E+00    4.701E+00
AM-241        7.5030E+01    1.756E+00    3.286E+00

   # - 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 (2.7 to 1999.3 keV) 9.4556366E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0109 D1 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:51:39 Page    1
EnergySolutions                  Spectrum name: Win00059.An1

Sample description
     WI07-0109 D1 IS RCA 061407


Spectrum Filename: C:\User\Win00059.An1

Acquisition information
       Start time:                 14-Jun-2007 09:39:21
       Live time:                600
       Real time:                603
       Dead time:                  0.44 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.9690E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.9690E+02) =
                                   3.3681E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:51:39 Page    2
EnergySolutions                  Spectrum name: Win00059.An1
```

WI07-0109 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1151

********** 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	
28.78	7.37	43.	490.	0.817	10.37	1.200	CU-64	s
52.14	13.21	35.	41.	0.068	56.54	0.570	TH-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.96	46.16	104.	20.	0.033	186.90	0.363s
AM-241	237.88	59.63	200.	2083.	3.472	4.97	0.981
Th-234	252.70	63.34	32.	13.	0.022	144.05	0.545s
Pb-214	298.61	74.81	57.	75.	0.125	36.57	0.971D
Pb-212	298.63	74.81	73.	0.	0.000	249.80	0.283D
Pb-212	307.80	77.11	66.	117.	0.195	26.93	0.972D
Pb-214	307.80	77.11	161.	0.	0.000	153.32	0.000D
Pb-214	348.33	87.24	41.	44.	0.073	60.22	0.927
Th-234	368.79	92.35	39.	30.	0.050	69.11	0.985D
Ac-228	380.79	95.35	38.	11.	0.018	173.38	0.987D
Ac-228	835.24	208.93	29.	17.	0.028	133.75	0.341s
Pb-212	954.08	238.62	21.	167.	0.279	17.29	1.099D
Pb-214	967.50	241.98	38.	27.	0.045	75.69	1.101D

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 3
EnergySolutions Spectrum name: Win00059.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.23	269.90	17.	15.	0.025	119.38	0.464s
Pb-214	1179.60	294.99	2.	45.	0.075	32.07	0.432s
Ac-228	1308.73	327.26	4.	28.	0.047	47.59	0.796s
Ac-228	1351.77	338.02	5.	49.	0.081	33.94	0.396s
Pb-214	1406.74	351.75	0.	81.	0.135	22.22	0.687s

Ac-228	1851.67	462.94	0.	12.	0.020	57.74	0.937s
Bi-214	2438.47	609.59	0.	52.	0.087	27.74	1.015s
CS-137	2646.43	661.56	0.	14.	0.023	53.45	0.312s
Bi-214	3074.71	768.58	0.	7.	0.012	75.59	0.500s
Ac-228	3180.00	794.89	1.	0.	0.000	0.00	0.000s
Ac-228	3644.39	910.94	0.	38.	0.063	32.44	1.031s
Bi-214	3725.94	931.32	2.	4.	0.007	161.78	0.238s
Ac-228	3859.13	964.60	0.	9.	0.015	69.88	1.588D
Ac-228	3877.18	969.11	2.	19.	0.031	51.90	1.591D
Bi-214	4481.89	1120.22	0.	10.	0.017	63.25	0.750s
Bi-214	4955.00	1238.43	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.11	0.	3.	0.005	115.47	0.250s
K-40	5844.00	1460.57	7.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	3.	1.	0.002	529.15	0.089s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7035E-04	609.31	2.661E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	1.276E-04	G
			1120.29	2.624E-04	?(	2.624E-05	G
			1238.11	0.000E+00	?	1.457E-04	G
			768.36	3.982E-04	+	2.432E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.477E-04	?(	1.159E-04	G
			934.06	4.742E-04	&	4.505E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.012E-04	G
Ac-228	N	4.5390E-04	911.07	4.543E-04	(	1.195E-05	G K
			969.11	3.919E-04	(	5.750E-05	G
			338.32	6.411E-04	+	1.436E-04	G
			964.60	5.831E-04	(	9.371E-05	G
			794.70	0.000E+00	?	1.282E-04	G
			463.00	5.197E-04	?(	4.331E-05	G
			209.28	4.038E-04	?(	1.981E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 4
EnergySolutions Spectrum name: Win00059.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.313E-04	?(	2.250E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.426E-04	-	2.344E-04	X
		327.64	1.299E-03	+	3.903E-04	G
Pb-212	N 4.3769E-04	238.62	4.377E-04	(	1.825E-05	G K
		77.11	5.419E-04	+	9.082E-05	Energy duplication
		74.81	0.000E+00	%	9.875E-05	Energy duplication
CS-137	4.1628E-05	661.66	4.163E-05	?(	2.973E-06	G
Th-234	N 3.8303E-04	92.35	4.416E-04	(	1.372E-04	G
		63.29	2.997E-04	?(	1.963E-04	G

```
Pb-214    N   3.4094E-04    351.92 3.367E-04 @(  4.157E-06          G K
                            295.21 3.173E-04  (  1.869E-05          G
                             77.11 0.000E+00 ?   1.461E-04Energy duplication
                            241.98 4.225E-04  (  1.456E-04          G
                             74.81 1.015E-03 +   2.264E-04Energy duplication
                             87.30 7.567E-04 +   2.339E-04          X

Pb-210    N   4.6851E-04     46.50 4.685E-04 ?(  3.498E-04          G

AM-241        5.1641E-03     59.54 5.164E-03  (  5.084E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 5
EnergySolutions Spectrum name: Win00059.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.1059E-01	2.526E-01	2.540E-01
K-40 <	6.7780E-01		
Ac-228	1.5288E+00	4.960E-01	4.980E-01
Pb-212	1.4742E+00	2.548E-01	2.585E-01
CS-137 #	1.4021E-01	7.495E-02	7.507E-02
Th-234	1.2901E+00	8.917E-01	8.922E-01
Pb-214	1.1483E+00	2.552E-01	2.574E-01
Pb-210 #C	1.5780E+00	2.949E+00	2.950E+00
AM-241	1.7394E+01	8.650E-01	1.078E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0109 D1 IS RCA 061407

& - 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 (2.7 to 1999.2 kev) 2.5463768E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0110 D2 IS RCA 061407

Sample description
WI07-0110 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000083.An1

Acquisition information

Start time:	14-Jun-2007 09:42:44
Live time:	600
Real time:	602
Dead time:	0.31 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9000E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9000E+02) = 3.4483E+03
Detection limit method:	Traditional ORTEC method

WI07-0110 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1367

********** 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	
14.57	3.83	5337.	26508.	44.180	1.65	2.062	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	158.	0.	0.000	0.00	0.000s
AM-241	237.69	59.60	275.	3596.	5.993	3.76	0.837
Th-234	253.23	63.48	84.	54.	0.090	73.14	0.535s
Pb-214	298.54	74.81	85.	92.	0.153	35.15	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	302.25	0.437D
Pb-212	307.74	77.11	54.	165.	0.276	19.97	0.919D
Pb-214	307.74	77.11	159.	0.	0.000	402.67	0.255D
Pb-214	348.60	87.32	28.	72.	0.120	34.69	1.067s
Th-234	368.72	92.35	68.	53.	0.089	51.55	0.933D
Ac-228	380.72	95.35	30.	5.	0.009	313.66	0.935D
Ac-228	836.17	209.19	31.	34.	0.057	78.71	0.340s
Pb-212	953.94	238.62	23.	224.	0.373	14.66	1.057D
Pb-214	967.37	241.98	34.	40.	0.067	51.48	1.060D
Ac-228	1078.79	269.83	7.	33.	0.056	47.33	0.578s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.69	295.30	10.	72.	0.120	29.83	1.220
Ac-228	1311.24	327.93	8.	26.	0.043	59.77	0.709s
Ac-228	1352.48	338.24	11.	49.	0.082	36.55	1.221
Pb-214	1407.36	351.95	10.	102.	0.170	22.95	0.926
Ac-228	1852.96	463.32	3.	25.	0.042	46.78	0.942

Bi-214	2436.82	609.24	0.	77.	0.128	22.79	1.100
CS-137	2647.13	661.80	2.	36.	0.059	36.96	0.548s
Bi-214	3075.00	768.73	0.	10.	0.017	63.25	0.250s
Ac-228	3181.00	795.22	0.	11.	0.018	60.30	0.500s
Ac-228	3645.53	911.30	0.	57.	0.095	26.49	0.708s
Bi-214	3734.60	933.56	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	0.	13.	0.021	58.51	1.595D
Ac-228	3876.86	969.11	3.	22.	0.037	48.11	1.598D
Bi-214	4481.25	1120.14	0.	13.	0.022	55.47	0.312s
Bi-214	4948.00	1236.77	0.	5.	0.008	89.44	0.750s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5844.96	1460.89	0.	47.	0.078	29.17	0.677s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7062.10	1764.98	0.	12.	0.020	57.74	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	3.6223E-04	609.31	3.581E-04	(	4.650E-06	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	3.390E-04	&(	6.779E-05	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	6.4037E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	4.272E-04	-	1.474E-04	G
			338.32	5.743E-04	(	6.114E-05	G
			964.60	7.741E-04	(	9.763E-05	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	9.874E-04	+	3.118E-04	G
			209.28	7.265E-04	(	1.766E-04	G
			270.23	1.041E-03	+	2.955E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:53:10 Page 4
EnergySolutions Spectrum name: WI000083.An1

Nuclide	Nuclide Code	Ave activity	Energy	Activity	Peak Code	MDA	Comments
			1588.00	0.000E+00	?	2.905E-04	G
			95.35	0.000E+00	%	1.711E-04	X
			327.64	1.038E-03	+	3.568E-04	G
Pb-212	N	5.1495E-04	238.62	5.150E-04	(	1.675E-05	G K
			77.11	6.333E-04	+	8.209E-05	Energy duplication
			74.81	0.000E+00	%	8.923E-05	Energy duplication
CS-137		9.6653E-05	661.66	9.665E-05	(	7.364E-06	G
Th-234	N	8.1508E-04	92.35	6.650E-04	(	1.516E-04	G
			63.29	1.029E-03	@(	2.566E-04	G
Pb-214	N	4.0271E-04	351.92	3.778E-04	(	1.852E-05	G K

```
                                WI07-0110 D2 IS RCA 061407
                               295.21 4.510E-04  (  3.132E-05          G
                                77.11 0.000E+00 %   1.202E-04Energy duplication
                               241.98 5.574E-04 +   1.753E-04          G
                                74.81 1.028E-03 +   2.156E-04Energy duplication
                                87.30 1.045E-03 +   2.126E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   3.801E-04          G

AM-241       7.4047E-03      59.54 7.405E-03  (  4.933E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.2491E+00	2.847E-01	2.885E-01
K-40	#	7.1355E+00	2.082E+00	2.099E+00
Ac-228		2.2082E+00	5.461E-01	5.524E-01
Pb-212		1.7757E+00	2.604E-01	2.688E-01
CS-137		3.3329E-01	1.232E-01	1.238E-01
Th-234		2.8106E+00	1.257E+00	1.259E+00
Pb-214		1.3887E+00	2.613E-01	2.665E-01
Pb-210	<	1.3105E+00		
AM-241		2.5533E+01	9.588E-01	1.346E+00

- 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 (2.7 to 1999.3 keV) 4.2434364E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0111 D1 IS RCA 061407

Sample description
WI07-0111 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00060.An1

Acquisition information
Start time: 14-Jun-2007 10:00:59
Live time: 600
Real time: 605
Dead time: 0.74 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8470E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8470E+02) = 3.5125E+03
Detection limit method: Traditional ORTEC method

WI07-0111 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1200

********** 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	
28.58	7.32	65.	462.	0.770	11.55	0.851	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.33	46.50	18.	41.	0.068	47.55	0.489s
AM-241	237.84	59.62	61.	187.	0.311	21.74	0.833
Th-234	252.32	63.24	56.	28.	0.046	103.77	0.980
Pb-214	298.61	74.81	79.	94.	0.156	33.83	0.971D
Pb-212	298.63	74.81	89.	0.	0.000	212.62	0.411D
Pb-212	307.80	77.11	80.	117.	0.196	28.33	0.972D
Pb-214	307.80	77.11	234.	0.	0.000	95.87	0.000D
Pb-214	348.37	87.25	48.	48.	0.081	58.41	0.514s
Th-234	368.79	92.35	42.	31.	0.051	70.01	0.985D
Ac-228	380.79	95.35	41.	2.	0.003	987.48	0.987D
Ac-228	836.73	209.30	18.	22.	0.038	81.35	0.350s
Pb-212	954.08	238.62	28.	191.	0.319	16.45	1.099D
Pb-214	967.50	241.98	44.	23.	0.038	92.16	1.101D
Ac-228	1078.75	269.78	0.	32.	0.053	35.36	0.417s

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:11:11 Page 3
EnergySolutions Spectrum name: Win00060.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.02	295.09	13.	52.	0.087	39.18	0.855s
Ac-228	1309.57	327.47	11.	2.	0.004	447.21	0.259s
Ac-228	1353.61	338.47	5.	46.	0.077	34.65	1.113s
Pb-214	1406.85	351.78	4.	84.	0.139	24.70	1.415
Ac-228	1852.00	463.03	5.	3.	0.004	291.55	0.000s

Bi-214	2436.28	609.04	0.	47.	0.078	29.17	1.728s
CS-137	2647.68	661.87	0.	31.	0.052	35.92	0.646s
Bi-214	3074.00	768.40	0.	9.	0.015	66.67	0.750s
Ac-228	3179.84	794.85	0.	19.	0.032	45.88	0.791s
Ac-228	3644.42	910.95	0.	53.	0.088	27.47	1.249
Bi-214	3731.00	932.58	0.	8.	0.013	70.71	0.250s
Ac-228	3859.13	964.60	3.	6.	0.011	105.33	1.589D
Ac-228	3877.18	969.11	2.	16.	0.026	56.81	1.591D
Bi-214	4481.85	1120.21	0.	13.	0.022	55.47	0.500s
Bi-214	4955.50	1238.56	0.	2.	0.003	141.42	0.500s
Bi-214	5512.00	1377.61	0.	2.	0.003	141.42	0.250s
K-40	5843.52	1460.45	0.	28.	0.047	37.80	0.417s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.33	1764.22	0.	9.	0.015	66.67	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	2.7816E-04	609.31	2.405E-04	(	5.117E-06	G K
			1764.49	3.404E-04	?(	3.783E-05	G
			1120.29	3.411E-04	?(	2.624E-05	G
			1238.11	1.457E-04	-	1.866E-04	G
			768.36	5.120E-04	+	2.715E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?(	1.159E-04	G
			934.06	8.431E-04	&	4.775E-04	G
K-40	N	1.3181E-03	1460.81	1.318E-03	?(	4.707E-05	G
Ac-228	N	6.1739E-04	911.07	6.336E-04	(	1.195E-05	G K
			969.11	3.327E-04	-	1.372E-04	G
			338.32	6.060E-04	(	4.876E-05	G
			964.60	4.315E-04	-	3.191E-04	G
			794.70	1.218E-03	+	4.286E-04	G
			463.00	0.000E+00	%	1.962E-04	G
			209.28	5.451E-04	?(	1.560E-04	G
			270.23	1.133E-03	+	3.016E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.204E-04	X
		327.64	0.000E+00	%	2.577E-04	G
Pb-212	N 5.1275E-04	238.62	5.005E-04	(	2.094E-05	G K
		77.11	5.431E-04	(	6.071E-05	Energy duplication
		74.81	0.000E+00	%	1.086E-04	Energy duplication
CS-137	9.2177E-05	661.66	9.218E-05	(	2.973E-06	G
Th-234	N 5.2785E-04	92.35	4.506E-04	(	1.427E-04	G
		63.29	6.379E-04	?(	2.565E-04	G
Pb-214	N 3.5603E-04	351.92	3.478E-04	(	1.449E-05	G K

```
                                WI07-0111 D1 IS RCA 061407
                               295.21 3.704E-04 ?(  3.934E-05          G
                                77.11 0.000E+00 ?   1.755E-04Energy duplication
                               241.98 3.601E-04  (  1.560E-04          G
                                74.81 1.268E-03 +   2.582E-04Energy duplication
                                87.30 8.344E-04 +   2.480E-04          X

Pb-210    N   9.6045E-04      46.50 9.604E-04  (  1.528E-04          G

AM-241        4.6278E-04      59.54 4.628E-04  (  2.873E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.7703E-01	2.850E-01	2.865E-01
K-40 #	4.6297E+00	1.750E+00	1.755E+00
Ac-228	2.1686E+00	5.958E-01	5.992E-01
Pb-212	1.8010E+00	2.950E-01	2.997E-01
CS-137	3.2377E-01	1.163E-01	1.167E-01
Th-234	1.8541E+00	1.160E+00	1.161E+00
Pb-214	1.2506E+00	3.089E-01	3.111E-01
Pb-210	3.3735E+00	1.604E+00	1.606E+00
AM-241	1.6255E+00	3.533E-01	3.584E-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 (2.7 to 1999.2 keV) 1.8003792E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0112 D2 IS RCA 061407

Sample description
WI07-0112 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000082.An1

Acquisition information
Start time: 14-Jun-2007 10:05:24
Live time: 600
Real time: 602
Dead time: 0.38 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8050E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8050E+02) = 3.5651E+03
Detection limit method: Traditional ORTEC method

WI07-0112 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0859

********** 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
12.00	3.27	7336.	12579.	20.965	2.62	0.854	- D
17.45	4.63	12857.	9410.	15.683	3.98	0.855	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.14	46.71	234.	85.	0.142	67.62	1.278s
AM-241	237.63	59.58	266.	1326.	2.209	7.31	0.873
Th-234	253.76	63.62	175.	42.	0.070	119.08	1.020
Pb-214	298.54	74.81	139.	110.	0.183	35.87	0.917D
Pb-212	298.56	74.81	129.	0.	0.000	363.11	0.449D
Pb-212	307.74	77.11	133.	162.	0.271	25.46	0.919D
Pb-214	307.74	77.11	270.	0.	0.000	166.31	0.000D
Pb-214	348.27	87.24	86.	69.	0.114	54.99	0.866
Th-234	368.72	92.35	90.	45.	0.076	65.97	0.933D
Ac-228	380.72	95.35	86.	17.	0.028	163.46	0.935D
Ac-228	835.60	209.05	19.	29.	0.049	65.24	0.555s
Pb-212	953.94	238.62	24.	209.	0.349	15.31	1.057D
Pb-214	967.37	241.98	30.	30.	0.050	63.89	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.56	270.52	11.	26.	0.044	61.44	0.396s
Pb-214	1180.25	295.19	23.	61.	0.101	41.93	1.202
Ac-228	1311.79	328.06	7.	17.	0.029	78.45	0.333s
Ac-228	1353.76	338.55	3.	55.	0.091	30.41	1.444s
Pb-214	1407.38	351.96	10.	93.	0.155	24.33	0.671s

Ac-228	1852.43	463.19	0.	24.	0.040	40.82	0.750s
Bi-214	2436.68	609.20	6.	56.	0.093	31.94	0.554s
CS-137	2647.60	661.92	9.	4.	0.007	257.39	0.381s
Bi-214	3072.53	768.11	3.	11.	0.018	87.20	0.596s
Ac-228	3181.60	795.37	0.	11.	0.018	60.30	0.375s
Ac-228	3645.16	911.21	0.	55.	0.092	26.97	0.495s
Bi-214	3738.00	934.41	0.	8.	0.013	70.71	0.750s
Ac-228	3858.81	964.60	0.	12.	0.020	58.37	1.595D
Ac-228	3876.86	969.11	3.	22.	0.037	47.93	1.598D
Bi-214	4481.00	1120.08	9.	0.	0.001	1054.09	0.000s
Bi-214	4955.00	1238.52	0.	6.	0.010	81.65	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.64	1460.06	15.	7.	0.011	216.79	0.447s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7058.00	1763.96	0.	3.	0.005	115.47	0.750s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6042E-04	609.31	2.604E-04	(	1.860E-05	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	0.000E+00	%	1.161E-04	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	5.732E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.149E-04	G
Ac-228	N	6.4613E-04	911.07	6.057E-04	?(	1.101E-05	G K
			969.11	4.283E-04	-	1.474E-04	G
			338.32	6.407E-04	(	3.668E-05	G
			964.60	7.354E-04	(	7.104E-05	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	9.355E-04	+	2.902E-04	G
			209.28	6.207E-04	?(	1.403E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.227E-04	(	1.608E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	3.242E-04	-	2.863E-04	X
		327.64	7.059E-04	(	1.705E-04	G
Pb-212	N 4.8095E-04	238.62	4.809E-04	(	1.702E-05	G K
		77.11	6.218E-04	+	9.492E-05	Energy duplication
		74.81	0.000E+00	%	1.073E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.524E-05	G
Th-234	N 6.6312E-04	92.35	5.669E-04	(	1.733E-04	G
		63.29	8.001E-04	?(	3.661E-04	G

```
Pb-214    N   3.6297E-04    351.92 3.444E-04  (  1.852E-05          G K
                            295.21 3.800E-04  (  4.604E-05          G
                             77.11 0.000E+00 ?   1.558E-04Energy duplication
                            241.98 4.112E-04  (  1.147E-04          G
                             74.81 1.226E-03 +   2.547E-04Energy duplication
                             87.30 9.964E-04 +   2.629E-04          X

Pb-210    N   1.7352E-03     46.50 1.735E-03 *(  4.519E-04          G

AM-241        2.7297E-03     59.54 2.730E-03  (  4.856E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:15:36 Page    5
EnergySolutions                  Spectrum name: WI000082.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214        9.2843E-01    2.966E-01    2.986E-01
K-40    <     1.1226E+00
Ac-228        2.3035E+00    4.978E-01    5.052E-01
Pb-212        1.7146E+00    2.625E-01    2.703E-01
CS-137  <     5.4328E-02
Th-234        2.3641E+00    1.559E+00    1.560E+00
Pb-214        1.2940E+00    3.148E-01    3.186E-01
Pb-210 #      6.1860E+00    4.183E+00    4.186E+00
AM-241        9.7317E+00    7.112E-01    7.972E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0112 D2 IS RCA 061407

& - 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 (2.7 to 1999.3 keV) 2.4522255E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0113 D1 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    1
EnergySolutions                  Spectrum name: Win00061.An1

Sample description
     WI07-0113 D1 IS RCA 061407


Spectrum Filename: C:\User\Win00061.An1

Acquisition information
       Start time:                 14-Jun-2007 10:13:35
       Live time:                600
       Real time:                607
       Dead time:                  1.22 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.2730E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.2730E+02) =
                                   4.3995E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    2
EnergySolutions                  Spectrum name: Win00061.An1
```

WI07-0113 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1897

********** 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	
28.47	7.30	85.	410.	0.683	13.23	1.178	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	179.53	45.05	15.	23.	0.039	69.05	0.230s
AM-241	237.93	59.64	38.	34.	0.056	71.29	0.757
Th-234	251.28	62.98	48.	40.	0.067	73.48	0.859s
Pb-214	298.61	74.81	64.	59.	0.098	46.38	0.971D
Pb-212	298.63	74.81	62.	0.	0.000	261.04	0.228D
Pb-212	307.80	77.11	75.	109.	0.182	29.41	0.973D
Pb-214	307.80	77.11	167.	0.	0.000	133.04	0.000D
Pb-214	348.76	87.34	33.	48.	0.081	51.88	0.593s
Th-234	368.79	92.35	40.	54.	0.089	43.24	0.985D
Ac-228	380.79	95.35	33.	16.	0.027	110.31	0.987D
Ac-228	835.88	209.09	15.	32.	0.053	59.95	0.392s
Pb-212	954.08	238.62	13.	147.	0.245	17.85	1.099D
Pb-214	967.50	241.98	15.	22.	0.036	66.20	1.101D
Ac-228	1081.46	270.46	8.	13.	0.022	93.58	2.166s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.64	295.00	7.	57.	0.094	33.65	1.033s
Ac-228	1309.38	327.42	4.	24.	0.039	53.32	0.904
Ac-228	1352.94	338.31	4.	50.	0.083	33.47	1.340s
Pb-214	1406.92	351.80	4.	63.	0.104	29.56	0.583s
Ac-228	1843.33	460.86	0.	18.	0.030	47.14	0.250s

Bi-214	2436.71	609.15	5.	59.	0.098	31.98	0.878s
CS-137	2648.00	661.95	1.	0.	0.000	0.00	0.000s
Bi-214	3074.67	768.57	3.	3.	0.004	254.95	0.176s
Ac-228	3174.00	793.39	0.	7.	0.012	75.59	0.250s
Ac-228	3645.66	911.26	0.	29.	0.048	37.14	0.375s
Bi-214	3738.50	934.46	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	2.	9.	0.015	82.44	1.589D
Ac-228	3877.18	969.11	6.	10.	0.017	89.52	1.591D
Bi-214	4481.00	1119.99	0.	10.	0.017	63.25	0.312s
Bi-214	4952.33	1237.77	1.	0.	0.001	240.37	0.197s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.33	1460.65	0.	33.	0.055	34.82	0.625s
Ac-228	6355.00	1588.24	0.	3.	0.005	115.47	0.250s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9219E-04	609.31	3.019E-04	(	1.894E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	2.624E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	%	2.276E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	1.5534E-03	1460.81	1.553E-03	?(	4.707E-05	G
Ac-228	N	3.7861E-04	911.07	3.467E-04	(	1.195E-05	G K
			969.11	2.185E-04	-	1.300E-04	G
			338.32	6.587E-04	+	1.436E-04	G
			964.60	5.892E-04	+	3.489E-04	G
			794.70	4.488E-04	&(	6.411E-05	G
			463.00	7.796E-04	&	2.824E-04	G
			209.28	7.753E-04	+	2.473E-04	G
			270.23	4.604E-04	(	1.605E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.647E-04	?(	1.549E-04	G
		95.35	3.688E-04	(	1.935E-04	X
		327.64	1.077E-03	+	3.605E-04	G
Pb-212	N 3.8544E-04	238.62	3.854E-04	(	1.460E-05	G K
		77.11	5.058E-04	+	9.107E-05	Energy duplication
		74.81	0.000E+00	%	9.168E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.947E-06	G
Th-234	N 8.4307E-04	92.35	7.875E-04	(	1.395E-04	G
		63.29	9.222E-04	*(	2.377E-04	G
Pb-214	N 2.7442E-04	351.92	2.605E-04	*(	1.449E-05	G K

```
                          WI07-0113 D1 IS RCA 061407
                         295.21 4.011E-04 +   8.369E-05          G
                          77.11 0.000E+00 ?   1.488E-04Energy duplication
                         241.98 3.435E-04  (  9.496E-05          G
                          74.81 7.967E-04 +   2.188E-04Energy duplication
                          87.30 8.344E-04 +   2.285E-04          X

Pb-210   N   5.4660E-04     46.50 5.466E-04 &(  1.391E-04          G

AM-241       8.3053E-05     59.54 8.305E-05 ?(  2.303E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    5
 EnergySolutions                  Spectrum name: Win00061.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        1.2855E+00    4.111E-01    4.128E-01
 K-40    #     6.8343E+00    2.379E+00    2.388E+00
 Ac-228        1.6657E+00    6.186E-01    6.206E-01
 Pb-212        1.6957E+00    3.028E-01    3.068E-01
 CS-137   <    2.6163E-02
 Th-234        3.7091E+00    1.581E+00    1.584E+00
 Pb-214        1.2073E+00    3.569E-01    3.586E-01
 Pb-210 #      2.4047E+00    1.660E+00    1.661E+00
 AM-241 #      3.6539E-01    2.605E-01    2.608E-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 (2.7 to 1999.2 keV) 1.9167715E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0113 D2 IS RCA QC 061407

Sample description
WI07-0113 D2 IS RCA QC 061407

Spectrum Filename: C:\User\WI000083.An1

Acquisition information

Start time:	14-Jun-2007 10:19:30
Live time:	600
Real time:	602
Dead time:	0.28 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.1520E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.1520E+02) = 4.6468E+03
Detection limit method:	Traditional ORTEC method

WI07-0113 D2 IS RCA QC 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1406

********** 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	
11.54	2.89	5130.	11031.	18.385	2.65	0.854	-	D
15.45	3.87	14537.	9561.	15.935	4.11	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.86	46.40	43.	43.	0.072	65.24	1.269s
AM-241	238.55	59.81	48.	60.	0.101	48.18	0.565s
Th-234	251.75	63.11	48.	34.	0.057	78.48	0.545s
Pb-214	298.54	74.81	57.	88.	0.147	32.16	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	552.81	0.429D
Pb-212	307.74	77.11	51.	139.	0.231	22.40	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	108.18	0.388D
Pb-214	348.77	87.36	29.	46.	0.076	49.70	0.414s
Th-234	368.72	92.35	64.	45.	0.075	58.16	0.933D
Ac-228	380.72	95.35	40.	7.	0.012	263.53	0.935D
Ac-228	835.55	209.03	16.	34.	0.057	56.63	0.833
Pb-212	953.94	238.62	11.	165.	0.275	16.60	1.057D
Pb-214	967.37	241.98	31.	39.	0.064	52.25	1.060D

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EnergySolutions Spectrum name: WI000083.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.02	270.14	8.	28.	0.047	51.93	1.101
Pb-214	1180.22	295.18	9.	36.	0.061	43.96	1.059
Ac-228	1311.00	327.87	9.	1.	0.002	871.78	0.000s
Ac-228	1354.67	338.78	3.	50.	0.083	32.24	0.634s
Pb-214	1406.66	351.78	12.	70.	0.117	31.85	1.320s

Ac-228	1850.73	462.76	0.	27.	0.045	38.49	0.500s
Bi-214	2437.30	609.36	6.	40.	0.067	40.00	0.594s
CS-137	2644.75	661.20	0.	21.	0.035	43.64	0.375s
Bi-214	3075.64	768.89	0.	12.	0.020	57.74	0.312s
Ac-228	3179.92	794.95	0.	15.	0.025	51.64	0.500s
Ac-228	3644.62	911.08	0.	32.	0.053	35.36	0.705s
Bi-214	3738.33	934.49	0.	3.	0.005	115.47	0.375s
Ac-228	3858.81	964.60	3.	5.	0.008	141.07	1.595D
Ac-228	3876.86	969.11	1.	22.	0.036	45.24	1.598D
Bi-214	4481.67	1120.24	0.	10.	0.017	63.25	0.375s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.250s
K-40	5845.23	1460.95	0.	31.	0.052	35.92	0.562s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.96	0.	12.	0.020	57.74	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1182E-04	609.31	1.860E-04	(	1.860E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	4.2034E-04	911.07	3.524E-04	?(	1.101E-05	G K
			969.11	4.226E-04	(	4.174E-05	G
			338.32	5.821E-04	(	3.668E-05	G
			964.60	2.935E-04	-	2.797E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	1.052E-03	+	3.066E-04	G
			209.28	7.194E-04	+	2.224E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.904E-04	+	2.812E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	0.000E+00	%	2.036E-04	G
Pb-212	N 3.7884E-04	238.62	3.788E-04	(	1.206E-05	G K
		77.11	5.310E-04	+	7.657E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 5.9852E-04	92.35	5.640E-04	(	1.473E-04	G
		63.29	6.477E-04	(	1.964E-04	G

WI07-0113 D2 IS RCA QC 061407

```
Pb-214   N   2.4970E-04    351.92 2.611E-04 *(  1.971E-05          G K
                           295.21 2.276E-04  (  2.940E-05          G
                            77.11 0.000E+00 ?   1.363E-04Energy duplication
                           241.98 5.331E-04 +   1.707E-04          G
                            74.81 9.873E-04 +   1.960E-04Energy duplication
                            87.30 6.627E-04 +   1.851E-04          X

Pb-210   N   8.8460E-04     46.50 8.846E-04  (  1.991E-04          G

AM-241       1.2423E-04     59.54 1.242E-04  (  2.116E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:29:40 Page 5
EnergySolutions Spectrum name: WI000083.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.8431E-01	3.937E-01	3.955E-01
K-40 #	6.3423E+00	2.278E+00	2.291E+00
Ac-228	1.9532E+00	4.287E-01	4.349E-01
Pb-212	1.7604E+00	2.922E-01	2.995E-01
CS-137 #	2.6444E-01	1.154E-01	1.159E-01
Th-234	2.7812E+00	1.358E+00	1.360E+00
Pb-214	1.1603E+00	3.150E-01	3.180E-01
Pb-210	4.1106E+00	2.682E+00	2.683E+00
AM-241	5.7730E-01	2.782E-01	2.790E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0113 D2 IS RCA QC 061407

& - 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 (2.7 to 1999.3 keV) 1.9934153E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0114 D1 IS RCA 061407

Sample description
WI07-0114 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00062.An1

Acquisition information

Start time:	14-Jun-2007 10:27:51
Live time:	600
Real time:	603
Dead time:	0.42 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.6060E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.6060E+02) = 3.8373E+03
Detection limit method:	Traditional ORTEC method

WI07-0114 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0950

********** 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	
28.85	7.39	57.	423.	0.705	12.06	1.936	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.16	46.46	21.	28.	0.047	70.71	0.403s
AM-241	236.60	59.31	28.	46.	0.076	52.33	0.795s
Th-234	253.23	63.47	51.	48.	0.081	66.65	1.948s
Pb-214	298.61	74.81	72.	79.	0.131	37.94	0.971D
Pb-212	298.63	74.81	88.	0.	0.000	891.94	0.292D
Pb-212	307.80	77.11	64.	124.	0.207	25.56	0.973D
Pb-214	307.80	77.11	153.	0.	0.000	203.78	0.000D
Pb-214	348.55	87.29	27.	34.	0.057	59.82	0.770
Th-234	368.79	92.35	43.	29.	0.049	72.65	0.985D
Ac-228	380.79	95.35	26.	4.	0.007	375.71	0.987D
Ac-228	836.65	209.28	8.	35.	0.058	45.83	0.498s
Pb-212	954.08	238.62	25.	149.	0.248	18.98	1.099D
Pb-214	967.50	241.98	31.	24.	0.040	76.70	1.101D
Ac-228	1081.08	270.37	13.	14.	0.023	115.74	0.386s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.11	295.37	12.	40.	0.067	46.90	0.778s
Ac-228	1308.30	327.15	4.	23.	0.038	58.34	0.239s
Ac-228	1352.37	338.16	4.	38.	0.063	37.22	1.028
Pb-214	1407.23	351.88	6.	68.	0.113	28.66	0.979s
Ac-228	1850.78	462.72	0.	25.	0.042	40.00	0.364s

Bi-214	2437.18	609.27	0.	44.	0.073	30.15	0.553s
CS-137	2645.00	661.20	0.	20.	0.033	44.72	0.375s
Bi-214	3075.00	768.65	0.	3.	0.005	115.47	0.250s
Ac-228	3175.00	793.64	0.	4.	0.007	100.00	0.250s
Ac-228	3645.52	911.22	0.	35.	0.058	33.81	0.328s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3858.75	964.51	1.	0.	0.000	0.00	1.588
Ac-228	3877.27	969.13	0.	22.	0.037	42.64	0.416s
Bi-214	4483.12	1120.52	0.	8.	0.013	70.71	0.375s
Bi-214	4952.00	1237.68	0.	0.	0.001	223.61	0.100s
Bi-214	5509.00	1376.86	0.	2.	0.003	141.42	0.250s
K-40	5844.23	1460.62	0.	26.	0.043	39.22	0.750s
Ac-228	6351.00	1587.24	0.	4.	0.007	100.00	0.250s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.1838E-04	609.31	2.252E-04	(	5.117E-06	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	2.099E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	1.707E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?(	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	1.2239E-03	1460.81	1.224E-03	?(	4.707E-05	G
Ac-228	N	4.6002E-04	911.07	4.184E-04	(	1.195E-05	G K
			969.11	4.628E-04	?(	2.103E-05	G
			338.32	5.006E-04	(	4.442E-05	G
			964.60	0.000E+00		1.332E-04	G
			794.70	2.565E-04	&	2.162E-04	G
			463.00	1.083E-03	+	3.287E-04	G
			209.28	8.480E-04	+	2.371E-04	G
			270.23	4.840E-04	(	2.015E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	6.196E-04	?(	1.549E-04	G
		95.35	0.000E+00	%	1.860E-04	X
		327.64	1.046E-03	+	3.605E-04	G
Pb-212	N 3.8937E-04	238.62	3.894E-04	(	1.996E-05	G K
		77.11	5.743E-04	+	9.202E-05	Energy duplication
		74.81	0.000E+00	&	1.080E-04	Energy duplication
CS-137	5.9469E-05	661.66	5.947E-05	?(	2.973E-06	G
Th-234	N 7.1395E-04	92.35	4.327E-04	(	1.430E-04	G
		63.29	1.114E-03	(	2.439E-04	G
Pb-214	N 2.9344E-04	351.92	2.813E-04	(	1.702E-05	G K

```
                                WI07-0114 D1 IS RCA 061407
                               295.21 2.831E-04  (  3.839E-05          G
                                77.11 0.000E+00 %   1.429E-04Energy duplication
                               241.98 3.803E-04  (  1.318E-04          G
                                74.81 1.064E-03 +   2.417E-04Energy duplication
                                87.30 5.927E-04 +   1.995E-04          X

Pb-210   N   6.5592E-04      46.50 6.559E-04  (  1.640E-04          G

AM-241       1.1280E-04      59.54 1.128E-04 @(  1.967E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	8.3801E-01	2.527E-01	2.539E-01
K-40 #	4.6966E+00	1.842E+00	1.847E+00
Ac-228	1.7652E+00	5.880E-01	5.903E-01
Pb-212	1.4941E+00	2.836E-01	2.870E-01
CS-137 #	2.2820E-01	1.021E-01	1.023E-01
Th-234	2.7396E+00	1.351E+00	1.352E+00
Pb-214	1.1260E+00	3.228E-01	3.245E-01
Pb-210	2.5169E+00	1.780E+00	1.781E+00
AM-241 #	4.3286E-01	2.265E-01	2.271E-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 (2.7 to 1999.2 keV) 1.5837599E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0115 D2 IS RCA 061407

Sample description
WI07-0115 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000084.An1

Acquisition information

Start time:	14-Jun-2007 10:33:07
Live time:	600
Real time:	602
Dead time:	0.26 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9750E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9750E+02) = 3.3613E+03
Detection limit method:	Traditional ORTEC method

WI07-0115 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1429

********** 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	
11.99	3.41	8183.	14478.	24.130	2.43	0.854	-	D
18.84	5.12	9509.	7945.	13.242	4.13	0.856	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.45	46.79	24.	44.	0.073	48.96	0.672
AM-241	237.45	59.54	64.	78.	0.130	45.34	0.880
Th-234	252.53	63.31	48.	19.	0.032	128.54	0.312s
Pb-214	298.54	74.81	63.	64.	0.106	43.20	0.917D
Pb-212	298.56	74.81	79.	0.	0.000	232.26	0.735D
Pb-212	307.74	77.11	54.	92.	0.153	30.71	0.919D
Pb-214	307.74	77.11	125.	0.	0.000	309.72	0.452D
Pb-214	348.29	87.24	27.	39.	0.066	53.44	0.471s
Th-234	368.72	92.35	45.	22.	0.037	94.35	0.933D
Ac-228	380.72	95.35	26.	11.	0.018	149.09	0.935D
Ac-228	835.55	209.03	9.	31.	0.051	51.26	1.412s
Pb-212	953.94	238.62	12.	155.	0.259	17.24	1.057D
Pb-214	967.37	241.98	13.	30.	0.050	49.49	1.060D

0

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.24	270.19	9.	20.	0.033	68.25	0.594s
Pb-214	1179.27	294.94	7.	56.	0.093	33.41	0.670s
Ac-228	1307.00	326.87	11.	1.	0.002	1021.00	0.000s
Ac-228	1352.67	338.28	4.	30.	0.051	42.08	0.619s
Pb-214	1406.45	351.72	8.	81.	0.136	26.76	1.091

Ac-228	1849.43	462.44	3.	7.	0.012	108.80	0.331s
Bi-214	2438.84	609.74	0.	50.	0.083	28.28	1.250
CS-137	2645.95	661.50	0.	20.	0.033	44.72	1.000s
Bi-214	3073.75	768.41	0.	9.	0.015	66.67	0.312s
Ac-228	3179.27	794.78	2.	6.	0.010	122.16	0.327s
Ac-228	3645.48	911.29	0.	33.	0.055	34.82	0.594s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	2.	0.003	290.13	1.595D
Ac-228	3876.86	969.11	0.	23.	0.039	41.26	1.598D
Bi-214	4480.50	1119.95	0.	12.	0.020	57.74	0.500s
Bi-214	4953.25	1238.08	0.	4.	0.007	100.00	0.375s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5846.16	1461.19	0.	31.	0.052	35.92	0.309s
Ac-228	6355.00	1588.32	0.	4.	0.007	100.00	0.250s
Bi-214	7062.00	1764.96	0.	6.	0.010	81.65	0.750s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4247E-04	609.31	2.325E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	3.9663E-04	911.07	3.634E-04	(	1.101E-05	G K
			969.11	4.563E-04	(	1.942E-05	G
			338.32	3.555E-04	(	3.813E-05	G
			964.60	0.000E+00	%	2.082E-04	G
			794.70	3.430E-04	?(	1.553E-04	G
			463.00	2.728E-04	-	1.949E-04	G
			209.28	6.489E-04	+	2.001E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:43:17 Page 4
EnergySolutions Spectrum name: WI000084.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.196E-04	+	2.541E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	2.056E-04	-	1.756E-04	X
		327.64	0.000E+00	&	2.209E-04	G
Pb-212	N 3.5540E-04	238.62	3.566E-04	(	1.240E-05	G K
		77.11	3.525E-04	(	4.172E-05	Energy duplication
		74.81	0.000E+00	%	8.489E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	(	2.710E-06	G
Th-234	N 3.1610E-04	92.35	2.794E-04	(	1.242E-04	G
		63.29	3.683E-04	?(	1.958E-04	G

```
Pb-214   N   3.2975E-04    351.92 3.012E-04  (  1.647E-05          G K
                           295.21 3.508E-04 @(  2.678E-05          G
                            77.11 0.000E+00 %   1.071E-04Energy duplication
                           241.98 4.174E-04  (  7.724E-05          G
                            74.81 7.125E-04 +   1.835E-04Energy duplication
                            87.30 5.708E-04 +   1.741E-04          X

Pb-210   N   8.9821E-04     46.50 8.982E-04  (  1.520E-04          G

AM-241       1.6061E-04     59.54 1.606E-04  (  2.435E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:43:17 Page 5
EnergySolutions Spectrum name: WI000084.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	8.1502E-01	2.305E-01	2.325E-01
K-40 #	4.5878E+00	1.648E+00	1.657E+00
Ac-228	1.3332E+00	4.588E-01	4.615E-01
Pb-212	1.1946E+00	2.060E-01	2.108E-01
CS-137	1.8218E-01	8.147E-02	8.177E-02
Th-234	1.0625E+00	8.471E-01	8.474E-01
Pb-214	1.1084E+00	2.417E-01	2.453E-01
Pb-210	3.0192E+00	1.478E+00	1.480E+00
AM-241	5.3987E-01	2.448E-01	2.456E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0115 D2 IS RCA 061407

& - 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 (2.7 to 1999.3 keV) 1.3842793E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0116 D1 IS RCA 061407

Sample description
WI07-0116 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00063.An1

Acquisition information
Start time: 14-Jun-2007 10:41:30
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8240E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8240E+02) = 3.5411E+03
Detection limit method: Traditional ORTEC method

WI07-0116 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1044

********** 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	
28.25	7.24	28.	404.	0.673	11.21	1.410	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.94	46.65	22.	41.	0.068	49.59	0.925
AM-241	235.07	58.93	31.	64.	0.106	42.42	0.799s
Th-234	251.48	63.03	48.	52.	0.087	56.34	0.515s
Pb-214	298.61	74.81	62.	81.	0.136	35.15	0.971D
Pb-212	298.63	74.81	66.	0.	0.000	175.74	0.573D
Pb-212	307.80	77.11	52.	137.	0.229	22.62	0.972D
Pb-214	307.80	77.11	223.	0.	0.000	77.34	0.243D
Pb-214	348.26	87.22	42.	45.	0.075	57.18	0.879
Th-234	368.79	92.35	47.	33.	0.054	69.28	0.985D
Ac-228	380.79	95.35	43.	13.	0.021	159.08	0.987D
Ac-228	837.63	209.52	13.	29.	0.048	61.44	0.513s
Pb-212	954.08	238.62	11.	173.	0.289	16.14	1.099D
Pb-214	967.50	241.98	31.	36.	0.061	54.16	1.101D
Ac-228	1081.94	270.58	13.	10.	0.017	143.06	0.268s

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:51:40 Page 3
EnergySolutions Spectrum name: Win00063.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.84	295.30	7.	66.	0.111	29.42	1.291s
Ac-228	1310.57	327.72	10.	22.	0.038	74.24	0.590s
Ac-228	1351.84	338.03	13.	43.	0.072	45.25	0.646s
Pb-214	1407.39	351.91	11.	90.	0.150	26.42	1.080
Ac-228	1849.35	462.37	2.	10.	0.017	74.40	0.426s

Bi-214	2437.71	609.40	0.	55.	0.092	26.97	1.111
CS-137	2645.59	661.35	3.	8.	0.014	102.14	0.472s
Bi-214	3071.33	767.74	0.	5.	0.008	89.44	0.250s
Ac-228	3179.50	794.77	0.	14.	0.023	53.45	0.312s
Ac-228	3644.52	910.97	0.	40.	0.067	31.62	1.572
Bi-214	3736.00	933.83	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	2.	1.	0.002	403.64	1.589D
Ac-228	3877.18	969.11	6.	16.	0.027	65.50	1.591D
Bi-214	4480.69	1119.92	0.	13.	0.022	55.47	0.812s
Bi-214	4951.89	1237.66	0.	13.	0.022	55.47	0.375s
Bi-214	5511.50	1377.49	0.	4.	0.007	100.00	0.375s
K-40	5846.00	1461.07	18.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.75	1764.33	0.	4.	0.007	100.00	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9523E-04	609.31	2.815E-04	(	5.117E-06	G K
			1764.49	1.513E-04	-	1.276E-04	G
			1120.29	3.411E-04	?(	2.624E-05	G
			1238.11	9.472E-04	+	4.097E-04	G
			768.36	2.844E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.636E-04	+	3.908E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.147E-04	G
Ac-228	N	5.1729E-04	911.07	4.782E-04	?(	1.195E-05	G K
			969.11	3.391E-04	-	1.504E-04	G
			338.32	5.708E-04	?(	7.322E-05	G
			964.60	0.000E+00	%	2.006E-04	G
			794.70	8.976E-04	+	3.728E-04	G
			463.00	4.475E-04	&(	1.036E-04	G
			209.28	6.945E-04	?(	1.378E-04	G
			270.23	3.542E-04	-	2.586E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.823E-04	-	2.498E-04	X
		327.64	1.031E-03	+	3.959E-04	G
Pb-212	N 4.5341E-04	238.62	4.534E-04	(	1.369E-05	G K
		77.11	6.345E-04	+	9.226E-05	Energy duplication
		74.81	0.000E+00	?	9.398E-05	Energy duplication
CS-137	2.4779E-05	661.66	2.478E-05	?(	8.513E-06	G
Th-234	N 7.8055E-04	92.35	4.786E-04	(	1.506E-04	G
		63.29	1.210E-03	?(	2.365E-04	G
Pb-214	N 4.0659E-04	351.92	3.741E-04	(	2.169E-05	G K

```
                                WI07-0116 D1 IS RCA 061407
                               295.21 4.695E-04 @(  2.962E-05         G
                                77.11 0.000E+00 ?   1.715E-04Energy duplication
                               241.98 5.741E-04 +   1.903E-04         G
                                74.81 1.100E-03 +   2.353E-04Energy duplication
                                87.30 7.740E-04 +   2.365E-04         X

Pb-210   N   9.6045E-04      46.50 9.604E-04  (  1.675E-04         G

AM-241       1.5825E-04      59.54 1.583E-04 &(  2.085E-05         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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0454E+00	2.819E-01	2.836E-01
K-40 <	1.1143E+00		
Ac-228	1.8317E+00	5.091E-01	5.119E-01
Pb-212	1.6056E+00	2.591E-01	2.634E-01
CS-137 #	8.7744E-02	8.962E-02	8.966E-02
Th-234	2.7640E+00	1.234E+00	1.236E+00
Pb-214	1.4398E+00	2.847E-01	2.878E-01
Pb-210	3.4010E+00	1.686E+00	1.688E+00
AM-241 #	5.6039E-01	2.377E-01	2.386E-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 (2.7 to 1999.2 keV) 1.2735631E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0117 D2 IS RCA 061407

Sample description
WI07-0117 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000085.An1

Acquisition information

Start time:	14-Jun-2007 10:58:13
Live time:	600
Real time:	602
Dead time:	0.27 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9650E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9650E+02) = 3.3727E+03
Detection limit method:	Traditional ORTEC method

WI07-0117 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1486

********** 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
14.41	3.79	5208.	22040.	36.733	1.88	1.851	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.58	46.82	32.	32.	0.053	70.71	0.913
AM-241	237.91	59.65	33.	53.	0.088	45.18	0.564s
Th-234	253.54	63.56	77.	92.	0.154	44.63	1.087s
Pb-214	298.54	74.81	55.	104.	0.174	28.09	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	177.25	0.294D
Pb-212	307.74	77.11	67.	174.	0.290	20.16	0.919D
Pb-214	307.74	77.11	170.	0.	0.000	448.50	0.223D
Pb-214	348.46	87.29	56.	68.	0.113	45.18	1.367s
Th-234	368.72	92.35	48.	48.	0.081	49.62	0.933D
Ac-228	380.72	95.35	32.	8.	0.013	210.12	0.935D
Ac-228	835.12	208.93	28.	29.	0.048	81.74	0.878
Pb-212	953.94	238.62	36.	213.	0.354	15.89	1.057D
Pb-214	967.37	241.98	31.	37.	0.061	54.58	1.060D
Ac-228	1078.69	269.81	6.	32.	0.054	45.48	0.397s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.06	295.14	10.	58.	0.097	32.35	0.701s
Ac-228	1311.39	327.96	7.	19.	0.032	68.49	0.496s
Ac-228	1353.30	338.44	7.	43.	0.071	37.34	0.395s
Pb-214	1407.42	351.97	7.	107.	0.178	22.26	1.151
Ac-228	1852.49	463.20	6.	26.	0.043	56.22	0.871s

Bi-214	2437.75	609.47	0.	68.	0.113	24.25	0.534s
CS-137	2647.93	662.00	0.	33.	0.055	34.82	0.375s
Bi-214	3070.67	767.64	2.	1.	0.002	447.21	0.187s
Ac-228	3179.00	794.72	6.	1.	0.002	636.96	0.000s
Ac-228	3644.78	911.11	0.	41.	0.068	31.23	0.869s
Bi-214	3737.50	934.28	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	3.	7.	0.012	95.46	1.595D
Ac-228	3876.86	969.11	3.	28.	0.047	41.74	1.598D
Bi-214	4482.64	1120.49	0.	18.	0.030	47.14	0.375s
Bi-214	4952.33	1237.85	0.	3.	0.005	115.47	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.61	1460.80	0.	36.	0.060	33.33	1.218s
Ac-228	6350.00	1587.07	0.	9.	0.015	66.67	0.250s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1623E-04	609.31	3.162E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	4.9423E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	5.429E-04	(	5.857E-05	G
			338.32	5.000E-04	?(	5.112E-05	G
			964.60	4.585E-04	(	1.742E-04	G
			794.70	0.000E+00	%	2.514E-04	G
			463.00	1.000E-03	+	3.319E-04	G
			209.28	6.066E-04	?(	1.702E-04	G
			270.23	1.010E-03	+	2.884E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.307E-03	+	6.931E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	7.737E-04	+	3.147E-04	G
Pb-212	N 4.8870E-04	238.62	4.887E-04	(	2.078E-05	G K
		77.11	6.663E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	?	9.716E-05	Energy duplication
CS-137	8.9426E-05	661.66	8.943E-05	(	2.710E-06	G
Th-234	N 6.0283E-04	92.35	6.028E-04	(	1.282E-04	G
		63.29	1.759E-03	+	3.599E-04	G
Pb-214	N 3.8426E-04	351.92	3.951E-04	(	1.616E-05	G K

```
                          WI07-0117 D2 IS RCA 061407
                         295.21 3.633E-04  (  3.132E-05          G
                          77.11 0.000E+00 %   1.245E-04Energy duplication
                         241.98 5.053E-04 +   1.683E-04          G
                          74.81 1.163E-03 +   2.048E-04Energy duplication
                          87.30 9.867E-04 +   2.359E-04          X

Pb-210   N   6.5324E-04     46.50 6.532E-04  (  1.738E-04          G

AM-241       1.0845E-04     59.54 1.084E-04  (  1.787E-05          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

   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
```


ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 11:08:24 Page   5
EnergySolutions   Spectrum name: WI000085.An1


```
   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        1.0665E+00    2.587E-01    2.617E-01
K-40    #     5.3457E+00    1.782E+00    1.793E+00
Ac-228        1.6669E+00    4.704E-01    4.745E-01
Pb-212        1.6482E+00    2.619E-01    2.691E-01
CS-137        3.0161E-01    1.050E-01    1.056E-01
Th-234        2.0332E+00    1.009E+00    1.010E+00
Pb-214        1.2960E+00    2.544E-01    2.590E-01
Pb-210        2.2032E+00    1.558E+00    1.559E+00
AM-241        3.6576E-01    1.653E-01    1.658E-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 (2.7 to 1999.3 keV) 1.5927024E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0049 D1 OS RCA 061307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:23:01 Page    1
EnergySolutions                  Spectrum name: Win00041.An1

Sample description
     WI07-0049 D1 OS RCA 061307


Spectrum Filename: C:\User\Win00041.An1

Acquisition information
       Start time:                 13-Jun-2007 09:12:51
       Live time:                600
       Real time:                602
       Dead time:                  0.41 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                3.0270E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.0270E+02) =
                                   3.3036E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:23:01 Page    2
EnergySolutions                  Spectrum name: Win00041.An1
```

WI07-0049 D1 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1582

********** 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	
28.23	7.24	65.	436.	0.726	12.02	1.253	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.73	46.60	32.	50.	0.083	55.88	0.290s
AM-241	237.67	59.58	17.	0.	0.000	0.00	0.174s
Th-234	253.83	63.62	57.	56.	0.093	61.19	0.616s
Pb-214	298.61	74.81	53.	86.	0.143	32.45	0.971D
Pb-212	298.63	74.81	109.	0.	0.000	168.57	0.660D
Pb-212	307.80	77.11	80.	117.	0.195	28.50	0.973D
Pb-214	307.80	77.11	128.	0.	0.000	157.45	0.304D
Pb-214	348.90	87.38	34.	69.	0.115	37.90	0.729s
Th-234	368.79	92.35	48.	32.	0.054	70.06	0.985D
Ac-228	380.79	95.35	44.	10.	0.016	204.85	0.987D
Ac-228	836.50	209.24	11.	33.	0.056	51.07	0.746s
Pb-212	954.08	238.62	19.	153.	0.255	18.06	1.099D
Pb-214	967.50	241.98	22.	33.	0.054	54.15	1.101D
Ac-228	1079.16	269.89	18.	30.	0.049	70.54	0.624s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.53	294.97	4.	78.	0.129	24.92	1.136s
Ac-228	1314.61	328.73	9.	16.	0.027	81.02	0.256s
Ac-228	1352.96	338.31	8.	48.	0.079	37.68	0.379s
Pb-214	1407.64	351.98	3.	96.	0.159	21.94	0.891s
Ac-228	1852.76	463.22	7.	27.	0.046	54.86	0.618s

Bi-214	2437.89	609.44	3.	66.	0.109	27.26	0.467s
CS-137	2642.71	660.63	13.	3.	0.005	443.05	0.193s
Bi-214	3072.64	768.06	3.	8.	0.014	106.83	0.432s
Ac-228	3173.89	793.37	2.	4.	0.006	153.86	0.229s
Ac-228	3646.39	911.44	0.	41.	0.068	31.23	1.093s
Bi-214	3738.00	934.33	0.	6.	0.010	81.65	0.750s
Ac-228	3859.13	964.60	0.	13.	0.021	56.11	1.588D
Ac-228	3877.18	969.11	2.	28.	0.047	39.80	1.591D
Bi-214	4485.73	1121.17	0.	19.	0.032	45.88	0.312s
Bi-214	4955.00	1238.43	0.	3.	0.005	115.47	0.250s
Bi-214	5512.33	1377.69	0.	4.	0.007	100.00	0.250s
K-40	5845.28	1460.89	0.	32.	0.053	35.36	0.625s
Ac-228	6354.00	1587.99	0.	0.	0.001	223.61	0.100s
Bi-214	7058.80	1764.09	0.	8.	0.013	70.71	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.2753E-04	609.31	3.360E-04	(	1.602E-05	G K
			1764.49	3.026E-04	?(	3.783E-05	G
			1120.29	4.985E-04	&	1.754E-04	G
			1238.11	2.186E-04	-	2.186E-04	G
			768.36	4.646E-04	+	2.968E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.636E-04	+	3.908E-04	G
			934.06	6.323E-04	+	4.215E-04	G
K-40	N	1.5064E-03	1460.81	1.506E-03	?(	4.707E-05	G
Ac-228	N	5.6002E-04	911.07	4.901E-04	(	1.195E-05	G K
			969.11	5.952E-04	(	5.075E-05	G
			338.32	6.257E-04	@(	6.130E-05	G
			964.60	8.497E-04	+	3.722E-04	G
			794.70	2.244E-04	&	2.373E-04	G
			463.00	1.184E-03	+	3.795E-04	G
			209.28	8.076E-04	+	2.397E-04	G
			270.23	1.045E-03	+	3.616E-04	G

0

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	2.455E-04	X
		327.64	7.485E-04	&(	2.151E-04	G
Pb-212	N 4.0055E-04	238.62	4.005E-04	(	1.750E-05	G K
		77.11	5.403E-04	+	9.415E-05	Energy duplication
		74.81	0.000E+00	?	1.199E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.837E-05	G
Th-234	N 8.1105E-04	92.35	4.739E-04	(	1.510E-04	G
		63.29	1.291E-03	$(	2.580E-04	G
Pb-214	N 3.9768E-04	351.92	3.977E-04	(	1.301E-05	G K

```
                                295.21 5.485E-04 +   9.369E-05          G
                                 77.11 0.000E+00 ?   1.306E-04Energy duplication
                                241.98 5.118E-04 +   1.732E-04          G
                                 74.81 1.155E-03 +   2.321E-04Energy duplication
                                 87.30 1.191E-03 +   2.566E-04          X

Pb-210   N   1.1596E-03      46.50 1.160E-03 *(  1.980E-04          G

AM-241       0.0000E+00      59.54 0.000E+00 %   1.589E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:23:01 Page    5
 EnergySolutions                  Spectrum name: Win00041.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.0820E+00	2.950E-01	2.967E-01
K-40	#	4.9765E+00	1.759E+00	1.766E+00
Ac-228		1.8501E+00	4.749E-01	4.780E-01
Pb-212		1.3232E+00	2.390E-01	2.422E-01
CS-137	<	6.0696E-02		
Th-234		2.6794E+00	1.246E+00	1.248E+00
Pb-214		1.3138E+00	2.882E-01	2.908E-01
Pb-210	#	3.8307E+00	2.140E+00	2.142E+00
AM-241	<	5.2491E-02		

- 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 (2.7 to 1999.2 keV) 1.7055737E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0050 D2 OS RCA 061307

Sample description
WI07-0050 D2 OS RCS 061307

Spectrum Filename: C:\User\WI000066.An1

Acquisition information
Start time: 13-Jun-2007 09:17:47
Live time: 600
Real time: 602
Dead time: 0.33 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.6270E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6270E+02) = 3.8066E+03
Detection limit method: Traditional ORTEC method

WI07-0050 D2 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1046

********** 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	
14.52	3.82	4986.	23091.	38.485	1.80	2.051	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.26	46.24	150.	60.	0.101	76.39	0.357s
AM-241	237.81	59.63	119.	61.	0.101	68.82	0.932s
Th-234	253.62	63.58	117.	34.	0.057	118.31	0.600s
Pb-214	298.54	74.81	89.	130.	0.216	27.11	0.917D
Pb-212	298.56	74.81	160.	0.	0.000	550.01	0.000D
Pb-212	307.74	77.11	99.	179.	0.298	21.76	0.919D
Pb-214	307.74	77.11	273.	0.	0.000	99.19	0.231D
Pb-214	348.43	87.28	91.	61.	0.102	61.27	0.645s
Th-234	368.72	92.35	81.	48.	0.080	60.49	0.933D
Ac-228	380.72	95.35	61.	5.	0.008	470.91	0.935D
Ac-228	836.88	209.37	20.	41.	0.069	52.59	0.738s
Pb-212	953.94	238.62	30.	228.	0.380	14.90	1.057D
Pb-214	967.37	241.98	42.	17.	0.028	119.19	1.060D
Ac-228	1079.15	269.92	9.	20.	0.034	67.99	0.722s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.34	295.21	5.	67.	0.112	27.04	0.869
Ac-228	1310.44	327.73	6.	21.	0.034	66.38	0.340s
Ac-228	1353.46	338.48	5.	59.	0.098	30.15	0.322s
Pb-214	1407.72	352.04	11.	98.	0.164	23.45	1.091
Ac-228	1851.78	463.03	0.	37.	0.062	32.88	0.400s

Bi-214	2437.29	609.36	0.	76.	0.127	22.94	0.964s
CS-137	2646.16	661.56	0.	22.	0.037	42.64	0.333s
Bi-214	3072.57	768.12	0.	14.	0.023	53.45	0.312s
Ac-228	3180.25	795.03	0.	14.	0.023	53.45	0.500s
Ac-228	3645.98	911.41	0.	46.	0.077	29.49	1.349
Bi-214	3736.67	934.08	0.	3.	0.005	115.47	0.375s
Ac-228	3858.81	964.60	3.	8.	0.014	86.75	1.595D
Ac-228	3876.86	969.11	6.	24.	0.040	49.34	1.598D
Bi-214	4480.50	1119.95	0.	16.	0.027	50.00	0.417s
Bi-214	4952.00	1237.77	0.	14.	0.023	53.45	0.500s
Bi-214	5512.50	1377.82	0.	5.	0.008	89.44	0.500s
K-40	5844.03	1460.65	0.	39.	0.065	32.03	1.124s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7061.00	1764.71	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.6226E-04	609.31	3.534E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-04	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	2.915E-04	-	2.915E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	5.3786E-04	911.07	5.066E-04	(	1.101E-05	G K
			969.11	4.707E-04	(	7.633E-05	G
			338.32	6.875E-04	(	4.458E-05	G
			964.60	5.233E-04	(	1.729E-04	G
			794.70	8.232E-04	+	3.419E-04	G
			463.00	1.442E-03	+	3.554E-04	G
			209.28	8.711E-04	+	2.445E-04	G
			270.23	6.353E-04	(	1.466E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.311E-04	X
		327.64	8.416E-04	+	3.203E-04	G
Pb-212	N 5.2363E-04	238.62	5.236E-04	(	1.903E-05	G K
		77.11	6.835E-04	+	9.220E-05	Energy duplication
		74.81	0.000E+00	%	1.191E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 6.1845E-04	92.35	5.979E-04	(	1.652E-04	G
		63.29	6.477E-04	?(	3.011E-04	G
Pb-214	N 3.8340E-04	351.92	3.636E-04	(	1.919E-05	G K

```
                          WI07-0050 D2 OS RCA 061307
                         295.21 4.218E-04  (  2.252E-05          G
                          77.11 0.000E+00 ?   1.567E-04Energy duplication
                         241.98 2.333E-04 -   1.573E-04          G
                          74.81 1.446E-03 +   2.392E-04Energy duplication
                          87.30 8.852E-04 +   2.604E-04          X

Pb-210   N   1.2350E-03     46.50 1.235E-03  (  3.633E-04          G

AM-241       1.2526E-04     59.54 1.253E-04  (  3.284E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:27:58 Page    5
 EnergySolutions                  Spectrum name: WI000066.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	1.3790E+00	3.164E-01	3.206E-01
K-40 #	6.5363E+00	2.093E+00	2.108E+00
Ac-228	2.0474E+00	5.238E-01	5.294E-01
Pb-212	1.9933E+00	2.970E-01	3.063E-01
CS-137 #	2.2694E-01	9.677E-02	9.716E-02
Th-234	2.3542E+00	1.424E+00	1.425E+00
Pb-214	1.4595E+00	2.612E-01	2.669E-01
Pb-210	4.7013E+00	3.591E+00	3.593E+00
AM-241 #	4.7683E-01	3.282E-01	3.286E-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 (2.7 to 1999.3 keV) 2.1174734E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0051 D1 OS RCA 061307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:36:54 Page    1
EnergySolutions                  Spectrum name: Win00042.An1

Sample description
     WI07-0051 D1 OS RCA 061307


Spectrum Filename: C:\User\Win00042.An1

Acquisition information
       Start time:                 13-Jun-2007 09:26:43
       Live time:                600
       Real time:                603
       Dead time:                  0.41 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8930E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8930E+02) =
                                   3.4566E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 09:36:54 Page    2
EnergySolutions                  Spectrum name: Win00042.An1
```

WI07-0051 D1 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1528

********** 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	
28.13	7.21	48.	388.	0.647	12.24	1.089	CU-64	s
252.89	63.38	66.	42.	0.070	73.77	0.310	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	51.	46.	0.077	67.57	0.412s
AM-241	237.53	59.55	76.	216.	0.361	20.86	0.930
Th-234	252.35	63.25	108.	0.	0.000	0.00	0.961
Pb-214	298.61	74.81	67.	101.	0.168	30.41	0.971D
Pb-212	298.63	74.81	92.	0.	0.000	233.33	0.364D
Pb-212	307.80	77.11	77.	149.	0.248	23.37	0.972D
Pb-214	307.80	77.11	303.	0.	0.000	64.99	0.000D
Pb-214	348.72	87.33	51.	56.	0.093	54.10	0.967s
Th-234	368.79	92.35	53.	53.	0.088	47.57	0.985D
Ac-228	380.79	95.35	41.	5.	0.008	410.04	0.987D
Ac-228	839.02	209.87	18.	40.	0.068	53.93	0.545s
Pb-212	954.08	238.62	30.	181.	0.301	17.18	1.099D
Pb-214	967.50	241.98	28.	33.	0.054	58.04	1.101D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.51	270.47	3.	39.	0.064	37.70	0.261s
Pb-214	1179.78	295.03	7.	55.	0.092	33.82	1.133s
Ac-228	1305.33	326.41	10.	11.	0.018	123.32	0.280s
Ac-228	1351.30	337.90	7.	42.	0.071	39.87	0.593s
Pb-214	1407.51	351.95	4.	94.	0.156	22.89	1.146s

Ac-228	1853.15	463.31	4.	28.	0.047	46.68	0.634s
Bi-214	2437.38	609.32	4.	77.	0.128	25.58	1.705s
CS-137	2647.17	661.74	0.	28.	0.047	37.80	0.552s
Bi-214	3074.00	768.40	0.	2.	0.003	141.42	0.250s
Ac-228	3179.00	794.64	0.	14.	0.023	53.45	0.375s
Ac-228	3645.11	911.12	0.	36.	0.060	33.33	0.550s
Bi-214	3737.50	934.21	0.	4.	0.007	100.00	0.500s
Ac-228	3859.13	964.60	1.	17.	0.028	52.78	1.589D
Ac-228	3877.18	969.11	5.	28.	0.046	43.72	1.591D
Bi-214	4481.00	1119.99	4.	1.	0.002	642.91	0.000s
Bi-214	4951.00	1237.43	0.	4.	0.007	100.00	0.375s
Bi-214	5509.00	1376.86	0.	3.	0.005	115.47	0.250s
K-40	5844.00	1460.57	0.	28.	0.047	37.80	0.375s
Ac-228	6352.50	1587.62	0.	6.	0.010	81.65	0.999s
Bi-214	7057.00	1763.64	0.	9.	0.015	66.67	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.8036E-04	609.31	3.940E-04	(	1.726E-05	G K
			1764.49	3.404E-04	?(	3.783E-05	G
			1120.29	0.000E+00	%	9.711E-05	G
			1238.11	2.914E-04	-	2.457E-04	G
			768.36	1.138E-04	-	1.457E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.477E-04	?(	1.159E-04	G
			934.06	4.215E-04	?(	1.054E-04	G
K-40	N	1.3181E-03	1460.81	1.318E-03	?(	4.707E-05	G
Ac-228	N	5.0240E-04	911.07	4.304E-04	?(	1.195E-05	G K
			969.11	5.843E-04	(	7.485E-05	G
			338.32	5.577E-04	(	5.514E-05	G
			964.60	1.106E-03	+	4.337E-04	G
			794.70	8.976E-04	+	3.728E-04	G
			463.00	1.234E-03	+	3.688E-04	G
			209.28	9.812E-04	&	2.733E-04	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 09:36:54 Page 4
EnergySolutions Spectrum name: Win00042.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.369E-03	+	3.428E-04	G
		1588.00	9.294E-04	+	6.196E-04	G
		95.35	0.000E+00	%	2.275E-04	X
		327.64	5.041E-04	&(	2.291E-04	G
Pb-212	N 4.7338E-04	238.62	4.734E-04	(	2.169E-05	G K
		77.11	6.889E-04	+	1.007E-04	Energy duplication
		74.81	0.000E+00	%	1.104E-04	Energy duplication
CS-137	8.3257E-05	661.66	8.326E-05	?(	2.973E-06	G
Th-234	N 7.7865E-04	92.35	7.786E-04	(	1.587E-04	G
		63.29	0.000E+00		3.506E-04	G

```
Pb-214   N   3.8979E-04    351.92 3.901E-04 *(  1.426E-05         G K
                           295.21 3.893E-04 @(  3.026E-05         G
                            77.11 0.000E+00 ?   1.993E-04Energy duplication
                           241.98 5.130E-04 +   1.819E-04         G
                            74.81 1.363E-03 +   2.545E-04Energy duplication
                            87.30 9.610E-04 +   2.613E-04         X

Pb-210   N   1.0776E-03     46.50 1.078E-03  (  2.486E-04         G

AM-241       5.3674E-04     59.54 5.367E-04  (  3.193E-05         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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.3148E+00	3.363E-01	3.386E-01
K-40 #	4.5561E+00	1.722E+00	1.727E+00
Ac-228	1.7366E+00	5.789E-01	5.811E-01
Pb-212	1.6363E+00	2.811E-01	2.852E-01
CS-137 #	2.8779E-01	1.088E-01	1.091E-01
Th-234	2.6915E+00	1.280E+00	1.282E+00
Pb-214	1.3474E+00	2.751E-01	2.780E-01
Pb-210	3.7248E+00	2.517E+00	2.518E+00
AM-241	1.8553E+00	3.870E-01	3.930E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0051 D1 OS RCA 061307

& - 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 (2.7 to 1999.2 keV) 1.9150471E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0052 D2 OS RCA 061307

Sample description
WI07-0052 D2 OS RCS 061307

Spectrum Filename: C:\User\WI000067.An1

Acquisition information
Start time: 13-Jun-2007 09:31:42
Live time: 600
Real time: 601
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0440E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0440E+02) = 3.2852E+03
Detection limit method: Traditional ORTEC method

WI07-0052 D2 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1130

********** 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	
14.63	3.84	3387.	19758.	32.930	1.85	2.209	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.28	46.25	56.	29.	0.048	105.57	0.584s
AM-241	237.45	59.54	65.	239.	0.398	17.65	0.883
Th-234	252.84	63.38	31.	32.	0.054	63.05	0.835
Pb-214	298.54	74.81	82.	83.	0.139	37.78	0.917D
Pb-212	298.56	74.81	91.	0.	0.000	457.04	0.631D
Pb-212	307.74	77.11	59.	157.	0.261	21.16	0.919D
Pb-214	307.74	77.11	173.	0.	0.000	553.43	0.436D
Pb-214	347.95	87.16	48.	62.	0.103	46.30	0.944s
Th-234	368.72	92.35	51.	36.	0.059	66.02	0.933D
Ac-228	380.72	95.35	35.	1.	0.002	1482.34	0.935D
Ac-228	836.02	209.15	23.	28.	0.046	74.23	1.444s
Pb-212	953.94	238.62	31.	186.	0.309	16.98	1.057D
Pb-214	967.37	241.98	35.	31.	0.051	65.24	1.060D
Ac-228	1081.00	270.38	17.	31.	0.052	63.27	0.682s

D

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 09:41:53 Page 3
EnergySolutions Spectrum name: WI000067.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.39	295.22	22.	56.	0.093	44.99	0.805s
Ac-228	1312.57	328.26	8.	32.	0.052	50.83	0.307s
Ac-228	1353.19	338.41	6.	39.	0.065	38.72	0.366s
Pb-214	1406.82	351.82	3.	89.	0.148	22.58	0.661s
Ac-228	1851.41	462.93	3.	24.	0.041	48.00	0.353s

Bi-214	2437.64	609.44	0.	67.	0.112	24.43	1.000s
CS-137	2647.33	661.85	0.	31.	0.052	35.92	1.000s
Bi-214	3068.00	766.98	0.	9.	0.015	66.67	0.250s
Ac-228	3179.56	794.86	0.	18.	0.030	47.14	0.292s
Ac-228	3645.92	911.40	0.	38.	0.063	32.44	0.833s
Bi-214	3735.50	933.78	0.	6.	0.010	81.65	0.375s
Ac-228	3858.81	964.60	8.	8.	0.013	121.26	1.595D
Ac-228	3876.86	969.11	13.	2.	0.003	613.55	1.598D
Bi-214	4481.25	1120.14	0.	17.	0.028	48.51	0.375s
Bi-214	4951.25	1237.58	0.	9.	0.015	66.67	0.375s
Bi-214	5511.50	1377.57	0.	2.	0.003	141.42	0.500s
K-40	5845.70	1461.07	0.	43.	0.072	30.50	0.937s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1158E-04	609.31	3.116E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	4.690E-04	&	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.8932E-03	1460.81	1.893E-03	(	4.403E-05	G
Ac-228	N	4.5008E-04	911.07	4.185E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.145E-04	G
			338.32	4.571E-04	(	4.688E-05	G
			964.60	4.885E-04	(	2.728E-04	G
			794.70	1.058E-03	+	3.834E-04	G
			463.00	9.485E-04	+	3.066E-04	G
			209.28	5.854E-04	@(	1.555E-04	G
			270.23	9.685E-04	+	3.221E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	1.283E-03	&	3.852E-04	G
Pb-212	N 4.2667E-04	238.62	4.267E-04	(	1.938E-05	G K
		77.11	6.003E-04	+	8.151E-05	Energy duplication
		74.81	0.000E+00	%	9.068E-05	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	?(	2.710E-06	G
Th-234	N 5.1533E-04	92.35	4.446E-04	(	1.328E-04	G
		63.29	6.160E-04	?(	1.590E-04	G
Pb-214	N 3.4733E-04	351.92	3.296E-04	(	1.111E-05	G K

```
                                295.21 3.508E-04  (  4.480E-05          G
                                 77.11 0.000E+00 %   1.255E-04Energy duplication
                                241.98 4.263E-04  (  1.231E-04          G
                                 74.81 9.282E-04 +   2.084E-04Energy duplication
                                 87.30 8.997E-04 +   2.226E-04          X

Pb-210    N    5.9200E-04      46.50 5.920E-04  (  2.265E-04          G

AM-241         4.9213E-04      59.54 4.921E-04  (  2.453E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 09:41:53 Page 5
EnergySolutions Spectrum name: WI000067.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0236E+00	2.501E-01	2.530E-01
K-40	6.2194E+00	1.897E+00	1.911E+00
Ac-228	1.4786E+00	4.797E-01	4.829E-01
Pb-212	1.4017E+00	2.379E-01	2.437E-01
CS-137 #	2.7597E-01	9.913E-02	9.969E-02
Th-234	1.6929E+00	7.727E-01	7.737E-01
Pb-214	1.1410E+00	2.577E-01	2.612E-01
Pb-210	1.9448E+00	2.053E+00	2.054E+00
AM-241	1.6167E+00	2.853E-01	2.916E-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 (2.7 to 1999.3 keV) 1.6794758E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0053 D1 OS RCA 061307

Sample description
WI07-0053 D1 OS RCA 061307

Spectrum Filename: C:\User\Win00044.An1

Acquisition information
Start time: 13-Jun-2007 10:52:48
Live time: 600
Real time: 608
Dead time: 1.27 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0030E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0030E+02) = 3.3300E+03
Detection limit method: Traditional ORTEC method

WI07-0053 D1 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1137

********** 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	
30.05	7.69	423.	1614.	2.690	7.12	2.580	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.31	45.99	18.	2.	0.003	616.44	0.227s
AM-241	238.24	59.72	64.	54.	0.090	62.93	0.401s
Th-234	255.69	64.08	54.	49.	0.082	66.44	1.363s
Pb-214	298.61	74.81	62.	47.	0.079	55.47	0.971D
Pb-212	298.63	74.81	80.	0.	0.000	310.85	0.185D
Pb-212	307.80	77.11	82.	69.	0.115	44.35	0.972D
Pb-214	307.80	77.11	126.	0.	0.000	1070.95	0.353D
Pb-214	341.72	85.58	48.	47.	0.078	65.79	0.413s
Th-234	369.95	92.64	49.	51.	0.085	64.62	0.314s
Ac-228	380.79	95.35	8.	0.	0.000	0.00	0.277D
Ac-228	836.36	209.21	9.	16.	0.026	87.31	0.445s
Pb-212	954.08	238.62	38.	101.	0.168	26.32	1.099D
Pb-214	967.50	241.98	37.	19.	0.032	99.28	1.101D
Ac-228	1078.28	269.67	2.	18.	0.029	57.10	0.521s

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:03:04 Page 3
EnergySolutions Spectrum name: Win00044.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1176.32	294.17	13.	7.	0.012	184.12	0.441s
Ac-228	1308.67	327.24	3.	1.	0.002	360.56	0.186s
Ac-228	1350.53	337.71	10.	27.	0.045	62.12	0.480s
Pb-214	1406.82	351.77	16.	56.	0.094	39.35	1.296
Ac-228	1853.69	463.45	10.	5.	0.008	225.09	0.238s

Bi-214	2437.19	609.27	5.	49.	0.082	35.29	0.380s
CS-137	2646.85	661.66	0.	20.	0.033	44.72	1.000s
Bi-214	3082.33	770.49	0.	9.	0.015	66.67	0.250s
Ac-228	3181.50	795.27	0.	4.	0.007	100.00	1.000s
Ac-228	3640.35	909.93	10.	4.	0.006	311.68	0.345s
Bi-214	3735.33	933.67	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	2.	0.	0.000	0.00	0.232D
Ac-228	3876.28	968.89	0.	18.	0.030	47.14	1.312
Bi-214	4482.38	1120.34	0.	16.	0.027	50.00	0.375s
Bi-214	4953.67	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5846.54	1461.20	0.	57.	0.095	26.49	1.655
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.33	1764.47	1.	0.	0.001	240.37	0.197s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.5246E-04	609.31	2.525E-04	@(	1.840E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	4.198E-04	+	1.621E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	5.120E-04	&	2.715E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	2.6832E-03	1460.81	2.683E-03	(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	&	6.952E-05	G K
			969.11	3.786E-04	?	1.372E-04	G
			338.32	3.557E-04	&	1.201E-04	G
			964.60	0.000E+00	&	1.600E-04	G
			794.70	2.565E-04	?	2.162E-04	G
			463.00	0.000E+00	%	2.599E-04	G
			209.28	3.796E-04	?	1.839E-04	G
			270.23	6.257E-04	&	2.424E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	&	1.039E-04	X
		327.64	0.000E+00	%	1.546E-04	G
Pb-212	N 2.8007E-04	238.62	2.646E-04	(	2.415E-05	G K
		77.11	3.184E-04	(	6.164E-05	Energy duplication
		74.81	0.000E+00	%	1.032E-04	Energy duplication
CS-137	5.9469E-05	661.66	5.947E-05	?(	2.973E-06	G
Th-234	N 9.0611E-04	92.35	7.491E-04	*(	1.529E-04	G
		63.29	1.130E-03	&(	2.514E-04	G
Pb-214	N 2.4550E-04	351.92	2.335E-04	?(	2.556E-05	G K

```
                                WI07-0053 D1 OS RCA 061307
                               295.21 5.072E-05 &   4.844E-05         G
                                77.11 0.000E+00 %   1.297E-04Energy duplication
                               241.98 3.052E-04  (  1.428E-04         G
                                74.81 6.367E-04 +   2.064E-04Energy duplication
                                87.30 8.114E-04 &   2.468E-04         X

Pb-210   N   0.0000E+00      46.50 0.000E+00 &   1.603E-04         G

AM-241       1.3388E-04      59.54 1.339E-04 *(  2.932E-05         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

   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
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 11:03:04 Page    5
 EnergySolutions                    Spectrum name: Win00044.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	8.4068E-01	2.967E-01	2.977E-01
K-40	8.9352E+00	2.367E+00	2.382E+00
Ac-228 B<	2.3149E-01		
Pb-212	9.3262E-01	2.405E-01	2.421E-01
CS-137 #	1.9803E-01	8.856E-02	8.877E-02
Th-234 #	3.0173E+00	1.398E+00	1.400E+00
Pb-214	8.1752E-01	3.217E-01	3.226E-01
Pb-210 <	5.3390E-01		
AM-241 #	4.4581E-01	2.805E-01	2.810E-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 (2.7 to 1999.2 keV) 1.5187148E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0054 D2 OS RCA 061307

Sample description
WI07-0054 D2 OS RCS 061307

Spectrum Filename: C:\User\WI000068.An1

Acquisition information
Start time: 13-Jun-2007 10:58:07
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.6990E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6990E+02) = 3.7051E+03
Detection limit method: Traditional ORTEC method

0

WI07-0054 D2 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1045

********** 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	
14.71	3.86	4650.	20159.	33.598	1.95	2.217	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.58	46.58	44.	43.	0.072	61.53	0.821
AM-241	241.41	60.53	52.	21.	0.035	129.77	0.257s
Th-234	252.94	63.41	67.	41.	0.069	81.80	0.525s
Pb-214	298.54	74.81	81.	115.	0.191	28.98	0.917D
Pb-212	298.56	74.81	142.	0.	0.000	410.91	0.436D
Pb-212	307.74	77.11	92.	154.	0.257	23.89	0.919D
Pb-214	307.74	77.11	248.	0.	0.000	108.51	0.213D
Pb-214	348.11	87.20	40.	53.	0.088	49.07	0.986
Th-234	368.72	92.35	46.	50.	0.084	47.44	0.933D
Ac-228	380.72	95.35	49.	10.	0.017	201.18	0.936D
Ac-228	836.57	209.29	22.	28.	0.047	69.50	0.391s
Pb-212	953.94	238.62	37.	223.	0.372	15.46	1.057D
Pb-214	967.37	241.98	24.	36.	0.060	50.77	1.060D
Ac-228	1081.34	270.47	22.	23.	0.038	97.48	0.435s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.65	295.29	7.	93.	0.156	23.69	1.238s
Ac-228	1309.00	327.37	4.	0.	0.000	0.00	0.000s
Ac-228	1353.01	338.37	12.	55.	0.092	36.91	1.234
Pb-214	1407.38	351.96	11.	118.	0.197	21.21	1.188s
Ac-228	1851.92	463.06	3.	13.	0.022	72.11	0.346s

Bi-214	2437.24	609.34	0.	90.	0.150	21.08	1.107s
CS-137	2647.00	661.77	10.	1.	0.002	1113.55	0.000s
Bi-214	3073.54	768.36	2.	8.	0.013	93.54	0.697s
Ac-228	3175.67	793.88	2.	1.	0.002	447.21	0.324s
Ac-228	3646.58	911.56	0.	60.	0.100	25.82	0.908s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	11.	0.019	59.22	1.595D
Ac-228	3876.86	969.11	1.	33.	0.055	35.63	1.598D
Bi-214	4482.00	1120.33	1.	0.	0.000	0.00	0.000s
Bi-214	4950.00	1237.27	0.	5.	0.008	89.44	0.250s
Bi-214	5509.50	1377.07	0.	9.	0.015	66.67	0.500s
K-40	5846.18	1461.19	0.	45.	0.075	29.81	0.625s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	4.1838E-04	609.31	4.185E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	?	4.867E-05	G
			1238.11	3.390E-04	-	2.509E-04	G
			768.36	4.169E-04	?(	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.737E-04	+	5.163E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	?(	4.403E-05	G
Ac-228	N	6.5632E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	6.436E-04	(	3.690E-05	G
			338.32	6.446E-04	(	6.357E-05	G
			964.60	7.040E-04	(	6.173E-05	G
			794.70	0.000E+00	&	1.764E-04	G
			463.00	5.197E-04	-	2.408E-04	G
			209.28	5.995E-04	(	1.503E-04	G
			270.23	7.186E-04	?(	2.234E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.191E-04	X
		327.64	0.000E+00	%	1.420E-04	G
Pb-212	N 5.3446E-04	238.62	5.123E-04	(	2.097E-05	G K
		77.11	5.893E-04	(	5.390E-05	Energy duplication
		74.81	0.000E+00	%	1.126E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.414E-05	G
Th-234	N 6.9280E-04	92.35	6.263E-04	(	1.258E-04	G
		63.29	7.874E-04	@(	2.297E-04	G
Pb-214	N 4.4845E-04	351.92	4.383E-04	*(	1.906E-05	G K

```
                                295.21 5.847E-04 +   9.178E-05          G
                                 77.11 0.000E+00 ?   1.495E-04Energy duplication
                                241.98 4.990E-04  (  1.028E-04          G
                                 74.81 1.282E-03 +   2.266E-04Energy duplication
                                 87.30 7.642E-04 +   2.053E-04          X

Pb-210   N   8.7779E-04      46.50 8.778E-04 ?(  2.020E-04          G

AM-241       4.3242E-05      59.54 4.324E-05 &(  2.205E-05          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

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

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:08:19 Page 5
EnergySolutions Spectrum name: WI000068.An1

R - Coincidence Corrected
H - Halflife limit exceeded
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
Bi-214 #	1.5501E+00	3.268E-01	3.319E-01
K-40 #	7.3407E+00	2.189E+00	2.206E+00
Ac-228	2.4317E+00	5.892E-01	5.963E-01
Pb-212	1.9802E+00	2.817E-01	2.914E-01
CS-137 <	5.2380E-02		
Th-234	2.5669E+00	1.214E+00	1.215E+00
Pb-214	1.6615E+00	3.524E-01	3.578E-01
Pb-210 #	3.2523E+00	2.001E+00	2.003E+00
AM-241 #	1.6021E-01	2.079E-01	2.080E-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 (2.7 to 1999.3 keV) 2.0943619E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0055 D1 OS RCA 061307

Sample description
WI07-0055 D1 OS RCA 061307

Spectrum Filename: C:\User\Win00045.An1

Acquisition information
Start time: 13-Jun-2007 11:05:40
Live time: 600
Real time: 609
Dead time: 1.43 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.4490E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4490E+02) = 4.0833E+03
Detection limit method: Traditional ORTEC method

WI07-0055 D1 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1567

********** 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	
28.60	7.33	334.	1610.	2.683	6.68	1.579	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	187.35	47.00	43.	51.	0.086	56.16	0.886
AM-241	237.52	59.54	126.	572.	0.952	12.04	0.868s
Th-234	259.44	65.02	26.	28.	0.047	75.33	0.391s
Pb-214	298.61	74.81	60.	33.	0.056	73.76	0.971D
Pb-212	298.63	74.81	46.	0.	0.000	649.79	0.215D
Pb-212	307.80	77.11	54.	79.	0.131	34.73	0.972D
Pb-214	307.80	77.11	126.	0.	0.000	248.12	0.000D
Pb-214	347.40	87.00	42.	34.	0.056	80.60	0.580s
Th-234	368.79	92.35	22.	32.	0.053	54.70	0.985D
Ac-228	380.79	95.35	24.	6.	0.009	262.27	0.987D
Ac-228	837.00	209.37	2.	0.	0.000	0.00	0.000s
Pb-212	954.08	238.62	29.	91.	0.151	26.87	1.099D
Pb-214	967.50	241.98	19.	21.	0.035	72.66	1.101D
Ac-228	1078.43	269.70	3.	23.	0.038	51.44	1.305s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1177.85	294.55	6.	35.	0.058	45.08	1.208s
Ac-228	1313.71	328.50	8.	13.	0.022	93.58	0.444s
Ac-228	1353.59	338.47	7.	25.	0.042	58.13	0.432s
Pb-214	1407.92	352.05	12.	46.	0.077	42.15	1.130
Ac-228	1851.67	462.94	0.	12.	0.020	57.74	0.875s

Bi-214	2438.03	609.48	4.	28.	0.047	49.49	0.357s
CS-137	2648.18	661.99	5.	14.	0.023	80.18	0.469s
Bi-214	3071.78	767.85	2.	2.	0.003	244.95	0.218s
Ac-228	3174.50	793.52	0.	6.	0.010	81.65	0.500s
Ac-228	3646.08	911.36	0.	26.	0.043	39.22	0.309s
Bi-214	3738.00	934.33	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	0.	11.	0.019	59.44	1.589D
Ac-228	3877.18	969.11	4.	11.	0.018	80.98	1.591D
Bi-214	4476.50	1118.87	0.	11.	0.018	60.30	0.500s
Bi-214	4952.00	1237.68	0.	0.	0.001	223.61	0.100s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.65	1460.98	0.	20.	0.033	44.72	0.417s
Ac-228	6353.00	1587.74	0.	1.	0.002	200.00	0.250s
Bi-214	7057.00	1763.64	0.	5.	0.008	89.44	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.8109E-04	609.31	1.433E-04	?(	1.726E-05	G K
			1764.49	1.891E-04	?(	3.783E-05	G
			1120.29	2.886E-04	&(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	%	1.918E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	9.4148E-04	1460.81	9.415E-04	?(	4.707E-05	G
Ac-228	N	2.9785E-04	911.07	3.108E-04	?(	1.195E-05	G K
			969.11	2.275E-04	(	7.226E-05	G
			338.32	3.337E-04	(	5.514E-05	G
			964.60	7.572E-04	+	3.534E-04	G
			794.70	3.847E-04	&(	6.411E-05	G
			463.00	5.197E-04	+	2.349E-04	G
			209.28	0.000E+00	?	6.206E-05	G
			270.23	8.146E-04	+	2.737E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	1.860E-04	X
		327.64	5.958E-04	&	3.208E-04	G
Pb-212	N 2.3790E-04	238.62	2.379E-04	(	2.133E-05	G K
		77.11	3.644E-04	+	7.778E-05	Energy duplication
		74.81	0.000E+00	%	7.923E-05	Energy duplication
CS-137	4.1628E-05	661.66	4.163E-05	?(	1.101E-05	G
Th-234	N 5.4470E-04	92.35	4.685E-04	(	1.053E-04	G
		63.29	6.532E-04	&(	1.771E-04	G
Pb-214	N 2.2405E-04	351.92	1.912E-04	(	2.255E-05	G K

```
                                295.21 2.454E-04 &(  2.898E-05          G
                                 77.11 0.000E+00 %   1.299E-04Energy duplication
                                241.98 3.325E-04  (  1.049E-04          G
                                 74.81 4.524E-04 +   1.911E-04Energy duplication
                                 87.30 5.783E-04 +   2.216E-04          X

Pb-210   N   1.2025E-03      46.50 1.203E-03 &(  2.284E-04          G

AM-241       1.4169E-03      59.54 1.417E-03 @(  4.069E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:15:55 Page 5
EnergySolutions Spectrum name: Win00045.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	7.3944E-01	2.925E-01	2.933E-01
K-40 #	3.8444E+00	1.719E+00	1.723E+00
Ac-228	1.2162E+00	4.095E-01	4.111E-01
Pb-212	9.7144E-01	2.611E-01	2.626E-01
CS-137 #	1.6998E-01	1.363E-01	1.364E-01
Th-234	2.2242E+00	1.035E+00	1.037E+00
Pb-214	9.1486E-01	2.907E-01	2.920E-01
Pb-210	4.9102E+00	2.758E+00	2.760E+00
AM-241 #	5.7854E+00	6.963E-01	7.285E-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 (2.7 to 1999.2 keV) 2.0776138E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0055 D2 OS RCA Recount 061307

Sample description
WI07-0055 D2 OS RCS 061307

Spectrum Filename: C:\User\WI000071.An1

Acquisition information
Start time: 13-Jun-2007 11:43:46
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.4490E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4490E+02) = 4.0833E+03
Detection limit method: Traditional ORTEC method

WI07-0055 D2 OS RCA Recount 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0931

********** 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	
11.61	2.91	5915.	9338.	15.564	3.12	0.854	-	D
15.63	3.92	13058.	7866.	13.109	4.69	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.48	46.55	58.	41.	0.068	75.41	0.624s
AM-241	237.70	59.60	117.	711.	1.185	9.74	0.901
Th-234	253.26	63.49	40.	36.	0.060	75.09	0.760
Pb-214	298.54	74.81	44.	76.	0.127	33.58	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	2848.78	0.226D
Pb-212	307.74	77.11	39.	91.	0.152	28.44	0.919D
Pb-214	307.74	77.11	105.	0.	0.000	2357.96	0.400D
Pb-214	347.65	87.08	35.	27.	0.045	82.59	0.474s
Th-234	368.72	92.35	27.	39.	0.065	49.64	0.933D
Ac-228	380.72	95.35	22.	3.	0.005	452.65	0.935D
Ac-228	837.38	209.49	7.	24.	0.040	57.33	0.715s
Pb-212	953.94	238.62	30.	116.	0.193	22.85	1.057D
Pb-214	967.37	241.98	24.	17.	0.028	95.01	1.060D

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:53:56 Page 3
EnergySolutions Spectrum name: WI000071.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1075.82	269.09	10.	20.	0.034	75.62	0.230s
Pb-214	1181.61	295.53	0.	28.	0.047	37.80	1.146
Ac-228	1311.22	327.92	3.	11.	0.018	82.92	0.382s
Ac-228	1354.54	338.75	4.	41.	0.069	36.99	0.359s
Pb-214	1407.17	351.90	0.	62.	0.103	25.40	0.987

Ac-228	1852.45	463.19	7.	13.	0.022	102.63	0.522s
Bi-214	2437.19	609.33	0.	54.	0.090	27.22	0.906s
CS-137	2645.39	661.36	3.	33.	0.054	42.02	1.102
Bi-214	3070.67	767.64	2.	1.	0.002	447.21	0.187s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3645.40	911.27	0.	35.	0.058	33.81	0.937s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	0.	7.	0.012	74.38	1.595D
Ac-228	3876.86	969.11	0.	22.	0.037	42.24	1.598D
Bi-214	4481.80	1120.28	0.	5.	0.008	89.44	0.500s
Bi-214	4952.67	1237.93	0.	6.	0.010	81.65	0.375s
Bi-214	5513.50	1378.07	0.	2.	0.003	141.42	0.500s
K-40	5845.05	1460.91	0.	24.	0.040	40.82	0.375s
Ac-228	6355.00	1588.32	0.	2.	0.003	141.42	0.250s
Bi-214	7058.33	1764.04	0.	7.	0.012	75.59	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4848E-04	609.31	2.511E-04	(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	1.217E-04	-	9.007E-05	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.0567E-03	1460.81	1.057E-03	?(	4.403E-05	G
Ac-228	N	4.4322E-04	911.07	3.855E-04	(	1.101E-05	G K
			969.11	4.353E-04	(	1.942E-05	G
			338.32	4.844E-04	*(	3.813E-05	G
			964.60	4.462E-04	(	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	5.067E-04	?(	1.666E-04	G
			209.28	5.078E-04	(	9.046E-05	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:53:56 Page 4
EnergySolutions Spectrum name: WI000071.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.405E-04	&(	1.527E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.462E-04	X
		327.64	4.344E-04	?(	1.275E-04	G
Pb-212	N 2.6675E-04	238.62	2.667E-04	(	1.897E-05	G K
		77.11	3.496E-04	+	6.367E-05	Energy duplication
		74.81	0.000E+00	%	9.179E-05	Energy duplication
CS-137	8.8523E-05	661.66	8.852E-05	(	8.482E-06	G
Th-234	N 5.6793E-04	92.35	4.851E-04	(	9.834E-05	G
		63.29	6.858E-04	(	1.802E-04	G

```
Pb-214    N   2.3048E-04    351.92 2.296E-04  (  3.704E-06          G K
                           295.21 1.754E-04 -   5.011E-05          G
                            77.11 0.000E+00 %   9.859E-05Energy duplication
                           241.98 2.347E-04  (  1.030E-04          G
                            74.81 8.507E-04 +   1.786E-04Energy duplication
                            87.30 3.942E-04 +   1.690E-04          X

Pb-210    N   8.3016E-04     46.50 8.302E-04 *(  2.309E-04          G

AM-241        1.4637E-03     59.54 1.464E-03  (  3.257E-05          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

   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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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***** 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
Bi-214	1.0146E+00	2.761E-01	2.788E-01
K-40 #	4.3147E+00	1.761E+00	1.769E+00
Ac-228	1.8098E+00	4.307E-01	4.360E-01
Pb-212	1.0892E+00	2.489E-01	2.523E-01
CS-137	3.6147E-01	1.519E-01	1.525E-01
Th-234	2.3190E+00	1.044E+00	1.045E+00
Pb-214	9.4112E-01	2.390E-01	2.416E-01
Pb-210 #	3.3898E+00	2.556E+00	2.557E+00
AM-241	5.9767E+00	5.823E-01	6.229E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0055 D2 OS RCA Recount 061307

& - 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 (2.7 to 1999.3 keV) 2.1216450E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0056 D2 OS RCA 061307

Sample description
WI07-0056 D2 OS RCS 061307

Spectrum Filename: C:\User\WI000069.An1

Acquisition information
Start time: 13-Jun-2007 11:12:17
Live time: 600
Real time: 603
Dead time: 0.44 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8390E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8390E+02) = 3.5224E+03
Detection limit method: Traditional ORTEC method

WI07-0056 D2 OS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1925

********** 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	
14.63	3.84	5979.	23234.	38.723	1.87	2.021	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.79	46.63	604.	84.	0.140	103.67	0.434s
AM-241	235.86	59.14	224.	34.	0.058	141.20	0.550s
Th-234	252.75	63.36	231.	60.	0.100	89.10	0.639s
Pb-214	298.54	74.81	213.	98.	0.164	46.48	0.917D
Pb-212	298.56	74.81	135.	0.	0.000	181.05	0.597D
Pb-212	307.74	77.11	207.	144.	0.241	32.70	0.919D
Pb-214	307.74	77.11	362.	0.	0.000	118.63	0.253D
Pb-214	346.62	86.83	154.	88.	0.147	54.41	0.883s
Th-234	368.72	92.35	104.	17.	0.028	175.48	0.933D
Ac-228	380.72	95.35	96.	6.	0.010	464.17	0.935D
Ac-228	836.53	209.28	20.	39.	0.065	57.49	0.306s
Pb-212	953.94	238.62	25.	200.	0.333	16.96	0.816
Pb-214	967.85	242.10	40.	0.	0.000	0.00	1.060
Ac-228	1079.72	270.06	9.	7.	0.011	160.00	0.300s

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 11:22:29 Page 3
EnergySolutions Spectrum name: WI000069.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.89	295.35	6.	76.	0.127	26.32	1.221s
Ac-228	1311.22	327.92	6.	26.	0.043	56.22	0.555s
Ac-228	1354.07	338.63	10.	56.	0.093	35.14	1.008
Pb-214	1406.37	351.70	12.	100.	0.167	24.33	1.200
Ac-228	1853.86	463.54	3.	15.	0.024	73.57	1.086

Bi-214	2437.11	609.31	0.	73.	0.122	23.41	0.371s
CS-137	2647.00	661.77	5.	1.	0.001	724.19	0.000s
Bi-214	3071.44	767.84	2.	2.	0.002	328.86	0.377s
Ac-228	3182.00	795.47	4.	4.	0.006	190.24	0.000s
Ac-228	3647.00	911.67	0.	39.	0.065	32.03	0.750s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	2.	5.	0.009	115.58	1.595D
Ac-228	3876.86	969.11	0.	26.	0.043	39.22	1.598D
Bi-214	4484.60	1120.97	0.	16.	0.027	50.00	0.250s
Bi-214	4955.40	1238.62	0.	6.	0.010	81.65	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.95	1460.88	0.	43.	0.072	30.50	0.833s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7057.78	1763.90	1.	1.	0.002	346.41	0.217s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	3.5659E-04	609.31	3.395E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8932E-03	1460.81	1.893E-03	?(	4.403E-05	G
Ac-228	N	5.0268E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	5.050E-04	(	1.942E-05	G
			338.32	6.504E-04	(	5.728E-05	G
			964.60	3.178E-04	-	2.639E-04	G
			794.70	2.058E-04	&	2.514E-04	G
			463.00	5.717E-04	(	1.220E-04	G
			209.28	8.252E-04	+	2.407E-04	G
			270.23	2.083E-04	-	1.930E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.849E-04	X
		327.64	1.045E-03	+	3.468E-04	G
Pb-212	N 4.8642E-04	238.62	4.596E-04	(	1.744E-05	G K
		77.11	5.528E-04	(	7.976E-05	Energy duplication
		74.81	0.000E+00	?	1.097E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.084E-05	G
Th-234	N 5.9689E-04	92.35	2.133E-04	(	1.862E-04	G
		63.29	1.143E-03	?(	4.191E-04	G
Pb-214	N 4.0636E-04	351.92	3.704E-04	(	2.009E-05	G K

```
                                WI07-0056 D2 OS RCA 061307
                               295.21 4.761E-04 @(  2.506E-05          G
                                77.11 0.000E+00 ?   1.799E-04Energy duplication
                               241.98 0.000E+00 %   1.308E-04          G
                                74.81 1.099E-03 +   2.840E-04Energy duplication
                                87.30 1.279E-03 +   3.266E-04          X

Pb-210   N   1.7148E-03      46.50 1.715E-03 ?(  7.198E-04          G

AM-241       7.1040E-05      59.54 7.104E-05 ?(  4.458E-05          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

   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
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 11:22:29 Page    5
 EnergySolutions                  Spectrum name: WI000069.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

 ------------------------------------------------------------------------------
 Bi-214        1.2561E+00    2.940E-01    2.978E-01
 K-40    #     6.6685E+00    2.034E+00    2.049E+00
 Ac-228        1.7706E+00    4.248E-01    4.300E-01
 Pb-212        1.7134E+00    2.905E-01    2.975E-01
 CS-137   <    3.8181E-02
 Th-234   C    2.1025E+00    1.873E+00    1.874E+00
 Pb-214        1.4313E+00    2.565E-01    2.621E-01
 Pb-210 #      6.0400E+00    6.262E+00    6.263E+00
 AM-241 #C     2.5023E-01    3.533E-01    3.534E-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 (2.7 to 1999.3 keV) 2.1232616E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA 062507

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    1
EnergySolutions                  Spectrum name: WI000114.An1

Sample description
     WI07-0104 D2 IS RCA 062507


Spectrum Filename: C:\User\WI000114.An1

Acquisition information
       Start time:                 25-Jun-2007 08:38:00
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8640E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8640E+02) =
                                   3.4916E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    2
EnergySolutions                  Spectrum name: WI000114.An1
```

WI07-0104 D2 IS RCA 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1903

********** 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	
14.53	3.82	4707.	22189.	36.982	1.83	2.140	CU-64	s
105.55	26.57	19.	70.	0.117	32.74	0.694	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.48	46.55	127.	37.	0.062	103.76	0.921
AM-241	237.51	59.56	295.	4480.	7.467	3.34	0.920
Th-234	252.45	63.29	24.	28.	0.047	76.93	0.323s
Pb-214	298.54	74.81	35.	13.	0.022	139.40	0.917D
Pb-212	298.56	74.81	20.	0.	0.000	331.66	0.359D
Pb-212	307.74	77.11	27.	43.	0.072	45.51	0.919D
Pb-214	307.74	77.11	73.	0.	0.000	173.12	0.000D
Pb-214	347.32	87.00	14.	22.	0.037	75.33	0.812
Th-234	368.72	92.35	13.	25.	0.042	56.37	0.933D
Ac-228	380.72	95.35	23.	6.	0.010	246.13	0.935D
Ac-228	836.00	209.15	1.	0.	0.000	0.00	0.000s
Pb-212	953.94	238.62	11.	19.	0.032	66.78	1.057D
Pb-214	967.37	241.98	11.	18.	0.029	72.68	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1076.67	269.30	0.	18.	0.030	47.14	0.812s
Pb-214	1179.38	294.97	0.	39.	0.065	32.03	0.646s
Ac-228	1300.33	325.20	0.	11.	0.018	60.30	0.375s
Ac-228	1348.00	337.11	0.	15.	0.025	51.64	0.250s
Pb-214	1407.02	351.87	0.	47.	0.078	29.17	1.312

Ac-228	1851.50	462.95	0.	2.	0.003	141.42	0.500s
Bi-214	2436.00	609.03	0.	33.	0.055	34.82	0.537s
CS-137	2647.00	661.77	1.	0.	0.000	0.00	0.000s
Bi-214	3071.83	767.93	0.	6.	0.010	81.65	0.500s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3643.67	910.84	0.	3.	0.005	115.47	0.375s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	2.	0.004	249.63	1.595D
Ac-228	3876.86	969.11	2.	2.	0.004	214.68	1.598D
Bi-214	4480.06	1119.84	0.	17.	0.028	48.51	0.364s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5844.56	1460.78	0.	9.	0.015	66.67	0.375s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5346E-04	609.31	1.535E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.127E-04	+	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.9625E-04	1460.81	3.962E-04	?(	4.403E-05	G
Ac-228	N	1.3360E-04	911.07	3.304E-05	?(	1.101E-05	G K
			969.11	0.000E+00	%	6.548E-05	G
			338.32	1.758E-04	&(	1.172E-05	G
			964.60	0.000E+00	%	2.268E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	7.795E-05	?(	3.898E-05	G
			209.28	0.000E+00	?	4.232E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.624E-04	&(	3.124E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.566E-04	X
		327.64	4.480E-04	&(	4.072E-05	G
Pb-212	N 4.3996E-05	238.62	4.400E-05	(	1.192E-05	G K
		77.11	1.659E-04	+	4.734E-05	Energy duplication
		74.81	0.000E+00	%	4.433E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 4.0542E-04	92.35	3.155E-04	(	6.957E-05	G
		63.29	5.334E-04	*(	1.419E-04	G

```
                                WI07-0104 D2 IS RCA 062507
Pb-214    N   2.0316E-04     351.92 1.741E-04  (  3.704E-06          G K
                             295.21 2.443E-04 *(  6.264E-06          G
                              77.11 0.000E+00 ?   8.283E-05Energy duplication
                             241.98 2.421E-04  (  7.356E-05          G
                              74.81 1.458E-04 -   1.151E-04Energy duplication
                              87.30 3.192E-04 +   1.306E-04          X

Pb-210    N   7.6212E-04      46.50 7.621E-04 ?(  3.353E-04          G

AM-241        9.2256E-03      59.54 9.226E-03  (  5.103E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:06:23 Page    5
EnergySolutions                    Spectrum name: WI000114.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #      5.3584E-01    1.866E-01    1.876E-01
K-40   #      1.3836E+00    9.224E-01    9.238E-01
Ac-228 #      4.6649E-01    1.909E-01    1.917E-01
Pb-212        1.5362E-01    1.026E-01    1.027E-01
CS-137   <    1.8924E-02
Th-234        1.4156E+00    6.750E-01    6.758E-01
Pb-214        7.0934E-01    2.001E-01    2.018E-01
Pb-210 #      2.6610E+00    2.761E+00    2.762E+00
AM-241        3.2212E+01    1.077E+00    1.607E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0104 D2 IS RCA 062507

& - 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 (2.7 to 1999.3 keV) 3.9537811E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA QC 061307

Sample description
WI07-0104 D2 IS RCS QC 061307

Spectrum Filename: C:\User\WI000078.An1

Acquisition information
Start time: 13-Jun-2007 14:31:05
Live time: 600
Real time: 602
Dead time: 0.39 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8480E+02) = 3.5112E+03
Detection limit method: Traditional ORTEC method

WI07-0104 D2 IS RCA QC 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0620

********** 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	
14.75	3.87	5409.	25087.	41.812	1.72	2.286	CU-64	s
96.55	24.32	720.	97.	0.162	92.60	0.432	SN-113	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.35	46.02	142.	20.	0.033	174.36	0.273s
AM-241	237.34	59.51	411.	4539.	7.565	3.46	0.984
Th-234	251.92	63.16	38.	24.	0.041	94.35	0.292s
Pb-214	298.54	74.81	44.	29.	0.048	75.02	0.917D
Pb-212	298.56	74.81	34.	0.	0.000	247.44	0.638D
Pb-212	307.74	77.11	40.	43.	0.072	51.60	0.919D
Pb-214	307.74	77.11	55.	0.	0.000	778.52	0.000D
Pb-214	348.85	87.38	25.	26.	0.043	81.95	0.761s
Th-234	368.72	92.35	28.	17.	0.029	98.19	0.933D
Ac-228	380.72	95.35	16.	10.	0.017	130.92	0.935D
Ac-228	839.44	210.01	6.	2.	0.004	355.18	0.257s
Pb-212	953.94	238.62	4.	39.	0.066	34.74	1.057D
Pb-214	967.37	241.98	4.	20.	0.033	54.32	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.96	270.37	4.	4.	0.007	154.49	0.237s
Pb-214	1180.21	295.18	5.	30.	0.049	47.30	1.305s
Ac-228	1309.33	327.45	1.	0.	0.001	240.37	0.197s
Ac-228	1350.00	337.61	2.	3.	0.005	182.62	0.086s
Pb-214	1407.19	351.91	4.	44.	0.072	35.39	0.821s

Ac-228	1851.62	462.99	1.	1.	0.001	339.93	0.375s
Bi-214	2437.48	609.40	0.	31.	0.052	35.92	1.687s
CS-137	2647.50	661.89	0.	4.	0.007	100.00	0.500s
Bi-214	3074.00	768.48	0.	7.	0.012	75.59	0.250s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3645.33	911.25	0.	10.	0.017	63.25	0.292s
Bi-214	3736.67	934.08	1.	1.	0.001	366.67	0.181s
Ac-228	3857.00	964.15	0.	0.	0.000	0.00	0.000s
Ac-228	3876.86	969.11	3.	0.	0.000	0.00	1.598
Bi-214	4476.00	1118.83	0.	7.	0.012	75.59	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5844.33	1460.73	0.	6.	0.010	81.65	0.375s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7059.00	1764.21	0.	1.	0.002	200.00	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.5060E-04	609.31	1.442E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	1.703E-04	&(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	3.648E-04	+	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	2.6417E-04	1460.81	2.642E-04	?(	4.403E-05	G
Ac-228	N	1.2140E-04	911.07	1.101E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	5.627E-05	G
			338.32	3.711E-05	&	4.338E-05	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	9.984E-05	G
			209.28	0.000E+00	&	9.588E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.406E-04	?(	9.974E-05	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.909E-04	(	1.193E-04	X
		327.64	0.000E+00	%	8.145E-05	G
Pb-212	N 9.0356E-05	238.62	9.036E-05	(	7.478E-06	G K
		77.11	1.646E-04	+	5.128E-05	Energy duplication
		74.81	0.000E+00	&	5.675E-05	Energy duplication
CS-137	1.0840E-05	661.66	1.084E-05	?(	2.710E-06	G
Th-234	N 3.1981E-04	92.35	2.166E-04	(	9.921E-05	G
		63.29	4.667E-04	(	1.770E-04	G

WI07-0104 D2 IS RCA QC 061307

Pb-214	N	1.6953E-04	351.92	1.611E-04	(	1.182E-05		G K
			295.21	1.858E-04	*(	2.383E-05		G
			77.11	0.000E+00	%	7.209E-05	Energy duplication	
			241.98	2.704E-04	+	1.027E-04		G
			74.81	3.220E-04	+	1.405E-04	Energy duplication	
			87.30	3.773E-04	+	1.540E-04		X
Pb-210	N	4.0828E-04	46.50	4.083E-04	?(	3.544E-04		G
AM-241		9.3464E-03	59.54	9.346E-03	(	6.008E-05		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

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

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:41:17 Page 5
EnergySolutions Spectrum name: WI000078.An1

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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.2879E-01	1.899E-01	1.910E-01
K-40 #	9.2755E-01	7.573E-01	7.581E-01
Ac-228	4.2628E-01	2.696E-01	2.701E-01
Pb-212	3.1726E-01	1.102E-01	1.109E-01
CS-137 #	3.8060E-02	3.806E-02	3.809E-02
Th-234	1.1229E+00	7.646E-01	7.650E-01
Pb-214	5.9526E-01	1.758E-01	1.772E-01
Pb-210 #C	1.4336E+00	2.499E+00	2.500E+00
AM-241	3.2818E+01	1.137E+00	1.664E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0104 D2 IS RCA QC 061307

& - 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 (2.7 to 1999.3 keV) 3.8207207E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D2 IS RCA QC 062507

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    1
EnergySolutions                 Spectrum name: WI000114.An1

Sample description
     WI07-0104 D2 IS RCA QC 062507


Spectrum Filename: C:\User\WI000114.An1

Acquisition information
       Start time:                 25-Jun-2007 09:32:17
       Live time:                600
       Real time:                602
       Dead time:                  0.29 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8470E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8470E+02) =
                                   3.5125E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    2
EnergySolutions                 Spectrum name: WI000114.An1
```

WI07-0104 D2 IS RCA QC 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0536

********** 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
11.64	2.91	5247.	10526.	17.544	2.75	0.854	- D
16.81	4.20	14729.	7468.	12.447	5.15	0.855	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.00	45.93	108.	12.	0.019	297.20	0.000s
AM-241	237.60	59.58	298.	3712.	6.186	3.75	0.921
Th-234	252.94	63.41	45.	47.	0.078	64.11	1.039s
Pb-214	298.54	74.81	41.	67.	0.112	36.23	0.917D
Pb-212	298.56	74.81	63.	0.	0.000	329.50	0.750D
Pb-212	307.74	77.11	36.	98.	0.163	26.62	0.919D
Pb-214	307.74	77.11	123.	0.	0.000	190.20	0.244D
Pb-214	347.44	87.03	37.	41.	0.069	65.61	0.385s
Th-234	370.47	92.79	21.	72.	0.120	33.10	0.766s
Ac-228	381.32	95.50	12.	0.	0.000	0.00	0.935
Ac-228	838.42	209.75	12.	33.	0.055	54.55	0.951s
Pb-212	953.94	238.62	19.	122.	0.203	20.76	1.057D
Pb-214	967.37	241.98	26.	34.	0.057	53.64	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.42	270.49	4.	27.	0.045	49.77	0.397s
Pb-214	1179.73	295.06	9.	54.	0.091	36.91	0.854s
Ac-228	1310.57	327.76	5.	8.	0.013	115.47	0.881
Ac-228	1351.78	338.06	4.	34.	0.058	41.09	2.116s
Pb-214	1407.17	351.90	4.	81.	0.134	25.26	1.264s

Ac-228	1852.00	463.08	1.	0.	0.000	0.00	0.000s
Bi-214	2437.09	609.31	4.	58.	0.097	29.78	0.992s
CS-137	2647.00	661.77	3.	0.	0.000	0.00	0.000s
Bi-214	3067.17	766.77	0.	10.	0.017	63.25	0.375s
Ac-228	3177.33	794.30	0.	7.	0.012	75.59	0.250s
Ac-228	3643.83	910.88	0.	23.	0.038	41.70	0.750s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	0.	3.	0.004	142.44	1.595D
Ac-228	3876.86	969.11	4.	7.	0.012	102.69	1.598D
Bi-214	4478.67	1119.49	0.	10.	0.017	63.25	0.375s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5845.00	1460.90	6.	3.	0.005	282.84	0.000s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.67	1764.38	0.	9.	0.015	66.67	0.292s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7583E-04	609.31	2.713E-04	(	1.513E-05	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	5.211E-04	&	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.101E-04	G
Ac-228	N	3.1048E-04	911.07	2.533E-04	(	1.101E-05	G K
			969.11	1.443E-04	-	1.013E-04	G
			338.32	4.043E-04	*(	3.742E-05	G
			964.60	1.600E-04	-	1.852E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	0.000E+00	?	7.795E-05	G
			209.28	6.983E-04	+	2.116E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.488E-04	+	2.621E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.045E-04	X
		327.64	3.258E-04	(	1.507E-04	G
Pb-212	N 2.8009E-04	238.62	2.801E-04	(	1.541E-05	G K
		77.11	3.752E-04	+	6.464E-05	Energy duplication
		74.81	0.000E+00	%	7.602E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	8.130E-06	G
Th-234	N 8.9712E-04	92.35	8.983E-04	*(	8.734E-05	G
		63.29	8.954E-04	*(	1.905E-04	G

```
                                WI07-0104 D2 IS RCA QC 062507
Pb-214    N    3.1293E-04     351.92 2.988E-04 @(  1.291E-05          G K
                              295.21 3.404E-04 @(  2.940E-05          G
                               77.11 0.000E+00 ?   1.063E-04Energy duplication
                              241.98 4.768E-04 +   1.585E-04          G
                               74.81 7.532E-04 +   1.701E-04Energy duplication
                               87.30 5.974E-04 +   1.886E-04          X

Pb-210    N    0.0000E+00      46.50 0.000E+00 &   3.266E-04          G

AM-241         7.6425E-03      59.54 7.642E-03  (  5.127E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:42:30 Page    5
EnergySolutions                     Spectrum name: WI000114.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
              pCi/g           pCi/g        pCi/g

Bi-214        9.6885E-01    2.885E-01    2.908E-01
K-40    <     7.3797E-01
Ac-228        1.0905E+00    4.087E-01    4.108E-01
Pb-212        9.8381E-01    2.043E-01    2.076E-01
CS-137  <     2.8555E-02
Th-234 #      3.1511E+00    1.043E+00    1.046E+00
Pb-214        1.0991E+00    2.458E-01    2.492E-01
Pb-210  <     1.1472E+00
AM-241        2.6844E+01    1.008E+00    1.415E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0104 D2 IS RCA QC 062507

& - 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 (2.7 to 1999.3 keV) 3.4137466E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D1 IS RCA 062507

Sample description
WI07-0104 D1 IS RCA 062507

Spectrum Filename: C:\User\Win00099.An1

Acquisition information
Start time: 25-Jun-2007 09:17:50
Live time: 600
Real time: 603
Dead time: 0.47 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8640E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8640E+02) = 3.4916E+03
Detection limit method: Traditional ORTEC method

WI07-0104 D1 IS RCA 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1583

********** 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	
28.75	7.37	128.	402.	0.670	14.69	1.298	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	180.96	45.41	106.	20.	0.033	190.27	0.481s
AM-241	237.77	59.60	260.	3521.	5.869	4.02	1.254s
Th-234	253.60	63.56	11.	20.	0.033	71.53	0.700s
Pb-214	298.61	74.81	16.	23.	0.039	63.13	0.971D
Pb-212	298.63	74.81	17.	0.	0.000	491.56	0.458D
Pb-212	307.80	77.11	18.	31.	0.051	53.53	0.972D
Pb-214	307.80	77.11	54.	0.	0.000	222.80	0.264D
Pb-214	352.40	88.25	15.	3.	0.006	367.70	0.362s
Th-234	368.79	92.35	13.	16.	0.027	81.35	0.985D
Ac-228	380.79	95.35	8.	8.	0.014	120.50	0.987D
Ac-228	836.50	209.24	2.	0.	0.000	0.00	0.292s
Pb-212	954.08	238.62	7.	21.	0.035	55.83	1.099D
Pb-214	967.50	241.98	4.	14.	0.023	68.52	1.101D
Ac-228	1081.00	270.35	1.	0.	0.000	0.00	0.000s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.61	295.24	0.	38.	0.063	32.44	0.594s
Ac-228	1312.14	328.11	1.	4.	0.006	142.00	0.349s
Ac-228	1348.87	337.29	1.	2.	0.003	262.30	0.227s
Pb-214	1408.17	352.11	0.	35.	0.058	33.81	0.612s
Ac-228	1851.33	462.86	0.	6.	0.010	81.65	0.250s

Bi-214	2436.18	609.02	0.	22.	0.037	42.64	0.750s
CS-137	2646.67	661.62	0.	3.	0.005	115.47	0.375s
Bi-214	3076.33	768.99	0.	9.	0.015	66.67	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3641.83	910.30	1.	1.	0.001	366.67	0.223s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	0.	0.000	2285.32	1.589D
Ac-228	3877.18	969.11	1.	2.	0.003	280.35	1.591D
Bi-214	4475.00	1118.49	0.	7.	0.012	75.59	0.250s
Bi-214	4954.00	1238.18	0.	4.	0.007	100.00	0.500s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.32	0.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7058.83	1764.10	0.	6.	0.010	81.65	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3006E-04	609.31	1.126E-04	?(	5.117E-06	G K
			1764.49	2.270E-04	+	1.513E-04	G
			1120.29	1.836E-04	&(	2.624E-05	G
			1238.11	2.914E-04	+	2.457E-04	G
			768.36	5.120E-04	+	2.715E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	3.062E-05	G K
			969.11	0.000E+00	%	6.310E-05	G
			338.32	0.000E+00	&	3.952E-05	G
			964.60	0.000E+00	%	1.338E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	2.599E-04	?	1.732E-04	G
			209.28	0.000E+00	?	6.206E-05	G
			270.23	0.000E+00	?	7.084E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	1.826E-04		1.391E-04	X
		327.64	1.680E-04	?	1.696E-04	G
Pb-212	N 5.5363E-05	238.62	5.536E-05	(	1.109E-05	G K
		77.11	1.418E-04	+	4.816E-05	Energy duplication
		74.81	0.000E+00	%	4.936E-05	Energy duplication
CS-137	8.9204E-06	661.66	8.920E-06	?(	2.973E-06	G
Th-234	N 3.2781E-04	92.35	2.342E-04	(	8.275E-05	G
		63.29	4.611E-04	?(	1.203E-04	G
Pb-214	N 1.5765E-04	351.92	1.455E-04	(	4.157E-06	G K

```
                                WI07-0104 D1 IS RCA 062507
                               295.21 2.689E-04 +   6.534E-05          G
                                77.11 0.000E+00 %   8.658E-05Energy duplication
                               241.98 2.180E-04  (  5.488E-05          G
                                74.81 3.163E-04 +   1.263E-04Energy duplication
                                87.30 0.000E+00 &   1.126E-04          X

Pb-210   N   4.6461E-04      46.50 4.646E-04 &(  3.533E-04          G

AM-241       8.7300E-03      59.54 8.730E-03  (  5.775E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 09:28:01 Page    5
 EnergySolutions                  Spectrum name: Win00099.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214 #     4.5411E-01    1.936E-01    1.941E-01
 K-40    <    1.6436E-01
 Ac-228 B<    1.0692E-01
 Pb-212       1.9331E-01    1.079E-01    1.081E-01
 CS-137 #     3.1147E-02    3.596E-02    3.598E-02
 Th-234       1.1446E+00    6.199E-01    6.205E-01
 Pb-214       5.5045E-01    1.861E-01    1.868E-01
 Pb-210  C    1.6222E+00    3.087E+00    3.087E+00
 AM-241 #     3.0482E+01    1.226E+00    1.666E+00

   # - 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 (2.7 to 1999.2 keV) 3.4477760E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0104 D1 IS RCA QC 062507

Sample description
WI07-0104 D1 IS RCA QC 062507

Spectrum Filename: C:\User\Win00098.An1

Acquisition information

Start time:	25-Jun-2007 08:37:08
Live time:	600
Real time:	607
Dead time:	1.12 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.8470E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.8470E+02) = 3.5125E+03
Detection limit method:	Traditional ORTEC method

WI07-0104 D1 IS RCA QC 062507

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1505

********** 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	
28.90	7.40	128.	404.	0.674	14.78	1.270	CU-64	s
105.81	26.62	16.	87.	0.144	27.41	0.992	AM-241	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.00	46.17	133.	12.	0.019	347.82	0.000s
AM-241	237.78	59.61	272.	3075.	5.126	4.04	1.187s
Th-234	252.33	63.24	35.	27.	0.045	88.79	0.262s
Pb-214	298.61	74.81	49.	36.	0.060	64.22	0.971D
Pb-212	298.63	74.81	50.	0.	0.000	1146.90	0.236D
Pb-212	307.80	77.11	44.	80.	0.133	32.40	0.972D
Pb-214	307.80	77.11	88.	0.	0.000	289.97	0.000D
Pb-214	347.08	86.93	26.	33.	0.055	65.09	0.684s
Th-234	368.79	92.35	30.	26.	0.044	71.00	0.985D
Ac-228	380.79	95.35	22.	6.	0.010	236.59	0.987D
Ac-228	834.71	208.79	14.	16.	0.027	98.95	0.937
Pb-212	954.08	238.62	20.	101.	0.168	23.65	1.099D
Pb-214	967.50	241.98	17.	32.	0.054	50.55	1.101D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.03	270.35	7.	22.	0.037	64.09	0.554s
Pb-214	1181.05	295.35	4.	49.	0.082	33.90	0.295s
Ac-228	1310.00	327.58	0.	15.	0.025	51.64	0.312s
Ac-228	1355.25	338.88	6.	26.	0.043	54.39	0.777s
Pb-214	1406.96	351.81	4.	64.	0.107	28.34	0.921s

Ac-228	1850.90	462.75	2.	14.	0.024	66.51	0.270s
Bi-214	2438.15	609.51	0.	48.	0.080	28.87	0.550s
CS-137	2647.33	661.78	0.	24.	0.040	40.82	0.750s
Bi-214	3073.00	768.16	0.	10.	0.017	63.25	0.375s
Ac-228	3179.86	794.86	0.	7.	0.012	75.59	0.375s
Ac-228	3646.64	911.50	0.	26.	0.043	39.22	0.666s
Bi-214	3737.50	934.21	0.	3.	0.005	115.47	0.500s
Ac-228	3859.13	964.60	2.	4.	0.007	124.98	1.589D
Ac-228	3877.18	969.11	2.	12.	0.020	68.49	1.591D
Bi-214	4482.23	1120.30	0.	13.	0.022	55.47	0.375s
Bi-214	4952.00	1237.68	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.53	1460.70	3.	2.	0.003	322.49	0.248s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.89	0.	6.	0.010	81.65	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4458E-04	609.31	2.456E-04	(	5.117E-06	G K
			1764.49	2.270E-04	?(	3.783E-05	G
			1120.29	3.411E-04	+	1.475E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	5.689E-04	+	2.844E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	3.162E-04	?(	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.742E-04	G
Ac-228	N	3.1367E-04	911.07	3.108E-04	?(	1.195E-05	G K
			969.11	2.475E-04	(	5.621E-05	G
			338.32	3.425E-04	(	5.269E-05	G
			964.60	2.949E-04	(	1.573E-04	G
			794.70	4.488E-04	?(	6.411E-05	G
			463.00	6.280E-04	+	2.751E-04	G
			209.28	3.876E-04	?(	1.409E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUN-2007 08:47:22 Page 4
EnergySolutions Spectrum name: Win00098.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.910E-04	+	2.880E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	1.801E-04	X
		327.64	6.874E-04	+	2.750E-04	G
Pb-212	N 2.6326E-04	238.62	2.633E-04	(	1.810E-05	G K
		77.11	3.700E-04	+	7.518E-05	Energy duplication
		74.81	0.000E+00	%	8.256E-05	Energy duplication
CS-137	7.1363E-05	661.66	7.136E-05	(	2.973E-06	G
Th-234	N 4.8207E-04	92.35	3.834E-04	(	1.211E-04	G
		63.29	6.225E-04	$(	2.048E-04	G

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                                WI07-0104 D1 IS RCA QC 062507
Pb-214    N    2.9399E-04     351.92 2.667E-04 *(  1.377E-05          G K
                              295.21 3.468E-04 @(  2.387E-05          G
                               77.11 0.000E+00 %   1.095E-04Energy duplication
                              241.98 5.055E-04 +   1.639E-04          G
                               74.81 4.870E-04 +   1.830E-04Energy duplication
                               87.30 5.697E-04 +   1.964E-04          X

Pb-210    N    0.0000E+00      46.50 0.000E+00 %   4.108E-04          G

AM-241         7.6242E-03      59.54 7.624E-03  (  5.904E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUN-2007 08:47:22 Page    5
 EnergySolutions                    Spectrum name: Win00098.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
                pCi/g          pCi/g        pCi/g

 ____________________________________________________________________________
 Bi-214        8.5908E-01    2.480E-01     2.493E-01
 K-40     <    6.1204E-01
 Ac-228        1.1018E+00    3.687E-01     3.701E-01
 Pb-212        9.2469E-01    2.187E-01     2.204E-01
 CS-137        2.5066E-01    1.023E-01     1.026E-01
 Th-234        1.6932E+00    9.625E-01     9.633E-01
 Pb-214        1.0326E+00    2.282E-01     2.302E-01
 Pb-210   <    1.4429E+00
 AM-241        2.6780E+01    1.082E+00     1.468E+00
   < - 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 (2.7 to 1999.2 keV) 3.2641949E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0105 D1 IS RCA 061307

```
     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 14:31:19 Page    1
EnergySolutions                  Spectrum name: Win00052.An1

Sample description
     WI07-0105 D1 IS RCA 061307


Spectrum Filename: C:\User\Win00052.An1

Acquisition information
       Start time:                 13-Jun-2007 14:21:09
       Live time:                600
       Real time:                603
       Dead time:                  0.44 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.5860E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.5860E+02) =
                                   3.8670E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  13-JUN-2007 14:31:19 Page    2
EnergySolutions                  Spectrum name: Win00052.An1
```

WI07-0105 D1 IS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 1.0000

********** 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	
28.73	7.36	929.	1963.	3.271	7.57	1.489	CU-64	s
242.80	61.08	74.	38.	0.063	72.24	0.959	AM-241	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.64	46.58	15.	8.	0.013	162.87	0.267s
AM-241	237.51	59.54	129.	23.	0.038	147.99	0.958D
Th-234	252.51	63.29	31.	0.	0.000	0.00	0.961D
Pb-214	298.61	74.81	46.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	58.	0.	0.000	266.50	0.223D
Pb-212	303.60	76.06	56.	23.	0.038	131.40	0.274s
Pb-214	307.80	77.11	25.	0.	0.000	485.34	0.213D
Pb-214	349.00	87.40	8.	1.	0.002	757.19	0.000s
Th-234	368.79	92.35	24.	7.	0.012	198.17	0.985D
Ac-228	380.79	95.35	33.	7.	0.012	246.43	0.987D
Ac-228	835.75	209.05	3.	4.	0.007	158.11	0.434s
Pb-212	949.89	237.58	25.	28.	0.047	76.76	0.467s
Pb-214	967.50	241.98	11.	0.	0.000	0.00	0.000D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.10	1.	0.	0.000	0.00	0.000s
Pb-214	1179.00	294.84	5.	0.	0.000	0.00	0.000s
Ac-228	1308.12	327.11	4.	1.	0.002	600.00	0.144s
Ac-228	1352.67	338.24	1.	0.	0.001	240.37	0.197s
Pb-214	1400.00	350.07	0.	52.	0.087	27.74	0.337s

Ac-228	1851.00	462.78	0.	1.	0.002	200.00	0.250s
Bi-214	2431.62	607.88	0.	24.	0.040	40.82	0.562s
CS-137	2647.33	661.78	1.	0.	0.001	240.37	0.197s
Bi-214	3075.00	768.65	1.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3645.33	911.18	1.	0.	0.001	240.37	0.197s
Bi-214	3736.00	933.83	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	1.	1.	0.001	484.86	1.589D
Ac-228	3877.18	969.11	3.	3.	0.005	193.41	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5839.67	1459.48	3.	1.	0.002	583.10	0.210s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.2282E-04	609.31	1.228E-04	&(	5.117E-06	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	0.000E+00	?	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	?	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	&	1.587E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	2.391E-05	G K
			969.11	6.494E-05		8.414E-05	G
			338.32	0.000E+00	%	2.635E-05	G
			964.60	0.000E+00	%	1.713E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	0.000E+00	%	8.662E-05	G
			209.28	9.691E-05	?	1.036E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	7.084E-05	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.130E-04	X
		327.64	0.000E+00	%	1.696E-04	G
Pb-212	N 8.2810E-05	238.62	7.330E-05	&(	1.987E-05	G K
		77.11	1.064E-04	&(	5.131E-05	X
		74.81	0.000E+00	&	8.883E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	5.947E-06	G
Th-234	N 1.0949E-04	92.35	1.095E-04	(	1.084E-04	G
		63.29	0.000E+00	!	1.933E-04	G

```
Pb-214   N   2.1616E-04    351.92 2.162E-04 &(  4.157E-06          G K
                           295.21 0.000E+00 ?   2.620E-05          G
                            77.11 0.000E+00 %   6.017E-05Energy duplication
                           241.98 0.000E+00 %   8.100E-05          G
                            74.81 0.000E+00 %   1.365E-04Energy duplication
                            87.30 0.000E+00 %   8.238E-05          X

Pb-210   N   1.8350E-04     46.50 1.835E-04 ?(  1.413E-04          G

AM-241       5.6197E-05     59.54 5.620E-05  (  4.113E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:31:19 Page 5
EnergySolutions Spectrum name: Win00052.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	4.7493E-01	1.939E-01	1.944E-01
K-40 <	6.1387E-01		
Ac-228 B<	9.2454E-02		
Pb-212	3.2022E-01	2.437E-01	2.438E-01
CS-137 <	2.2997E-02		
Th-234 C	4.2341E-01	8.391E-01	8.391E-01
Pb-214 #	8.3589E-01	2.318E-01	2.331E-01
Pb-210 #C	7.0959E-01	1.156E+00	1.156E+00
AM-241 C	2.1731E-01	3.216E-01	3.217E-01

```
  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
```

WI07-0105 D1 IS RCA 061307

& - 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 (2.7 to 1999.2 keV) 2.9813592E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0106 D2 IS RCA 061307

Sample description
WI07-0106 D1 IS RCA 061307

Spectrum Filename: C:\User\Win00053.An1

Acquisition information

Start time:	13-Jun-2007 14:39:32
Live time:	600
Real time:	606
Dead time:	0.96 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.0940E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0940E+02) = 3.2321E+03
Detection limit method:	Traditional ORTEC method

WI07-0106 D2 IS RCA 061307

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.3415

********** 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
29.03	7.44	541.	944.	1.573	11.64	1.487	CU-64 s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.00	45.92	11.	3.	0.005	303.08	0.269s
AM-241	239.00	59.91	13.	0.	0.000	0.00	0.000s
Th-234	252.00	63.16	8.	0.	0.000	0.00	0.000s
Pb-214	298.61	74.81	117.	0.	0.000	0.00	0.445D
Pb-212	298.63	74.81	83.	0.	0.000	2304.02	0.000D
Pb-212	306.67	76.83	114.	127.	0.212	40.28	0.526s
Pb-214	307.80	77.11	82.	0.	0.000	91.72	0.333D
Pb-214	348.20	87.20	70.	57.	0.096	65.04	0.393s
Th-234	368.79	92.35	63.	18.	0.030	132.06	0.985D
Ac-228	380.79	95.35	49.	13.	0.022	159.64	0.987D
Ac-228	835.00	208.87	8.	2.	0.003	493.96	0.000s
Pb-212	954.33	238.69	77.	11.	0.018	275.24	0.197s
Pb-214	967.50	241.98	7.	0.	0.000	0.00	0.284D
Ac-228	1081.89	270.57	2.	2.	0.002	328.86	0.294s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.90	295.56	20.	26.	0.043	81.65	0.963
Ac-228	1314.44	328.69	9.	4.	0.007	257.39	0.223s
Ac-228	1354.25	338.63	19.	32.	0.053	70.09	0.302s
Pb-214	1412.33	353.15	24.	6.	0.010	323.18	0.210s
Ac-228	1850.00	462.53	2.	2.	0.002	258.20	0.100s

Bi-214	2436.42	609.08	5.	48.	0.080	36.80	0.292s
CS-137	2641.71	660.38	6.	4.	0.007	235.59	0.311s
Bi-214	3077.23	769.21	2.	7.	0.011	108.31	0.229s
Ac-228	3178.00	794.39	0.	2.	0.003	141.42	0.250s
Ac-228	3642.80	910.54	2.	8.	0.013	89.44	0.592s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3856.00	963.82	1.	0.	0.000	0.00	0.000s
Ac-228	3878.54	969.45	12.	0.	0.000	0.00	1.591
Bi-214	4474.33	1118.33	0.	9.	0.015	66.67	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.00	1461.32	5.	1.	0.002	452.77	0.000s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	0.250s
Bi-214	7060.33	1764.47	0.	7.	0.012	75.59	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA microCi	Value Comments
Bi-214	N	2.5633E-04	609.31	2.456E-04	?(	1.894E-05	G K
			1764.49	2.648E-04	?(	3.783E-05	G
			1120.29	2.361E-04	&(	2.624E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	3.887E-04	&(	1.502E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.883E-04	G
Ac-228	N	1.8842E-04	911.07	8.966E-05	?(	2.753E-05	G K
			969.11	0.000E+00	%	1.141E-04	G
			338.32	4.193E-04	@(	8.841E-05	G
			964.60	0.000E+00	%	1.338E-04	G
			794.70	1.282E-04	?(	6.411E-05	G
			463.00	0.000E+00	%	1.299E-04	G
			209.28	0.000E+00	%	1.211E-04	G
			270.23	0.000E+00	%	1.194E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	2.969E-04	(	2.340E-04	X
		327.64	0.000E+00	&	2.577E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	%	3.606E-05	G K
		77.11	5.889E-04	*	1.039E-04	X
		74.81	0.000E+00	%	1.049E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.487E-05	G
Th-234	N 2.6677E-04	92.35	2.668E-04	(	1.722E-04	G
		63.29	0.000E+00	?	1.045E-04	G
Pb-214	N 0.0000E+00	351.92	0.000E+00	&	3.435E-05	G K

WI07-0106 D2 IS RCA 061307

			295.21	1.840E-04		7.152E-05	G
			77.11	0.000E+00	&	1.058E-04	Energy duplication
			241.98	0.000E+00	&	6.589E-05	G
			74.81	0.000E+00	&	2.138E-04	Energy duplication
			87.30	9.898E-04	?	2.839E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	1.362E-04	G
AM-241		0.0000E+00	59.54	0.000E+00	?	1.394E-05	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

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

ORTEC g v - i (63) wan32 G53W2.06 13-JUN-2007 14:49:46 Page 5
EnergySolutions Spectrum name: Win00053.An1

R - Coincidence Corrected
H - Halflife limit exceeded
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
Bi-214	#	8.2849E-01	3.049E-01	3.059E-01
K-40	<	6.0859E-01		
Ac-228		6.0897E-01	3.679E-01	3.683E-01
Pb-212	B<	1.1656E-01		
CS-137	<	4.8052E-02		
Th-234	C	8.6221E-01	1.139E+00	1.139E+00
Pb-214	B<	1.1101E-01		
Pb-210	<	4.4028E-01		
AM-241	<	4.5060E-02		

\# - 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 (2.7 to 1999.2 keV) 2.2996738E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0108 D2 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:32:32 Page    1
EnergySolutions                  Spectrum name: WI000082.An1

Sample description
     WI07-0108 D2 IS RCA 061407


Spectrum Filename: C:\User\WI000082.An1

Acquisition information
       Start time:                 14-Jun-2007 09:22:20
       Live time:                600
       Real time:                603
       Dead time:                  0.51 %
       Detector ID:                    2

Detector system
     MCB 06325561


Calibration
       Filename:                   250 ml Soil ReGe.Clb
     250ml.soil


       Energy Calibration
            Created:               17-May-2007 15:02:20
            Zero offset:           0.187 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.670E-09 keV/channel^2

       Efficiency Calibration
            Created:               17-May-2007 15:44:56
            Knee Energy:         140.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.56 %
            Log(Eff):             -7.345271E-01 + (-1.332721E-01*Log(E) ) +
                                   ( -5.539954E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.16 %
            Log(Eff):             -1.026413E+01 + ( 3.289732E+00*Log(E) ) +
                                   ( -3.579367E-01*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.69keV )
       Stop channel:            8000 (  1999.30keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.8660E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8660E+02) =
                                   3.4892E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:32:32 Page    2
EnergySolutions                  Spectrum name: WI000082.An1
```

WI07-0108 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1634

********** 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	
14.50	3.81	6285.	25790.	42.983	1.75	2.071	CU-64	s
104.61	26.34	1295.	210.	0.350	64.08	0.464	U-237	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.46	46.54	447.	46.	0.077	142.42	0.263s
AM-241	237.58	59.57	1122.	10443.	17.405	2.34	0.940
Th-234	252.60	63.33	224.	66.	0.110	82.32	0.348s
Pb-214	298.54	74.81	181.	113.	0.188	38.71	0.917D
Pb-212	298.56	74.81	153.	0.	0.000	443.00	0.244D
Pb-212	307.74	77.11	157.	171.	0.285	25.75	0.919D
Pb-214	307.74	77.11	292.	0.	0.000	131.27	0.000D
Pb-214	349.16	87.46	104.	73.	0.122	53.76	1.766s
Th-234	368.72	92.35	103.	61.	0.101	53.77	0.933D
Ac-228	380.72	95.35	109.	9.	0.016	322.49	0.935D
Ac-228	835.44	209.01	22.	32.	0.054	64.91	0.739s
Pb-212	953.94	238.62	10.	228.	0.379	13.81	1.057D
Pb-214	967.37	241.98	35.	36.	0.059	57.97	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.09	269.90	3.	32.	0.053	41.46	0.558s
Pb-214	1179.40	294.98	8.	68.	0.112	29.64	0.761s
Ac-228	1312.32	328.20	6.	10.	0.018	97.28	0.483s
Ac-228	1353.25	338.43	6.	40.	0.066	37.58	0.994
Pb-214	1407.04	351.87	15.	137.	0.228	21.25	1.067

Ac-228	1851.56	462.97	4.	29.	0.048	49.22	0.724s
Bi-214	2437.55	609.42	0.	69.	0.115	24.08	0.955s
CS-137	2645.24	661.33	2.	12.	0.021	73.76	0.610s
Bi-214	3072.92	768.21	0.	13.	0.022	55.47	0.375s
Ac-228	3179.00	794.72	0.	10.	0.017	63.25	0.375s
Ac-228	3645.87	911.39	0.	39.	0.065	32.03	0.750s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	4.	6.	0.010	119.44	1.595D
Ac-228	3876.86	969.11	2.	29.	0.048	39.39	1.598D
Bi-214	4481.00	1120.08	0.	11.	0.018	60.30	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5845.95	1461.13	0.	42.	0.070	30.86	0.437s
Ac-228	6354.00	1588.07	0.	3.	0.005	115.47	0.750s
Bi-214	7062.90	1765.18	0.	10.	0.017	63.25	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1762E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8492E-03	1460.81	1.849E-03	?(	4.403E-05	G
Ac-228	N	4.8306E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	5.570E-04	(	4.597E-05	G
			338.32	4.629E-04	?(	4.517E-05	G
			964.60	3.765E-04	(	1.990E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	1.124E-03	+	3.367E-04	G
			209.28	6.877E-04	(	1.529E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.998E-04	+	2.775E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	3.057E-04	X
		327.64	4.276E-04	(	1.570E-04	G
Pb-212	N 5.2283E-04	238.62	5.228E-04	(	1.127E-05	G K
		77.11	6.548E-04	+	9.998E-05	Energy duplication
		74.81	0.000E+00	%	1.166E-04	Energy duplication
CS-137	3.3874E-05	661.66	3.387E-05	?(	7.564E-06	G
Th-234	N 9.6441E-04	92.35	7.586E-04	(	1.856E-04	G
		63.29	1.257E-03	(	4.129E-04	G

```
Pb-214    N   4.7948E-04    351.92 5.062E-04  (  2.245E-05         G K
                            295.21 4.228E-04  (  2.915E-05         G
                             77.11 0.000E+00 ?   1.618E-04Energy duplication
                            241.98 4.921E-04  (  1.235E-04         G
                             74.81 1.257E-03 +   2.763E-04Energy duplication
                             87.30 1.059E-03 +   2.804E-04         X

Pb-210    N   9.4584E-04     46.50 9.458E-04 ?(  6.204E-04         G

AM-241        2.1504E-02     59.54 2.150E-02  (  9.858E-05         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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:32:32 Page   5
EnergySolutions   Spectrum name: WI000082.An1

```
   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        1.1082E+00    2.668E-01    2.701E-01
K-40    #     6.4521E+00    1.991E+00    2.006E+00
Ac-228        1.6855E+00    4.676E-01    4.719E-01
Pb-212        1.8242E+00    2.519E-01    2.610E-01
CS-137  #     1.1819E-01    8.717E-02    8.729E-02
Th-234        3.3650E+00    1.654E+00    1.656E+00
Pb-214        1.6730E+00    3.554E-01    3.609E-01
Pb-210  #C    3.3002E+00    4.700E+00    4.701E+00
AM-241        7.5030E+01    1.756E+00    3.286E+00

   # - 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 (2.7 to 1999.3 keV) 9.4556366E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0109 D1 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:51:39 Page    1
EnergySolutions                  Spectrum name: Win00059.An1

Sample description
     WI07-0109 D1 IS RCA 061407


Spectrum Filename: C:\User\Win00059.An1

Acquisition information
       Start time:                 14-Jun-2007 09:39:21
       Live time:                600
       Real time:                603
       Dead time:                  0.44 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.9690E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.9690E+02) =
                                   3.3681E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 09:51:39 Page    2
EnergySolutions                  Spectrum name: Win00059.An1
```

WI07-0109 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1151

********** 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	
28.78	7.37	43.	490.	0.817	10.37	1.200	CU-64	s
52.14	13.21	35.	41.	0.068	56.54	0.570	TH-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	183.96	46.16	104.	20.	0.033	186.90	0.363s
AM-241	237.88	59.63	200.	2083.	3.472	4.97	0.981
Th-234	252.70	63.34	32.	13.	0.022	144.05	0.545s
Pb-214	298.61	74.81	57.	75.	0.125	36.57	0.971D
Pb-212	298.63	74.81	73.	0.	0.000	249.80	0.283D
Pb-212	307.80	77.11	66.	117.	0.195	26.93	0.972D
Pb-214	307.80	77.11	161.	0.	0.000	153.32	0.000D
Pb-214	348.33	87.24	41.	44.	0.073	60.22	0.927
Th-234	368.79	92.35	39.	30.	0.050	69.11	0.985D
Ac-228	380.79	95.35	38.	11.	0.018	173.38	0.987D
Ac-228	835.24	208.93	29.	17.	0.028	133.75	0.341s
Pb-212	954.08	238.62	21.	167.	0.279	17.29	1.099D
Pb-214	967.50	241.98	38.	27.	0.045	75.69	1.101D

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 3
EnergySolutions Spectrum name: Win00059.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.23	269.90	17.	15.	0.025	119.38	0.464s
Pb-214	1179.60	294.99	2.	45.	0.075	32.07	0.432s
Ac-228	1308.73	327.26	4.	28.	0.047	47.59	0.796s
Ac-228	1351.77	338.02	5.	49.	0.081	33.94	0.396s
Pb-214	1406.74	351.75	0.	81.	0.135	22.22	0.687s

Ac-228	1851.67	462.94	0.	12.	0.020	57.74	0.937s
Bi-214	2438.47	609.59	0.	52.	0.087	27.74	1.015s
CS-137	2646.43	661.56	0.	14.	0.023	53.45	0.312s
Bi-214	3074.71	768.58	0.	7.	0.012	75.59	0.500s
Ac-228	3180.00	794.89	1.	0.	0.000	0.00	0.000s
Ac-228	3644.39	910.94	0.	38.	0.063	32.44	1.031s
Bi-214	3725.94	931.32	2.	4.	0.007	161.78	0.238s
Ac-228	3859.13	964.60	0.	9.	0.015	69.88	1.588D
Ac-228	3877.18	969.11	2.	19.	0.031	51.90	1.591D
Bi-214	4481.89	1120.22	0.	10.	0.017	63.25	0.750s
Bi-214	4955.00	1238.43	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.11	0.	3.	0.005	115.47	0.250s
K-40	5844.00	1460.57	7.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	3.	1.	0.002	529.15	0.089s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7035E-04	609.31	2.661E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	1.276E-04	G
			1120.29	2.624E-04	?(	2.624E-05	G
			1238.11	0.000E+00	?	1.457E-04	G
			768.36	3.982E-04	+	2.432E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.477E-04	?(	1.159E-04	G
			934.06	4.742E-04	&	4.505E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	2.012E-04	G
Ac-228	N	4.5390E-04	911.07	4.543E-04	(	1.195E-05	G K
			969.11	3.919E-04	(	5.750E-05	G
			338.32	6.411E-04	+	1.436E-04	G
			964.60	5.831E-04	(	9.371E-05	G
			794.70	0.000E+00	?	1.282E-04	G
			463.00	5.197E-04	?(	4.331E-05	G
			209.28	4.038E-04	?(	1.981E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 4
EnergySolutions Spectrum name: Win00059.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.313E-04	?(	2.250E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.426E-04	-	2.344E-04	X
		327.64	1.299E-03	+	3.903E-04	G
Pb-212	N 4.3769E-04	238.62	4.377E-04	(	1.825E-05	G K
		77.11	5.419E-04	+	9.082E-05	Energy duplication
		74.81	0.000E+00	%	9.875E-05	Energy duplication
CS-137	4.1628E-05	661.66	4.163E-05	?(	2.973E-06	G
Th-234	N 3.8303E-04	92.35	4.416E-04	(	1.372E-04	G
		63.29	2.997E-04	?(	1.963E-04	G

```
Pb-214    N   3.4094E-04    351.92 3.367E-04 @(  4.157E-06          G K
                            295.21 3.173E-04  (  1.869E-05          G
                             77.11 0.000E+00 ?   1.461E-04Energy duplication
                            241.98 4.225E-04  (  1.456E-04          G
                             74.81 1.015E-03 +   2.264E-04Energy duplication
                             87.30 7.567E-04 +   2.339E-04          X

Pb-210    N   4.6851E-04     46.50 4.685E-04 ?(  3.498E-04          G

AM-241        5.1641E-03     59.54 5.164E-03  (  5.084E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:51:39 Page 5
EnergySolutions Spectrum name: Win00059.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.1059E-01	2.526E-01	2.540E-01
K-40 <	6.7780E-01		
Ac-228	1.5288E+00	4.960E-01	4.980E-01
Pb-212	1.4742E+00	2.548E-01	2.585E-01
CS-137 #	1.4021E-01	7.495E-02	7.507E-02
Th-234	1.2901E+00	8.917E-01	8.922E-01
Pb-214	1.1483E+00	2.552E-01	2.574E-01
Pb-210 #C	1.5780E+00	2.949E+00	2.950E+00
AM-241	1.7394E+01	8.650E-01	1.078E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0109 D1 IS RCA 061407

& - 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 (2.7 to 1999.2 kev) 2.5463768E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0110 D2 IS RCA 061407

Sample description
WI07-0110 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000083.An1

Acquisition information

Start time:	14-Jun-2007 09:42:44
Live time:	600
Real time:	602
Dead time:	0.31 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9000E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9000E+02) = 3.4483E+03
Detection limit method:	Traditional ORTEC method

WI07-0110 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1367

********** 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	
14.57	3.83	5337.	26508.	44.180	1.65	2.062	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.00	46.43	158.	0.	0.000	0.00	0.000s
AM-241	237.69	59.60	275.	3596.	5.993	3.76	0.837
Th-234	253.23	63.48	84.	54.	0.090	73.14	0.535s
Pb-214	298.54	74.81	85.	92.	0.153	35.15	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	302.25	0.437D
Pb-212	307.74	77.11	54.	165.	0.276	19.97	0.919D
Pb-214	307.74	77.11	159.	0.	0.000	402.67	0.255D
Pb-214	348.60	87.32	28.	72.	0.120	34.69	1.067s
Th-234	368.72	92.35	68.	53.	0.089	51.55	0.933D
Ac-228	380.72	95.35	30.	5.	0.009	313.66	0.935D
Ac-228	836.17	209.19	31.	34.	0.057	78.71	0.340s
Pb-212	953.94	238.62	23.	224.	0.373	14.66	1.057D
Pb-214	967.37	241.98	34.	40.	0.067	51.48	1.060D
Ac-228	1078.79	269.83	7.	33.	0.056	47.33	0.578s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.69	295.30	10.	72.	0.120	29.83	1.220
Ac-228	1311.24	327.93	8.	26.	0.043	59.77	0.709s
Ac-228	1352.48	338.24	11.	49.	0.082	36.55	1.221
Pb-214	1407.36	351.95	10.	102.	0.170	22.95	0.926
Ac-228	1852.96	463.32	3.	25.	0.042	46.78	0.942

Bi-214	2436.82	609.24	0.	77.	0.128	22.79	1.100
CS-137	2647.13	661.80	2.	36.	0.059	36.96	0.548s
Bi-214	3075.00	768.73	0.	10.	0.017	63.25	0.250s
Ac-228	3181.00	795.22	0.	11.	0.018	60.30	0.500s
Ac-228	3645.53	911.30	0.	57.	0.095	26.49	0.708s
Bi-214	3734.60	933.56	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	0.	13.	0.021	58.51	1.595D
Ac-228	3876.86	969.11	3.	22.	0.037	48.11	1.598D
Bi-214	4481.25	1120.14	0.	13.	0.022	55.47	0.312s
Bi-214	4948.00	1236.77	0.	5.	0.008	89.44	0.750s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5844.96	1460.89	0.	47.	0.078	29.17	0.677s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7062.10	1764.98	0.	12.	0.020	57.74	0.375s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	3.6223E-04	609.31	3.581E-04	(	4.650E-06	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	3.390E-04	&(	6.779E-05	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	6.4037E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	4.272E-04	-	1.474E-04	G
			338.32	5.743E-04	(	6.114E-05	G
			964.60	7.741E-04	(	9.763E-05	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	9.874E-04	+	3.118E-04	G
			209.28	7.265E-04	(	1.766E-04	G
			270.23	1.041E-03	+	2.955E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 09:53:10 Page 4
EnergySolutions Spectrum name: WI000083.An1

Nuclide	Nuclide Code	Ave activity	Energy	Activity	Peak Code	MDA	Comments
			1588.00	0.000E+00	?	2.905E-04	G
			95.35	0.000E+00	%	1.711E-04	X
			327.64	1.038E-03	+	3.568E-04	G
Pb-212	N	5.1495E-04	238.62	5.150E-04	(	1.675E-05	G K
			77.11	6.333E-04	+	8.209E-05	Energy duplication
			74.81	0.000E+00	%	8.923E-05	Energy duplication
CS-137		9.6653E-05	661.66	9.665E-05	(	7.364E-06	G
Th-234	N	8.1508E-04	92.35	6.650E-04	(	1.516E-04	G
			63.29	1.029E-03	@(	2.566E-04	G
Pb-214	N	4.0271E-04	351.92	3.778E-04	(	1.852E-05	G K

```
                                WI07-0110 D2 IS RCA 061407
                               295.21 4.510E-04  (  3.132E-05          G
                                77.11 0.000E+00 %   1.202E-04Energy duplication
                               241.98 5.574E-04 +   1.753E-04          G
                                74.81 1.028E-03 +   2.156E-04Energy duplication
                                87.30 1.045E-03 +   2.126E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   3.801E-04          G

AM-241       7.4047E-03      59.54 7.405E-03  (  4.933E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		1.2491E+00	2.847E-01	2.885E-01
K-40	#	7.1355E+00	2.082E+00	2.099E+00
Ac-228		2.2082E+00	5.461E-01	5.524E-01
Pb-212		1.7757E+00	2.604E-01	2.688E-01
CS-137		3.3329E-01	1.232E-01	1.238E-01
Th-234		2.8106E+00	1.257E+00	1.259E+00
Pb-214		1.3887E+00	2.613E-01	2.665E-01
Pb-210	<	1.3105E+00		
AM-241		2.5533E+01	9.588E-01	1.346E+00

- 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 (2.7 to 1999.3 keV) 4.2434364E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0111 D1 IS RCA 061407

Sample description
WI07-0111 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00060.An1

Acquisition information
Start time: 14-Jun-2007 10:00:59
Live time: 600
Real time: 605
Dead time: 0.74 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8470E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8470E+02) = 3.5125E+03
Detection limit method: Traditional ORTEC method

WI07-0111 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1200

********** 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	
28.58	7.32	65.	462.	0.770	11.55	0.851	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.33	46.50	18.	41.	0.068	47.55	0.489s
AM-241	237.84	59.62	61.	187.	0.311	21.74	0.833
Th-234	252.32	63.24	56.	28.	0.046	103.77	0.980
Pb-214	298.61	74.81	79.	94.	0.156	33.83	0.971D
Pb-212	298.63	74.81	89.	0.	0.000	212.62	0.411D
Pb-212	307.80	77.11	80.	117.	0.196	28.33	0.972D
Pb-214	307.80	77.11	234.	0.	0.000	95.87	0.000D
Pb-214	348.37	87.25	48.	48.	0.081	58.41	0.514s
Th-234	368.79	92.35	42.	31.	0.051	70.01	0.985D
Ac-228	380.79	95.35	41.	2.	0.003	987.48	0.987D
Ac-228	836.73	209.30	18.	22.	0.038	81.35	0.350s
Pb-212	954.08	238.62	28.	191.	0.319	16.45	1.099D
Pb-214	967.50	241.98	44.	23.	0.038	92.16	1.101D
Ac-228	1078.75	269.78	0.	32.	0.053	35.36	0.417s

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:11:11 Page 3
EnergySolutions Spectrum name: Win00060.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.02	295.09	13.	52.	0.087	39.18	0.855s
Ac-228	1309.57	327.47	11.	2.	0.004	447.21	0.259s
Ac-228	1353.61	338.47	5.	46.	0.077	34.65	1.113s
Pb-214	1406.85	351.78	4.	84.	0.139	24.70	1.415
Ac-228	1852.00	463.03	5.	3.	0.004	291.55	0.000s

Bi-214	2436.28	609.04	0.	47.	0.078	29.17	1.728s
CS-137	2647.68	661.87	0.	31.	0.052	35.92	0.646s
Bi-214	3074.00	768.40	0.	9.	0.015	66.67	0.750s
Ac-228	3179.84	794.85	0.	19.	0.032	45.88	0.791s
Ac-228	3644.42	910.95	0.	53.	0.088	27.47	1.249
Bi-214	3731.00	932.58	0.	8.	0.013	70.71	0.250s
Ac-228	3859.13	964.60	3.	6.	0.011	105.33	1.589D
Ac-228	3877.18	969.11	2.	16.	0.026	56.81	1.591D
Bi-214	4481.85	1120.21	0.	13.	0.022	55.47	0.500s
Bi-214	4955.50	1238.56	0.	2.	0.003	141.42	0.500s
Bi-214	5512.00	1377.61	0.	2.	0.003	141.42	0.250s
K-40	5843.52	1460.45	0.	28.	0.047	37.80	0.417s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.33	1764.22	0.	9.	0.015	66.67	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	2.7816E-04	609.31	2.405E-04	(	5.117E-06	G K
			1764.49	3.404E-04	?(	3.783E-05	G
			1120.29	3.411E-04	?(	2.624E-05	G
			1238.11	1.457E-04	-	1.866E-04	G
			768.36	5.120E-04	+	2.715E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?(	1.159E-04	G
			934.06	8.431E-04	&	4.775E-04	G
K-40	N	1.3181E-03	1460.81	1.318E-03	?(	4.707E-05	G
Ac-228	N	6.1739E-04	911.07	6.336E-04	(	1.195E-05	G K
			969.11	3.327E-04	-	1.372E-04	G
			338.32	6.060E-04	(	4.876E-05	G
			964.60	4.315E-04	-	3.191E-04	G
			794.70	1.218E-03	+	4.286E-04	G
			463.00	0.000E+00	%	1.962E-04	G
			209.28	5.451E-04	?(	1.560E-04	G
			270.23	1.133E-03	+	3.016E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.204E-04	X
		327.64	0.000E+00	%	2.577E-04	G
Pb-212	N 5.1275E-04	238.62	5.005E-04	(	2.094E-05	G K
		77.11	5.431E-04	(	6.071E-05	Energy duplication
		74.81	0.000E+00	%	1.086E-04	Energy duplication
CS-137	9.2177E-05	661.66	9.218E-05	(	2.973E-06	G
Th-234	N 5.2785E-04	92.35	4.506E-04	(	1.427E-04	G
		63.29	6.379E-04	?(	2.565E-04	G
Pb-214	N 3.5603E-04	351.92	3.478E-04	(	1.449E-05	G K

```
                                WI07-0111 D1 IS RCA 061407
                               295.21 3.704E-04 ?(  3.934E-05          G
                                77.11 0.000E+00 ?   1.755E-04Energy duplication
                               241.98 3.601E-04  (  1.560E-04          G
                                74.81 1.268E-03 +   2.582E-04Energy duplication
                                87.30 8.344E-04 +   2.480E-04          X

Pb-210    N   9.6045E-04      46.50 9.604E-04  (  1.528E-04          G

AM-241        4.6278E-04      59.54 4.628E-04  (  2.873E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.7703E-01	2.850E-01	2.865E-01
K-40 #	4.6297E+00	1.750E+00	1.755E+00
Ac-228	2.1686E+00	5.958E-01	5.992E-01
Pb-212	1.8010E+00	2.950E-01	2.997E-01
CS-137	3.2377E-01	1.163E-01	1.167E-01
Th-234	1.8541E+00	1.160E+00	1.161E+00
Pb-214	1.2506E+00	3.089E-01	3.111E-01
Pb-210	3.3735E+00	1.604E+00	1.606E+00
AM-241	1.6255E+00	3.533E-01	3.584E-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 (2.7 to 1999.2 keV) 1.8003792E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0112 D2 IS RCA 061407

Sample description
WI07-0112 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000082.An1

Acquisition information
Start time: 14-Jun-2007 10:05:24
Live time: 600
Real time: 602
Dead time: 0.38 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8050E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8050E+02) = 3.5651E+03
Detection limit method: Traditional ORTEC method

WI07-0112 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0859

********** 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
12.00	3.27	7336.	12579.	20.965	2.62	0.854	- D
17.45	4.63	12857.	9410.	15.683	3.98	0.855	- D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.14	46.71	234.	85.	0.142	67.62	1.278s
AM-241	237.63	59.58	266.	1326.	2.209	7.31	0.873
Th-234	253.76	63.62	175.	42.	0.070	119.08	1.020
Pb-214	298.54	74.81	139.	110.	0.183	35.87	0.917D
Pb-212	298.56	74.81	129.	0.	0.000	363.11	0.449D
Pb-212	307.74	77.11	133.	162.	0.271	25.46	0.919D
Pb-214	307.74	77.11	270.	0.	0.000	166.31	0.000D
Pb-214	348.27	87.24	86.	69.	0.114	54.99	0.866
Th-234	368.72	92.35	90.	45.	0.076	65.97	0.933D
Ac-228	380.72	95.35	86.	17.	0.028	163.46	0.935D
Ac-228	835.60	209.05	19.	29.	0.049	65.24	0.555s
Pb-212	953.94	238.62	24.	209.	0.349	15.31	1.057D
Pb-214	967.37	241.98	30.	30.	0.050	63.89	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.56	270.52	11.	26.	0.044	61.44	0.396s
Pb-214	1180.25	295.19	23.	61.	0.101	41.93	1.202
Ac-228	1311.79	328.06	7.	17.	0.029	78.45	0.333s
Ac-228	1353.76	338.55	3.	55.	0.091	30.41	1.444s
Pb-214	1407.38	351.96	10.	93.	0.155	24.33	0.671s

Ac-228	1852.43	463.19	0.	24.	0.040	40.82	0.750s
Bi-214	2436.68	609.20	6.	56.	0.093	31.94	0.554s
CS-137	2647.60	661.92	9.	4.	0.007	257.39	0.381s
Bi-214	3072.53	768.11	3.	11.	0.018	87.20	0.596s
Ac-228	3181.60	795.37	0.	11.	0.018	60.30	0.375s
Ac-228	3645.16	911.21	0.	55.	0.092	26.97	0.495s
Bi-214	3738.00	934.41	0.	8.	0.013	70.71	0.750s
Ac-228	3858.81	964.60	0.	12.	0.020	58.37	1.595D
Ac-228	3876.86	969.11	3.	22.	0.037	47.93	1.598D
Bi-214	4481.00	1120.08	9.	0.	0.001	1054.09	0.000s
Bi-214	4955.00	1238.52	0.	6.	0.010	81.65	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.64	1460.06	15.	7.	0.011	216.79	0.447s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7058.00	1763.96	0.	3.	0.005	115.47	0.750s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6042E-04	609.31	2.604E-04	(	1.860E-05	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	0.000E+00	%	1.161E-04	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	5.732E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.149E-04	G
Ac-228	N	6.4613E-04	911.07	6.057E-04	?(	1.101E-05	G K
			969.11	4.283E-04	-	1.474E-04	G
			338.32	6.407E-04	(	3.668E-05	G
			964.60	7.354E-04	(	7.104E-05	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	9.355E-04	+	2.902E-04	G
			209.28	6.207E-04	?(	1.403E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.227E-04	(	1.608E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	3.242E-04	-	2.863E-04	X
		327.64	7.059E-04	(	1.705E-04	G
Pb-212	N 4.8095E-04	238.62	4.809E-04	(	1.702E-05	G K
		77.11	6.218E-04	+	9.492E-05	Energy duplication
		74.81	0.000E+00	%	1.073E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.524E-05	G
Th-234	N 6.6312E-04	92.35	5.669E-04	(	1.733E-04	G
		63.29	8.001E-04	?(	3.661E-04	G

```
Pb-214    N   3.6297E-04    351.92 3.444E-04  (  1.852E-05          G K
                            295.21 3.800E-04  (  4.604E-05          G
                             77.11 0.000E+00 ?   1.558E-04Energy duplication
                            241.98 4.112E-04  (  1.147E-04          G
                             74.81 1.226E-03 +   2.547E-04Energy duplication
                             87.30 9.964E-04 +   2.629E-04          X

Pb-210    N   1.7352E-03     46.50 1.735E-03 *(  4.519E-04          G

AM-241        2.7297E-03     59.54 2.730E-03  (  4.856E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:15:36 Page    5
 EnergySolutions                  Spectrum name: WI000082.An1

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		9.2843E-01	2.966E-01	2.986E-01
K-40	<	1.1226E+00		
Ac-228		2.3035E+00	4.978E-01	5.052E-01
Pb-212		1.7146E+00	2.625E-01	2.703E-01
CS-137	<	5.4328E-02		
Th-234		2.3641E+00	1.559E+00	1.560E+00
Pb-214		1.2940E+00	3.148E-01	3.186E-01
Pb-210	#	6.1860E+00	4.183E+00	4.186E+00
AM-241		9.7317E+00	7.112E-01	7.972E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0112 D2 IS RCA 061407

& - 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 (2.7 to 1999.3 keV) 2.4522255E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0113 D1 IS RCA 061407

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    1
EnergySolutions                  Spectrum name: Win00061.An1

Sample description
     WI07-0113 D1 IS RCA 061407


Spectrum Filename: C:\User\Win00061.An1

Acquisition information
       Start time:                 14-Jun-2007 10:13:35
       Live time:                600
       Real time:                607
       Dead time:                  1.22 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   250 ml Soil LeGe.Clb
     250 ml Soil Standard; 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:               17-May-2007 12:57:41
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   1.58 %
            Log(Eff):             -1.143846E+00 + (-7.027109E-02*Log(E) ) +
                                   ( -5.759660E-02*Log(E)^2 )
            Below the Knee:        Linear           Uncertainty =   0.15 %
            Log(Eff):             -4.039622E+00 + ( 2.584107E-01*Log(E) ) +
                                   (  0.000000E+00*Log(E)^2 )

Library Files
       Main analysis library:      Winnie.Lib
       Library Match Width:        0.500

Analysis parameters
       Analysis engine:            wan32   G53W2.06
       Start channel:             10 (     2.68keV )
       Stop channel:            8000 (  1999.24keV )
       Peak rejection level:     100.000%
       Peak search sensitivity:    4
       Sample Size:                2.2730E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.2730E+02) =
                                   4.3995E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    2
EnergySolutions                  Spectrum name: Win00061.An1
```

WI07-0113 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1897

********** 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	
28.47	7.30	85.	410.	0.683	13.23	1.178	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	179.53	45.05	15.	23.	0.039	69.05	0.230s
AM-241	237.93	59.64	38.	34.	0.056	71.29	0.757
Th-234	251.28	62.98	48.	40.	0.067	73.48	0.859s
Pb-214	298.61	74.81	64.	59.	0.098	46.38	0.971D
Pb-212	298.63	74.81	62.	0.	0.000	261.04	0.228D
Pb-212	307.80	77.11	75.	109.	0.182	29.41	0.973D
Pb-214	307.80	77.11	167.	0.	0.000	133.04	0.000D
Pb-214	348.76	87.34	33.	48.	0.081	51.88	0.593s
Th-234	368.79	92.35	40.	54.	0.089	43.24	0.985D
Ac-228	380.79	95.35	33.	16.	0.027	110.31	0.987D
Ac-228	835.88	209.09	15.	32.	0.053	59.95	0.392s
Pb-212	954.08	238.62	13.	147.	0.245	17.85	1.099D
Pb-214	967.50	241.98	15.	22.	0.036	66.20	1.101D
Ac-228	1081.46	270.46	8.	13.	0.022	93.58	2.166s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.64	295.00	7.	57.	0.094	33.65	1.033s
Ac-228	1309.38	327.42	4.	24.	0.039	53.32	0.904
Ac-228	1352.94	338.31	4.	50.	0.083	33.47	1.340s
Pb-214	1406.92	351.80	4.	63.	0.104	29.56	0.583s
Ac-228	1843.33	460.86	0.	18.	0.030	47.14	0.250s

Bi-214	2436.71	609.15	5.	59.	0.098	31.98	0.878s
CS-137	2648.00	661.95	1.	0.	0.000	0.00	0.000s
Bi-214	3074.67	768.57	3.	3.	0.004	254.95	0.176s
Ac-228	3174.00	793.39	0.	7.	0.012	75.59	0.250s
Ac-228	3645.66	911.26	0.	29.	0.048	37.14	0.375s
Bi-214	3738.50	934.46	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	2.	9.	0.015	82.44	1.589D
Ac-228	3877.18	969.11	6.	10.	0.017	89.52	1.591D
Bi-214	4481.00	1119.99	0.	10.	0.017	63.25	0.312s
Bi-214	4952.33	1237.77	1.	0.	0.001	240.37	0.197s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.33	1460.65	0.	33.	0.055	34.82	0.625s
Ac-228	6355.00	1588.24	0.	3.	0.005	115.47	0.250s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9219E-04	609.31	3.019E-04	(	1.894E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	2.624E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	%	2.276E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	1.5534E-03	1460.81	1.553E-03	?(	4.707E-05	G
Ac-228	N	3.7861E-04	911.07	3.467E-04	(	1.195E-05	G K
			969.11	2.185E-04	-	1.300E-04	G
			338.32	6.587E-04	+	1.436E-04	G
			964.60	5.892E-04	+	3.489E-04	G
			794.70	4.488E-04	&(	6.411E-05	G
			463.00	7.796E-04	&	2.824E-04	G
			209.28	7.753E-04	+	2.473E-04	G
			270.23	4.604E-04	(	1.605E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.647E-04	?(	1.549E-04	G
		95.35	3.688E-04	(	1.935E-04	X
		327.64	1.077E-03	+	3.605E-04	G
Pb-212	N 3.8544E-04	238.62	3.854E-04	(	1.460E-05	G K
		77.11	5.058E-04	+	9.107E-05	Energy duplication
		74.81	0.000E+00	%	9.168E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.947E-06	G
Th-234	N 8.4307E-04	92.35	7.875E-04	(	1.395E-04	G
		63.29	9.222E-04	*(	2.377E-04	G
Pb-214	N 2.7442E-04	351.92	2.605E-04	*(	1.449E-05	G K

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                          WI07-0113 D1 IS RCA 061407
                         295.21 4.011E-04 +   8.369E-05          G
                          77.11 0.000E+00 ?   1.488E-04Energy duplication
                         241.98 3.435E-04  (  9.496E-05          G
                          74.81 7.967E-04 +   2.188E-04Energy duplication
                          87.30 8.344E-04 +   2.285E-04          X

Pb-210   N   5.4660E-04     46.50 5.466E-04 &(  1.391E-04          G

AM-241       8.3053E-05     59.54 8.305E-05 ?(  2.303E-05          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

   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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUN-2007 10:23:50 Page    5
 EnergySolutions                  Spectrum name: Win00061.An1

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214        1.2855E+00    4.111E-01    4.128E-01
 K-40    #     6.8343E+00    2.379E+00    2.388E+00
 Ac-228        1.6657E+00    6.186E-01    6.206E-01
 Pb-212        1.6957E+00    3.028E-01    3.068E-01
 CS-137   <    2.6163E-02
 Th-234        3.7091E+00    1.581E+00    1.584E+00
 Pb-214        1.2073E+00    3.569E-01    3.586E-01
 Pb-210 #      2.4047E+00    1.660E+00    1.661E+00
 AM-241 #      3.6539E-01    2.605E-01    2.608E-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 (2.7 to 1999.2 keV) 1.9167715E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0113 D2 IS RCA QC 061407

Sample description
WI07-0113 D2 IS RCA QC 061407

Spectrum Filename: C:\User\WI000083.An1

Acquisition information

Start time:	14-Jun-2007 10:19:30
Live time:	600
Real time:	602
Dead time:	0.28 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.1520E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.1520E+02) = 4.6468E+03
Detection limit method:	Traditional ORTEC method

WI07-0113 D2 IS RCA QC 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1406

********** 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	
11.54	2.89	5130.	11031.	18.385	2.65	0.854	-	D
15.45	3.87	14537.	9561.	15.935	4.11	0.855	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	184.86	46.40	43.	43.	0.072	65.24	1.269s
AM-241	238.55	59.81	48.	60.	0.101	48.18	0.565s
Th-234	251.75	63.11	48.	34.	0.057	78.48	0.545s
Pb-214	298.54	74.81	57.	88.	0.147	32.16	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	552.81	0.429D
Pb-212	307.74	77.11	51.	139.	0.231	22.40	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	108.18	0.388D
Pb-214	348.77	87.36	29.	46.	0.076	49.70	0.414s
Th-234	368.72	92.35	64.	45.	0.075	58.16	0.933D
Ac-228	380.72	95.35	40.	7.	0.012	263.53	0.935D
Ac-228	835.55	209.03	16.	34.	0.057	56.63	0.833
Pb-212	953.94	238.62	11.	165.	0.275	16.60	1.057D
Pb-214	967.37	241.98	31.	39.	0.064	52.25	1.060D

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:29:40 Page 3
EnergySolutions Spectrum name: WI000083.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.02	270.14	8.	28.	0.047	51.93	1.101
Pb-214	1180.22	295.18	9.	36.	0.061	43.96	1.059
Ac-228	1311.00	327.87	9.	1.	0.002	871.78	0.000s
Ac-228	1354.67	338.78	3.	50.	0.083	32.24	0.634s
Pb-214	1406.66	351.78	12.	70.	0.117	31.85	1.320s

Ac-228	1850.73	462.76	0.	27.	0.045	38.49	0.500s
Bi-214	2437.30	609.36	6.	40.	0.067	40.00	0.594s
CS-137	2644.75	661.20	0.	21.	0.035	43.64	0.375s
Bi-214	3075.64	768.89	0.	12.	0.020	57.74	0.312s
Ac-228	3179.92	794.95	0.	15.	0.025	51.64	0.500s
Ac-228	3644.62	911.08	0.	32.	0.053	35.36	0.705s
Bi-214	3738.33	934.49	0.	3.	0.005	115.47	0.375s
Ac-228	3858.81	964.60	3.	5.	0.008	141.07	1.595D
Ac-228	3876.86	969.11	1.	22.	0.036	45.24	1.598D
Bi-214	4481.67	1120.24	0.	10.	0.017	63.25	0.375s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.250s
K-40	5845.23	1460.95	0.	31.	0.052	35.92	0.562s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.96	0.	12.	0.020	57.74	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1182E-04	609.31	1.860E-04	(	1.860E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	4.2034E-04	911.07	3.524E-04	?(	1.101E-05	G K
			969.11	4.226E-04	(	4.174E-05	G
			338.32	5.821E-04	(	3.668E-05	G
			964.60	2.935E-04	-	2.797E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	1.052E-03	+	3.066E-04	G
			209.28	7.194E-04	+	2.224E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.904E-04	+	2.812E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	0.000E+00	%	2.036E-04	G
Pb-212	N 3.7884E-04	238.62	3.788E-04	(	1.206E-05	G K
		77.11	5.310E-04	+	7.657E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 5.9852E-04	92.35	5.640E-04	(	1.473E-04	G
		63.29	6.477E-04	(	1.964E-04	G

WI07-0113 D2 IS RCA QC 061407

```
Pb-214   N   2.4970E-04    351.92 2.611E-04 *(  1.971E-05          G K
                           295.21 2.276E-04  (  2.940E-05          G
                            77.11 0.000E+00 ?   1.363E-04Energy duplication
                           241.98 5.331E-04 +   1.707E-04          G
                            74.81 9.873E-04 +   1.960E-04Energy duplication
                            87.30 6.627E-04 +   1.851E-04          X

Pb-210   N   8.8460E-04     46.50 8.846E-04  (  1.991E-04          G

AM-241       1.2423E-04     59.54 1.242E-04  (  2.116E-05          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

   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
```

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:29:40 Page 5
EnergySolutions Spectrum name: WI000083.An1

```
   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	9.8431E-01	3.937E-01	3.955E-01
K-40 #	6.3423E+00	2.278E+00	2.291E+00
Ac-228	1.9532E+00	4.287E-01	4.349E-01
Pb-212	1.7604E+00	2.922E-01	2.995E-01
CS-137 #	2.6444E-01	1.154E-01	1.159E-01
Th-234	2.7812E+00	1.358E+00	1.360E+00
Pb-214	1.1603E+00	3.150E-01	3.180E-01
Pb-210	4.1106E+00	2.682E+00	2.683E+00
AM-241	5.7730E-01	2.782E-01	2.790E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0113 D2 IS RCA QC 061407

& - 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 (2.7 to 1999.3 keV) 1.9934153E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0114 D1 IS RCA 061407

Sample description
WI07-0114 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00062.An1

Acquisition information

Start time:	14-Jun-2007 10:27:51
Live time:	600
Real time:	603
Dead time:	0.42 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.6060E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.6060E+02) = 3.8373E+03
Detection limit method:	Traditional ORTEC method

WI07-0114 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0950

********** 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	
28.85	7.39	57.	423.	0.705	12.06	1.936	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.16	46.46	21.	28.	0.047	70.71	0.403s
AM-241	236.60	59.31	28.	46.	0.076	52.33	0.795s
Th-234	253.23	63.47	51.	48.	0.081	66.65	1.948s
Pb-214	298.61	74.81	72.	79.	0.131	37.94	0.971D
Pb-212	298.63	74.81	88.	0.	0.000	891.94	0.292D
Pb-212	307.80	77.11	64.	124.	0.207	25.56	0.973D
Pb-214	307.80	77.11	153.	0.	0.000	203.78	0.000D
Pb-214	348.55	87.29	27.	34.	0.057	59.82	0.770
Th-234	368.79	92.35	43.	29.	0.049	72.65	0.985D
Ac-228	380.79	95.35	26.	4.	0.007	375.71	0.987D
Ac-228	836.65	209.28	8.	35.	0.058	45.83	0.498s
Pb-212	954.08	238.62	25.	149.	0.248	18.98	1.099D
Pb-214	967.50	241.98	31.	24.	0.040	76.70	1.101D
Ac-228	1081.08	270.37	13.	14.	0.023	115.74	0.386s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.11	295.37	12.	40.	0.067	46.90	0.778s
Ac-228	1308.30	327.15	4.	23.	0.038	58.34	0.239s
Ac-228	1352.37	338.16	4.	38.	0.063	37.22	1.028
Pb-214	1407.23	351.88	6.	68.	0.113	28.66	0.979s
Ac-228	1850.78	462.72	0.	25.	0.042	40.00	0.364s

Bi-214	2437.18	609.27	0.	44.	0.073	30.15	0.553s
CS-137	2645.00	661.20	0.	20.	0.033	44.72	0.375s
Bi-214	3075.00	768.65	0.	3.	0.005	115.47	0.250s
Ac-228	3175.00	793.64	0.	4.	0.007	100.00	0.250s
Ac-228	3645.52	911.22	0.	35.	0.058	33.81	0.328s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3858.75	964.51	1.	0.	0.000	0.00	1.588
Ac-228	3877.27	969.13	0.	22.	0.037	42.64	0.416s
Bi-214	4483.12	1120.52	0.	8.	0.013	70.71	0.375s
Bi-214	4952.00	1237.68	0.	0.	0.001	223.61	0.100s
Bi-214	5509.00	1376.86	0.	2.	0.003	141.42	0.250s
K-40	5844.23	1460.62	0.	26.	0.043	39.22	0.750s
Ac-228	6351.00	1587.24	0.	4.	0.007	100.00	0.250s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.1838E-04	609.31	2.252E-04	(	5.117E-06	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	2.099E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	1.707E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?(	1.159E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	1.2239E-03	1460.81	1.224E-03	?(	4.707E-05	G
Ac-228	N	4.6002E-04	911.07	4.184E-04	(	1.195E-05	G K
			969.11	4.628E-04	?(	2.103E-05	G
			338.32	5.006E-04	(	4.442E-05	G
			964.60	0.000E+00		1.332E-04	G
			794.70	2.565E-04	&	2.162E-04	G
			463.00	1.083E-03	+	3.287E-04	G
			209.28	8.480E-04	+	2.371E-04	G
			270.23	4.840E-04	(	2.015E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	6.196E-04	?(	1.549E-04	G
		95.35	0.000E+00	%	1.860E-04	X
		327.64	1.046E-03	+	3.605E-04	G
Pb-212	N 3.8937E-04	238.62	3.894E-04	(	1.996E-05	G K
		77.11	5.743E-04	+	9.202E-05	Energy duplication
		74.81	0.000E+00	&	1.080E-04	Energy duplication
CS-137	5.9469E-05	661.66	5.947E-05	?(	2.973E-06	G
Th-234	N 7.1395E-04	92.35	4.327E-04	(	1.430E-04	G
		63.29	1.114E-03	(	2.439E-04	G
Pb-214	N 2.9344E-04	351.92	2.813E-04	(	1.702E-05	G K

```
                                WI07-0114 D1 IS RCA 061407
                               295.21 2.831E-04  (  3.839E-05          G
                                77.11 0.000E+00 %   1.429E-04Energy duplication
                               241.98 3.803E-04  (  1.318E-04          G
                                74.81 1.064E-03 +   2.417E-04Energy duplication
                                87.30 5.927E-04 +   1.995E-04          X

Pb-210   N   6.5592E-04      46.50 6.559E-04  (  1.640E-04          G

AM-241       1.1280E-04      59.54 1.128E-04 @(  1.967E-05          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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	8.3801E-01	2.527E-01	2.539E-01
K-40 #	4.6966E+00	1.842E+00	1.847E+00
Ac-228	1.7652E+00	5.880E-01	5.903E-01
Pb-212	1.4941E+00	2.836E-01	2.870E-01
CS-137 #	2.2820E-01	1.021E-01	1.023E-01
Th-234	2.7396E+00	1.351E+00	1.352E+00
Pb-214	1.1260E+00	3.228E-01	3.245E-01
Pb-210	2.5169E+00	1.780E+00	1.781E+00
AM-241 #	4.3286E-01	2.265E-01	2.271E-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 (2.7 to 1999.2 keV) 1.5837599E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0115 D2 IS RCA 061407

Sample description
WI07-0115 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000084.An1

Acquisition information

Start time:	14-Jun-2007 10:33:07
Live time:	600
Real time:	602
Dead time:	0.26 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9750E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9750E+02) = 3.3613E+03
Detection limit method:	Traditional ORTEC method

WI07-0115 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1429

********** 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	
11.99	3.41	8183.	14478.	24.130	2.43	0.854	-	D
18.84	5.12	9509.	7945.	13.242	4.13	0.856	-	D

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.45	46.79	24.	44.	0.073	48.96	0.672
AM-241	237.45	59.54	64.	78.	0.130	45.34	0.880
Th-234	252.53	63.31	48.	19.	0.032	128.54	0.312s
Pb-214	298.54	74.81	63.	64.	0.106	43.20	0.917D
Pb-212	298.56	74.81	79.	0.	0.000	232.26	0.735D
Pb-212	307.74	77.11	54.	92.	0.153	30.71	0.919D
Pb-214	307.74	77.11	125.	0.	0.000	309.72	0.452D
Pb-214	348.29	87.24	27.	39.	0.066	53.44	0.471s
Th-234	368.72	92.35	45.	22.	0.037	94.35	0.933D
Ac-228	380.72	95.35	26.	11.	0.018	149.09	0.935D
Ac-228	835.55	209.03	9.	31.	0.051	51.26	1.412s
Pb-212	953.94	238.62	12.	155.	0.259	17.24	1.057D
Pb-214	967.37	241.98	13.	30.	0.050	49.49	1.060D

0

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.24	270.19	9.	20.	0.033	68.25	0.594s
Pb-214	1179.27	294.94	7.	56.	0.093	33.41	0.670s
Ac-228	1307.00	326.87	11.	1.	0.002	1021.00	0.000s
Ac-228	1352.67	338.28	4.	30.	0.051	42.08	0.619s
Pb-214	1406.45	351.72	8.	81.	0.136	26.76	1.091

Ac-228	1849.43	462.44	3.	7.	0.012	108.80	0.331s
Bi-214	2438.84	609.74	0.	50.	0.083	28.28	1.250
CS-137	2645.95	661.50	0.	20.	0.033	44.72	1.000s
Bi-214	3073.75	768.41	0.	9.	0.015	66.67	0.312s
Ac-228	3179.27	794.78	2.	6.	0.010	122.16	0.327s
Ac-228	3645.48	911.29	0.	33.	0.055	34.82	0.594s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	2.	0.003	290.13	1.595D
Ac-228	3876.86	969.11	0.	23.	0.039	41.26	1.598D
Bi-214	4480.50	1119.95	0.	12.	0.020	57.74	0.500s
Bi-214	4953.25	1238.08	0.	4.	0.007	100.00	0.375s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5846.16	1461.19	0.	31.	0.052	35.92	0.309s
Ac-228	6355.00	1588.32	0.	4.	0.007	100.00	0.250s
Bi-214	7062.00	1764.96	0.	6.	0.010	81.65	0.750s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4247E-04	609.31	2.325E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	3.9663E-04	911.07	3.634E-04	(	1.101E-05	G K
			969.11	4.563E-04	(	1.942E-05	G
			338.32	3.555E-04	(	3.813E-05	G
			964.60	0.000E+00	%	2.082E-04	G
			794.70	3.430E-04	?(	1.553E-04	G
			463.00	2.728E-04	-	1.949E-04	G
			209.28	6.489E-04	+	2.001E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:43:17 Page 4
EnergySolutions Spectrum name: WI000084.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.196E-04	+	2.541E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	2.056E-04	-	1.756E-04	X
		327.64	0.000E+00	&	2.209E-04	G
Pb-212	N 3.5540E-04	238.62	3.566E-04	(	1.240E-05	G K
		77.11	3.525E-04	(	4.172E-05	Energy duplication
		74.81	0.000E+00	%	8.489E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	(	2.710E-06	G
Th-234	N 3.1610E-04	92.35	2.794E-04	(	1.242E-04	G
		63.29	3.683E-04	?(	1.958E-04	G

```
                                WI07-0115 D2 IS RCA 061407
Pb-214   N   3.2975E-04    351.92 3.012E-04  (  1.647E-05          G K
                           295.21 3.508E-04 @(  2.678E-05          G
                            77.11 0.000E+00 %   1.071E-04Energy duplication
                           241.98 4.174E-04  (  7.724E-05          G
                            74.81 7.125E-04 +   1.835E-04Energy duplication
                            87.30 5.708E-04 +   1.741E-04          X

Pb-210   N   8.9821E-04     46.50 8.982E-04  (  1.520E-04          G

AM-241       1.6061E-04     59.54 1.606E-04  (  2.435E-05          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

   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   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
               pCi/g          pCi/g       pCi/g

 ____________________________________________________________________________
 Bi-214        8.1502E-01    2.305E-01    2.325E-01
 K-40    #     4.5878E+00    1.648E+00    1.657E+00
 Ac-228        1.3332E+00    4.588E-01    4.615E-01
 Pb-212        1.1946E+00    2.060E-01    2.108E-01
 CS-137        1.8218E-01    8.147E-02    8.177E-02
 Th-234        1.0625E+00    8.471E-01    8.474E-01
 Pb-214        1.1084E+00    2.417E-01    2.453E-01
 Pb-210        3.0192E+00    1.478E+00    1.480E+00
 AM-241        5.3987E-01    2.448E-01    2.456E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0115 D2 IS RCA 061407

& - 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 (2.7 to 1999.3 keV) 1.3842793E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0116 D1 IS RCA 061407

Sample description
WI07-0116 D1 IS RCA 061407

Spectrum Filename: C:\User\Win00063.An1

Acquisition information
Start time: 14-Jun-2007 10:41:30
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 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: 17-May-2007 12:57:41
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 1.58 %
Log(Eff): -1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee: Linear Uncertainty = 0.15 %
Log(Eff): -4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files
Main analysis library: Winnie.Lib
Library Match Width: 0.500

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.68keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8240E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8240E+02) = 3.5411E+03
Detection limit method: Traditional ORTEC method

WI07-0116 D1 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1044

********** 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	
28.25	7.24	28.	404.	0.673	11.21	1.410	CU-64	s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	185.94	46.65	22.	41.	0.068	49.59	0.925
AM-241	235.07	58.93	31.	64.	0.106	42.42	0.799s
Th-234	251.48	63.03	48.	52.	0.087	56.34	0.515s
Pb-214	298.61	74.81	62.	81.	0.136	35.15	0.971D
Pb-212	298.63	74.81	66.	0.	0.000	175.74	0.573D
Pb-212	307.80	77.11	52.	137.	0.229	22.62	0.972D
Pb-214	307.80	77.11	223.	0.	0.000	77.34	0.243D
Pb-214	348.26	87.22	42.	45.	0.075	57.18	0.879
Th-234	368.79	92.35	47.	33.	0.054	69.28	0.985D
Ac-228	380.79	95.35	43.	13.	0.021	159.08	0.987D
Ac-228	837.63	209.52	13.	29.	0.048	61.44	0.513s
Pb-212	954.08	238.62	11.	173.	0.289	16.14	1.099D
Pb-214	967.50	241.98	31.	36.	0.061	54.16	1.101D
Ac-228	1081.94	270.58	13.	10.	0.017	143.06	0.268s

ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 10:51:40 Page 3
EnergySolutions Spectrum name: Win00063.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.84	295.30	7.	66.	0.111	29.42	1.291s
Ac-228	1310.57	327.72	10.	22.	0.038	74.24	0.590s
Ac-228	1351.84	338.03	13.	43.	0.072	45.25	0.646s
Pb-214	1407.39	351.91	11.	90.	0.150	26.42	1.080
Ac-228	1849.35	462.37	2.	10.	0.017	74.40	0.426s

Bi-214	2437.71	609.40	0.	55.	0.092	26.97	1.111
CS-137	2645.59	661.35	3.	8.	0.014	102.14	0.472s
Bi-214	3071.33	767.74	0.	5.	0.008	89.44	0.250s
Ac-228	3179.50	794.77	0.	14.	0.023	53.45	0.312s
Ac-228	3644.52	910.97	0.	40.	0.067	31.62	1.572
Bi-214	3736.00	933.83	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	2.	1.	0.002	403.64	1.589D
Ac-228	3877.18	969.11	6.	16.	0.027	65.50	1.591D
Bi-214	4480.69	1119.92	0.	13.	0.022	55.47	0.812s
Bi-214	4951.89	1237.66	0.	13.	0.022	55.47	0.375s
Bi-214	5511.50	1377.49	0.	4.	0.007	100.00	0.375s
K-40	5846.00	1461.07	18.	0.	0.000	0.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.75	1764.33	0.	4.	0.007	100.00	0.312s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9523E-04	609.31	2.815E-04	(	5.117E-06	G K
			1764.49	1.513E-04	-	1.276E-04	G
			1120.29	3.411E-04	?(	2.624E-05	G
			1238.11	9.472E-04	+	4.097E-04	G
			768.36	2.844E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.636E-04	+	3.908E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.147E-04	G
Ac-228	N	5.1729E-04	911.07	4.782E-04	?(	1.195E-05	G K
			969.11	3.391E-04	-	1.504E-04	G
			338.32	5.708E-04	?(	7.322E-05	G
			964.60	0.000E+00	%	2.006E-04	G
			794.70	8.976E-04	+	3.728E-04	G
			463.00	4.475E-04	&(	1.036E-04	G
			209.28	6.945E-04	?(	1.378E-04	G
			270.23	3.542E-04	-	2.586E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.823E-04	-	2.498E-04	X
		327.64	1.031E-03	+	3.959E-04	G
Pb-212	N 4.5341E-04	238.62	4.534E-04	(	1.369E-05	G K
		77.11	6.345E-04	+	9.226E-05	Energy duplication
		74.81	0.000E+00	?	9.398E-05	Energy duplication
CS-137	2.4779E-05	661.66	2.478E-05	?(	8.513E-06	G
Th-234	N 7.8055E-04	92.35	4.786E-04	(	1.506E-04	G
		63.29	1.210E-03	?(	2.365E-04	G
Pb-214	N 4.0659E-04	351.92	3.741E-04	(	2.169E-05	G K

```
                                WI07-0116 D1 IS RCA 061407
                               295.21 4.695E-04 @(  2.962E-05         G
                                77.11 0.000E+00 ?   1.715E-04Energy duplication
                               241.98 5.741E-04 +   1.903E-04         G
                                74.81 1.100E-03 +   2.353E-04Energy duplication
                                87.30 7.740E-04 +   2.365E-04         X

Pb-210   N   9.6045E-04      46.50 9.604E-04  (  1.675E-04         G

AM-241       1.5825E-04      59.54 1.583E-04 &(  2.085E-05         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

   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	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	1.0454E+00	2.819E-01	2.836E-01
K-40 <	1.1143E+00		
Ac-228	1.8317E+00	5.091E-01	5.119E-01
Pb-212	1.6056E+00	2.591E-01	2.634E-01
CS-137 #	8.7744E-02	8.962E-02	8.966E-02
Th-234	2.7640E+00	1.234E+00	1.236E+00
Pb-214	1.4398E+00	2.847E-01	2.878E-01
Pb-210	3.4010E+00	1.686E+00	1.688E+00
AM-241 #	5.6039E-01	2.377E-01	2.386E-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 (2.7 to 1999.2 keV) 1.2735631E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0117 D2 IS RCA 061407

Sample description
WI07-0117 D2 IS RCA 061407

Spectrum Filename: C:\User\WI000085.An1

Acquisition information

Start time:	14-Jun-2007 10:58:13
Live time:	600
Real time:	602
Dead time:	0.27 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

Main analysis library:	Winnie.Lib
Library Match Width:	0.500

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9650E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9650E+02) = 3.3727E+03
Detection limit method:	Traditional ORTEC method

WI07-0117 D2 IS RCA 061407

Random error: 1.0000000E+00
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:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1486

********** 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
14.41	3.79	5208.	22040.	36.733	1.88	1.851	- s

s - Peak fails shape tests.
D - Peak area deconvoluted.

********** 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	186.58	46.82	32.	32.	0.053	70.71	0.913
AM-241	237.91	59.65	33.	53.	0.088	45.18	0.564s
Th-234	253.54	63.56	77.	92.	0.154	44.63	1.087s
Pb-214	298.54	74.81	55.	104.	0.174	28.09	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	177.25	0.294D
Pb-212	307.74	77.11	67.	174.	0.290	20.16	0.919D
Pb-214	307.74	77.11	170.	0.	0.000	448.50	0.223D
Pb-214	348.46	87.29	56.	68.	0.113	45.18	1.367s
Th-234	368.72	92.35	48.	48.	0.081	49.62	0.933D
Ac-228	380.72	95.35	32.	8.	0.013	210.12	0.935D
Ac-228	835.12	208.93	28.	29.	0.048	81.74	0.878
Pb-212	953.94	238.62	36.	213.	0.354	15.89	1.057D
Pb-214	967.37	241.98	31.	37.	0.061	54.58	1.060D
Ac-228	1078.69	269.81	6.	32.	0.054	45.48	0.397s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.06	295.14	10.	58.	0.097	32.35	0.701s
Ac-228	1311.39	327.96	7.	19.	0.032	68.49	0.496s
Ac-228	1353.30	338.44	7.	43.	0.071	37.34	0.395s
Pb-214	1407.42	351.97	7.	107.	0.178	22.26	1.151
Ac-228	1852.49	463.20	6.	26.	0.043	56.22	0.871s

Bi-214	2437.75	609.47	0.	68.	0.113	24.25	0.534s
CS-137	2647.93	662.00	0.	33.	0.055	34.82	0.375s
Bi-214	3070.67	767.64	2.	1.	0.002	447.21	0.187s
Ac-228	3179.00	794.72	6.	1.	0.002	636.96	0.000s
Ac-228	3644.78	911.11	0.	41.	0.068	31.23	0.869s
Bi-214	3737.50	934.28	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	3.	7.	0.012	95.46	1.595D
Ac-228	3876.86	969.11	3.	28.	0.047	41.74	1.598D
Bi-214	4482.64	1120.49	0.	18.	0.030	47.14	0.375s
Bi-214	4952.33	1237.85	0.	3.	0.005	115.47	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.61	1460.80	0.	36.	0.060	33.33	1.218s
Ac-228	6350.00	1587.07	0.	9.	0.015	66.67	0.250s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.

***** 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 microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1623E-04	609.31	3.162E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	4.9423E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	5.429E-04	(	5.857E-05	G
			338.32	5.000E-04	?(	5.112E-05	G
			964.60	4.585E-04	(	1.742E-04	G
			794.70	0.000E+00	%	2.514E-04	G
			463.00	1.000E-03	+	3.319E-04	G
			209.28	6.066E-04	?(	1.702E-04	G
			270.23	1.010E-03	+	2.884E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.307E-03	+	6.931E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	7.737E-04	+	3.147E-04	G
Pb-212	N 4.8870E-04	238.62	4.887E-04	(	2.078E-05	G K
		77.11	6.663E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	?	9.716E-05	Energy duplication
CS-137	8.9426E-05	661.66	8.943E-05	(	2.710E-06	G
Th-234	N 6.0283E-04	92.35	6.028E-04	(	1.282E-04	G
		63.29	1.759E-03	+	3.599E-04	G
Pb-214	N 3.8426E-04	351.92	3.951E-04	(	1.616E-05	G K

```
                          WI07-0117 D2 IS RCA 061407
                         295.21 3.633E-04  (  3.132E-05          G
                          77.11 0.000E+00 %   1.245E-04Energy duplication
                         241.98 5.053E-04 +   1.683E-04          G
                          74.81 1.163E-03 +   2.048E-04Energy duplication
                          87.30 9.867E-04 +   2.359E-04          X

Pb-210   N   6.5324E-04     46.50 6.532E-04  (  1.738E-04          G

AM-241       1.0845E-04     59.54 1.084E-04  (  1.787E-05          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

   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
```


ORTEC g v - i (63) wan32 G53W2.06 14-JUN-2007 11:08:24 Page   5
EnergySolutions   Spectrum name: WI000085.An1


```
   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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
               pCi/g          pCi/g        pCi/g

Bi-214        1.0665E+00    2.587E-01    2.617E-01
K-40    #     5.3457E+00    1.782E+00    1.793E+00
Ac-228        1.6669E+00    4.704E-01    4.745E-01
Pb-212        1.6482E+00    2.619E-01    2.691E-01
CS-137        3.0161E-01    1.050E-01    1.056E-01
Th-234        2.0332E+00    1.009E+00    1.010E+00
Pb-214        1.2960E+00    2.544E-01    2.590E-01
Pb-210        2.2032E+00    1.558E+00    1.559E+00
AM-241        3.6576E-01    1.653E-01    1.658E-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 (2.7 to 1999.3 keV) 1.5927024E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

BASELINE SAMPLE ANALYSIS RESULTS
Out Side RCA, Prior To Improving Road

Detector	Samples Number	Analysis Date	Am-241 Activity pCi/g	2 Sigma Error pCi/g	MDA	Description	Grid Location	RFP Analysis Results pCi/g
D-2	WI07-0010	6/10/2007	0.204	0.163		# 1		
D-2	WI07-0011	6/10/2007	0.313	0.140		# 2		
D-2	WI07-0012	6/10/2007	0.208	0.124		# 3		
D-2	WI07-0013	6/10/2007	0.880	0.224		# 4		
D-2	WI07-0014	6/10/2007	0.204	0.199		# 5		
D-2	WI07-0015	6/10/2007	<		0.049	# 6		
D-2	WI07-0016	6/10/2007	0.164	0.133		# 7		
D-2	WI07-0017	6/11/2007	0.396	0.230		# 8		
D-2	WI07-0018	6/11/2007	0.965	0.186		# 9		
D-2	WI07-0019	6/11/2007	2.992	0.362		# 10		
D-2	WI07-0020	6/11/2007	0.415	0.229		# 11		
D-2	WI07-0021	6/11/2007	<		0.102	# 12		

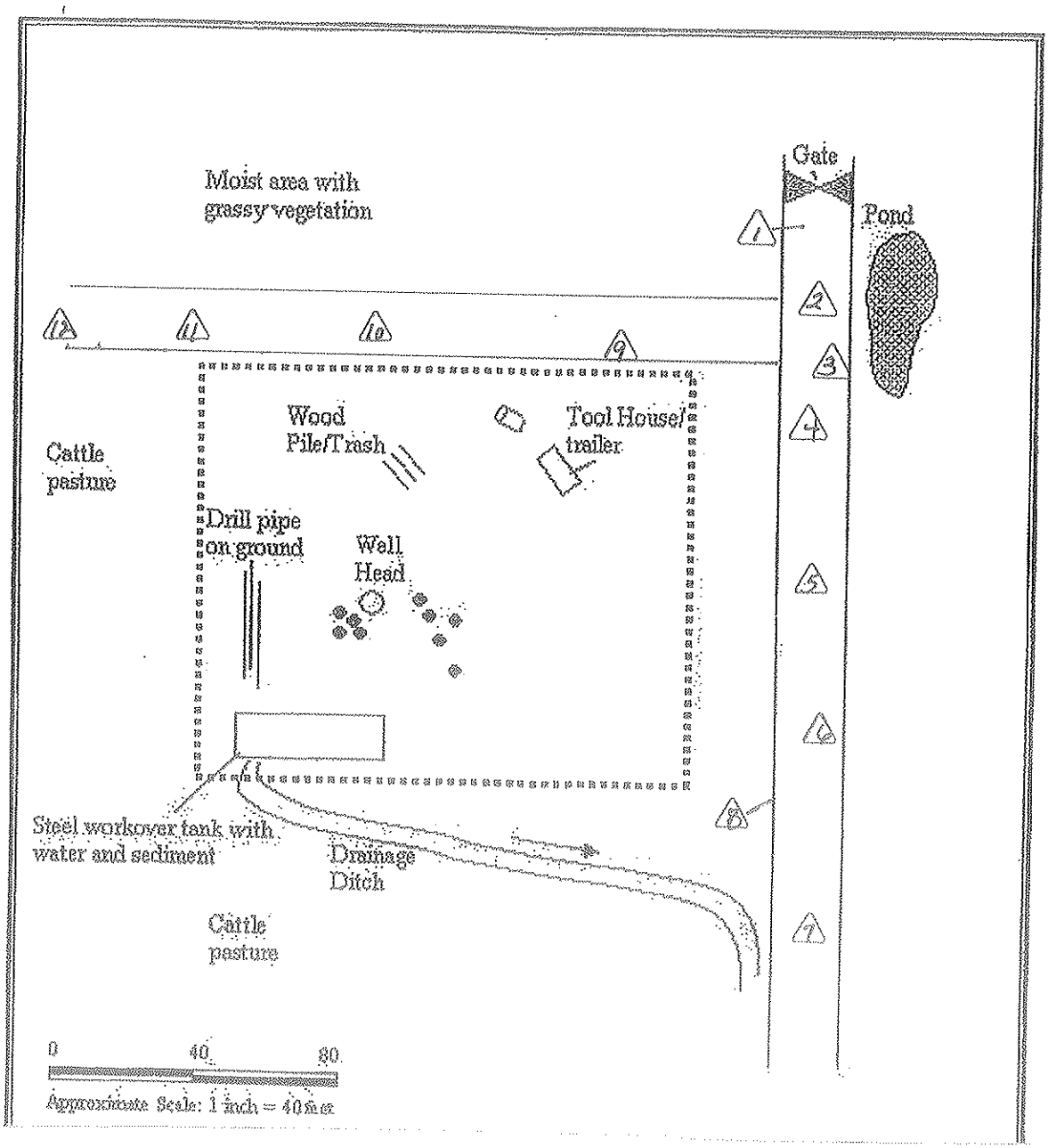
BASELINE SAMPLE ANALYSIS RESULTS
Out Side RCA

Detector	Samples Number	Analysis Date	Am-241 Activity pCi/g	2 Sigma Error pCi/g	MDA	Description	Grid Location	RFP Analysis Results pCi/g
D-2	WI07-0027	6/11/2007	<		0.039	# 1		
D-2	WI07-0028	6/11/2007	0.200	0.221		# 2		
D-2	WI07-0028 (QC)	6/11/2007	0.102	0.200		# 2		
D-2	WI07-0028 (Recount)	6/11/2007	0.180	0.155		# 2		
D-1	WI07-0029	6/11/2007	0.160	0.227		# 3		
D-2	WI07-0030	6/11/2007	<		0.045	# 4		
D-2	WI07-0031	6/11/2007	0.130	0.185		# 5		
D-1	WI07-0032	6/11/2007	0.111	0.185		# 6		
D-2	WI07-0033	6/11/2007	<		0.070	# 7		
D-1	WI07-0034	6/11/2007	0.176	0.207		# 8		
D-2	WI07-0035	6/11/2007	<		0.060	# 9		
D-1	WI07-0036	6/11/2007	<		0.047	# 10		
D-2	WI07-0037	6/11/2007	0.125	0.220		# 11		
D-1	WI07-0038	6/11/2007	0.438	0.244		# 12		
D-2	WI07-0038 (QC)	6/11/2007	0.631	0.249		# 12		
D-1	WI07-0038 (Recount)	6/11/2007	0.566	0.232		# 12		
D-1	WI07-0039	6/11/2007	12.582	1.046		# 13	Drainage Ditch	7.703 (Ditch 6)
D-2	WI07-0040	6/12/2007	0.250	0.197		# 14		
D-1	WI07-0041	6/13/2007	1.461	0.482		# 15		
D-2	WI07-0042	6/13/2007	0.126	0.245		# 16		
D-1	WI07-0043	6/13/2007	0.144	0.225		# 17		
D-2	WI07-0044	6/13/2007	0.160	0.218		# 18		
D-1	WI07-0045	6/13/2007	0.260	0.203		# 19		
D-2	WI07-0046	6/13/2007	0.468	0.566		# 20		
D-2	WI07-0046	6/13/2007	0.468	0.566		# 20		
D-1	WI07-0047	6/13/2007	0.872	0.354		# 21		
D-2	WI07-0048	6/13/2007	0.123	0.134		# 22		
D-1	WI07-0049	6/13/2007	<		0.052	# 23		
D-2	WI07-0050	6/13/2007	0.478	0.329		# 24		
D-1	WI07-0051	6/13/2007	1.855	0.393		# 25		
D-2	WI07-0052	6/13/2007	1.617	0.292		# 26		
D-1	WI07-0053	6/13/2007	0.446	0.281		# 27		

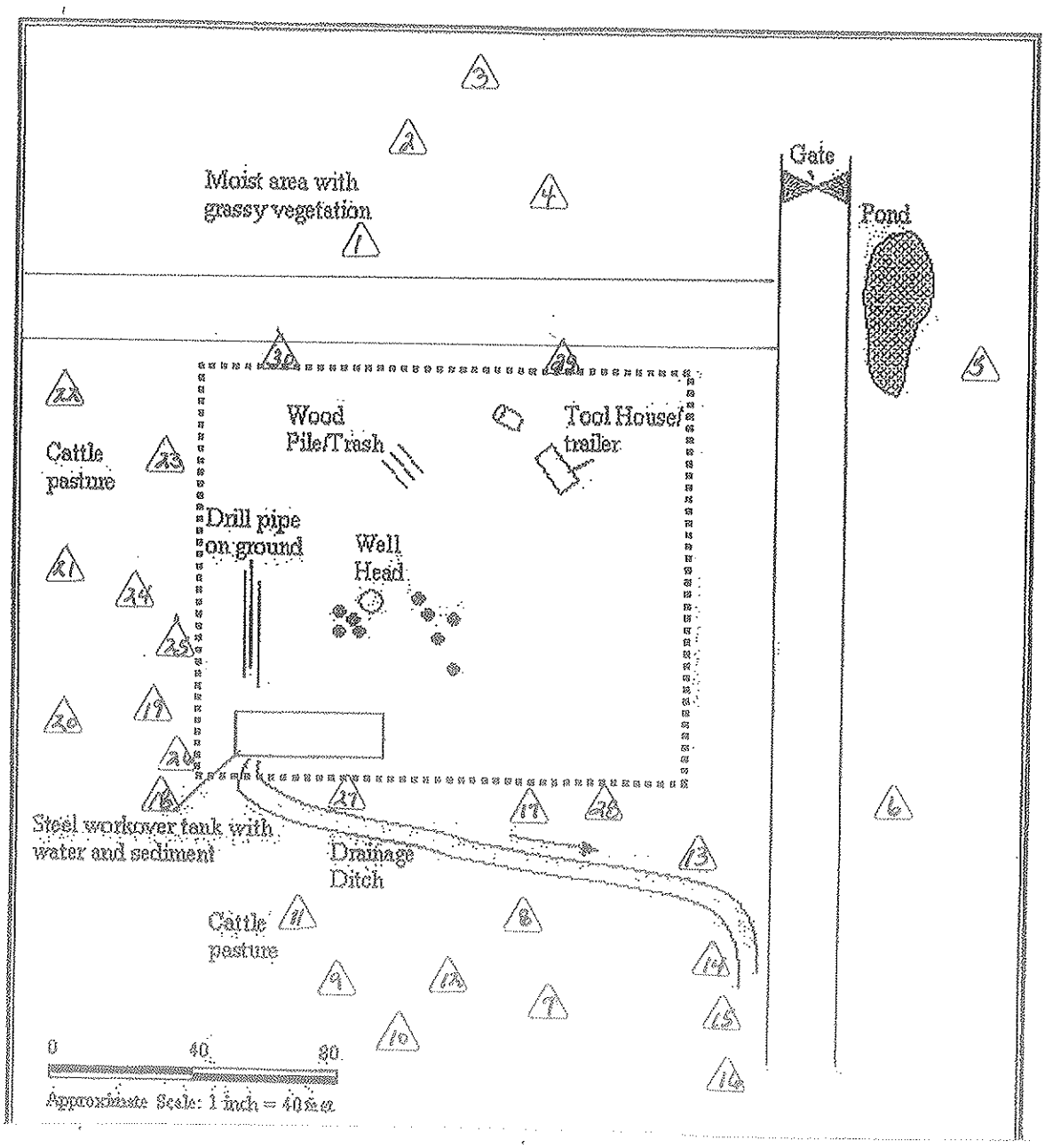
D-2	WI07-0054	6/13/2007	0.160	0.208	# 28
D-1	WI07-0055	6/13/2007	5.785	0.729	# 29
D-2	WI07-0055	6/13/2007	5.977	0.623	# 29
D-2	WI07-0056	6/13/2007	0.250	0.353	# 30

BASELINE SAMPLE ANALYSIS RESULTS
In Side RCA

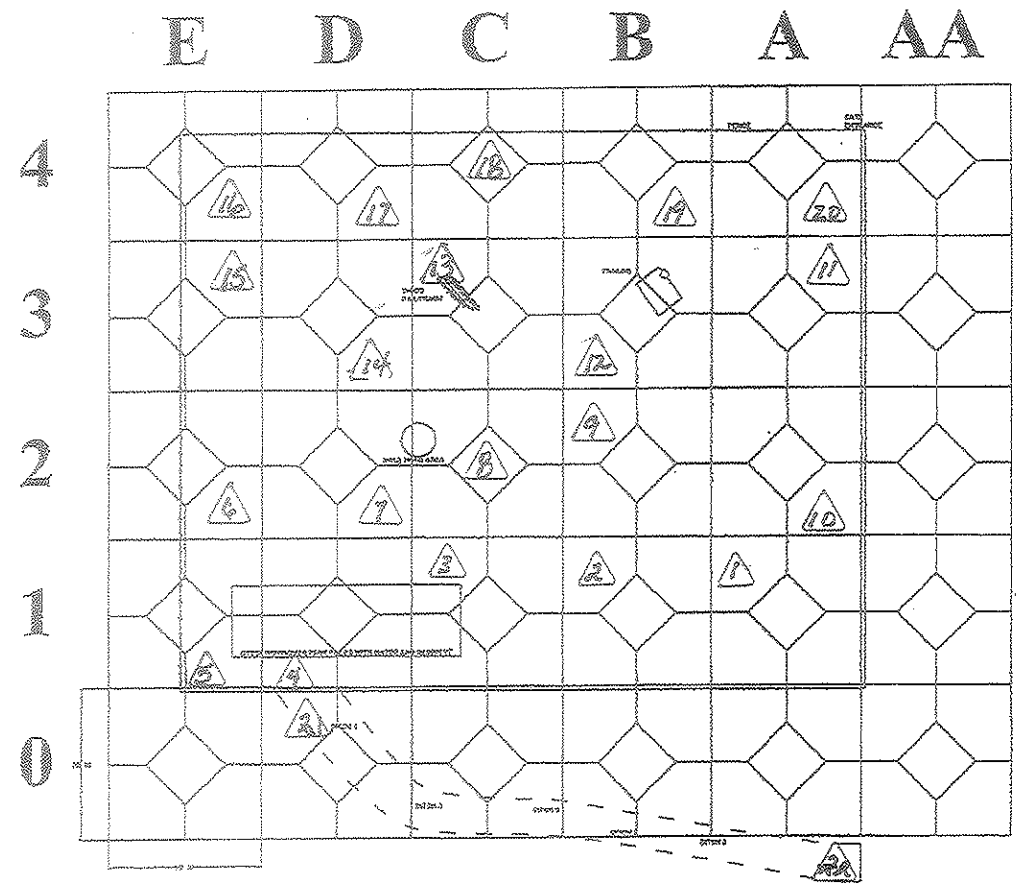
Detector	Samples Number	Analysis Date	Am-241 Activity pCi/g	2 Sigma Error pCi/g	MDA	Description	Grid Location	RFP Analysis Results pCi/g
D-2	WI07-0096	6/13/2007	**13.253**	0.947		# 1	A1-5	32.227
D-1	WI07-0097	6/13/2007	**30.177**	1.691		# 2	B1-5	37.41
D-2	WI07-0097	6/13/2007	**31.531**	1.598		# 2	B1-5	37.41
D-1	WI07-0098	6/13/2007	**20.982**	1.656		# 3	C1-5	18.288
D-2	WI07-0099	6/13/2007	**1095.200**	40.980		# 4	D1-2	15.206
D-1	WI07-0100	6/13/2007	1.872	0.612		# 5	E1-1	0.712
D-2	WI07-0101	6/13/2007	**12.698**	0.849		# 6	E2-1	0.194
D-1	WI07-0102	6/13/2007	2.354	0.665		# 7	D2-1	15.206
D-2	WI07-0103	6/13/2007	1.059	0.260		# 8	C2-3	50.643
D-1	WI07-0104	6/25/2007	**30.480**	1.666		# 9	B2-5	17.555
D-2	WI07-0104	6/25/2007	**32.212**	1.607		# 9	B2-5	17.555
D-1	WI07-0104 (QC)	6/25/2007	**26.780**	1.468		# 9	B2-5	17.555
D-2	WI07-0104 (QC)	6/25/2007	**26.844**	1.415		# 9	B2-5	17.555
D-1	WI07-0105	6/13/2007	0.217	0.322		# 10	A2-1	0.071
D-2	WI07-0106	6/13/2007	<		0.045	# 11	A3-4	0.26
D-2	WI07-0107	6/14/2007	3.780	0.432		# 12	B3-2	0.996
D-2	WI07-0108	6/14/2007	**75.030**	3.286		# 13	C3-5	2.115
D-1	WI07-0109	6/14/2007	**17.394**	1.078		# 14	D3-1	11.693
D-2	WI07-0110	6/14/2007	**25.533**	1.346		# 15	E3-4	6.501
D-1	WI07-0111	6/14/2007	1.626	0.358		# 16	E4-1	1.239
D-2	WI07-0112	6/14/2007	**9.732**	0.797		# 17	D4-1	2.567
D-1	WI07-0113	6/14/2007	0.365	0.261		# 18	C4-3	1.172
D-2	WI07-0113 (QC)	6/14/2007	0.577	0.279		# 18	C4-3	1.172
D-1	WI07-0114	6/14/2007	0.433	0.227		# 19	B4-1	0.54
D-2	WI07-0115	6/14/2007	0.540	0.246		# 20	A4-1	0.076
D-1	WI07-0116	6/14/2007	0.560	0.239		# 21	D0-5	35.100 (Ditch 1)
D-2	WI07-0117	6/14/2007	0.366	0.166		# 22	Draiage Ditch	7.703 (Ditch 6)

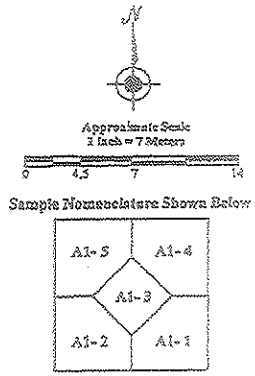


△ - indicates soil sample locations prior to road being put down.



△ - indicates soil sample locations at random outside areas





indicates Soil Sample locations taken in each grid.

Sample Location Map	Former D&G Operating Company Evans Unit 05779 Lease Chambers County Winnie, Texas
Date: August 2005	
Figure: 3	CORRIGAN CONSULTING, INC.

82A8008
Survey Cover Sheet

Survey No. WI07-0519

eyor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Carl Ingle
Sign

Sign

7/25/07
7/24/2007
Date

7/25/07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	L-2929	Meter Model #	L-2929	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.7	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	43	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

TION: External Surface of Bag # S-046
POSE: Contamination / Dose Rate

BAG # S-046

Contact D/R -- 13

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	<MDC	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	89.3	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	87.0	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0520

eyor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/25/07
7/24/2007
Date

7/25/07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	L-2929	Meter Model #	L-2929	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.7	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	43	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

ATION: External Surface of Bag # S-045
POSE: Contamination / Dose Rate

BAG # S- 045

Contact D/R – 12

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	<MDC	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	100.7	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	96.1	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0523

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/24/2007 — Date

7/25/07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/43-5	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	96784 / 127389	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	10.4	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.7	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Access to RCA
PURPOSE: Daily / Contamination

1 thru 4 - Floor boards
5 & 7 - Benches
8 & 10 - Storage boxes

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	107.99	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	<MDC	<MDC	N/A
4	N/A	<MDC	<MDC	N/A
5	N/A	103.42	<MDC	N/A
6	N/A	92.01	<MDC	N/A
7	N/A	117.12	15.27	N/A
8	N/A	80.59	16.56	N/A
9	N/A	78.31	<MDC	N/A
10	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0524

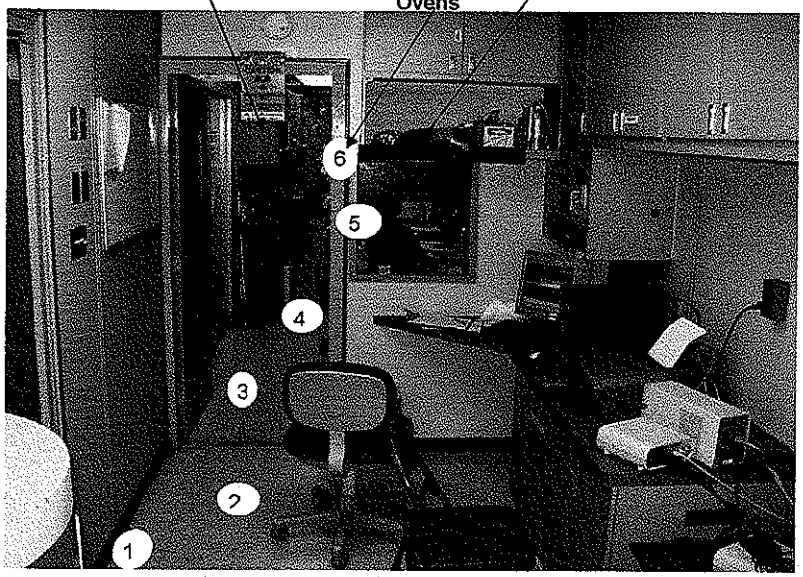
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/24/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/24/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Effiency (surface)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.7	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Energy Solutions Mobile Lab
PURPOSE: Daily - Contamination / Dose Rate



Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	<MDC	<MDC	5
2	N/A	78.3	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	85.2	<MDC	5
5	N/A	121.7	<MDC	5
6	N/A	85.2	<MDC	5

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0525

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/24/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/25/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/43-5	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	96784 / 127389	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	10.4	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.7	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Energy Solutions Office/Break Trail
PURPOSE: Daily / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	Floor inRSO Office	1	N/A	78.31	<MDC	N/A
2	UnderRSO desk	2	N/A	<MDC	<MDC	N/A
3	Floor in break area under south table	3	N/A	<MDC	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	85.16	<MDC	N/A
5	South table in break room	5	N/A	<MDC	<MDC	N/A
6	HP East desk (underneath)	6	N/A	87.44	<MDC	N/A
7	No. HP desk (on top)	7	N/A	<MDC	<MDC	N/A
8	HP office floor	8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level