```
                    WI07-0739   D2 Bag# S-099   Grid C2-2,3  073107
                              295.21 4.385E-04  (  4.085E-05          G
                               77.11 0.000E+00 ?   1.292E-04Energy duplication
                              241.98 5.315E-04  (  1.362E-04          G
                               74.81 1.297E-03 +   2.174E-04Energy duplication
                               87.30 8.755E-04 +   2.206E-04          X

Pb-210   N   3.6745E-04      46.50 3.674E-04 ?(  3.062E-04          G

AM-241       7.4603E-03      59.54 7.460E-03  (  5.788E-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  31-JUL-2007 16:21:39 Page    5
 4714781                          Spectrum name: Win00444.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	1.0188E+00	2.148E-01	2.182E-01
K-40 #	3.1081E+00	1.154E+00	1.160E+00
Ac-228	1.1549E+00	3.377E-01	3.404E-01
Pb-212	1.5238E+00	1.833E-01	1.920E-01
CS-137 #	5.9370E-02	3.958E-02	3.964E-02
Th-234	1.9655E+00	8.078E-01	8.091E-01
Pb-214	9.8165E-01	2.422E-01	2.450E-01
Pb-210 #C	8.9447E-01	1.557E+00	1.557E+00
AM-241	1.8160E+01	7.192E-01	9.845E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0739 D2 Bag# S-099 Grid C2-2,3 073107

< - 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) 2.8866982E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0740 D2 Bag# S-100 Grid C2-1,2 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:36:35 Page 1
4714781 Spectrum name: Win00445.An1

Sample description
WI07- 0740 D2 Bag S-100 Grid C2-1,2 073107

Spectrum Filename: C:\User\Win00445.An1

Acquisition information
Start time: 31-Jul-2007 16:26:25
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: 4.4950E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.4950E+02) = 2.2247E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:36:35 Page 2
4714781 Spectrum name: Win00445.An1

WI07-0740 D2 Bag# S-100 Grid C2-1,2 073107

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: 0.1735

********** 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	
14.48	3.81	3030.	19288.	32.147	1.84	2.108	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	97.	46.	0.076	78.20	0.783
AM-241	237.23	59.48	295.	2912.	4.853	4.31	0.953
Th-234	251.83	63.13	93.	49.	0.081	81.25	0.323s
Pb-214	298.54	74.81	82.	113.	0.188	29.47	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	259.37	0.617D
Pb-212	307.74	77.11	84.	174.	0.290	21.25	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	1723.14	0.348D
Pb-214	347.30	87.00	54.	78.	0.130	39.72	1.041
Th-234	370.54	92.81	75.	58.	0.097	61.73	1.505s
Ac-228	380.72	95.35	54.	0.	0.000	0.00	0.935
Ac-228	835.08	208.91	24.	37.	0.062	60.43	0.406s
Pb-212	953.94	238.62	17.	251.	0.419	13.45	1.057D
Pb-214	967.37	241.98	38.	45.	0.076	48.43	1.060D
Ac-228	1078.99	269.88	22.	32.	0.053	70.02	0.379s

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:36:35 Page 3
4714781 Spectrum name: Win00445.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.48	295.25	13.	88.	0.147	26.90	1.201
Ac-228	1308.40	327.22	11.	4.	0.007	254.95	0.184s
Ac-228	1352.68	338.29	12.	46.	0.078	40.86	1.351s
Pb-214	1406.59	351.76	20.	110.	0.183	26.35	1.454s
Ac-228	1851.74	463.02	5.	29.	0.048	48.45	0.496s

WI07-0740 D2 Bag# S-100 Grid C2-1,2 073107

Bi-214	2436.62	609.19	3.	88.	0.146	23.05	1.171
CS-137	2646.64	661.68	0.	16.	0.027	50.00	0.500s
Bi-214	3073.92	768.46	1.	6.	0.010	99.14	0.839s
Ac-228	3176.64	794.13	0.	11.	0.018	60.30	0.500s
Ac-228	3645.85	911.38	0.	69.	0.115	24.08	1.112s
Bi-214	3738.00	934.41	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	6.	5.	0.009	155.48	1.595D
Ac-228	3876.86	969.11	2.	36.	0.059	35.37	1.598D
Bi-214	4481.95	1120.31	0.	25.	0.042	40.00	0.604s
Bi-214	4953.11	1238.04	0.	11.	0.018	60.30	0.500s
Bi-214	5508.00	1376.69	0.	4.	0.007	100.00	0.250s
K-40	5844.38	1460.74	0.	63.	0.105	25.20	0.979s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7061.09	1764.73	0.	13.	0.022	55.47	0.333s

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	4.2235E-04	609.31	4.077E-04	(	1.456E-05	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	6.083E-04	+	1.847E-04	G
			1238.11	7.457E-04	+	3.537E-04	G
			768.36	3.040E-04	-	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	&(	1.082E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.7737E-03	1460.81	2.774E-03	?(	4.403E-05	G
Ac-228	N	7.3086E-04	911.07	7.599E-04	(	1.101E-05	G K
			969.11	6.919E-04	(	5.007E-05	G
			338.32	5.450E-04	-	1.333E-04	G
			964.60	3.249E-04	-	3.220E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	1.117E-03	+	3.415E-04	G
			209.28	7.829E-04	?(	1.576E-04	G
			270.23	9.946E-04	+	3.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:36:35 Page 4
4714781 Spectrum name: Win00445.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.108E-04	X
		327.64	0.000E+00	%	2.443E-04	G
Pb-212	N 6.0275E-04	238.62	5.771E-04	(	1.465E-05	G K
		77.11	6.664E-04	(	5.155E-05	Energy duplication
		74.81	0.000E+00	%	9.716E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 8.0761E-04	92.35	7.237E-04	*(	1.592E-04	G
		63.29	9.271E-04	(	2.700E-04	G
Pb-214	N 4.5709E-04	351.92	4.074E-04	(	2.535E-05	G K

```
                    WI07-0740   D2 Bag# S-100   Grid C2-1,2  073107
                              295.21 5.533E-04  (  3.482E-05          G
                               77.11 0.000E+00 %   1.207E-04Energy duplication
                              241.98 6.272E-04 +   1.852E-04          G
                               74.81 1.261E-03 +   2.261E-04Energy duplication
                               87.30 1.132E-03 +   2.431E-04          X

Pb-210   N   9.3563E-04      46.50 9.356E-04  (  2.950E-04          G

AM-241       5.9962E-03      59.54 5.996E-03  (  5.106E-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  31-JUL-2007 16:36:35 Page    5
4714781                                  Spectrum name: Win00445.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        9.3959E-01    2.166E-01    2.195E-01
K-40    #     6.1707E+00    1.555E+00    1.572E+00
Ac-228        1.6259E+00    3.882E-01    3.929E-01
Pb-212        1.3409E+00    1.686E-01    1.759E-01
CS-137  #     9.6459E-02    4.823E-02    4.837E-02
Th-234        1.7967E+00    9.167E-01    9.176E-01
Pb-214        1.0169E+00    1.914E-01    1.952E-01
Pb-210        2.0815E+00    1.628E+00    1.628E+00
AM-241        1.3340E+01    5.754E-01    7.582E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0740 D2 Bag# S-100 Grid C2-1,2 073107

< - 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) 2.8408482E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0741 D2 Bag# S-101 Grid C2-1,2 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:52:14 Page 1
4714781 Spectrum name: Win00446.An1

Sample description
WI07- 0741 D2 Bag S-101 Grid C2-1,2 073107

Spectrum Filename: C:\User\Win00446.An1

Acquisition information
Start time: 31-Jul-2007 16:42:03
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: 4.3360E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.3360E+02) = 2.3063E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:52:14 Page 2
4714781 Spectrum name: Win00446.An1

WI07-0741 D2 Bag# S-101 Grid C2-1,2 073107

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: 0.1268

********** 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
14.25	3.75	2460.	21706.	36.177	1.64	1.935	s
128.34	32.27	51.	125.	0.209	29.27	0.939 -	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	186.27	46.75	189.	22.	0.037	202.16	0.325s
AM-241	237.17	59.47	501.	5515.	9.192	3.14	0.853
Th-234	253.72	63.61	79.	51.	0.084	70.07	0.944s
Pb-214	298.54	74.81	92.	98.	0.164	34.11	0.917D
Pb-212	298.56	74.81	89.	0.	0.000	267.75	0.136D
Pb-212	307.74	77.11	83.	172.	0.287	21.35	0.919D
Pb-214	307.74	77.11	284.	0.	0.000	107.62	0.245D
Pb-214	347.83	87.13	68.	72.	0.121	48.47	0.565s
Th-234	368.72	92.35	70.	47.	0.078	58.59	0.933D
Ac-228	380.72	95.35	43.	6.	0.009	347.87	0.935D
Ac-228	838.01	209.65	16.	46.	0.077	45.88	0.333s
Pb-212	953.94	238.62	17.	252.	0.419	13.46	1.057D
Pb-214	967.37	241.98	28.	47.	0.079	42.65	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:52:14 Page 3
4714781 Spectrum name: Win00446.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.07	269.90	19.	20.	0.033	99.58	1.000
Pb-214	1180.45	295.24	5.	63.	0.106	28.05	0.694s
Ac-228	1310.96	327.86	7.	34.	0.056	48.95	0.973s
Ac-228	1352.30	338.19	12.	56.	0.093	36.42	1.102
Pb-214	1407.00	351.86	7.	94.	0.157	23.05	1.054

WI07-0741 D2 Bag# S-101 Grid C2-1,2 073107

Ac-228	1851.40	462.93	3.	21.	0.036	52.29	0.319s
Bi-214	2437.14	609.32	7.	65.	0.108	28.92	1.664s
CS-137	2647.44	661.88	0.	25.	0.042	40.00	0.812s
Bi-214	3073.38	768.32	0.	13.	0.022	55.47	0.312s
Ac-228	3171.92	792.95	2.	3.	0.005	182.62	0.234s
Ac-228	3642.48	910.54	32.	2.	0.004	821.38	0.205s
Bi-214	3737.50	934.28	0.	8.	0.013	70.71	0.750s
Ac-228	3858.81	964.60	1.	4.	0.006	140.43	1.595D
Ac-228	3876.86	969.11	2.	37.	0.061	34.88	1.598D
Bi-214	4480.82	1120.03	3.	20.	0.034	55.24	0.708s
Bi-214	4951.67	1237.68	2.	0.	0.001	368.18	0.210s
Bi-214	5510.50	1377.32	0.	9.	0.015	66.67	0.375s
K-40	5844.76	1460.84	0.	62.	0.103	25.40	1.109s
Ac-228	6355.50	1588.45	0.	2.	0.003	141.42	0.500s
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	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	3.0228E-04	609.31	3.023E-04	(	1.988E-05	G K
			1764.49	0.000E+00	?	1.068E-04	G
			1120.29	4.907E-04	+	1.776E-04	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.737E-04	+	5.163E-04	G
			934.06	7.773E-04	+	4.403E-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	%	9.781E-05	G K
			969.11	7.147E-04		1.815E-04	G
			338.32	6.563E-04	?	1.427E-04	G
			964.60	2.224E-04		2.285E-04	G
			794.70	1.862E-04	&	2.176E-04	G
			463.00	8.315E-04	?	2.902E-04	G
			209.28	9.769E-04		2.464E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:52:14 Page 4
4714781 Spectrum name: Win00446.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.248E-04		2.920E-04	G
		1588.00	2.905E-04	?	3.720E-04	G
		95.35	0.000E+00	%	2.006E-04	X
		327.64	1.371E-03	*	3.897E-04	G
Pb-212	N 6.0132E-04	238.62	5.780E-04	(	1.479E-05	G K
		77.11	6.591E-04	(	5.123E-05	Energy duplication
		74.81	0.000E+00	%	8.980E-05	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 7.4063E-04	92.35	5.829E-04	(	1.543E-04	G
		63.29	9.652E-04	*(	2.497E-04	G

WI07-0741 D2 Bag# S-101 Grid C2-1,2 073107

Pb-214	N	3.6469E-04	351.92	3.481E-04	(	1.583E-05	G K	
			295.21	3.967E-04	(	2.252E-05	G	
			77.11	0.000E+00	?	1.597E-04	Energy duplication	
			241.98	6.565E-04	+	1.764E-04	G	
			74.81	1.098E-03	+	2.232E-04	Energy duplication	
			87.30	1.052E-03	+	2.502E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	4.297E-04	G	
AM-241		1.1356E-02	59.54	1.136E-02	(	6.622E-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 31-JUL-2007 16:52:14 Page 5
4714781 Spectrum name: Win00446.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		6.9714E-01	2.016E-01	2.033E-01
K-40	#	6.2955E+00	1.599E+00	1.616E+00
Ac-228	B<	2.2558E-01		
Pb-212		1.3868E+00	1.750E-01	1.826E-01
CS-137	#	1.5624E-01	6.250E-02	6.278E-02
Th-234		1.7081E+00	7.801E-01	7.811E-01
Pb-214		8.4107E-01	1.527E-01	1.559E-01
Pb-210	<	9.9097E-01		
AM-241		2.6190E+01	8.236E-01	1.272E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0741 D2 Bag# S-101 Grid C2-1,2 073107

& - 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) 3.7275215E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0742 D2 Bag# S-102 Grid C2-1,2 073107

Sample description
WI07- 0742 D2 Bag S-102 Grid C2-1,2 073107

Spectrum Filename: C:\User\Win00447.An1

Acquisition information
Start time: 31-Jul-2007 17:04:48
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: 4.0450E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0450E+02) = 2.4722E+03
Detection limit method: Traditional ORTEC method

WI07-0742 D2 Bag# S-102 Grid C2-1,2 073107

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: 0.1149

********** 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	
11.60	2.92	5987.	10585.	17.642	2.84	0.854	-	D
15.76	3.96	13178.	8739.	14.566	4.29	0.855	-	D
104.90	26.41	33.	85.	0.142	34.66	0.854	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	177.02	44.43	237.	41.	0.068	148.43	0.256s
AM-241	237.28	59.50	400.	4518.	7.530	3.42	0.915
Th-234	252.03	63.18	91.	43.	0.072	91.25	0.515s
Pb-214	298.54	74.81	80.	108.	0.180	30.29	0.917D
Pb-212	298.56	74.81	102.	0.	0.000	959.17	0.219D
Pb-212	307.74	77.11	69.	171.	0.285	20.59	0.919D
Pb-214	307.74	77.11	143.	0.	0.000	247.44	0.472D
Pb-214	348.04	87.18	44.	52.	0.087	52.17	1.389s
Th-234	368.72	92.35	62.	61.	0.101	44.71	0.933D
Ac-228	380.72	95.35	34.	9.	0.015	191.09	0.935D
Ac-228	836.55	209.28	28.	46.	0.078	55.29	0.512s
Pb-212	953.94	238.62	23.	205.	0.341	15.48	1.057D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:14:58 Page 3
4714781 Spectrum name: Win00447.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	40.	45.	0.075	49.60	1.060D
Ac-228	1079.80	270.08	7.	54.	0.091	33.58	1.281s
Pb-214	1179.14	294.91	9.	81.	0.135	26.71	1.247s
Ac-228	1310.51	327.74	16.	26.	0.044	73.37	0.398s
Ac-228	1351.90	338.09	6.	54.	0.091	31.80	0.934

WI07-0742 D2 Bag# S-102 Grid C2-1,2 073107

Pb-214	1407.47	351.98	14.	119.	0.198	22.15	1.199
Ac-228	1849.15	462.37	3.	21.	0.035	56.00	0.483s
Bi-214	2436.93	609.27	0.	73.	0.122	23.41	0.900s
CS-137	2646.09	661.54	2.	11.	0.018	74.97	0.345s
Bi-214	3068.33	767.06	0.	11.	0.018	60.30	0.375s
Ac-228	3177.20	794.27	0.	9.	0.015	66.67	0.250s
Ac-228	3645.18	911.21	0.	51.	0.085	28.01	0.655s
Bi-214	3737.00	934.16	0.	5.	0.008	89.44	0.750s
Ac-228	3858.81	964.60	2.	11.	0.019	67.17	1.595D
Ac-228	3876.86	969.11	2.	34.	0.057	36.07	1.598D
Bi-214	4482.12	1120.36	0.	18.	0.030	47.14	0.583s
Bi-214	4952.50	1237.89	0.	8.	0.013	70.71	0.500s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5845.20	1460.94	0.	41.	0.068	31.23	0.737s
Ac-228	6349.87	1587.04	1.	1.	0.001	388.73	0.227s
Bi-214	7056.00	1763.46	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	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.8102E-04	609.31	3.395E-04	(	4.650E-06	G K
			1764.49	4.270E-04	&(	3.558E-05	G
			1120.29	4.380E-04	?(	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-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	%	2.164E-04	G
			934.06	4.858E-04	?(	9.716E-05	G
K-40	N	1.8051E-03	1460.81	1.805E-03	(	4.403E-05	G
Ac-228	N	6.2231E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	6.626E-04	(	4.855E-05	G
			338.32	6.387E-04	(	4.852E-05	G
			964.60	7.027E-04	(	1.461E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	8.120E-04	&(	1.195E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:14:58 Page 4
4714781 Spectrum name: Win00447.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.839E-04	+	2.699E-04	G
		270.23	1.698E-03	+	3.611E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	1.767E-04	-	1.885E-04	X
		327.64	1.066E-03	+	3.942E-04	G
Pb-212	N 4.7057E-04	238.62	4.706E-04	(	1.686E-05	G K
		77.11	6.538E-04	+	8.581E-05	Energy duplication
		74.81	0.000E+00	%	9.581E-05	Energy duplication
CS-137	2.9809E-05	661.66	2.981E-05	?(	6.942E-06	G
Th-234	N 7.8669E-04	92.35	7.594E-04	(	1.455E-04	G
		63.29	8.255E-04	$(	2.662E-04	G

WI07-0742 D2 Bag# S-102 Grid C2-1,2 073107

Pb-214	N	4.6303E-04	351.92	4.401E-04	(	2.165E-05		G K
			295.21	5.074E-04	*(	2.989E-05		G
			77.11	0.000E+00	%	1.143E-04	Energy	duplication
			241.98	6.231E-04	+	1.873E-04		G
			74.81	1.206E-03	+	2.221E-04	Energy	duplication
			87.30	7.546E-04	+	2.085E-04		X
Pb-210	N	8.3016E-04	46.50	8.302E-04	&(	4.551E-04		G
AM-241		9.3032E-03	59.54	9.303E-03	(	5.928E-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 31-JUL-2007 17:14:58 Page 5
4714781 Spectrum name: Win00447.Anl

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	9.4195E-01	2.205E-01	2.233E-01
K-40	4.4626E+00	1.394E+00	1.404E+00
Ac-228	1.5385E+00	3.160E-01	3.212E-01
Pb-212	1.1633E+00	1.801E-01	1.853E-01
CS-137 #	7.3693E-02	5.524E-02	5.532E-02
Th-234	1.9448E+00	8.695E-01	8.707E-01
Pb-214	1.1447E+00	1.986E-01	2.032E-01
Pb-210 #	2.0523E+00	3.046E+00	3.047E+00
AM-241	2.2999E+01	7.876E-01	1.160E+00

- All peaks for activity calculation had bad shape.

WI07-0742 D2 Bag# S-102 Grid C2-1,2 073107

* - 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) 3.6321163E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0770 D2 Bag# S-103 Grid B1-4,5 080107

Sample description
WI07-0770 D2 Bag # S-103 Grid B1-4,5 080107

Spectrum Filename: C:\User\Win00468.An1

Acquisition information
Start time: 01-Aug-2007 15:23:29
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: 3.9810E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9810E+02) = 2.5119E+03
Detection limit method: Traditional ORTEC method

WI07-0770 D2 Bag# S-103 Grid B2-2 080107

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: 0.1506

********** 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	4398.	25536.	42.560	1.63	2.164	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	184.63	46.34	50.	30.	0.050	90.90	0.393s
AM-241	237.66	59.59	80.	681.	1.135	9.10	0.831
Th-234	251.86	63.14	37.	34.	0.057	71.88	0.892
Pb-214	298.54	74.81	54.	73.	0.122	36.66	0.917D
Pb-212	298.56	74.81	71.	0.	0.000	178.43	0.663D
Pb-212	307.74	77.11	39.	121.	0.202	23.33	0.919D
Pb-214	307.74	77.11	200.	0.	0.000	91.47	0.000D
Pb-214	346.97	86.91	40.	46.	0.077	59.30	0.804
Th-234	368.72	92.35	52.	53.	0.088	47.69	0.933D
Ac-228	380.72	95.35	30.	5.	0.009	294.27	0.935D
Ac-228	836.81	209.35	7.	43.	0.072	40.15	0.375s
Pb-212	953.94	238.62	18.	136.	0.227	19.19	1.057D
Pb-214	967.37	241.98	25.	20.	0.034	82.75	1.060D
Ac-228	1079.81	270.08	7.	20.	0.033	65.83	0.976

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.80	295.33	7.	62.	0.103	31.19	0.571s
Ac-228	1313.57	328.51	2.	11.	0.019	72.45	0.286s
Ac-228	1353.08	338.39	0.	44.	0.073	30.15	0.900
Pb-214	1406.94	351.85	5.	71.	0.118	26.50	1.059s
Ac-228	1845.58	461.48	8.	22.	0.037	69.01	0.444s

WI07-0770 D2 Bag# S-103 Grid B2-2 080107

Bi-214	2436.83	609.24	0.	60.	0.100	25.82	0.513s
CS-137	2646.33	661.60	0.	11.	0.018	60.30	0.625s
Bi-214	3074.00	768.48	2.	0.	0.001	368.18	0.000s
Ac-228	3181.25	795.28	0.	8.	0.013	70.71	0.375s
Ac-228	3646.37	911.51	0.	35.	0.058	33.81	0.862s
Bi-214	3736.00	933.91	0.	5.	0.008	89.44	0.500s
Ac-228	3858.81	964.60	1.	9.	0.014	78.02	1.595D
Ac-228	3876.86	969.11	6.	20.	0.033	57.77	1.598D
Bi-214	4484.20	1120.87	0.	10.	0.017	63.25	0.292s
Bi-214	4952.00	1237.77	0.	2.	0.003	141.42	0.250s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5845.77	1461.09	0.	48.	0.080	28.87	1.000s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.46	1765.07	0.	14.	0.023	53.45	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	2.7025E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	1.356E-04	-	1.737E-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	%	2.164E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.1133E-03	1460.81	2.113E-03	(	4.403E-05	G
Ac-228	N	4.3625E-04	911.07	3.855E-04	(	1.101E-05	G K
			969.11	3.821E-04	(	7.942E-05	G
			338.32	5.157E-04	(	1.172E-05	G
			964.60	5.333E-04	(	1.373E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	8.705E-04	&	3.220E-04	G
			209.28	9.099E-04	+	2.224E-04	G
			270.23	6.248E-04	?(	1.336E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:33:41 Page 4
4714781 Spectrum name: Win00468.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.711E-04	X
		327.64	4.547E-04	&(	1.010E-04	G
Pb-212	N 3.1364E-04	238.62	3.136E-04	(	1.480E-05	G K
		77.11	4.637E-04	+	7.050E-05	Energy duplication
		74.81	0.000E+00	?	8.049E-05	Energy duplication
CS-137	2.9809E-05	661.66	2.981E-05	?(	2.710E-06	G
Th-234	N 6.5416E-04	92.35	6.565E-04	(	1.341E-04	G
		63.29	6.509E-04	(	1.733E-04	G
Pb-214	N 2.6569E-04	351.92	2.630E-04	(	1.371E-05	G K

```
                    WI07-0770   D2 Bag# S-103   Grid B2-2  080107
                            295.21 3.884E-04 +   7.679E-05          G
                             77.11 0.000E+00 ?   1.346E-04Energy duplication
                            241.98 2.792E-04  (  1.045E-04          G
                             74.81 8.185E-04 +   1.835E-04Energy duplication
                             87.30 6.675E-04 +   1.977E-04          X

Pb-210   N   6.1582E-04      46.50 6.158E-04  (  2.143E-04          G

AM-241       1.4023E-03      59.54 1.402E-03  (  2.710E-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:                        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  01-AUG-2007 15:33:41 Page    5
4714781                          Spectrum name: Win00468.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	6.7884E-01	1.753E-01	1.771E-01
K-40	5.3085E+00	1.532E+00	1.545E+00
Ac-228	1.0958E+00	2.527E-01	2.560E-01
Pb-212	7.8784E-01	1.512E-01	1.541E-01
CS-137 #	7.4878E-02	4.515E-02	4.524E-02
Th-234	1.6432E+00	7.088E-01	7.098E-01
Pb-214	6.6739E-01	1.769E-01	1.786E-01
Pb-210	1.5469E+00	1.406E+00	1.407E+00
AM-241	3.5224E+00	3.207E-01	3.462E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0770 D2 Bag# S-103 Grid B2-2 080107

< - 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) 1.5325832E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0771 D2 Bag# S-104 Grid E1-4,5 0801207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:14:59 Page 1
4714781 Spectrum name: Win00471.An1

Sample description
WI07- 0771 Bag # S-104 Grid E1-4,5 080207

Spectrum Filename: C:\User\Win00471.An1

Acquisition information
Start time: 02-Aug-2007 07:04:49
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: 3.6870E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6870E+02) = 2.7122E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:14:59 Page 2
4714781 Spectrum name: Win00471.An1

WI07-0771 D2 Bag# S-104 Grid E1-4,5 0801207

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: 0.1328

********** 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	5270.	11610.	19.351	2.56	0.854	-	D
17.79	4.40	14411.	9261.	15.436	4.21	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	184.65	46.34	54.	63.	0.105	51.98	1.049s
AM-241	237.50	59.55	59.	226.	0.377	17.51	0.701
Th-234	252.33	63.26	88.	67.	0.112	59.84	1.358s
Pb-214	298.54	74.81	90.	112.	0.186	30.62	0.917D
Pb-212	298.56	74.81	160.	0.	0.000	775.40	0.255D
Pb-212	307.74	77.11	106.	200.	0.333	20.31	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	379.77	0.907D
Pb-214	347.16	86.96	43.	52.	0.086	50.06	0.535s
Th-234	368.72	92.35	79.	39.	0.065	71.48	0.933D
Ac-228	380.72	95.35	35.	5.	0.008	352.66	0.935D
Ac-228	837.64	209.56	24.	30.	0.050	72.42	0.735s
Pb-212	953.94	238.62	29.	255.	0.425	13.87	1.057D
Pb-214	967.37	241.98	35.	41.	0.068	51.29	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:14:59 Page 3
4714781 Spectrum name: Win00471.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.39	269.98	10.	25.	0.042	59.33	0.540s
Pb-214	1180.82	295.33	8.	84.	0.140	25.35	1.338s
Ac-228	1310.63	327.78	7.	28.	0.047	55.10	1.019s
Ac-228	1352.90	338.34	12.	62.	0.104	36.07	0.831s
Pb-214	1407.01	351.86	2.	114.	0.191	19.39	1.416s

WI07-0771 D2 Bag# S-104 Grid E1-4,5 0801207

Ac-228	1843.67	461.00	0.	17.	0.028	48.51	0.375s
Bi-214	2437.09	609.31	0.	91.	0.152	20.97	1.500
CS-137	2647.84	661.97	2.	24.	0.039	48.33	0.426s
Bi-214	3072.00	767.98	0.	12.	0.020	57.74	0.375s
Ac-228	3171.00	792.72	0.	9.	0.015	66.67	0.375s
Ac-228	3646.20	911.47	0.	50.	0.083	28.28	0.916s
Bi-214	3738.50	934.53	0.	10.	0.017	63.25	0.312s
Ac-228	3858.81	964.60	0.	16.	0.026	52.18	1.595D
Ac-228	3876.86	969.11	0.	32.	0.054	35.26	1.598D
Bi-214	4479.93	1119.81	0.	15.	0.025	51.64	0.375s
Bi-214	4949.96	1237.26	1.	4.	0.006	142.00	0.242s
Bi-214	5514.00	1378.19	3.	1.	0.002	529.15	0.255s
K-40	5845.72	1461.08	0.	50.	0.083	28.28	0.750s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.91	1764.44	0.	13.	0.022	55.47	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1987E-04	609.31	4.232E-04	(	4.650E-06	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	2.486E-04	-	2.509E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	3.649E-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	6.1799E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	6.247E-04	(	1.942E-05	G
			338.32	7.325E-04	(	6.475E-05	G
			964.60	9.597E-04	+	3.814E-04	G
			794.70	5.292E-04	&(	5.880E-05	G
			463.00	6.626E-04	&(	3.898E-05	G
			209.28	6.348E-04	*(	1.576E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:14:59 Page 4
4714781 Spectrum name: Win00471.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.811E-04	(	1.562E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	1.140E-03	+	3.617E-04	G
Pb-212	N 5.8628E-04	238.62	5.863E-04	(	1.866E-05	G K
		77.11	7.653E-04	+	9.664E-05	Energy duplication
		74.81	0.000E+00	%	1.191E-04	Energy duplication
CS-137	6.3682E-05	661.66	6.368E-05	(	7.564E-06	G
Th-234	N 8.1559E-04	92.35	4.897E-04	(	1.629E-04	G
		63.29	1.280E-03	*(	2.622E-04	G

```
                    WI07-0771   D2 Bag# S-104   Grid E1-4,5  0801207
Pb-214   N   4.7163E-04    351.92 4.241E-04  (  1.034E-05          G K
                           295.21 5.262E-04  (  2.838E-05          G
                            77.11 0.000E+00 %   1.363E-04Energy duplication
                           241.98 5.679E-04  (  1.227E-04          G
                            74.81 1.246E-03 +   2.300E-04Energy duplication
                            87.30 7.497E-04 +   2.074E-04          X

Pb-210   N   1.2895E-03     46.50 1.289E-03 *(  2.223E-04          G

AM-241       4.6605E-04     59.54 4.661E-04  (  2.336E-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  02-AUG-2007 07:14:59 Page    5
4714781                              Spectrum name: Win00471.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        1.1388E+00    2.388E-01    2.425E-01
K-40          5.9707E+00    1.689E+00    1.704E+00
Ac-228        1.6761E+00    3.292E-01    3.352E-01
Pb-212        1.5901E+00    2.205E-01    2.284E-01
CS-137        1.7272E-01    8.348E-02    8.374E-02
Th-234        2.2121E+00    1.031E+00    1.032E+00
Pb-214        1.2792E+00    2.481E-01    2.526E-01
Pb-210 #      3.4973E+00    1.818E+00    1.820E+00
AM-241        1.2640E+00    2.213E-01    2.262E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0771 D2 Bag# S-104 Grid E1-4,5 0801207

& - 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) 1.8801056E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0772 D2 Bag# S-105 Grid B1-1 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:43:08 Page 1
4714781 Spectrum name: Win00472.An1

Sample description
WI07- 0772 Bag # S-105 Grid B1-1 080207

Spectrum Filename: C:\User\Win00472.An1

Acquisition information
Start time: 02-Aug-2007 07:31:45
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: 3.7740E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7740E+02) = 2.6497E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:43:08 Page 2
4714781 Spectrum name: Win00472.An1

WI07-0772 D2 Bag# S-105 Grid B1-1 080207

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: 0.0824

********** 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	5536.	7667.	12.778	3.57	0.854	-	D
15.84	3.94	11629.	7420.	12.366	4.72	0.855	-	D
279.95	70.16	46.	41.	0.068	65.26	0.541	GD-153	s
358.48	89.80	58.	52.	0.086	49.98	0.930	PB-214	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	184.50	46.31	40.	37.	0.062	73.26	0.762s
AM-241	237.50	59.55	102.	208.	0.346	24.84	1.019
Th-234	253.06	63.44	54.	68.	0.113	45.62	0.894s
Pb-214	298.54	74.81	99.	92.	0.154	36.84	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	301.43	0.322D
Pb-212	307.74	77.11	85.	178.	0.296	20.98	0.919D
Pb-214	307.74	77.11	298.	0.	0.000	88.71	0.256D
Pb-214	348.51	87.30	65.	47.	0.079	56.31	0.928D
Th-234	368.72	92.35	75.	39.	0.065	70.57	0.933D
Ac-228	380.72	95.35	25.	11.	0.018	147.82	0.935D
Ac-228	836.12	209.18	23.	39.	0.064	55.82	0.857

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 07:43:08 Page 3
4714781 Spectrum name: Win00472.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	40.	229.	0.381	15.38	1.057D
Pb-214	967.37	241.98	34.	36.	0.060	56.33	1.060D
Ac-228	1078.91	269.86	22.	45.	0.075	54.01	0.437s
Pb-214	1180.37	295.22	14.	62.	0.103	33.63	0.862
Ac-228	1310.50	327.74	5.	21.	0.035	55.80	0.743s

WI07-0772 D2 Bag# S-105 Grid B1-1 080207

Ac-228	1352.34	338.20	13.	58.	0.096	37.26	0.464s
Pb-214	1407.60	352.01	13.	95.	0.158	25.31	0.935
Ac-228	1854.46	463.69	4.	30.	0.050	46.26	0.388s
Bi-214	2436.85	609.25	0.	85.	0.142	21.69	1.226s
CS-137	2646.18	661.56	0.	17.	0.028	48.51	0.417s
Bi-214	3073.50	768.35	1.	1.	0.001	339.93	0.417s
Ac-228	3180.53	795.10	0.	19.	0.032	45.88	0.416s
Ac-228	3645.24	911.23	0.	54.	0.090	27.22	0.750s
Bi-214	3738.67	934.58	2.	2.	0.003	244.95	0.307s
Ac-228	3858.81	964.60	5.	8.	0.013	107.53	1.595D
Ac-228	3876.86	969.11	4.	29.	0.049	41.64	1.598D
Bi-214	4480.24	1119.88	0.	23.	0.038	41.70	0.417s
Bi-214	4952.67	1237.93	4.	2.	0.003	470.74	0.174s
Bi-214	5509.00	1376.94	0.	4.	0.007	100.00	0.250s
K-40	5845.57	1461.04	0.	42.	0.070	30.86	0.500s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.77	1764.40	0.	13.	0.022	55.47	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1367E-04	609.31	3.953E-04	@(	4.650E-06	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	5.596E-04	+	1.776E-04	G
			1238.11	0.000E+00	%	2.712E-04	G
			768.36	0.000E+00	%	1.335E-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	%	3.277E-04	G
K-40	N	1.8492E-03	1460.81	1.849E-03	(	4.403E-05	G
Ac-228	N	5.9302E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	5.661E-04	(	6.441E-05	G
			338.32	6.758E-04	(	6.666E-05	G
			964.60	4.883E-04	(	2.302E-04	G
			794.70	1.117E-03	+	3.930E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	1.176E-03	&	3.415E-04	G
		209.28	8.182E-04	+	2.464E-04	G
		270.23	1.406E-03	+	3.776E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.042E-04	-	1.734E-04	X
		327.64	8.552E-04	+	3.147E-04	G
Pb-212	N 5.2562E-04	238.62	5.256E-04	(	2.181E-05	G K
		77.11	6.810E-04	+	8.974E-05	Energy duplication
		74.81	0.000E+00	%	8.939E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 8.1876E-04	92.35	4.862E-04	(	1.592E-04	G

```
                    WI07-0772   D2 Bag# S-105   Grid B1-1  080207
                                 63.29 1.292E-03 *(  2.080E-04          G

Pb-214   N   3.6347E-04     351.92 3.506E-04  (  2.107E-05          G K
                            295.21 3.884E-04  (  3.643E-05          G
                             77.11 0.000E+00 ?   1.635E-04Energy duplication
                            241.98 5.002E-04 +   1.707E-04          G
                             74.81 1.031E-03 +   2.238E-04Energy duplication
                             87.30 6.853E-04 +   2.246E-04          X

Pb-210   N   7.5531E-04      46.50 7.553E-04 *(  1.931E-04          G

AM-241       4.2727E-04      59.54 4.273E-04  (  3.039E-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  02-AUG-2007 07:43:08 Page    5
4714781                              Spectrum name: Win00472.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 #     1.0961E+00     2.378E-01    2.413E-01
K-40         4.8998E+00     1.512E+00    1.523E+00
Ac-228       1.5713E+00     4.277E-01    4.317E-01
Pb-212       1.3928E+00     2.142E-01    2.205E-01
CS-137 #     1.2207E-01     5.921E-02    5.939E-02
Th-234       2.1695E+00     9.115E-01    9.129E-01
Pb-214       9.6310E-01     2.027E-01    2.059E-01
Pb-210 #     2.0014E+00     1.466E+00    1.467E+00
AM-241       1.1321E+00     2.812E-01    2.843E-01
```

WI07-0772 D2 Bag# S-105 Grid B1-1 080207

- 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) 1.5348083E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0773 D2 Bag# S-106 Grid B1-2 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 08:31:41 Page 1
4714781 Spectrum name: Win00473.An1

Sample description
WI07- 0773 Bag # S-106 Grid B1-2 080207

Spectrum Filename: C:\User\Win00473.An1

Acquisition information
Start time: 02-Aug-2007 08:21:31
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: 3.5950E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5950E+02) = 2.7816E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 08:31:41 Page 2
4714781 Spectrum name: Win00473.An1

WI07-0773 D2 Bag# S-106 Grid B1-2 080207

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: 0.1144

********** 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	
11.91	2.92	4464.	10855.	18.091	2.59	0.854	-	D
18.72	4.63	12233.	7472.	12.453	4.78	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	187.01	46.93	42.	56.	0.094	52.43	0.820s
AM-241	236.75	59.37	87.	155.	0.259	29.67	0.875s
Th-234	252.22	63.23	72.	51.	0.084	67.43	1.035
Pb-214	298.54	74.81	69.	121.	0.201	26.71	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	178.81	0.851D
Pb-212	307.74	77.11	64.	154.	0.257	21.79	0.919D
Pb-214	307.74	77.11	226.	0.	0.000	100.21	0.242D
Pb-214	347.95	87.16	48.	58.	0.097	47.68	0.771
Th-234	368.72	92.35	75.	37.	0.062	74.11	0.933D
Ac-228	380.72	95.35	36.	6.	0.009	313.37	0.935D
Ac-228	835.49	209.02	18.	22.	0.036	77.54	0.406s
Pb-212	953.94	238.62	32.	219.	0.365	15.35	1.057D
Pb-214	967.37	241.98	43.	53.	0.089	44.12	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 08:31:41 Page 3
4714781 Spectrum name: Win00473.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.31	269.96	28.	31.	0.052	80.84	0.314s
Pb-214	1180.44	295.24	20.	66.	0.110	37.44	1.178s
Ac-228	1310.56	327.76	8.	36.	0.059	49.75	0.327s
Ac-228	1352.51	338.24	6.	43.	0.072	37.23	0.848s
Pb-214	1407.33	351.94	8.	118.	0.197	20.57	1.286

WI07-0773 D2 Bag# S-106 Grid B1-2 080207

Ac-228	1851.78	463.03	3.	21.	0.035	54.71	0.264s
Bi-214	2437.25	609.35	3.	76.	0.127	24.69	1.243
CS-137	2647.69	661.94	0.	16.	0.027	50.00	0.483s
Bi-214	3068.00	766.98	0.	11.	0.018	60.30	0.375s
Ac-228	3172.80	793.17	4.	2.	0.002	476.10	0.220s
Ac-228	3645.73	911.35	0.	49.	0.082	28.57	1.062s
Bi-214	3732.00	932.91	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	4.	11.	0.018	84.03	1.595D
Ac-228	3876.86	969.11	1.	38.	0.063	33.19	1.598D
Bi-214	4482.62	1120.48	0.	17.	0.028	48.51	0.375s
Bi-214	4947.21	1236.57	3.	2.	0.003	389.87	0.447s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5844.71	1460.82	0.	49.	0.082	28.57	0.521s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7061.86	1764.92	0.	15.	0.025	51.64	0.749s

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	3.6926E-04	609.31	3.534E-04	(	1.395E-05	G K
			1764.49	5.338E-04	+	2.135E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	&	2.509E-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	%	2.164E-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	6.1231E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	7.393E-04	(	3.787E-05	G
			338.32	5.078E-04	?(	4.575E-05	G
			964.60	6.487E-04	(	2.184E-04	G
			794.70	0.000E+00	&	2.352E-04	G
			463.00	8.185E-04	?(	1.169E-04	G
			209.28	4.585E-04	-	2.001E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 08:31:41 Page 4
4714781 Spectrum name: Win00473.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.685E-04	+	3.554E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.864E-04	X
		327.64	1.452E-03	+	4.029E-04	G
Pb-212	N 5.2842E-04	238.62	5.036E-04	(	1.953E-05	G K
		77.11	5.900E-04	(	4.523E-05	Energy duplication
		74.81	0.000E+00	?	9.805E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 6.6880E-04	92.35	4.606E-04	(	1.593E-04	G
		63.29	9.652E-04	$(	2.389E-04	G

WI07-0773 D2 Bag# S-106 Grid B1-2 080207

Pb-214	N	4.2901E-04	351.92	4.370E-04	(	1.678E-05	G K
			295.21	4.134E-04	(	4.287E-05	G
			77.11	0.000E+00	?	1.428E-04	Energy duplication
			241.98	7.380E-04	+	1.986E-04	G
			74.81	1.346E-03	+	2.232E-04	Energy duplication
			87.30	8.465E-04	+	2.187E-04	X
Pb-210	N	1.1534E-03	46.50	1.153E-03	*(	1.987E-04	G
AM-241		3.1985E-04	59.54	3.199E-04	@(	2.816E-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 02-AUG-2007 08:31:41 Page 5
4714781 Spectrum name: Win00473.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	1.0271E+00	2.536E-01	2.565E-01
K-40	6.0010E+00	1.715E+00	1.729E+00
Ac-228	1.7032E+00	3.937E-01	3.989E-01
Pb-212	1.4699E+00	1.959E-01	2.035E-01
CS-137 #	1.2061E-01	6.030E-02	6.048E-02
Th-234	1.8603E+00	9.320E-01	9.329E-01
Pb-214	1.1933E+00	2.455E-01	2.495E-01
Pb-210 #	3.2083E+00	1.682E+00	1.684E+00
AM-241 #	8.8972E-01	2.639E-01	2.660E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0773 D2 Bag# S-106 Grid B1-2 080207

& - 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) 1.7473560E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0774 D2 Bag# S-107 Grid B2-1 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:52:48 Page 1
4714781 Spectrum name: Win00479.An1

Sample description
WI07-0774 D2 Bag # S-107 Grid B2-1. 080207

Spectrum Filename: C:\User\Win00479.An1

Acquisition information
Start time: 02-Aug-2007 10:42:37
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: 3.6140E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6140E+02) = 2.7670E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:52:48 Page 2
4714781 Spectrum name: Win00479.An1

WI07-0774 D2 Bag# S-107 Grid B2-1 080207

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: 0.0482

********** 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	4320.	30780.	51.300	1.42	2.226	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	185.93	46.66	44.	36.	0.060	72.01	0.627s
AM-241	237.70	59.60	68.	676.	1.127	8.78	0.822
Th-234	251.83	63.13	54.	61.	0.102	53.48	1.006s
Pb-214	298.54	74.81	59.	98.	0.163	30.01	0.917D
Pb-212	298.56	74.81	106.	0.	0.000	370.81	0.339D
Pb-212	307.74	77.11	62.	207.	0.345	17.56	0.919D
Pb-214	307.74	77.11	216.	0.	0.000	208.50	0.226D
Pb-214	347.20	86.97	42.	57.	0.095	49.25	1.126s
Th-234	368.72	92.35	44.	50.	0.083	47.33	0.933D
Ac-228	380.72	95.35	38.	16.	0.027	118.95	0.936D
Ac-228	834.17	208.69	24.	44.	0.074	55.91	0.433s
Pb-212	953.94	238.62	13.	247.	0.412	13.39	1.057D
Pb-214	967.37	241.98	22.	46.	0.077	41.24	1.060D
Ac-228	1083.55	271.02	12.	26.	0.044	61.34	0.240s

0

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:52:48 Page 3
4714781 Spectrum name: Win00479.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.06	295.14	5.	63.	0.104	28.94	1.025s
Ac-228	1305.89	326.59	13.	5.	0.009	249.45	0.263s
Ac-228	1353.07	338.38	7.	39.	0.065	40.49	0.680s
Pb-214	1407.34	351.95	7.	89.	0.148	24.67	0.578s
Ac-228	1851.16	462.87	4.	20.	0.032	60.89	0.280s

WI07-0774 D2 Bag# S-107 Grid B2-1 080207

Bi-214	2437.24	609.34	0.	68.	0.113	24.25	0.958s
CS-137	2646.42	661.62	0.	24.	0.040	40.82	0.416s
Bi-214	3073.62	768.38	1.	1.	0.001	339.93	0.375s
Ac-228	3180.20	795.02	0.	5.	0.008	89.44	0.375s
Ac-228	3645.42	911.27	0.	48.	0.080	28.87	0.750s
Bi-214	3737.00	934.16	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	0.	13.	0.022	56.00	1.595D
Ac-228	3876.86	969.11	5.	18.	0.031	57.09	1.598D
Bi-214	4481.00	1120.08	5.	2.	0.003	450.78	0.000s
Bi-214	4952.86	1237.98	0.	7.	0.012	75.59	0.375s
Bi-214	5511.67	1377.61	1.	1.	0.001	366.67	0.181s
K-40	5845.15	1460.93	0.	46.	0.077	29.49	0.425s
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	0.500s

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	3.1623E-04	609.31	3.162E-04	(	4.650E-06	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	4.746E-04	+	2.898E-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	%	2.771E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	5.0776E-04	911.07	5.286E-04	(	1.101E-05	G K
			969.11	3.574E-04	-	1.418E-04	G
			338.32	4.571E-04	?(	5.010E-05	G
			964.60	7.974E-04	+	3.471E-04	G
			794.70	2.940E-04	-	2.176E-04	G
			463.00	7.601E-04	+	2.846E-04	G
			209.28	9.416E-04	&	2.594E-04	G
			270.23	8.227E-04	&	2.884E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	3.104E-04	-	2.100E-04	X
		327.64	0.000E+00	&	2.655E-04	G
Pb-212	N 5.6745E-04	238.62	5.674E-04	(	1.296E-05	G K
		77.11	7.932E-04	+	9.073E-05	Energy duplication
		74.81	0.000E+00	%	9.760E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 8.4501E-04	92.35	6.200E-04	(	1.239E-04	G
		63.29	1.165E-03	*(	2.074E-04	G
Pb-214	N 3.5105E-04	351.92	3.296E-04	(	1.583E-05	G K

```
                    WI07-0774   D2 Bag# S-107   Grid B2-1  080207
                              295.21 3.926E-04 *(  2.383E-05          G
                               77.11 0.000E+00 %   1.397E-04Energy duplication
                              241.98 6.362E-04 +   1.683E-04          G
                               74.81 1.090E-03 +   2.030E-04Energy duplication
                               87.30 8.271E-04 +   2.116E-04          X

Pb-210    N   7.3490E-04      46.50 7.349E-04  (  2.020E-04          G

AM-241        1.3920E-03      59.54 1.392E-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  02-AUG-2007 10:52:48 Page    5
 4714781                          Spectrum name: Win00479.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	8.7501E-01	2.122E-01	2.147E-01
K-40 #	5.6040E+00	1.653E+00	1.666E+00
Ac-228	1.4050E+00	3.493E-01	3.533E-01
Pb-212	1.5701E+00	2.102E-01	2.183E-01
CS-137 #	1.7996E-01	7.347E-02	7.379E-02
Th-234	2.3381E+00	8.349E-01	8.367E-01
Pb-214	9.7137E-01	1.847E-01	1.882E-01
Pb-210 #	2.0335E+00	1.464E+00	1.465E+00
AM-241	3.8516E+00	3.380E-01	3.669E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0774 D2 Bag# S-107 Grid B2-1 080207

< - 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) 1.8828680E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0775 D2 Bag# S-108 Grid B2-1 080207

```
     ORTEC g v - i (  63) wan32  G53W2.06  02-AUG-2007 11:14:10 Page    1
4714781                          Spectrum name: Win00480.An1

Sample description
     WI07-0775 D2 Bag # S-108 Grid B2-1. 080207


Spectrum Filename: C:\User\Win00480.An1

Acquisition information
       Start time:                 02-Aug-2007 11:03:59
       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:                3.6150E+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  02-AUG-2007 11:14:10 Page    2
4714781                          Spectrum name: Win00480.An1
```

WI07-0775 D2 Bag# S-108 Grid B2-1 080207

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: 0.0679

********** 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	4602.	25191.	41.985	1.66	2.169	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	121.	35.	0.058	111.07	0.256s
AM-241	237.59	59.57	288.	3727.	6.212	3.75	0.893
Th-234	252.00	63.18	33.	48.	0.081	51.88	0.468s
Pb-214	298.54	74.81	37.	99.	0.165	26.62	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	97.94	0.257D
Pb-212	307.74	77.11	35.	124.	0.206	22.51	0.919D
Pb-214	307.74	77.11	105.	0.	0.000	609.92	0.342D
Pb-214	348.59	87.32	57.	50.	0.084	65.00	0.973s
Th-234	368.72	92.35	41.	52.	0.087	44.03	0.933D
Ac-228	380.72	95.35	37.	10.	0.016	187.98	0.935D
Ac-228	836.52	209.27	30.	36.	0.060	71.58	0.336s
Pb-212	953.94	238.62	27.	159.	0.265	18.33	1.057D
Pb-214	967.37	241.98	30.	29.	0.049	64.20	1.060D
Ac-228	1079.40	269.98	9.	1.	0.002	871.78	0.201s

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 11:14:10 Page 3
4714781 Spectrum name: Win00480.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.39	295.22	8.	58.	0.096	31.83	0.875s
Ac-228	1313.08	328.39	6.	24.	0.039	59.79	0.354s
Ac-228	1353.93	338.60	13.	34.	0.057	54.37	1.444s
Pb-214	1406.92	351.84	5.	112.	0.187	20.32	0.964s
Ac-228	1851.81	463.03	4.	16.	0.027	66.14	0.305s

WI07-0775 D2 Bag# S-108 Grid B2-1 080207

Bi-214	2437.23	609.34	0.	41.	0.068	31.23	0.473s
CS-137	2647.00	661.77	17.	0.	0.000	0.00	0.000s
Bi-214	3071.00	767.73	0.	6.	0.010	81.65	0.250s
Ac-228	3178.33	794.55	0.	7.	0.012	75.59	0.250s
Ac-228	3645.22	911.22	0.	37.	0.062	32.88	0.437s
Bi-214	3740.41	935.01	4.	2.	0.004	305.73	0.217s
Ac-228	3858.81	964.60	1.	7.	0.012	80.07	1.595D
Ac-228	3876.86	969.11	0.	30.	0.051	36.24	1.598D
Bi-214	4483.42	1120.68	0.	19.	0.032	45.88	1.125s
Bi-214	4954.83	1238.47	0.	11.	0.018	60.30	0.312s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.29	1460.97	0.	41.	0.068	31.23	0.770s
Ac-228	6350.00	1587.07	0.	2.	0.003	141.42	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 Value microCi	Comments
Bi-214	N	1.9067E-04	609.31	1.907E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	7.457E-04	+	3.537E-04	G
			768.36	3.127E-04	+	2.084E-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	&	3.887E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	4.6764E-04	911.07	4.075E-04	?(	1.101E-05	G K
			969.11	5.915E-04	(	1.942E-05	G
			338.32	4.024E-04	(	6.514E-05	G
			964.60	4.535E-04	(	1.078E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	6.236E-04	(	1.314E-04	G
			209.28	7.617E-04	+	2.539E-04	G
			270.23	0.000E+00	%	1.562E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	1.881E-04	-	1.966E-04	X
		327.64	9.638E-04	&	3.365E-04	G
Pb-212	N 3.6581E-04	238.62	3.658E-04	(	1.802E-05	G K
		77.11	4.741E-04	+	7.021E-05	Energy duplication
		74.81	0.000E+00	?	8.523E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.840E-05	G
Th-234	N 7.6458E-04	92.35	6.549E-04	(	1.187E-04	G
		63.29	9.208E-04	(	1.638E-04	G
Pb-214	N 3.9732E-04	351.92	4.148E-04	(	1.371E-05	G K

```
                    WI07-0775   D2 Bag# S-108   Grid B2-1  080207
                              295.21 3.602E-04  (  2.760E-05         G
                               77.11 0.000E+00 %   9.844E-05Energy duplication
                              241.98 4.056E-04  (  1.136E-04         G
                               74.81 1.103E-03 +   1.897E-04Energy duplication
                               87.30 7.304E-04 +   2.197E-04         X

Pb-210   N   7.1448E-04      46.50 7.145E-04 ?(  3.279E-04         G

AM-241       7.6744E-03      59.54 7.674E-03  (  5.046E-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  02-AUG-2007 11:14:10 Page    5
 4714781                          Spectrum name: Win00480.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 #     5.2744E-01    1.647E-01    1.659E-01
 K-40   #     4.9935E+00    1.560E+00    1.571E+00
 Ac-228       1.2936E+00    3.187E-01    3.224E-01
 Pb-212       1.0119E+00    1.855E-01    1.893E-01
 CS-137  <    5.0911E-02
 Th-234       2.1150E+00    7.196E-01    7.213E-01
 Pb-214       1.0991E+00    2.233E-01    2.271E-01
 Pb-210 #     1.9764E+00    2.195E+00    2.196E+00
 AM-241       2.1229E+01    7.957E-01    1.118E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0775 D2 Bag# S-108 Grid B2-1 080207

< - 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) 3.4246326E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fann
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0776 D2 Bag# S-109 Grid B2-2 080107

```
     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 13:32:04 Page    1
4714781                          Spectrum name: Win00461.An1

Sample description
     WI07-0776  D2  Bag # S-109 Grid B2-2  080107


Spectrum Filename: C:\User\Win00461.An1

Acquisition information
       Start time:                 01-Aug-2007 13:21:53
       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:                3.1910E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1910E+02) =
                                   3.1338E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 13:32:04 Page    2
4714781                          Spectrum name: Win00461.An1
```

WI07-0776 D2 Bag# S-109 Grid B2-2 080107

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	
14.92	3.92	5736.	23483.	39.138	1.84	2.447	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	186.26	46.74	38.	34.	0.056	71.29	0.630s
AM-241	237.48	59.55	164.	854.	1.423	9.35	0.966
Th-234	253.89	63.65	38.	24.	0.040	97.89	0.428s
Pb-214	298.54	74.81	58.	109.	0.181	27.60	0.917D
Pb-212	298.56	74.81	106.	0.	0.000	634.15	0.367D
Pb-212	307.74	77.11	47.	159.	0.265	20.06	0.919D
Pb-214	307.74	77.11	213.	0.	0.000	114.20	0.000D
Pb-214	347.55	87.06	50.	37.	0.062	73.92	1.558s
Th-234	368.72	92.35	66.	39.	0.066	66.38	0.933D
Ac-228	380.72	95.35	31.	10.	0.017	163.34	0.935D
Ac-228	835.83	209.10	10.	26.	0.043	57.56	0.374s
Pb-212	953.94	238.62	26.	166.	0.277	17.75	1.057D
Pb-214	967.37	241.98	23.	32.	0.053	55.20	1.060D
Ac-228	1081.00	270.38	15.	29.	0.048	62.26	0.500s

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:32:04 Page 3
4714781 Spectrum name: Win00461.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.69	295.05	10.	60.	0.100	33.88	0.751s
Ac-228	1312.02	328.12	4.	17.	0.029	60.75	0.667s
Ac-228	1353.22	338.42	5.	55.	0.091	31.52	0.897
Pb-214	1407.32	351.94	3.	79.	0.131	24.53	1.871s
Ac-228	1853.12	463.36	3.	26.	0.043	49.35	0.542s

WI07-0776 D2 Bag# S-109 Grid B2-2 080107

Bi-214	2437.27	609.35	4.	60.	0.100	29.81	0.578s
CS-137	2647.38	661.86	0.	17.	0.028	48.51	0.292s
Bi-214	3073.40	768.33	0.	6.	0.010	81.65	0.500s
Ac-228	3175.05	793.73	3.	1.	0.002	412.31	0.432s
Ac-228	3645.69	911.34	0.	51.	0.085	28.01	0.625s
Bi-214	3733.33	933.24	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	2.	15.	0.025	57.63	1.595D
Ac-228	3876.86	969.11	0.	41.	0.069	31.08	1.598D
Bi-214	4473.00	1118.08	0.	16.	0.027	50.00	0.250s
Bi-214	4952.00	1237.77	2.	0.	0.001	368.18	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.46	1460.76	0.	28.	0.047	37.80	0.999s
Ac-228	6354.50	1588.20	0.	3.	0.005	115.47	0.500s
Bi-214	7054.67	1763.13	3.	2.	0.003	308.22	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	3.0665E-04	609.31	2.790E-04	(	1.568E-05	G K
			1764.49	0.000E+00	&	1.317E-04	G
			1120.29	3.893E-04	&(	2.433E-05	G
			1238.11	0.000E+00	%	1.737E-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	5.830E-04	&	3.887E-04	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	5.8974E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	8.040E-04	+	1.867E-04	G
			338.32	6.407E-04	(	4.458E-05	G
			964.60	9.315E-04	+	3.921E-04	G
			794.70	0.000E+00	&	1.983E-04	G
			463.00	1.000E-03	+	3.170E-04	G
			209.28	5.501E-04	(	1.058E-04	G
			270.23	9.060E-04	+	3.091E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	1.996E-04	-	1.843E-04	X
		327.64	7.059E-04	(	1.325E-04	G
Pb-212	N 3.8217E-04	238.62	3.822E-04	(	1.767E-05	G K
		77.11	6.076E-04	+	7.964E-05	Energy duplication
		74.81	0.000E+00	%	9.768E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 4.7712E-04	92.35	4.911E-04	(	1.493E-04	G
		63.29	4.572E-04	$(	1.759E-04	G
Pb-214	N 3.2012E-04	351.92	2.914E-04	*(	1.159E-05	G K

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                    WI07-0776   D2 Bag# S-109   Grid B2-2  080107
                              295.21 3.759E-04 *(  3.132E-05          G
                               77.11 0.000E+00 ?   1.389E-04Energy duplication
                              241.98 4.425E-04 +   1.521E-04          G
                               74.81 1.214E-03 +   2.096E-04Energy duplication
                               87.30 5.369E-04 +   1.988E-04          X

Pb-210   N   6.8386E-04      46.50 6.839E-04  (  1.896E-04          G

AM-241       1.7575E-03      59.54 1.757E-03  (  3.839E-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  01-AUG-2007 13:32:04 Page    5
 4714781                                Spectrum name: Win00461.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       9.6097E-01    2.865E-01    2.888E-01
 K-40   #     3.8633E+00    1.460E+00    1.467E+00
 Ac-228       1.8481E+00    4.330E-01    4.385E-01
 Pb-212       1.1976E+00    2.125E-01    2.172E-01
 CS-137 #     1.4437E-01    7.003E-02    7.025E-02
 Th-234       1.4952E+00    8.842E-01    8.849E-01
 Pb-214       1.0032E+00    2.098E-01    2.132E-01
 Pb-210       2.1431E+00    1.528E+00    1.529E+00
 AM-241       5.5076E+00    5.152E-01    5.541E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0776 D2 Bag# S-109 Grid B2-2 080107

< - 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) 1.8163536E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0777 D2 Bag# S-110 Grid B2-2 080107

```
     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 15:19:40 Page    1
4714781                          Spectrum name: Win00467.An1

Sample description
     WI07-0777    D2  Bag # S-110  Grid  B2-2 080107


Spectrum Filename: C:\User\Win00467.An1

Acquisition information
       Start time:                 01-Aug-2007 15:09:29
       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:                2.9640E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.9640E+02) =
                                   3.3738E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 15:19:40 Page    2
4714781                          Spectrum name: Win00467.An1
```

WI07-0777 D2 Bag# S-110 Grid B2-2 080107

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: 0.0706

********** 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	2.92	6235.	11519.	19.198	2.69	0.854	-	D
16.53	4.11	15004.	10217.	17.028	3.93	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	185.70	46.60	19.	42.	0.071	49.72	0.623s
AM-241	237.64	59.59	60.	151.	0.252	25.17	0.895s
Th-234	252.39	63.27	48.	66.	0.109	46.48	1.364s
Pb-214	298.54	74.81	51.	77.	0.129	34.69	0.917D
Pb-212	298.56	74.81	89.	0.	0.000	304.14	0.502D
Pb-212	307.74	77.11	68.	131.	0.219	24.87	0.919D
Pb-214	307.74	77.11	210.	0.	0.000	115.47	0.629D
Pb-214	348.39	87.27	45.	35.	0.058	71.14	0.898
Th-234	368.72	92.35	57.	24.	0.039	99.68	0.933D
Ac-228	380.72	95.35	53.	8.	0.014	250.94	0.935D
Ac-228	836.55	209.28	11.	38.	0.063	47.82	0.460s
Pb-212	953.94	238.62	19.	167.	0.279	17.12	1.057D
Pb-214	967.37	241.98	30.	25.	0.042	72.97	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:19:40 Page 3
4714781 Spectrum name: Win00467.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.14	270.67	13.	3.	0.004	463.68	0.203s
Pb-214	1181.08	295.40	6.	60.	0.099	31.09	0.382s
Ac-228	1309.83	327.58	15.	26.	0.044	73.94	0.355s
Ac-228	1353.10	338.39	10.	58.	0.097	35.16	0.693s
Pb-214	1407.27	351.93	3.	84.	0.140	23.16	0.907s

WI07-0777 D2 Bag# S-110 Grid B2-2 080107

Ac-228	1846.97	461.82	4.	3.	0.005	258.20	0.298s
Bi-214	2437.47	609.40	3.	65.	0.109	26.53	0.852s
CS-137	2646.20	661.57	0.	10.	0.017	63.25	0.375s
Bi-214	3074.00	768.48	0.	6.	0.010	81.65	0.500s
Ac-228	3168.94	792.20	2.	4.	0.007	161.78	0.238s
Ac-228	3645.65	911.33	0.	43.	0.072	30.50	1.093s
Bi-214	3736.00	933.91	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	4.	4.	0.007	169.06	1.595D
Ac-228	3876.86	969.11	3.	19.	0.031	53.37	1.598D
Bi-214	4482.00	1120.33	3.	1.	0.001	498.89	0.000s
Bi-214	4952.00	1237.77	1.	0.	0.000	0.00	0.083s
Bi-214	5512.67	1377.86	1.	0.	0.001	240.37	0.197s
K-40	5844.70	1460.82	0.	37.	0.062	32.88	0.999s
Ac-228	6353.75	1588.01	0.	4.	0.007	100.00	0.375s
Bi-214	7059.27	1764.28	2.	5.	0.008	151.19	0.221s

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	3.0470E-04	609.31	3.038E-04	(	1.331E-05	G K
			1764.49	1.661E-04	-	1.521E-04	G
			1120.29	0.000E+00	%	8.206E-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	0.000E+00	%	2.164E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	4.4379E-04	911.07	4.736E-04	?(	1.101E-05	G K
			969.11	3.652E-04	(	5.972E-05	G
			338.32	6.856E-04	+	1.437E-04	G
			964.60	2.521E-04	-	2.797E-04	G
			794.70	2.646E-04	&	2.514E-04	G
			463.00	0.000E+00	&	1.666E-04	G
			209.28	7.970E-04	+	2.203E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:19:40 Page 4
4714781 Spectrum name: Win00467.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.930E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	2.226E-04	X
		327.64	1.072E-03	+	3.897E-04	G
Pb-212	N 3.8426E-04	238.62	3.843E-04	(	1.529E-05	G K
		77.11	5.028E-04	+	7.831E-05	Energy duplication
		74.81	0.000E+00	%	8.955E-05	Energy duplication
CS-137	2.7099E-05	661.66	2.710E-05	?(	2.710E-06	G
Th-234	N 6.8785E-04	92.35	2.945E-04	(	1.401E-04	G
		63.29	1.248E-03	@(	1.955E-04	G

```
                    WI07-0777   D2 Bag# S-110   Grid B2-2  080107
Pb-214   N   3.3473E-04    351.92 3.117E-04 @(  1.086E-05          G K
                           295.21 3.738E-04  (  2.565E-05          G
                            77.11 0.000E+00 ?   1.378E-04Energy duplication
                           241.98 3.489E-04  (  1.138E-04          G
                            74.81 8.634E-04 +   1.847E-04Energy duplication
                            87.30 5.079E-04 +   1.909E-04          X

Pb-210   N   8.6418E-04     46.50 8.642E-04  (  1.354E-04          G

AM-241       3.1093E-04     59.54 3.109E-04 *(  2.361E-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  01-AUG-2007 15:19:40 Page    5
4714781                          Spectrum name: Win00467.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        1.0280E+00    2.727E-01    2.754E-01
K-40    #     5.4960E+00    1.807E+00    1.819E+00
Ac-228        1.4973E+00    4.567E-01    4.601E-01
Pb-212        1.2964E+00    2.219E-01    2.272E-01
CS-137 #      9.1427E-02    5.782E-02    5.793E-02
Th-234        2.3207E+00    1.079E+00    1.080E+00
Pb-214        1.1293E+00    2.616E-01    2.650E-01
Pb-210        2.9156E+00    1.450E+00    1.451E+00
AM-241 #      1.0490E+00    2.640E-01    2.668E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0777 D2 Bag# S-110 Grid B2-2 080107

& - 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) 1.6823763E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0778 D2 Bag# S-111 Grid B2-1 080207

```
     ORTEC g v - i (  63) wan32  G53W2.06  02-AUG-2007 11:26:31 Page    1
4714781                          Spectrum name: Win00481.An1

Sample description
     WI07-0778 D2 Bag # S-111 Grid B2-1. 080207


Spectrum Filename: C:\User\Win00481.An1

Acquisition information
       Start time:                 02-Aug-2007 11:16:21
       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:                3.9280E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.9280E+02) =
                                   2.5458E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  02-AUG-2007 11:26:31 Page    2
4714781                          Spectrum name: Win00481.An1
```

WI07-0778 D2 Bag# S-111 Grid B2-1 080207

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: 0.0801

********** 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	
14.79	3.88	5355.	28518.	47.530	1.57	2.355	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	184.62	46.33	69.	36.	0.059	89.58	0.740
AM-241	237.74	59.61	168.	1449.	2.415	6.19	0.929
Th-234	252.91	63.40	83.	53.	0.089	70.80	0.973
Pb-214	298.54	74.81	81.	94.	0.156	34.19	0.917D
Pb-212	298.56	74.81	133.	0.	0.000	761.58	0.350D
Pb-212	307.74	77.11	68.	168.	0.280	20.78	0.919D
Pb-214	307.74	77.11	208.	0.	0.000	180.72	0.598D
Pb-214	347.44	87.03	58.	61.	0.101	52.66	0.796s
Th-234	368.72	92.35	82.	51.	0.084	57.88	0.933D
Ac-228	380.72	95.35	45.	0.	0.000	7601.25	0.935D
Ac-228	834.97	208.89	23.	28.	0.046	74.23	0.722s
Pb-212	953.94	238.62	24.	239.	0.399	14.15	1.057D
Pb-214	967.37	241.98	38.	46.	0.077	47.50	1.060D
Ac-228	1080.32	270.21	7.	16.	0.026	77.07	0.333s

0

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 11:26:31 Page 3
4714781 Spectrum name: Win00481.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.11	295.15	7.	63.	0.105	29.50	1.361s
Ac-228	1312.00	328.12	15.	1.	0.002	982.34	0.000s
Ac-228	1353.79	338.56	5.	53.	0.089	31.12	0.937
Pb-214	1407.32	351.94	7.	92.	0.153	23.35	1.167
Ac-228	1851.55	462.97	3.	18.	0.030	62.47	0.782s

WI07-0778 D2 Bag# S-111 Grid B2-1 080207

Bi-214	2437.38	609.38	0.	90.	0.150	21.08	1.104
CS-137	2644.73	661.20	3.	16.	0.027	64.32	0.285s
Bi-214	3074.10	768.50	2.	5.	0.009	117.26	0.592s
Ac-228	3177.91	794.44	0.	13.	0.022	55.47	0.562s
Ac-228	3644.81	911.12	0.	59.	0.098	26.04	0.906s
Bi-214	3735.00	933.66	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	5.	5.	0.009	141.33	1.595D
Ac-228	3876.86	969.11	0.	27.	0.045	38.37	1.598D
Bi-214	4482.80	1120.53	0.	12.	0.020	57.74	0.562s
Bi-214	4952.67	1237.93	0.	3.	0.005	115.47	0.375s
Bi-214	5512.33	1377.78	0.	3.	0.005	115.47	0.250s
K-40	5845.34	1460.98	0.	41.	0.068	31.23	0.328s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7061.43	1764.82	0.	14.	0.023	53.45	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	4.3634E-04	609.31	4.185E-04	(	4.650E-06	G K
			1764.49	4.982E-04	?(	3.558E-05	G
			1120.29	2.920E-04	-	1.320E-04	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	2.779E-04	-	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	-	3.246E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	6.2274E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	5.275E-04	(	1.942E-05	G
			338.32	6.250E-04	(	4.214E-05	G
			964.60	3.337E-04	-	3.086E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	6.951E-04	?(	1.195E-04	G
			209.28	5.854E-04	?(	1.555E-04	G
			270.23	4.895E-04	-	2.281E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	0.000E+00	%	2.516E-04	G
Pb-212	N 5.7626E-04	238.62	5.496E-04	(	1.695E-05	G K
		77.11	6.423E-04	(	4.660E-05	Energy duplication
		74.81	0.000E+00	%	1.091E-04	Energy duplication
CS-137	4.3810E-05	661.66	4.381E-05	?(	7.947E-06	G
Th-234	N 7.9078E-04	92.35	6.326E-04	(	1.664E-04	G
		63.29	1.016E-03	$(	2.547E-04	G
Pb-214	N 3.5909E-04	351.92	3.407E-04	(	1.583E-05	G K

```
                    WI07-0778   D2 Bag# S-111   Grid B2-1  080207
                            295.21 3.947E-04  (  2.678E-05          G
                             77.11 0.000E+00 ?   1.372E-04Energy duplication
                            241.98 6.419E-04 +   1.863E-04          G
                             74.81 1.045E-03 +   2.144E-04Energy duplication
                             87.30 8.803E-04 +   2.312E-04          X

Pb-210   N   7.2809E-04      46.50 7.281E-04  (  2.508E-04          G

AM-241       2.9837E-03      59.54 2.984E-03  (  3.879E-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  02-AUG-2007 11:26:31 Page    5
 4714781                          Spectrum name: Win00481.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        1.1108E+00    2.342E-01    2.379E-01
 K-40    #     4.5956E+00    1.435E+00    1.446E+00
 Ac-228        1.5854E+00    3.301E-01    3.354E-01
 Pb-212        1.4670E+00    1.844E-01    1.924E-01
 CS-137 #      1.1153E-01    7.173E-02    7.186E-02
 Th-234        2.0132E+00    9.205E-01    9.217E-01
 Pb-214        9.1419E-01    1.720E-01    1.753E-01
 Pb-210        1.8536E+00    1.661E+00    1.661E+00
 AM-241        7.5960E+00    4.699E-01    5.476E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0778 D2 Bag# S-111 Grid B2-1 080207

< - 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) 2.1247307E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0779 D2 Bag# S-112 Grid B1-2,3,5 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 11:42:31 Page 1
4714781 Spectrum name: Win00482.An1

Sample description
WI07-0779 D2 Bag # S-112 Grid B1-2,3,5 080207

Spectrum Filename: C:\User\Win00482.An1

Acquisition information
Start time: 02-Aug-2007 11:32:20
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: 3.7950E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7950E+02) = 2.6350E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 11:42:31 Page 2
4714781 Spectrum name: Win00482.An1

WI07-0779 D2 Bag# S-112 Grid B1-2,3,5 080207

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: 0.1176

********** 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	6615.	24647.	41.078	1.83	2.171	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	181.99	45.68	338.	54.	0.089	131.36	0.198s
AM-241	237.64	59.59	360.	964.	1.607	10.42	0.809
Th-234	252.44	63.29	156.	30.	0.050	152.61	0.807
Pb-214	298.54	74.81	125.	80.	0.133	45.69	0.917D
Pb-212	298.56	74.81	102.	0.	0.000	165.55	0.903D
Pb-212	307.74	77.11	118.	135.	0.226	28.50	0.919D
Pb-214	307.74	77.11	203.	0.	0.000	347.93	0.390D
Pb-214	349.20	87.47	100.	46.	0.077	80.87	0.315s
Th-234	368.72	92.35	73.	33.	0.055	80.75	0.933D
Ac-228	380.72	95.35	88.	23.	0.038	125.37	0.935D
Ac-228	837.34	209.48	25.	17.	0.028	120.26	0.451s
Pb-212	953.94	238.62	14.	155.	0.258	17.47	1.057D
Pb-214	967.37	241.98	20.	38.	0.064	45.99	1.060D
Ac-228	1080.52	270.26	9.	23.	0.038	66.79	0.294s

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 11:42:31 Page 3
4714781 Spectrum name: Win00482.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.57	295.02	6.	59.	0.099	30.35	1.098s
Ac-228	1310.89	327.84	4.	16.	0.026	69.21	0.608s
Ac-228	1353.20	338.42	5.	34.	0.057	41.14	0.854s
Pb-214	1407.74	352.05	2.	86.	0.143	22.43	1.029
Ac-228	1853.71	463.51	1.	1.	0.002	281.40	0.229s

WI07-0779 D2 Bag# S-112 Grid B1-2,3,5 080207

Bi-214	2437.68	609.45	0.	60.	0.100	25.82	1.379
CS-137	2646.65	661.68	2.	10.	0.016	86.41	0.824s
Bi-214	3071.25	767.79	2.	4.	0.006	153.86	0.329s
Ac-228	3180.00	794.97	1.	0.	0.000	0.00	0.000s
Ac-228	3646.10	911.44	3.	42.	0.070	34.54	0.750s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	4.	9.	0.015	89.30	1.595D
Ac-228	3876.86	969.11	1.	31.	0.052	36.92	1.598D
Bi-214	4469.00	1117.08	0.	15.	0.025	51.64	0.250s
Bi-214	4954.33	1238.35	2.	1.	0.002	416.33	0.225s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5843.92	1460.63	0.	65.	0.108	24.81	0.777s
Ac-228	6354.00	1588.07	0.	5.	0.008	89.44	0.375s
Bi-214	7058.00	1763.96	6.	2.	0.003	447.21	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	3.0017E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.612E-04	G
			1120.29	3.650E-04	&(	2.433E-05	G
			1238.11	0.000E+00	%	2.034E-04	G
			768.36	1.824E-04	-	1.929E-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	2.8618E-03	1460.81	2.862E-03	(	4.403E-05	G
Ac-228	N	5.2350E-04	911.07	4.644E-04	(	3.229E-05	G K
			969.11	6.035E-04	(	3.779E-05	G
			338.32	4.024E-04	(	4.214E-05	G
			964.60	5.669E-04	(	2.042E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	0.000E+00	%	9.984E-05	G
			209.28	3.597E-04	-	2.048E-04	G
			270.23	7.186E-04	(	1.491E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	4.340E-04	(	2.660E-04	X
		327.64	6.380E-04	(	1.420E-04	G
Pb-212	N 3.5597E-04	238.62	3.560E-04	(	1.341E-05	G K
		77.11	5.182E-04	+	8.817E-05	Energy duplication
		74.81	0.000E+00	?	9.581E-05	Energy duplication
CS-137	2.6196E-05	661.66	2.620E-05	?(	7.364E-06	G
Th-234	N 4.7859E-04	92.35	4.133E-04	(	1.570E-04	G
		63.29	5.715E-04	?(	3.462E-04	G
Pb-214	N 3.3621E-04	351.92	3.179E-04	(	9.781E-06	G K

```
                    WI07-0779   D2 Bag# S-112   Grid B1-2,3,5  080207
                              295.21 3.717E-04 *(  2.445E-05          G
                               77.11 0.000E+00 %   1.354E-04Energy duplication
                              241.98 5.299E-04 +   1.560E-04          G
                               74.81 8.879E-04 +   2.316E-04Energy duplication
                               87.30 6.675E-04 +   2.553E-04          X

Pb-210    N   1.0921E-03      46.50 1.092E-03 &(  5.407E-04          G

AM-241        1.9850E-03      59.54 1.985E-03  (  5.629E-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  02-AUG-2007 11:42:31 Page    5
 4714781                          Spectrum name: Win00482.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       7.9095E-01    2.042E-01    2.064E-01
 K-40         7.5410E+00    1.871E+00    1.892E+00
 Ac-228       1.3794E+00    3.666E-01    3.702E-01
 Pb-212       9.3800E-01    1.639E-01    1.676E-01
 CS-137 #     6.9027E-02    5.965E-02    5.971E-02
 Th-234       1.2611E+00    1.018E+00    1.019E+00
 Pb-214       8.8593E-01    1.672E-01    1.704E-01
 Pb-210 #     2.8778E+00    3.780E+00    3.781E+00
 AM-241       5.2306E+00    5.452E-01    5.786E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0779 D2 Bag# S-112 Grid B1-2,3,5 080207

< - 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) 2.0973877E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fern
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0780 D2 Bag# S-113 Grid B1-2,3,5 080207

Sample description
WI07-0780 D2 Bag # S-113 Grid B1-2,3,5 080207

Spectrum Filename: C:\user\D1 Samples\WI07-0835 D1 Sludge-H2O-Absorb 080207.An1

Acquisition information

Start time:	02-Aug-2007 12:21:33
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:	3.6830E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.6830E+02) = 2.7152E+03

Detection limit method: Traditional ORTEC method

WI07-0780 D2 Bag# S-113 Grid B1-2,3,5 080207

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	
14.82	3.89	4515.	23187.	38.645	1.75	2.343	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	184.73	46.36	188.	29.	0.048	167.94	0.466s
AM-241	237.64	59.59	459.	4749.	7.915	3.42	0.890
Th-234	252.14	63.21	77.	34.	0.057	100.29	0.462s
Pb-214	298.54	74.81	69.	117.	0.194	27.43	0.917D
Pb-212	298.56	74.81	112.	0.	0.000	256.04	0.693D
Pb-212	307.74	77.11	62.	181.	0.301	19.32	0.919D
Pb-214	307.74	77.11	286.	0.	0.000	73.92	0.249D
Pb-214	347.98	87.17	48.	69.	0.116	42.81	0.619s
Th-234	368.72	92.35	79.	36.	0.059	78.28	0.933D
Ac-228	380.72	95.35	50.	3.	0.005	712.92	0.935D
Ac-228	835.57	209.04	16.	41.	0.069	50.29	0.668s
Pb-212	953.94	238.62	19.	235.	0.391	14.10	1.057D
Pb-214	967.37	241.98	31.	41.	0.068	49.83	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 12:31:43 Page 3
4714781 Spectrum name: WI07-0835 D1 Sludge-H2O-Absorb

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.37	270.47	6.	42.	0.069	39.60	0.333s
Pb-214	1179.98	295.12	18.	64.	0.108	34.77	1.205s
Ac-228	1313.37	328.46	16.	24.	0.040	78.57	0.476s
Ac-228	1352.75	338.30	22.	67.	0.112	38.88	0.449s
Pb-214	1407.66	352.03	0.	127.	0.212	17.75	0.911s

WI07-0780 D2 Bag# S-113 Grid B1-2,3,5 080207

Ac-228	1852.76	463.27	3.	21.	0.035	53.47	0.501s
Bi-214	2437.35	609.37	3.	83.	0.139	23.32	0.921s
CS-137	2646.77	661.71	2.	17.	0.028	57.83	0.398s
Bi-214	3074.50	768.60	0.	9.	0.015	66.67	0.250s
Ac-228	3178.75	794.65	0.	8.	0.013	70.71	0.312s
Ac-228	3645.95	911.41	0.	43.	0.072	30.50	0.504s
Bi-214	3741.33	935.24	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	1.	7.	0.012	83.35	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.64	1.598D
Bi-214	4483.00	1120.58	9.	1.	0.002	804.67	0.000s
Bi-214	4955.33	1238.60	0.	8.	0.013	70.71	0.250s
Bi-214	5511.00	1377.44	0.	3.	0.005	115.47	0.750s
K-40	5846.46	1461.26	0.	41.	0.068	31.23	0.417s
Ac-228	6355.86	1588.53	0.	7.	0.012	75.59	0.417s
Bi-214	7059.62	1764.36	0.	13.	0.022	55.47	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	4.1078E-04	609.31	3.868E-04	(	1.364E-05	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.217E-04	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	4.690E-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	5.830E-04	&	3.887E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	4.9308E-04	911.07	4.736E-04	(	1.101E-05	G K
			969.11	5.483E-04	(	1.942E-05	G
			338.32	7.852E-04	+	1.623E-04	G
			964.60	4.408E-04	(	1.174E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	8.250E-04	+	2.902E-04	G
			209.28	8.711E-04	+	2.367E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.302E-03	+	3.221E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	2.082E-04	X
		327.64	9.841E-04	&	3.852E-04	G
Pb-212	N 5.3896E-04	238.62	5.390E-04	(	1.554E-05	G K
		77.11	6.923E-04	+	8.633E-05	Energy duplication
		74.81	0.000E+00	%	1.002E-04	Energy duplication
CS-137	4.5616E-05	661.66	4.562E-05	(	7.156E-06	G
Th-234	N 5.2833E-04	92.35	4.445E-04	(	1.636E-04	G
		63.29	6.477E-04	?(	2.461E-04	G

WI07-0780 D2 Bag# S-113 Grid B1-2,3,5 080207

Pb-214	N	4.4779E-04	351.92	4.704E-04	@(	3.704E-06	G K
			295.21	4.040E-04	@(	4.032E-05	G
			77.11	0.000E+00	?	1.603E-04	Energy duplication
			241.98	5.639E-04	+	1.730E-04	G
			74.81	1.301E-03	+	2.209E-04	Energy duplication
			87.30	1.006E-03	+	2.293E-04	X
Pb-210	N	5.9200E-04	46.50	5.920E-04	?(	4.062E-04	G
AM-241		9.7788E-03	59.54	9.779E-03	(	6.343E-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:
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 02-AUG-2007 12:31:43 Page 5
4714781 Spectrum name: WI07-0835 D1 Sludge-H2O-Absorb

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	1.1153E+00	2.601E-01	2.634E-01
K-40 #	4.9013E+00	1.531E+00	1.542E+00
Ac-228	1.3388E+00	4.002E-01	4.033E-01
Pb-212	1.4634E+00	2.064E-01	2.135E-01
CS-137	1.2386E-01	7.163E-02	7.179E-02
Th-234	1.4345E+00	9.125E-01	9.131E-01
Pb-214	1.2158E+00	2.158E-01	2.205E-01
Pb-210 #C	1.6074E+00	2.699E+00	2.700E+00
AM-241	2.6551E+01	9.074E-01	1.338E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0780 D2 Bag# S-113 Grid B1-2,3,5 080207

& - 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) 3.9751663E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0781 D2 Bag# S-114 Grid B1-2,5 080207

```
     ORTEC g v - i (  63) wan32  G53W2.06  02-AUG-2007 12:44:51 Page    1
4714781                          Spectrum name: Win00484.An1

Sample description
     WI07-0781 D2 Bag # S-114 Grid B1-2,5 080207


Spectrum Filename: C:\User\Win00484.An1

Acquisition information
       Start time:                 02-Aug-2007 12:34:40
       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:                3.6270E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.6270E+02) =
                                   2.7571E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  02-AUG-2007 12:44:51 Page    2
4714781                          Spectrum name: Win00484.An1
```

WI07-0781 D2 Bag# S-114 Grid B1-2,5 080207

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: 0.1143

********** 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	6581.	10719.	17.866	2.88	0.854	-	D
16.24	4.04	15072.	9560.	15.934	4.17	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	185.75	46.62	51.	50.	0.084	61.06	0.722
AM-241	237.42	59.53	68.	134.	0.224	28.24	0.814
Th-234	253.07	63.44	88.	65.	0.109	61.52	1.452s
Pb-214	298.54	74.81	70.	106.	0.176	29.68	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	478.09	0.220D
Pb-212	307.74	77.11	73.	192.	0.319	19.21	0.919D
Pb-214	307.74	77.11	222.	0.	0.000	146.96	0.248D
Pb-214	347.47	87.04	41.	98.	0.163	30.88	1.276s
Th-234	368.72	92.35	64.	44.	0.073	60.17	0.933D
Ac-228	380.72	95.35	26.	20.	0.033	86.75	0.935D
Ac-228	835.88	209.12	17.	35.	0.058	54.60	0.389s
Pb-212	953.94	238.62	21.	215.	0.358	14.91	1.057D
Pb-214	967.37	241.98	40.	35.	0.058	61.55	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 12:44:51 Page 3
4714781 Spectrum name: Win00484.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.68	269.55	4.	47.	0.079	33.92	0.900s
Pb-214	1181.08	295.40	10.	70.	0.116	30.06	0.925
Ac-228	1311.21	327.92	15.	19.	0.032	93.56	1.224
Ac-228	1352.43	338.22	12.	72.	0.121	31.22	0.481s
Pb-214	1406.87	351.83	0.	121.	0.202	18.18	1.450s

WI07-0781 D2 Bag# S-114 Grid B1-2,5 080207

Ac-228	1852.38	463.18	5.	13.	0.022	80.62	0.382s
Bi-214	2437.01	609.29	5.	82.	0.137	25.34	1.465s
CS-137	2646.23	661.57	0.	22.	0.037	42.64	0.375s
Bi-214	3074.08	768.50	0.	13.	0.022	55.47	0.562s
Ac-228	3179.50	794.84	0.	9.	0.015	66.67	0.500s
Ac-228	3645.05	911.18	0.	58.	0.097	26.26	1.037s
Bi-214	3735.33	933.74	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	3.	10.	0.017	80.14	1.595D
Ac-228	3876.86	969.11	8.	30.	0.050	45.51	1.598D
Bi-214	4482.21	1120.38	0.	14.	0.023	53.45	0.500s
Bi-214	4953.80	1238.22	0.	14.	0.023	53.45	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.23	1460.95	0.	47.	0.078	29.17	2.249
Ac-228	6357.33	1588.90	0.	5.	0.008	89.44	0.250s
Bi-214	7061.00	1764.71	0.	11.	0.018	60.30	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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	3.7637E-04	609.31	3.829E-04	*(	1.672E-05	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-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	?	1.082E-04	G
			934.06	2.915E-04	-	2.915E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	(	4.403E-05	G
Ac-228	N	6.2483E-04	911.07	6.388E-04	(	1.101E-05	G K
			969.11	5.797E-04	(	8.868E-05	G
			338.32	8.497E-04	+	1.579E-04	G
			964.60	6.165E-04	(	1.855E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	5.197E-04	?(	1.402E-04	G
			209.28	7.335E-04	(	1.356E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 12:44:51 Page 4
4714781 Spectrum name: Win00484.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.479E-03	&	3.315E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	3.778E-04	-	1.946E-04	X
		327.64	7.737E-04	(	2.443E-04	G
Pb-212	N 4.9408E-04	238.62	4.941E-04	(	1.609E-05	G K
		77.11	7.334E-04	+	9.007E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	(	2.710E-06	G
Th-234	N 8.3206E-04	92.35	5.445E-04	(	1.479E-04	G
		63.29	1.241E-03	$(	2.622E-04	G

WI07-0781 D2 Bag# S-114 Grid B1-2,5 080207

```
Pb-214   N   4.4828E-04    351.92 4.481E-04 @(  3.704E-06          G K
                           295.21 4.354E-04  (  3.062E-05          G
                            77.11 0.000E+00 ?   1.416E-04Energy duplication
                           241.98 4.821E-04  (  1.310E-04          G
                            74.81 1.180E-03 +   2.150E-04Energy duplication
                            87.30 1.420E-03 +   2.493E-04          X

Pb-210   N   1.0275E-03     46.50 1.027E-03  (  2.160E-04          G

AM-241       2.7661E-04     59.54 2.766E-04  (  2.501E-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 02-AUG-2007 12:44:51 Page 5
4714781 Spectrum name: Win00484.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 #	1.0377E+00	2.629E-01	2.658E-01
K-40	5.7053E+00	1.664E+00	1.678E+00
Ac-228	1.7227E+00	4.299E-01	4.348E-01
Pb-212	1.3622E+00	2.032E-01	2.095E-01
CS-137 #	1.6437E-01	7.009E-02	7.037E-02
Th-234	2.2941E+00	9.871E-01	9.885E-01
Pb-214	1.2360E+00	2.247E-01	2.294E-01
Pb-210	2.8329E+00	1.730E+00	1.731E+00
AM-241	7.6264E-01	2.154E-01	2.172E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0781 D2 Bag# S-114 Grid B1-2,5 080207

& - 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) 1.7117891E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [illegible]
Supervisor

Laboratory: 4714781

WI07-0823 D2 Bag# S-115 Grid B1-4,5 080407

```
     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 08:04:11 Page    1
4714781                          Spectrum name: Win00498.An1

Sample description
     WI07- 0823 D2 Bag#S-115 Grid B1-4,5 080407


Spectrum Filename: C:\User\Win00498.An1

Acquisition information
       Start time:                 04-Aug-2007 07:54:01
       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:                3.5820E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5820E+02) =
                                   2.7917E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 08:04:11 Page    2
4714781                          Spectrum name: Win00498.An1
```

WI07-0823 D2 Bag# S-115 Grid B1-4,5 080407

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: 0.1108

********** 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	5377.	10102.	16.837	2.86	0.854	- D
16.73	4.17	14176.	8209.	13.682	4.66	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	185.78	46.62	35.	43.	0.072	55.18	0.656s
AM-241	237.67	59.59	91.	411.	0.686	13.39	0.917
Th-234	252.12	63.21	50.	50.	0.084	57.49	0.615s
Pb-214	298.54	74.81	80.	79.	0.132	38.96	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	2734.96	0.248D
Pb-212	307.74	77.11	62.	163.	0.272	20.77	0.919D
Pb-214	307.74	77.11	268.	0.	0.000	74.33	0.227D
Pb-214	348.01	87.17	49.	88.	0.147	36.03	0.909
Th-234	368.72	92.35	34.	67.	0.112	34.44	0.933D
Ac-228	380.72	95.35	27.	12.	0.021	131.42	0.936D
Ac-228	837.10	209.42	26.	23.	0.038	87.39	0.892
Pb-212	953.94	238.62	26.	206.	0.343	15.61	1.057D
Pb-214	967.37	241.98	43.	36.	0.060	61.28	1.060D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:04:11 Page 3
4714781 Spectrum name: Win00498.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.51	270.51	15.	21.	0.035	79.66	0.342s
Pb-214	1180.39	295.22	14.	108.	0.179	25.08	0.815s
Ac-228	1310.32	327.70	4.	21.	0.035	54.71	1.122
Ac-228	1352.35	338.20	7.	44.	0.074	38.60	0.850s
Pb-214	1407.37	351.95	16.	114.	0.190	23.51	0.538s

WI07-0823 D2 Bag# S-115 Grid B1-4,5 080407

Ac-228	1853.00	463.33	4.	0.	0.000	0.00	0.000s
Bi-214	2437.15	609.32	0.	91.	0.152	20.97	1.494
CS-137	2647.25	661.83	0.	28.	0.047	37.80	0.750s
Bi-214	3075.20	768.78	0.	11.	0.018	60.30	0.312s
Ac-228	3176.00	793.97	0.	11.	0.018	60.30	0.250s
Ac-228	3645.49	911.29	0.	45.	0.075	29.81	0.656s
Bi-214	3738.08	934.43	0.	15.	0.025	51.64	0.750s
Ac-228	3858.81	964.60	3.	11.	0.019	72.13	1.595D
Ac-228	3876.86	969.11	2.	28.	0.047	39.84	1.598D
Bi-214	4481.95	1120.31	0.	21.	0.035	43.64	1.624
Bi-214	4952.33	1237.85	0.	7.	0.012	75.59	0.375s
Bi-214	5510.00	1377.19	0.	5.	0.008	89.44	0.250s
K-40	5846.09	1461.17	0.	68.	0.113	24.25	0.435s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7059.00	1764.21	2.	0.	0.001	368.18	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	4.5279E-04	609.31	4.232E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	5.110E-04	?(	2.433E-05	G
			1238.11	4.746E-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	5.410E-04	?(	1.082E-04	G
			934.06	1.457E-03	+	5.830E-04	G
K-40	N	2.9939E-03	1460.81	2.994E-03	(	4.403E-05	G
Ac-228	N	5.4229E-04	911.07	4.956E-04	?(	1.101E-05	G K
			969.11	5.490E-04	(	4.708E-05	G
			338.32	5.196E-04	(	4.905E-05	G
			964.60	6.989E-04	(	1.770E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	0.000E+00	?	1.314E-04	G
			209.28	4.867E-04	(	1.635E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.509E-04	(	1.884E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	2.375E-04	-	1.800E-04	X
		327.64	8.552E-04	+	3.090E-04	G
Pb-212	N 4.7276E-04	238.62	4.728E-04	(	1.776E-05	G K
		77.11	6.244E-04	+	8.315E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	7.5877E-05	661.66	7.588E-05	?(	2.710E-06	G
Th-234	N 8.8812E-04	92.35	8.406E-04	(	1.087E-04	G
		63.29	9.557E-04	(	2.000E-04	G

WI07-0823 D2 Bag# S-115 Grid B1-4,5 080407

```
Pb-214   N   4.3549E-04    351.92 4.228E-04 ?(  2.278E-05          G K
                           295.21 6.734E-04 +   1.006E-04          G
                            77.11 0.000E+00 ?   1.553E-04Energy duplication
                           241.98 4.983E-04  (  1.353E-04          G
                            74.81 8.852E-04 +   2.047E-04Energy duplication
                            87.30 1.277E-03 +   2.476E-04          X

Pb-210   N   8.8120E-04     46.50 8.812E-04  (  1.809E-04          G

AM-241       8.4699E-04     59.54 8.470E-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

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:04:11 Page 5
4714781 Spectrum name: Win00498.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	1.2641E+00	2.650E-01	2.692E-01
K-40	8.3581E+00	2.027E+00	2.051E+00
Ac-228	1.5139E+00	3.540E-01	3.585E-01
Pb-212	1.3198E+00	2.060E-01	2.119E-01
CS-137 #	2.1183E-01	8.006E-02	8.047E-02
Th-234	2.4794E+00	8.309E-01	8.328E-01
Pb-214	1.2158E+00	2.859E-01	2.895E-01
Pb-210	2.4601E+00	1.358E+00	1.359E+00
AM-241	2.3646E+00	3.167E-01	3.286E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0823 D2 Bag# S-115 Grid B1-4,5 080407

& - 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) 2.1187624E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0855 D2 Bag# S-116 Grid C1-3,4 080407

```
     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 10:54:46 Page    1
4714781                          Spectrum name: Win00504.An1

Sample description
     WI07- 0855 D2 Bag#S-116 Grid C1-1,4,3 080407


Spectrum Filename: C:\User\Win00504.An1

Acquisition information
       Start time:                 04-Aug-2007 10:44:35
       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:                3.5600E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5600E+02) =
                                   2.8090E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 10:54:46 Page    2
4714781                          Spectrum name: Win00504.An1
```

WI07-0855 D2 Bag# S-116 Grid C1-3,4 080407

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: 0.1732

********** 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	
12.05	3.29	6461.	10840.	18.067	2.84	0.854	-	D
17.39	4.62	10974.	8513.	14.189	4.10	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	186.78	46.87	48.	22.	0.037	112.35	0.491s
AM-241	237.53	59.56	70.	673.	1.122	9.00	0.961
Th-234	253.32	63.51	53.	58.	0.096	58.94	0.508s
Pb-214	298.54	74.81	57.	76.	0.126	36.50	0.918D
Pb-212	298.56	74.81	86.	0.	0.000	532.17	0.218D
Pb-212	307.74	77.11	63.	126.	0.210	25.18	0.920D
Pb-214	307.74	77.11	150.	0.	0.000	489.26	0.603D
Pb-214	346.91	86.90	48.	48.	0.081	60.43	0.535s
Th-234	368.72	92.35	50.	37.	0.061	63.60	0.933D
Ac-228	380.72	95.35	21.	1.	0.001	1533.13	0.935D
Ac-228	835.54	209.03	14.	21.	0.035	75.59	0.496s
Pb-212	953.94	238.62	24.	161.	0.268	17.98	1.057D
Pb-214	967.37	241.98	29.	21.	0.035	85.16	1.060D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 10:54:46 Page 3
4714781 Spectrum name: Win00504.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.33	269.96	11.	28.	0.047	57.97	0.798s
Pb-214	1180.09	295.15	7.	78.	0.129	27.24	0.915s
Ac-228	1305.17	326.41	5.	2.	0.003	450.78	0.282s
Ac-228	1352.56	338.25	5.	28.	0.046	49.68	0.278s
Pb-214	1407.08	351.88	15.	76.	0.127	30.69	0.641s

WI07-0855 D2 Bag# S-116 Grid C1-3,4 080407

Ac-228	1851.50	462.95	0.	14.	0.023	53.45	0.292s
Bi-214	2436.64	609.19	4.	65.	0.108	28.98	1.111
CS-137	2646.24	661.57	0.	19.	0.032	45.88	0.500s
Bi-214	3073.50	768.35	4.	6.	0.011	129.14	0.222s
Ac-228	3180.00	794.97	0.	15.	0.025	51.64	0.312s
Ac-228	3646.19	911.47	0.	36.	0.060	33.33	0.552s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	4.	13.	0.022	67.24	1.595D
Ac-228	3876.86	969.11	0.	22.	0.036	43.56	1.598D
Bi-214	4484.12	1120.86	0.	18.	0.030	47.14	0.875s
Bi-214	4953.33	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5515.33	1378.53	0.	5.	0.008	89.44	0.250s
K-40	5845.65	1461.06	0.	68.	0.113	24.25	0.866s
Ac-228	6353.00	1587.82	0.	3.	0.005	115.47	0.250s
Bi-214	7061.67	1764.88	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0361E-04	609.31	3.007E-04	(	1.621E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	3.300E-04	?(	1.696E-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	2.9939E-03	1460.81	2.994E-03	?(	4.403E-05	G
Ac-228	N	4.0514E-04	911.07	3.965E-04	(	1.101E-05	G K
			969.11	4.211E-04	(	2.790E-05	G
			338.32	3.242E-04	(	4.458E-05	G
			964.60	8.318E-04	+	3.921E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	5.457E-04	?(	3.898E-05	G
			209.28	4.443E-04	(	1.230E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 10:54:46 Page 4
4714781 Spectrum name: Win00504.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.852E-04	+	2.920E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.378E-04	X
		327.64	0.000E+00	&	1.741E-04	G
Pb-212	N 3.6967E-04	238.62	3.697E-04	(	1.716E-05	G K
		77.11	4.827E-04	+	7.637E-05	Energy duplication
		74.81	0.000E+00	%	8.825E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	?(	2.710E-06	G
Th-234	N 7.2321E-04	92.35	4.595E-04	(	1.314E-04	G
		63.29	1.099E-03	$(	2.065E-04	G

WI07-0855 D2 Bag# S-116 Grid C1-3,4 080407

Pb-214	N	2.8271E-04	351.92	2.815E-04	(	2.222E-05		G K
			295.21	4.865E-04	+	8.487E-05		G
			77.11	0.000E+00	%	1.170E-04	Energy duplication	
			241.98	2.888E-04	(	1.126E-04		G
			74.81	8.438E-04	+	1.877E-04	Energy duplication	
			87.30	7.038E-04	+	2.085E-04		X
Pb-210	N	4.5591E-04	46.50	4.559E-04	?(	2.098E-04		G
AM-241		1.3858E-03	59.54	1.386E-03	(	2.542E-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 04-AUG-2007 10:54:46 Page 5
4714781 Spectrum name: Win00504.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	8.5282E-01	2.471E-01	2.492E-01
K-40 #	8.4098E+00	2.040E+00	2.064E+00
Ac-228	1.1380E+00	3.139E-01	3.167E-01
Pb-212	1.0384E+00	1.867E-01	1.907E-01
CS-137 #	1.4463E-01	6.636E-02	6.659E-02
Th-234	2.0315E+00	8.807E-01	8.820E-01
Pb-214	7.9414E-01	2.437E-01	2.455E-01
Pb-210 #	1.2806E+00	1.439E+00	1.439E+00
AM-241	3.8927E+00	3.505E-01	3.790E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0855 D2 Bag# S-116 Grid C1-3,4 080407

& - 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) 1.9582661E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0856 D2 Bag# S-117 Grid C1-3,4 080407

```
     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 11:38:46 Page    1
4714781                          Spectrum name: Win00505.An1

Sample description
     WI07- 0856 D2 Bag#S-117 Grid C1-1,4,3 080407


Spectrum Filename: C:\User\Win00505.An1

Acquisition information
       Start time:                 04-Aug-2007 11:28:36
       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:                3.1050E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1050E+02) =
                                   3.2206E+03
       Detection limit method:     Traditional ORTEC method

D

     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 11:38:46 Page    2
4714781                          Spectrum name: Win00505.An1
```

WI07-0856 D2 Bag# S-117 Grid C1-3,4 080407

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: 0.1729

********** 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	4762.	9815.	16.358	2.83	0.854	-	D
15.70	3.91	14997.	9185.	15.309	4.31	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	186.45	46.79	118.	47.	0.078	85.21	0.411s
AM-241	237.63	59.58	283.	2521.	4.201	4.86	0.866
Th-234	253.71	63.60	64.	34.	0.057	88.43	0.746
Pb-214	298.54	74.81	75.	111.	0.185	29.16	0.917D
Pb-212	298.56	74.81	111.	0.	0.000	602.66	0.431D
Pb-212	307.74	77.11	54.	194.	0.323	17.91	0.919D
Pb-214	307.74	77.11	244.	0.	0.000	94.69	0.000D
Pb-214	348.66	87.34	44.	56.	0.093	48.97	1.073s
Th-234	368.72	92.35	60.	51.	0.084	51.80	0.933D
Ac-228	380.72	95.35	42.	9.	0.015	215.27	0.935D
Ac-228	837.70	209.57	19.	32.	0.054	62.10	0.637s
Pb-212	953.94	238.62	25.	203.	0.339	15.65	1.057D
Pb-214	967.37	241.98	35.	45.	0.075	47.48	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 11:38:46 Page 3
4714781 Spectrum name: Win00505.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.35	270.47	10.	35.	0.058	50.57	0.456s
Pb-214	1180.45	295.24	4.	64.	0.106	28.04	1.096s
Ac-228	1311.73	328.05	3.	24.	0.040	51.06	0.508s
Ac-228	1352.48	338.23	8.	60.	0.101	32.71	0.966
Pb-214	1407.31	351.94	23.	104.	0.173	28.21	0.667s

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Ac-228	1851.38	462.93	0.	23.	0.038	41.70	0.666s
Bi-214	2438.22	609.59	3.	56.	0.093	29.76	0.602s
CS-137	2648.31	662.09	0.	13.	0.022	55.47	0.375s
Bi-214	3075.00	768.73	0.	18.	0.030	47.14	0.625s
Ac-228	3179.33	794.80	0.	7.	0.012	75.59	0.375s
Ac-228	3646.08	911.44	0.	36.	0.060	33.33	1.583
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	12.	0.020	57.05	1.595D
Ac-228	3876.86	969.11	3.	16.	0.026	61.08	1.598D
Bi-214	4482.56	1120.47	0.	16.	0.027	50.00	0.333s
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	5845.95	1461.13	0.	40.	0.067	31.62	0.394s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7060.00	1764.46	2.	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	2.5965E-04	609.31	2.596E-04	(	1.426E-05	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	3.893E-04	+	1.503E-04	G
			1238.11	0.000E+00	?	6.779E-05	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	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	3.6563E-04	911.07	3.965E-04	(	1.101E-05	G K
			969.11	3.014E-04	(	6.182E-05	G
			338.32	7.071E-04	+	1.427E-04	G
			964.60	7.586E-04	+	3.385E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	6.842E-04	+	2.245E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 11:38:46 Page 4
4714781 Spectrum name: Win00505.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.093E-03	+	3.124E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.044E-04	X
		327.64	9.706E-04	+	3.203E-04	G
Pb-212	N 4.6689E-04	238.62	4.669E-04	(	1.739E-05	G K
		77.11	7.429E-04	+	8.721E-05	Energy duplication
		74.81	0.000E+00	%	9.980E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 6.3779E-04	92.35	6.308E-04	(	1.436E-04	G
		63.29	6.477E-04	$(	2.253E-04	G

WI07-0856 D2 Bag# S-117 Grid C1-3,4 080407

Pb-214	N	3.8947E-04	351.92	3.852E-04	(	2.704E-05	G K
			295.21	3.978E-04	*(	2.000E-05	G
			77.11	0.000E+00	?	1.484E-04	Energy duplication
			241.98	6.242E-04	+	1.819E-04	G
			74.81	1.237E-03	+	2.209E-04	Energy duplication
			87.30	8.126E-04	+	2.126E-04	X
Pb-210	N	9.5945E-04	46.50	9.594E-04	(	3.240E-04	G
AM-241		5.1904E-03	59.54	5.190E-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 04-AUG-2007 11:38:46 Page 5
4714781 Spectrum name: Win00505.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	8.3623E-01	2.489E-01	2.508E-01
K-40 #	5.6719E+00	1.794E+00	1.806E+00
Ac-228	1.1776E+00	3.925E-01	3.950E-01
Pb-212	1.5037E+00	2.354E-01	2.420E-01
CS-137 #	1.1346E-01	6.293E-02	6.308E-02
Th-234	2.0541E+00	1.053E+00	1.054E+00
Pb-214	1.2543E+00	2.494E-01	2.538E-01
Pb-210	3.0900E+00	2.633E+00	2.634E+00
AM-241	1.6716E+01	8.120E-01	1.021E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0856 D2 Bag# S-117 Grid C1-3,4 080407

& - 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) 3.2417480E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0857 D2 Bag# S-118 Grid C1-2,5 080407

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:22:57 Page 1
4714781 Spectrum name: Win00506.An1

Sample description
WI07- 0857 D2 Bag#S-118 Grid C1-2,5 080407

Spectrum Filename: C:\User\Win00506.An1

Acquisition information
Start time: 04-Aug-2007 12:12:45
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: 3.5560E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5560E+02) = 2.8121E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:22:57 Page 2
4714781 Spectrum name: Win00506.An1

WI07-0857 D2 Bag# S-118 Grid C1-2,5 080407

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: 0.1149

********** 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	5190.	23772.	39.620	1.78	2.316	CU-64	s
104.55	26.32	18.	44.	0.073	45.00	0.546	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	178.22	44.73	104.	22.	0.037	166.14	0.256s
AM-241	237.64	59.59	264.	2524.	4.207	4.71	0.918
Th-234	252.94	63.41	41.	79.	0.131	36.69	1.360s
Pb-214	298.54	74.81	70.	111.	0.185	28.64	0.917D
Pb-212	298.56	74.81	103.	0.	0.000	246.08	0.262D
Pb-212	307.74	77.11	63.	181.	0.302	19.33	0.919D
Pb-214	307.74	77.11	304.	0.	0.000	66.81	0.198D
Pb-214	348.12	87.20	56.	72.	0.120	43.03	0.458s
Th-234	368.72	92.35	70.	48.	0.081	56.53	0.933D
Ac-228	380.72	95.35	36.	7.	0.011	264.08	0.935D
Ac-228	835.49	209.02	21.	38.	0.063	54.70	0.799
Pb-212	953.94	238.62	30.	250.	0.416	14.11	1.057D
Pb-214	967.37	241.98	37.	35.	0.058	60.29	1.060D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:22:57 Page 3
4714781 Spectrum name: Win00506.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.45	270.74	15.	30.	0.050	63.25	0.642s
Pb-214	1180.29	295.20	10.	78.	0.129	27.92	1.254
Ac-228	1310.61	327.77	4.	12.	0.020	81.65	0.370s
Ac-228	1353.06	338.38	3.	73.	0.122	25.06	0.643s
Pb-214	1407.81	352.06	10.	110.	0.183	22.87	0.914

WI07-0857 D2 Bag# S-118 Grid C1-2,5 080407

Ac-228	1851.41	462.93	3.	21.	0.036	52.29	0.984
Bi-214	2437.00	609.28	3.	68.	0.113	26.78	0.887s
CS-137	2643.29	660.84	4.	2.	0.003	336.65	0.179s
Bi-214	3074.50	768.60	1.	7.	0.011	89.55	0.543s
Ac-228	3180.88	795.18	0.	12.	0.020	57.74	0.437s
Ac-228	3645.65	911.33	0.	50.	0.083	28.28	0.821s
Bi-214	3733.67	933.33	2.	1.	0.002	447.21	0.187s
Ac-228	3858.81	964.60	0.	10.	0.017	63.70	1.595D
Ac-228	3876.86	969.11	4.	29.	0.049	41.24	1.598D
Bi-214	4482.00	1120.33	0.	13.	0.022	55.47	0.750s
Bi-214	4950.00	1237.27	0.	13.	0.022	55.47	0.250s
Bi-214	5512.67	1377.86	0.	6.	0.010	81.65	0.375s
K-40	5845.28	1460.97	0.	47.	0.078	29.17	0.450s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.11	1764.99	0.	10.	0.017	63.25	0.333s

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	3.2543E-04	609.31	3.147E-04	(	1.456E-05	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	8.813E-04	+	3.812E-04	G
			768.36	3.561E-04	?(	1.098E-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	%	2.915E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	5.8764E-04	911.07	5.506E-04	?(	1.101E-05	G K
			969.11	5.700E-04	(	6.302E-05	G
			338.32	8.575E-04	+	1.505E-04	G
			964.60	6.143E-04	(	6.714E-05	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	8.315E-04	+	2.902E-04	G
			209.28	8.041E-04	(	1.481E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:22:57 Page 4
4714781 Spectrum name: Win00506.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.373E-04	+	3.124E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.885E-04	X
		327.64	4.887E-04	?(	1.373E-04	G
Pb-212	N 5.7380E-04	238.62	5.738E-04	(	1.908E-05	G K
		77.11	6.942E-04	+	8.656E-05	Energy duplication
		74.81	0.000E+00	%	9.626E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.084E-05	G
Th-234	N 6.0449E-04	92.35	6.045E-04	(	1.535E-04	G
		63.29	1.502E-03	+	3.048E-04	G

```
                    WI07-0857   D2 Bag# S-118   Grid C1-2,5 080407
Pb-214   N   4.3825E-04    351.92 4.056E-04  (  1.893E-05         G K
                           295.21 4.855E-04  (  3.062E-05         G
                            77.11 0.000E+00 ?   1.651E-04Energy duplication
                           241.98 4.796E-04  (  1.266E-04         G
                            74.81 1.236E-03 +   2.180E-04Energy duplication
                            87.30 1.045E-03 +   2.395E-04         X

Pb-210   N   4.4910E-04     46.50 4.491E-04 &(  3.048E-04         G

AM-241       5.1983E-03     59.54 5.198E-03  (  4.831E-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  GS3W2.06  04-AUG-2007 12:22:57 Page    5
4714781                          Spectrum name: Win00506.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        9.1515E-01    2.451E-01    2.475E-01
K-40    #     5.8192E+00    1.698E+00    1.712E+00
Ac-228        1.6525E+00    3.851E-01    3.900E-01
Pb-212        1.6136E+00    2.277E-01    2.356E-01
CS-137   <    3.0482E-02
Th-234        1.6999E+00    9.610E-01    9.618E-01
Pb-214        1.2324E+00    2.818E-01    2.856E-01
Pb-210 #C     1.2629E+00    2.098E+00    2.098E+00
AM-241        1.4618E+01    6.885E-01    8.757E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0857 D2 Bag# S-118 Grid C1-2,5 080407

& - 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) 2.8814140E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0858 D2 Bag# S-119 Grid C1-2,5 080407

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:36:42 Page 1
4714781 Spectrum name: Win00507.An1

Sample description
WI07- 0858 D2 Bag#S-119 Grid C1-2,5 080407

Spectrum Filename: C:\User\Win00507.An1

Acquisition information
Start time: 04-Aug-2007 12:26:32
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: 3.5680E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5680E+02) = 2.8027E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:36:42 Page 2
4714781 Spectrum name: Win00507.An1

WI07-0858 D2 Bag# S-119 Grid C1-2,5 080407

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	
11.73	2.91	2762.	9858.	16.431	2.52	0.854	-	D
17.68	4.39	12184.	7744.	12.906	4.63	0.855	-	D
742.81	185.85	22.	43.	0.072	48.56	0.391	U-235	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	185.87	46.65	103.	36.	0.059	98.92	1.025
AM-241	237.58	59.57	235.	3220.	5.367	3.97	0.928
Th-234	252.53	63.31	72.	65.	0.108	55.81	0.930s
Pb-214	298.54	74.81	65.	104.	0.173	29.44	0.917D
Pb-212	298.56	74.81	122.	0.	0.000	144.66	0.275D
Pb-212	307.74	77.11	77.	174.	0.290	20.81	0.919D
Pb-214	307.74	77.11	266.	0.	0.000	164.92	0.284D
Pb-214	347.73	87.10	65.	57.	0.095	56.88	0.625s
Th-234	371.60	93.07	57.	82.	0.137	42.04	0.844s
Ac-228	380.72	95.35	37.	0.	0.000	0.00	0.935
Ac-228	835.17	208.94	15.	51.	0.086	42.64	0.895s
Pb-212	953.94	238.62	16.	234.	0.389	13.97	1.057D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:36:42 Page 3
4714781 Spectrum name: Win00507.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	33.	51.	0.084	42.85	1.060D
Ac-228	1075.64	269.04	17.	15.	0.024	113.73	0.245s
Pb-214	1180.79	295.32	8.	80.	0.133	26.14	1.037
Ac-228	1307.27	326.94	4.	30.	0.049	45.61	0.275s
Ac-228	1353.07	338.38	12.	64.	0.108	32.26	0.837s

WI07-0858 D2 Bag# S-119 Grid C1-2,5 080407

Pb-214	1407.63	352.02	0.	136.	0.227	17.15	0.962
Ac-228	1841.91	460.56	9.	5.	0.008	256.35	0.233s
Bi-214	2438.14	609.57	4.	90.	0.151	22.95	1.490
CS-137	2647.80	661.97	0.	20.	0.033	44.72	0.469s
Bi-214	3074.20	768.53	0.	18.	0.030	47.14	0.312s
Ac-228	3179.75	794.90	3.	12.	0.020	78.88	0.573s
Ac-228	3645.61	911.32	0.	51.	0.085	28.01	1.349
Bi-214	3737.20	934.21	0.	6.	0.010	81.65	0.375s
Ac-228	3858.81	964.60	1.	16.	0.027	52.49	1.595D
Ac-228	3876.86	969.11	2.	28.	0.047	40.29	1.598D
Bi-214	4482.35	1120.41	0.	20.	0.033	44.72	0.300s
Bi-214	4951.14	1237.55	4.	2.	0.002	401.85	0.150s
Bi-214	5512.67	1377.86	1.	1.	0.001	366.67	0.181s
K-40	5843.95	1460.63	0.	38.	0.063	32.44	0.394s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.36	1764.80	0.	13.	0.022	55.47	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	4.4181E-04	609.31	4.201E-04	(	1.513E-05	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	4.867E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.509E-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	%	2.771E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	(	4.403E-05	G
Ac-228	N	6.0546E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	5.448E-04	(	4.922E-05	G
			338.32	7.559E-04	(	6.475E-05	G
			964.60	9.947E-04	+	3.921E-04	G
			794.70	7.154E-04	?(	1.724E-04	G
			463.00	0.000E+00	&	2.267E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 12:36:42 Page 4
4714781 Spectrum name: Win00507.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.086E-03	+	2.539E-04	G
		270.23	4.582E-04	&	2.660E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00		1.756E-04	X
		327.64	1.201E-03	&	3.518E-04	G
Pb-212	N 5.3702E-04	238.62	5.370E-04	(	1.433E-05	G K
		77.11	6.663E-04	+	8.771E-05	Energy duplication
		74.81	0.000E+00	?	1.047E-04	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 1.1143E-03	92.35	1.027E-03	&(	1.392E-04	G
		63.29	1.238E-03	*(	2.383E-04	G

```
Pb-214   N   5.0283E-04     351.92 5.037E-04  (  3.704E-06          G K
                            295.21 5.011E-04  (  2.838E-05          G
                             77.11 0.000E+00 ?   1.547E-04Energy duplication
                            241.98 6.994E-04 +   1.863E-04          G
                             74.81 1.160E-03 +   2.108E-04Energy duplication
                             87.30 8.271E-04 +   2.340E-04          X

Pb-210   N   7.2809E-04      46.50 7.281E-04  (  3.039E-04          G

AM-241       6.6311E-03      59.54 6.631E-03  (  4.565E-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	1.2382E+00	2.842E-01	2.879E-01
K-40	4.6891E+00	1.521E+00	1.531E+00
Ac-228	1.6969E+00	4.172E-01	4.220E-01
Pb-212	1.5051E+00	2.102E-01	2.177E-01
CS-137 #	1.5190E-01	6.793E-02	6.818E-02
Th-234 #	3.1231E+00	1.091E+00	1.094E+00
Pb-214	1.4093E+00	2.203E-01	2.265E-01
Pb-210	2.0406E+00	2.019E+00	2.019E+00
AM-241	1.8585E+01	7.373E-01	1.008E+00

- All peaks for activity calculation had bad shape.

WI07-0858 D2 Bag# S-119 Grid C1-2,5 080407

* - 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) 3.4439217E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0850 D2 Bag# S-120 Grid C1-3,5 080407

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:18:18 Page 1
4714781 Spectrum name: Win00499.An1

Sample description
WI07- 0850 D2 Bag#S-120 Grid C1-3,5 080407

Spectrum Filename: C:\User\Win00499.An1

Acquisition information
Start time: 04-Aug-2007 08:08:07
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: 3.9610E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9610E+02) = 2.5246E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:18:18 Page 2
4714781 Spectrum name: Win00499.An1

WI07-0850 D2 Bag# S-120 Grid C1-3,5 080407

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: 0.0843

********** 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	2.91	4977.	10763.	17.938	2.67	0.854	-	D
17.78	4.40	13247.	8714.	14.524	4.31	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	186.12	46.71	13.	38.	0.063	45.44	1.072s
AM-241	237.14	59.46	28.	26.	0.043	79.76	0.918
Th-234	254.17	63.72	60.	28.	0.047	116.93	0.260s
Pb-214	298.54	74.81	40.	59.	0.098	40.24	0.917D
Pb-212	298.56	74.81	61.	0.	0.000	166.60	0.212D
Pb-212	307.74	77.11	44.	102.	0.171	26.95	0.919D
Pb-214	307.74	77.11	174.	0.	0.000	131.23	0.000D
Pb-214	347.38	87.02	24.	61.	0.102	40.02	1.017s
Th-234	372.16	93.21	35.	66.	0.110	41.60	0.610s
Ac-228	381.03	95.43	34.	0.	0.000	0.00	0.935
Ac-228	836.80	209.35	4.	15.	0.025	65.77	0.998
Pb-212	953.94	238.62	27.	115.	0.192	22.48	1.057D
Pb-214	967.37	241.98	26.	24.	0.040	73.66	1.060D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:18:18 Page 3
4714781 Spectrum name: Win00499.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.25	269.69	16.	4.	0.007	318.17	0.175s
Pb-214	1182.02	295.63	40.	4.	0.007	600.00	0.256s
Ac-228	1312.58	328.26	2.	11.	0.018	74.97	0.348s
Ac-228	1353.52	338.49	3.	28.	0.047	44.36	0.488s
Pb-214	1407.61	352.01	5.	79.	0.132	24.87	0.838s

WI07-0850 D2 Bag# S-120 Grid C1-3,5 080407

Ac-228	1848.71	462.26	0.	18.	0.030	47.14	0.312s
Bi-214	2437.31	609.36	0.	61.	0.102	25.61	1.214
CS-137	2643.00	660.77	0.	5.	0.008	89.44	0.250s
Bi-214	3071.83	767.93	2.	2.	0.003	244.95	0.297s
Ac-228	3180.00	794.97	0.	4.	0.007	100.00	0.250s
Ac-228	3646.50	911.54	0.	24.	0.040	40.82	0.333s
Bi-214	3735.50	933.78	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	1.	6.	0.010	88.60	1.595D
Ac-228	3876.86	969.11	4.	8.	0.014	93.40	1.598D
Bi-214	4482.23	1120.38	0.	17.	0.028	48.51	0.500s
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	5845.29	1460.97	0.	94.	0.157	20.63	0.800s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7058.25	1764.02	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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	2.9298E-04	609.31	2.837E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	0.000E+00	%	1.757E-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	-	2.489E-04	G
K-40	N	4.1386E-03	1460.81	4.139E-03	(	4.403E-05	G
Ac-228	N	3.0107E-04	911.07	2.643E-04	(	1.101E-05	G K
			969.11	1.640E-04	-	1.053E-04	G
			338.32	3.301E-04	*(	3.437E-05	G
			964.60	3.873E-04	(	1.114E-04	G
			794.70	2.352E-04	?(	5.880E-05	G
			463.00	7.016E-04	&	2.542E-04	G
			209.28	3.174E-04	?(	7.136E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:18:18 Page 4
4714781 Spectrum name: Win00499.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	2.187E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00		1.688E-04	X
		327.64	4.480E-04	&(	1.043E-04	G
Pb-212	N 2.6543E-04	238.62	2.654E-04	(	1.792E-05	G K
		77.11	3.920E-04	+	6.745E-05	Energy duplication
		74.81	0.000E+00	?	7.485E-05	Energy duplication
CS-137	1.3549E-05	661.66	1.355E-05	&(	2.710E-06	G
Th-234	N 8.2347E-04	92.35	8.235E-04	&(	1.108E-04	G
		63.29	5.334E-04	-	2.624E-04	G

```
                    WI07-0850   D2 Bag# S-120   Grid C1-3,5  080407
Pb-214   N   2.9851E-04    351.92 2.926E-04 *(  1.371E-05         G K
                           295.21 0.000E+00 %   6.198E-05         G
                            77.11 0.000E+00 ?   1.258E-04Energy duplication
                           241.98 3.279E-04  (  1.074E-04         G
                            74.81 6.548E-04 +   1.627E-04Energy duplication
                            87.30 8.852E-04 +   1.966E-04         X

Pb-210   N   7.6892E-04     46.50 7.689E-04  (  1.161E-04         G

AM-241       5.2508E-05     59.54 5.251E-05  (  1.634E-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  04-AUG-2007 08:18:18 Page    5
4714781                          Spectrum name: Win00499.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        7.3967E-01    1.894E-01    1.914E-01
K-40          1.0448E+01    2.155E+00    2.191E+00
Ac-228        7.6008E-01    2.246E-01    2.264E-01
Pb-212        6.7011E-01    1.506E-01    1.527E-01
CS-137 #      3.4207E-02    3.060E-02    3.062E-02
Th-234 #      2.0789E+00    8.649E-01    8.663E-01
Pb-214        7.5362E-01    1.874E-01    1.895E-01
Pb-210        1.9412E+00    8.820E-01    8.831E-01
AM-241        1.3256E-01    1.057E-01    1.058E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0850 D2 Bag# S-120 Grid C1-3,5 080407

& - 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) 1.7558821E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0851 D2 Bag# S-121 Grid C1-2,5 080407

Sample description
WI07- 0851 D2 Bag#S-121 Grid C1-2,5 080407

Spectrum Filename: C:\User\Win00500.An1

Acquisition information
Start time: 04-Aug-2007 08:26:49
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: 3.4700E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4700E+02) = 2.8818E+03
Detection limit method: Traditional ORTEC method

WI07-0851 D2 Bag# S-121 Grid C1-2,5 080407

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	
11.70	2.91	6599.	11529.	19.215	2.73	0.854	-	D
16.70	4.16	16606.	10272.	17.119	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	185.34	46.51	71.	48.	0.080	74.24	0.307s
AM-241	237.40	59.53	150.	688.	1.146	10.75	0.814
Th-234	252.25	63.24	37.	53.	0.089	47.02	0.578s
Pb-214	298.54	74.81	52.	102.	0.170	28.12	0.917D
Pb-212	298.56	74.81	103.	0.	0.000	485.34	0.430D
Pb-212	307.74	77.11	51.	150.	0.249	21.24	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	2180.84	0.584D
Pb-214	347.03	86.93	77.	49.	0.082	71.36	0.625s
Th-234	368.72	92.35	62.	43.	0.071	60.43	0.933D
Ac-228	380.72	95.35	30.	4.	0.007	365.56	0.935D
Ac-228	836.86	209.36	38.	53.	0.088	58.58	1.093
Pb-212	953.94	238.62	16.	191.	0.319	15.66	1.057D
Pb-214	967.37	241.98	30.	43.	0.072	47.18	1.060D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:37:00 Page 3
4714781 Spectrum name: Win00500.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.63	270.54	12.	22.	0.038	72.35	0.676s
Pb-214	1180.23	295.18	6.	66.	0.111	28.29	0.805s
Ac-228	1311.35	327.96	6.	18.	0.029	70.53	0.471s
Ac-228	1352.57	338.26	8.	46.	0.077	37.74	1.014
Pb-214	1408.27	352.18	2.	96.	0.159	21.38	1.162

WI07-0851 D2 Bag# S-121 Grid C1-2,5 080407

Ac-228	1849.33	462.41	3.	22.	0.037	53.01	0.427s
Bi-214	2438.23	609.59	0.	73.	0.122	23.41	0.977s
CS-137	2644.63	661.17	3.	8.	0.014	106.83	0.448s
Bi-214	3074.89	768.70	5.	10.	0.017	98.48	0.528s
Ac-228	3180.50	795.09	0.	14.	0.023	53.45	0.437s
Ac-228	3647.54	911.80	0.	47.	0.078	29.17	0.708s
Bi-214	3736.50	934.03	0.	4.	0.007	100.00	1.000s
Ac-228	3858.81	964.60	0.	11.	0.018	63.92	1.595D
Ac-228	3876.86	969.11	0.	28.	0.046	37.91	1.598D
Bi-214	4482.94	1120.56	0.	32.	0.053	35.36	0.687s
Bi-214	4939.00	1234.52	0.	12.	0.020	57.74	0.250s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.65	1461.06	0.	63.	0.105	25.20	1.333s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.50	1764.58	0.	6.	0.010	81.65	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	3.4267E-04	609.31	3.395E-04	@(	4.650E-06	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	7.786E-04	+	2.072E-04	G
			1238.11	8.135E-04	&	3.677E-04	G
			768.36	5.385E-04	+	3.127E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.7737E-03	1460.81	2.774E-03	(	4.403E-05	G
Ac-228	N	5.5629E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	5.405E-04	(	1.942E-05	G
			338.32	5.391E-04	(	5.310E-05	G
			964.60	6.528E-04	(	9.560E-05	G
			794.70	8.232E-04	+	3.419E-04	G
			463.00	8.575E-04	+	2.958E-04	G
			209.28	1.114E-03	+	2.962E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 08:37:00 Page 4
4714781 Spectrum name: Win00500.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.030E-04	?(	1.726E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	7.127E-04	(	1.686E-04	G
Pb-212	N 4.3919E-04	238.62	4.392E-04	(	1.433E-05	G K
		77.11	5.731E-04	+	7.873E-05	Energy duplication
		74.81	0.000E+00	%	9.626E-05	Energy duplication
CS-137	2.2131E-05	661.66	2.213E-05	?(	7.947E-06	G
Th-234	N 7.3286E-04	92.35	5.339E-04	(	1.455E-04	G
		63.29	1.016E-03	(	1.729E-04	G

WI07-0851 D2 Bag# S-121 Grid C1-2,5 080407

Pb-214	N	3.7475E-04	351.92	3.537E-04	(	1.034E-05	G K
			295.21	4.155E-04	(	2.445E-05	G
			77.11	0.000E+00	%	1.176E-04	Energy duplication
			241.98	5.948E-04	+	1.741E-04	G
			74.81	1.141E-03	+	2.017E-04	Energy duplication
			87.30	7.110E-04	+	2.377E-04	X
Pb-210	N	9.8326E-04	46.50	9.833E-04	(	2.534E-04	G
AM-241		1.4157E-03	59.54	1.416E-03	(	3.677E-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 04-AUG-2007 08:37:00 Page 5
4714781 Spectrum name: Win00500.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 #	9.8752E-01	2.312E-01	2.341E-01
K-40	7.9935E+00	2.014E+00	2.036E+00
Ac-228	1.6031E+00	3.585E-01	3.635E-01
Pb-212	1.2657E+00	1.981E-01	2.037E-01
CS-137 #	6.3777E-02	6.813E-02	6.817E-02
Th-234	2.1120E+00	8.086E-01	8.100E-01
Pb-214	1.0800E+00	1.915E-01	1.957E-01
Pb-210	2.8336E+00	2.104E+00	2.105E+00
AM-241	4.0797E+00	4.384E-01	4.637E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0851 D2 Bag# S-121 Grid C1-2,5 080407

& - 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) 2.2018911E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0852 D2 Bag# S-122 Grid C1-2,4 080407

Sample description
WI07- 0852 D2 Bag#S-122 Grid C1-2,4 080407

Spectrum Filename: C:\User\Win00501.An1

Acquisition information
Start time: 04-Aug-2007 08:51:54
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: 3.3840E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3840E+02) = 2.9551E+03
Detection limit method: Traditional ORTEC method

WI07-0852 D2 Bag# S-122 Grid C1-2,4 080407

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: 0.1098

********** 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	
14.81	3.89	3846.	20385.	33.975	1.86	2.412	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	46.64	39.	44.	0.073	64.28	1.115s
AM-241	237.64	59.59	47.	329.	0.549	13.37	0.960
Th-234	250.50	62.80	57.	35.	0.058	92.67	0.999
Pb-214	298.54	74.81	48.	77.	0.128	34.20	0.917D
Pb-212	298.56	74.81	69.	0.	0.000	338.35	0.262D
Pb-212	307.74	77.11	52.	93.	0.155	30.25	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	176.59	0.000D
Pb-214	347.83	87.13	16.	40.	0.068	46.13	0.640s
Th-234	368.72	92.35	33.	34.	0.057	57.86	0.933D
Ac-228	380.72	95.35	24.	5.	0.008	289.98	0.936D
Ac-228	835.64	209.06	15.	10.	0.016	154.71	0.462s
Pb-212	953.94	238.62	21.	136.	0.226	19.71	1.057D
Pb-214	967.37	241.98	16.	28.	0.046	56.40	1.060D
Ac-228	1079.83	270.09	8.	23.	0.038	62.91	0.465s

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 09:02:04 Page 3
4714781 Spectrum name: Win00501.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.17	295.17	8.	52.	0.086	35.61	0.567s
Ac-228	1304.94	326.35	4.	24.	0.039	53.32	0.455s
Ac-228	1352.81	338.32	6.	38.	0.064	40.43	0.514s
Pb-214	1408.07	352.13	4.	89.	0.148	23.46	1.238s
Ac-228	1851.75	463.02	0.	20.	0.033	44.72	0.500s

WI07-0852 D2 Bag# S-122 Grid C1-2,4 080407

Bi-214	2437.80	609.48	0.	59.	0.098	26.04	0.515s
CS-137	2647.64	661.92	0.	12.	0.020	57.74	0.500s
Bi-214	3072.67	768.14	0.	8.	0.013	70.71	0.625s
Ac-228	3179.45	794.83	0.	11.	0.018	60.30	0.583s
Ac-228	3645.81	911.37	0.	29.	0.048	37.14	0.687s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	10.	0.016	63.62	1.595D
Ac-228	3876.86	969.11	0.	15.	0.025	52.21	1.598D
Bi-214	4481.67	1120.24	0.	14.	0.023	53.45	0.292s
Bi-214	4953.00	1238.02	0.	9.	0.015	66.67	0.750s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.250s
K-40	5845.67	1461.06	0.	67.	0.112	24.43	0.937s
Ac-228	6354.67	1588.24	1.	0.	0.001	240.37	0.197s
Bi-214	7059.14	1764.24	0.	14.	0.023	53.45	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	2.9280E-04	609.31	2.744E-04	(	4.650E-06	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	4.169E-04	+	2.361E-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	2.9499E-03	1460.81	2.950E-03	(	4.403E-05	G
Ac-228	N	3.3695E-04	911.07	3.194E-04	(	1.101E-05	G K
			969.11	2.891E-04	(	2.299E-05	G
			338.32	4.492E-04	?(	4.575E-05	G
			964.60	6.100E-04	+	3.070E-04	G
			794.70	6.468E-04	+	3.067E-04	G
			463.00	7.795E-04	+	2.668E-04	G
			209.28	2.081E-04	-	1.606E-04	G
			270.23	7.186E-04	+	2.621E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 09:02:04 Page 4
4714781 Spectrum name: Win00501.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.566E-04	X
		327.64	9.570E-04	&	3.203E-04	G
Pb-212	N 3.2410E-04	238.62	3.115E-04	(	1.625E-05	G K
		77.11	3.554E-04	(	4.106E-05	Energy duplication
		74.81	0.000E+00	%	7.949E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 5.2784E-04	92.35	4.302E-04	(	1.070E-04	G
		63.29	6.668E-04	?(	2.132E-04	G
Pb-214	N 3.3356E-04	351.92	3.296E-04	@(	1.249E-05	G K

```
                    WI07-0852   D2 Bag# S-122   Grid C1-2,4  080407
                              295.21 3.226E-04  (  2.915E-05         G
                               77.11 0.000E+00 ?   1.178E-04Energy duplication
                              241.98 3.812E-04  (  8.648E-05         G
                               74.81 8.549E-04 +   1.815E-04Energy duplication
                               87.30 5.877E-04 +   1.624E-04         X

Pb-210   N   8.9821E-04      46.50 8.982E-04  (  1.908E-04         G

AM-241       6.7814E-04      59.54 6.781E-04  (  2.095E-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  04-AUG-2007 09:02:04 Page    5
4714781                                  Spectrum name: Win00501.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       8.6526E-01     2.253E-01    2.276E-01
K-40         8.7171E+00     2.130E+00    2.155E+00
Ac-228       9.9571E-01     2.514E-01    2.542E-01
Pb-212       9.5774E-01     1.729E-01    1.766E-01
CS-137 #     9.6095E-02     5.548E-02    5.560E-02
Th-234       1.5598E+00     8.520E-01    8.528E-01
Pb-214       9.8570E-01     2.313E-01    2.342E-01
Pb-210       2.6543E+00     1.706E+00    1.707E+00
AM-241       2.0040E+00     2.680E-01    2.781E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0852 D2 Bag# S-122 Grid C1-2,4 080407

< - 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) 1.8835648E+01 pCi/g

The library has energies which are not separable.

Analyzed by: Y.C. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0853 D2 Bag# S-123 Grid C1-2,4 080407

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 09:28:40 Page 1
4714781 Spectrum name: Win00502.An1

Sample description
WI07- 0853 D2 Bag#S-123 Grid C1-2,4,5 080407

Spectrum Filename: C:\User\Win00502.An1

Acquisition information
Start time: 04-Aug-2007 09:18:30
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: 3.1140E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1140E+02) = 3.2113E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 09:28:40 Page 2
4714781 Spectrum name: Win00502.An1

WI07-0853 D2 Bag# S-123 Grid C1-2,4 080407

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: 0.1053

********** 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	2.92	5702.	10857.	18.096	2.75	0.854	-	D
16.97	4.22	15504.	9043.	15.072	4.43	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	183.68	46.10	20.	8.	0.014	178.03	0.202s
AM-241	237.47	59.54	48.	312.	0.520	14.29	0.917s
Th-234	252.69	63.35	35.	32.	0.054	78.11	0.610s
Pb-214	298.54	74.81	45.	46.	0.077	50.11	0.917D
Pb-212	298.56	74.81	47.	0.	0.000	656.59	0.000D
Pb-212	307.74	77.11	42.	87.	0.144	30.27	0.919D
Pb-214	307.74	77.11	114.	0.	0.000	488.23	0.000D
Pb-214	348.28	87.24	17.	30.	0.051	57.02	0.715
Th-234	371.31	93.00	26.	55.	0.092	42.61	0.858s
Ac-228	380.72	95.35	30.	0.	0.000	0.00	0.935
Ac-228	836.97	209.39	5.	19.	0.032	61.10	0.958s
Pb-212	953.94	238.62	18.	88.	0.147	25.28	1.057D
Pb-214	967.37	241.98	17.	23.	0.039	64.92	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.82	270.59	2.	13.	0.022	65.09	0.281s
Pb-214	1181.69	295.55	0.	48.	0.080	28.87	0.750s
Ac-228	1309.96	327.61	2.	8.	0.014	89.52	0.274s
Ac-228	1352.91	338.34	9.	29.	0.048	55.60	0.597s
Pb-214	1406.78	351.81	8.	66.	0.111	30.66	0.677s

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Ac-228	1854.14	463.62	1.	4.	0.006	131.59	0.608s
Bi-214	2437.79	609.48	0.	38.	0.063	32.44	1.593
CS-137	2648.00	662.02	1.	0.	0.000	0.00	0.000s
Bi-214	3073.80	768.43	0.	8.	0.013	70.71	0.500s
Ac-228	3184.50	796.09	0.	12.	0.020	57.74	0.375s
Ac-228	3645.53	911.30	0.	30.	0.050	36.51	0.562s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	6.	0.009	85.04	1.595D
Ac-228	3876.86	969.11	0.	17.	0.029	48.00	1.598D
Bi-214	4480.92	1120.06	0.	15.	0.025	51.64	0.292s
Bi-214	4953.33	1238.10	0.	6.	0.010	81.65	0.375s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.24	1461.21	0.	84.	0.140	21.82	1.273s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.71	1764.64	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	1.7672E-04	609.31	1.767E-04	(	4.650E-06	G K
			1764.49	3.203E-04	+	1.698E-04	G
			1120.29	3.650E-04	+	1.460E-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	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	3.6983E-03	1460.81	3.698E-03	?(	4.403E-05	G
Ac-228	N	3.4319E-04	911.07	3.304E-04	(	1.101E-05	G K
			969.11	3.372E-04	(	1.942E-05	G
			338.32	3.399E-04	(	5.593E-05	G
			964.60	3.414E-04	(	6.173E-05	G
			794.70	7.056E-04	&	3.189E-04	G
			463.00	1.494E-04	-	1.443E-04	G
			209.28	4.091E-04	*(	7.608E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.114E-04	?(	7.745E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	3.326E-04	?(	1.010E-04	G
Pb-212	N 2.0240E-04	238.62	2.024E-04	(	1.496E-05	G K
		77.11	3.313E-04	+	6.344E-05	Energy duplication
		74.81	0.000E+00	%	6.612E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 6.5724E-04	92.35	6.862E-04	&(	9.643E-05	G
		63.29	6.160E-04	$(	1.684E-04	G

```
                    WI07-0853   D2 Bag# S-123   Grid C1-2,4  080407
Pb-214   N   2.7104E-04    351.92 2.457E-04  (  1.647E-05          G K
                           295.21 3.007E-04  (  6.264E-06          G
                            77.11 0.000E+00 %   1.024E-04Energy duplication
                           241.98 3.210E-04  (  8.732E-05          G
                            74.81 5.185E-04 +   1.562E-04Energy duplication
                            87.30 4.402E-04 +   1.481E-04          X

Pb-210   N   1.7352E-04     46.50 1.735E-04 ?(  1.381E-04          G

AM-241       6.4211E-04     59.54 6.421E-04 @(  2.127E-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  04-AUG-2007 09:28:40 Page    5
 4714781                          Spectrum name: Win00502.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	5.6749E-01	1.841E-01	1.853E-01
K-40 #	1.1876E+01	2.592E+00	2.630E+00
Ac-228	1.1021E+00	2.724E-01	2.756E-01
Pb-212	6.4998E-01	1.643E-01	1.661E-01
CS-137 <	1.7405E-02		
Th-234	2.1106E+00	8.994E-01	9.007E-01
Pb-214	8.7039E-01	2.245E-01	2.269E-01
Pb-210 #C	5.5722E-01	9.920E-01	9.921E-01
AM-241 #	2.0620E+00	2.947E-01	3.044E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0853 D2 Bag# S-123 Grid C1-2,4 080407

& - 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) 1.9796225E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K. Fina
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0854 D2 Bag# S-124 Grid C1-3,4 080407

```
     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 10:32:05 Page    1
4714781                          Spectrum name: Win00503.An1

Sample description
     WI07- 0854 D2 Bag#S-124 Grid C1-1,4,3 080407


Spectrum Filename: C:\User\Win00503.An1

Acquisition information
       Start time:                 04-Aug-2007 10:21:53
       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:                3.5600E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5600E+02) =
                                   2.8090E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 10:32:05 Page    2
4714781                          Spectrum name: Win00503.An1
```

WI07-0854 D2 Bag# S-124 Grid C1-3,4 080407

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: 0.1423

********** 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	4884.	24440.	40.733	1.72	2.172	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	184.67	46.35	44.	29.	0.048	92.67	0.606s
AM-241	237.56	59.57	107.	650.	1.084	9.92	0.853
Th-234	252.84	63.39	75.	26.	0.044	131.57	0.343s
Pb-214	298.54	74.81	28.	78.	0.131	29.65	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	324.04	0.273D
Pb-212	307.74	77.11	48.	122.	0.204	24.16	0.919D
Pb-214	307.74	77.11	133.	0.	0.000	562.64	0.670D
Pb-214	346.65	86.83	38.	52.	0.087	48.42	0.422s
Th-234	368.72	92.35	48.	35.	0.059	64.44	0.933D
Ac-228	380.72	95.35	43.	3.	0.005	591.65	0.935D
Ac-228	835.67	209.06	15.	29.	0.048	62.26	0.929
Pb-212	953.94	238.62	18.	164.	0.273	17.23	1.057D
Pb-214	967.37	241.98	30.	22.	0.036	82.80	1.060D
Ac-228	1079.49	270.00	12.	12.	0.021	116.06	1.013s

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 10:32:05 Page 3
4714781 Spectrum name: Win00503.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.07	295.14	6.	50.	0.083	35.12	0.892
Ac-228	1308.94	327.35	4.	2.	0.003	294.39	0.191s
Ac-228	1354.41	338.72	3.	42.	0.069	35.96	0.824s
Pb-214	1407.73	352.04	8.	70.	0.117	28.48	1.261
Ac-228	1853.30	463.40	4.	14.	0.023	76.59	0.566s

WI07-0854 D2 Bag# S-124 Grid C1-3,4 080407

Bi-214	2437.84	609.49	0.	64.	0.107	25.00	0.950s
CS-137	2647.39	661.86	2.	13.	0.022	63.25	0.352s
Bi-214	3072.67	768.14	0.	3.	0.005	115.47	0.375s
Ac-228	3182.71	795.64	0.	16.	0.027	50.00	1.187
Ac-228	3645.07	911.19	0.	40.	0.067	31.62	0.643s
Bi-214	3738.00	934.41	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	1.	8.	0.014	75.86	1.595D
Ac-228	3876.86	969.11	0.	17.	0.028	49.05	1.598D
Bi-214	4482.00	1120.33	3.	0.	0.000	0.00	0.000s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5510.33	1377.28	2.	1.	0.002	416.33	0.197s
K-40	5846.00	1461.15	0.	74.	0.123	23.25	0.444s
Ac-228	6355.50	1588.45	0.	2.	0.003	141.42	0.500s
Bi-214	7059.00	1764.21	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	3.2002E-04	609.31	2.976E-04	(	4.650E-06	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	0.000E+00	?	7.300E-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	0.000E+00	%	3.246E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	3.2581E-03	1460.81	3.258E-03	(	4.403E-05	G
Ac-228	N	4.7344E-04	911.07	4.405E-04	(	1.101E-05	G K
			969.11	3.228E-04	-	1.221E-04	G
			338.32	4.883E-04	@(	3.668E-05	G
			964.60	5.085E-04	(	1.131E-04	G
			794.70	9.408E-04	&	3.633E-04	G
			463.00	5.327E-04	?(	1.359E-04	G
			209.28	6.136E-04	(	1.270E-04	G
			270.23	3.853E-04	@(	1.673E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 10:32:05 Page 4
4714781 Spectrum name: Win00503.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.946E-04	X
		327.64	0.000E+00	%	1.629E-04	G
Pb-212	N 3.7616E-04	238.62	3.762E-04	(	1.482E-05	G K
		77.11	4.677E-04	+	7.253E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	3.6132E-05	661.66	3.613E-05	?(	6.485E-06	G
Th-234	N 4.6689E-04	92.35	4.425E-04	(	1.281E-04	G
		63.29	5.017E-04	$(	2.425E-04	G
Pb-214	N 2.7993E-04	351.92	2.593E-04	(	1.678E-05	G K

```
                    WI07-0854   D2 Bag# S-124   Grid C1-3,4  080407
                            295.21 3.111E-04  (  2.565E-05          G
                             77.11 0.000E+00 %   1.105E-04Energy duplication
                            241.98 3.026E-04  (  1.144E-04          G
                             74.81 8.739E-04 +   1.686E-04Energy duplication
                             87.30 7.618E-04 +   2.032E-04          X

Pb-210   N   5.8520E-04      46.50 5.852E-04  (  2.027E-04          G

AM-241       1.3391E-03      59.54 1.339E-03  (  3.112E-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  04-AUG-2007 10:32:05 Page    5
4714781                          Spectrum name: Win00503.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       8.9892E-01    2.247E-01    2.272E-01
K-40         9.1518E+00    2.128E+00    2.155E+00
Ac-228       1.3299E+00    3.919E-01    3.950E-01
Pb-212       1.0566E+00    1.820E-01    1.863E-01
CS-137 #     1.0149E-01    6.419E-02    6.431E-02
Th-234       1.3115E+00    8.451E-01    8.456E-01
Pb-214       7.8633E-01    2.239E-01    2.258E-01
Pb-210       1.6438E+00    1.523E+00    1.524E+00
AM-241       3.7616E+00    3.733E-01    3.984E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0854 D2 Bag# S-124 Grid C1-3,4 080407

< - 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) 2.0041986E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Flynn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0861 D2 Bag# S-125 Grid D3-1 080407

Sample description
WI07- 0861 D2 Bag# S-125 D3-1 080407

Spectrum Filename: C:\User\Win00511.An1

Acquisition information
Start time: 04-Aug-2007 14:05:54
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: 3.1360E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1360E+02) = 3.1888E+03
Detection limit method: Traditional ORTEC method

WI07-0861 D2 Bag# S-125 Grid D3-1 080407

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: 0.0888

********** 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	3654.	21893.	36.488	1.75	2.141	CU-64	s
2332.33	583.13	0.	87.	0.145	21.44	0.539	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	185.61	46.58	58.	38.	0.063	76.63	1.358s
AM-241	237.26	59.49	119.	515.	0.858	12.59	0.848
Th-234	253.27	63.49	33.	33.	0.054	67.50	0.300s
Pb-214	298.54	74.81	74.	96.	0.160	32.43	0.917D
Pb-212	298.56	74.81	96.	0.	0.000	220.27	0.549D
Pb-212	307.74	77.11	54.	158.	0.264	20.57	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	1013.25	0.201D
Pb-214	348.18	87.22	33.	55.	0.092	44.31	1.269s
Th-234	368.72	92.35	52.	48.	0.080	51.72	0.933D
Ac-228	380.72	95.35	22.	6.	0.009	253.09	0.935D
Ac-228	835.43	209.00	16.	32.	0.054	54.78	0.895
Pb-212	953.94	238.62	21.	224.	0.373	14.56	1.057D
Pb-214	967.37	241.98	22.	39.	0.065	46.44	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:16:05 Page 3
8905696 Spectrum name: Win00511.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.30	269.96	4.	40.	0.068	37.04	0.662s
Pb-214	1180.51	295.25	12.	44.	0.074	42.22	1.331s
Ac-228	1310.00	327.62	7.	0.	0.000	0.00	0.000s
Ac-228	1352.75	338.30	5.	55.	0.092	30.96	1.090
Pb-214	1406.58	351.76	12.	88.	0.147	27.13	1.142

WI07-0861 D2 Bag# S-125 Grid D3-1 080407

Ac-228	1851.44	462.94	0.	20.	0.033	44.72	0.500s
Bi-214	2437.00	609.28	48.	0.	0.000	0.00	0.000s
CS-137	2646.35	661.60	0.	26.	0.043	39.22	2.249s
Bi-214	3071.75	767.91	0.	4.	0.007	100.00	0.312s
Ac-228	3181.60	795.37	0.	10.	0.017	63.25	0.500s
Ac-228	3645.82	911.38	0.	34.	0.057	34.30	0.750s
Bi-214	3736.00	933.91	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	1.	6.	0.009	102.26	1.595D
Ac-228	3876.86	969.11	0.	22.	0.037	42.26	1.598D
Bi-214	4480.19	1119.87	0.	22.	0.037	42.64	0.562s
Bi-214	4952.60	1237.92	0.	7.	0.012	75.59	0.500s
Bi-214	5513.25	1378.01	0.	4.	0.007	100.00	0.312s
K-40	5845.58	1461.04	0.	50.	0.083	28.28	0.365s
Ac-228	6353.50	1587.95	0.	2.	0.003	141.42	0.500s
Bi-214	7057.74	1763.89	3.	2.	0.004	250.71	0.191s

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	0.0000E+00	609.31	0.000E+00	%	5.304E-05	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	5.353E-04	?	1.740E-04	G
			1238.11	4.746E-04	?	2.898E-04	G
			768.36	2.084E-04	?	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?	3.649E-04	G
			934.06	5.830E-04	?	3.887E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	?(	4.403E-05	G
Ac-228	N	4.0866E-04	911.07	3.744E-04	?(	1.101E-05	G K
			969.11	4.348E-04	(	1.942E-05	G
			338.32	6.446E-04	+	1.344E-04	G
			964.60	3.488E-04	(	1.368E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	7.795E-04	+	2.668E-04	G
			209.28	6.877E-04	+	2.203E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:16:05 Page 4
8905696 Spectrum name: Win00511.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.265E-03	+	3.091E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.541E-04	X
		327.64	0.000E+00	%	1.811E-04	G
Pb-212	N 5.1493E-04	238.62	5.149E-04	(	1.606E-05	G K
		77.11	6.067E-04	+	8.077E-05	Energy duplication
		74.81	0.000E+00	%	9.305E-05	Energy duplication
CS-137	7.0457E-05	661.66	7.046E-05	(	2.710E-06	G
Th-234	N 6.0649E-04	92.35	5.954E-04	(	1.340E-04	G
		63.29	6.223E-04	$(	1.654E-04	G

```
                    WI07-0861   D2 Bag# S-125   Grid D3-1   080407
Pb-214    N   3.1109E-04    351.92 3.278E-04  (  1.971E-05         G K
                            295.21 2.788E-04  (  3.461E-05         G
                             77.11 0.000E+00 %   1.145E-04Energy duplication
                            241.98 5.418E-04 +   1.598E-04         G
                             74.81 1.075E-03 +   2.114E-04Energy duplication
                             87.30 7.981E-04 +   1.999E-04         X

Pb-210    N   7.7572E-04     46.50 7.757E-04  (  2.303E-04         G

AM-241        1.0605E-03     59.54 1.060E-03  (  3.281E-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
   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  04-AUG-2007 14:16:05 Page    5
8905696                                  Spectrum name: Win00511.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 B<     1.6913E-01
K-40   #      7.0197E+00    1.985E+00    2.003E+00
Ac-228        1.3031E+00    4.300E-01    4.328E-01
Pb-212        1.6420E+00    2.390E-01    2.468E-01
CS-137        2.2467E-01    8.812E-02    8.854E-02
Th-234        1.9340E+00    8.223E-01    8.235E-01
Pb-214        9.9200E-01    2.489E-01    2.517E-01
Pb-210        2.4736E+00    1.896E+00    1.896E+00
AM-241        3.3816E+00    4.256E-01    4.437E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0861 D2 Bag# S-125 Grid D3-1 080407

& - 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) 1.8970642E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0860 D2 Bag# S-127 Grid D3-5,E3 080407

```
     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 14:01:45 Page    1
4714781                          Spectrum name: Win00510.An1

Sample description
     WI07- 0860  D2  Bag# S-127 D3-5 & E3-1   080407


Spectrum Filename: C:\User\Win00510.An1

Acquisition information
       Start time:                 04-Aug-2007 13:51:34
       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:                3.4220E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.4220E+02) =
                                   2.9223E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 14:01:45 Page    2
4714781                          Spectrum name: Win00510.An1
```

WI07-0860 D2 Bag# S-127 Grid D3-5,E3 080407

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: 0.0528

********** 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	2.94	5604.	11564.	19.274	2.61	0.854	-	D
16.89	4.22	15429.	8974.	14.956	4.45	0.855	-	D
70.62	17.84	78.	95.	0.158	42.47	0.822	MO-99	s
104.36	26.27	31.	159.	0.265	21.01	0.825	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	184.59	46.33	267.	28.	0.047	180.04	0.328s
AM-241	237.44	59.54	977.	10526.	17.544	2.31	0.921
Th-234	252.55	63.31	60.	60.	0.100	54.77	0.766
Pb-214	298.54	74.81	75.	110.	0.183	29.38	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	311.13	0.309D
Pb-212	307.74	77.11	64.	142.	0.236	23.23	0.919D
Pb-214	307.74	77.11	149.	0.	0.000	594.81	0.251D
Pb-214	347.97	87.16	44.	46.	0.077	58.01	0.767
Th-234	368.72	92.35	77.	58.	0.096	50.43	0.933D
Ac-228	380.72	95.35	27.	15.	0.026	108.05	0.935D
Ac-228	834.44	208.76	14.	49.	0.081	41.59	0.368s

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4714781 Spectrum name: Win00510.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	12.	202.	0.337	14.86	1.057D
Pb-214	967.37	241.98	29.	33.	0.056	56.87	1.060D
Ac-228	1081.20	270.43	6.	40.	0.066	40.98	1.625s
Pb-214	1180.09	295.15	5.	48.	0.080	33.72	1.466s
Ac-228	1309.32	327.45	7.	19.	0.032	71.84	0.311s

WI07-0860 D2 Bag# S-127 Grid D3-5,E3 080407

Ac-228	1352.77	338.31	0.	62.	0.103	25.40	0.875
Pb-214	1407.29	351.93	7.	107.	0.178	22.00	0.847s
Ac-228	1851.64	462.99	6.	10.	0.017	105.83	0.428s
Bi-214	2437.17	609.32	3.	67.	0.112	26.53	0.931s
CS-137	2646.93	661.75	0.	27.	0.045	38.49	0.687s
Bi-214	3072.00	767.98	1.	1.	0.002	316.23	0.100s
Ac-228	3179.56	794.86	0.	20.	0.033	44.72	0.312s
Ac-228	3645.38	911.26	0.	50.	0.083	28.28	0.825s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	4.	4.	0.007	151.09	1.595D
Ac-228	3876.86	969.11	2.	32.	0.053	37.10	1.598D
Bi-214	4482.00	1120.33	0.	16.	0.027	50.00	0.937s
Bi-214	4950.00	1237.27	0.	6.	0.010	81.65	0.250s
Bi-214	5513.00	1377.94	1.	0.	0.000	0.00	0.000s
K-40	5844.75	1460.83	0.	32.	0.053	35.36	0.337s
Ac-228	6349.00	1586.82	0.	3.	0.005	115.47	0.250s
Bi-214	7061.40	1764.81	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	3.3741E-04	609.31	3.116E-04	(	1.395E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.335E-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	1.4089E-03	1460.81	1.409E-03	(	4.403E-05	G
Ac-228	N	6.1792E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	6.229E-04	(	4.647E-05	G
			338.32	7.266E-04	(	1.172E-05	G
			964.60	2.772E-04	-	2.797E-04	G
			794.70	1.176E-03	+	4.024E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	3.898E-04	-	2.408E-04	G
		209.28	1.033E-03	&	2.483E-04	G
		270.23	1.239E-03	+	3.157E-04	G
		1588.00	4.357E-04	&	4.357E-04	G
		95.35	2.954E-04	-	1.864E-04	X
		327.64	7.873E-04	?(	1.705E-04	G
Pb-212 N	4.8672E-04	238.62	4.644E-04	(	1.231E-05	G K
		77.11	5.420E-04	(	4.541E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	7.3167E-05	661.66	7.317E-05	?(	2.710E-06	G
Th-234 N	8.9507E-04	92.35	7.209E-04	(	1.614E-04	G

```
                    WI07-0860   D2 Bag# S-127   Grid D3-5,E3   080407
                                 63.29 1.143E-03  (  2.184E-04          G

Pb-214    N   4.0742E-04      351.92 3.963E-04 *(  1.583E-05          G K
                             295.21 3.007E-04 -   6.770E-05          G
                              77.11 0.000E+00 %   1.167E-04Energy duplication
                             241.98 4.627E-04  (  1.116E-04          G
                              74.81 1.225E-03 +   2.203E-04Energy duplication
                              87.30 6.675E-04 +   2.021E-04          X

Pb-210    N   5.7839E-04       46.50 5.784E-04 ?(  4.818E-04          G

AM-241        2.1675E-02       59.54 2.168E-02  (  9.204E-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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4714781                          Spectrum name: Win00510.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        9.8600E-01     2.616E-01    2.642E-01
K-40          4.1171E+00     1.456E+00    1.464E+00
Ac-228        1.8057E+00     4.033E-01    4.090E-01
Pb-212        1.4223E+00     1.961E-01    2.032E-01
CS-137 #      2.1381E-01     8.230E-02    8.270E-02
Th-234        2.6156E+00     9.737E-01    9.756E-01
Pb-214        1.1906E+00     2.619E-01    2.657E-01
Pb-210 #C     1.6902E+00     3.043E+00    3.043E+00
AM-241        6.3341E+01     1.462E+00    2.763E+00
```

WI07-0860 D2 Bag# S-127 Grid D3-5,E3 080407

- 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) 7.7382111E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0859 D2 Bag# S-129 Grid C1-3,5 080407

Sample description
WI07- 0859 D2 Bag#S-129 Grid C1-3,5 080407

Spectrum Filename: C:\User\Win00508.An1

Acquisition information
Start time: 04-Aug-2007 13:19:33
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: 2.7410E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7410E+02) = 3.6483E+03
Detection limit method: Traditional ORTEC method

0

WI07-0859 D2 Bag# S-129 Grid C1-3,5 080407

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: 0.1876

********** 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	4344.	24503.	40.838	1.67	2.211	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	185.15	46.47	134.	40.	0.066	108.73	0.419s
AM-241	237.55	59.56	224.	2394.	3.990	4.74	0.873
Th-234	253.53	63.56	52.	38.	0.062	79.33	0.714
Pb-214	298.54	74.81	72.	71.	0.119	41.20	0.917D
Pb-212	298.56	74.81	83.	0.	0.000	1296.15	0.000D
Pb-212	307.74	77.11	70.	132.	0.220	24.97	0.919D
Pb-214	307.74	77.11	174.	0.	0.000	236.49	0.233D
Pb-214	346.86	86.89	33.	41.	0.068	56.57	0.348s
Th-234	368.72	92.35	48.	72.	0.121	35.73	0.933D
Ac-228	380.72	95.35	29.	9.	0.015	178.58	0.936D
Ac-228	836.81	209.35	13.	47.	0.079	42.28	1.039
Pb-212	953.94	238.62	18.	212.	0.353	14.90	1.057D
Pb-214	967.37	241.98	22.	40.	0.067	45.78	1.060D
Ac-228	1080.46	270.25	5.	23.	0.039	53.45	0.874

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 13:29:43 Page 3
4714781 Spectrum name: Win00508.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.12	295.41	0.	64.	0.107	25.00	0.950s
Ac-228	1307.03	326.88	8.	3.	0.005	319.82	0.312s
Ac-228	1353.94	338.60	4.	60.	0.100	29.81	0.986s
Pb-214	1406.85	351.82	4.	89.	0.148	23.85	1.252s
Ac-228	1852.70	463.25	2.	16.	0.027	60.91	0.282s

WI07-0859 D2 Bag# S-129 Grid C1-3,5 080407

Bi-214	2436.35	609.12	0.	46.	0.077	29.49	1.017s
CS-137	2647.42	661.87	0.	45.	0.075	29.81	0.537s
Bi-214	3074.20	768.53	0.	5.	0.008	89.44	0.375s
Ac-228	3169.89	792.44	6.	2.	0.002	626.57	0.230s
Ac-228	3645.82	911.37	0.	45.	0.075	29.81	0.300s
Bi-214	3734.78	933.60	1.	1.	0.002	346.41	0.218s
Ac-228	3858.81	964.60	3.	4.	0.007	139.29	1.595D
Ac-228	3876.86	969.11	8.	20.	0.034	58.68	1.598D
Bi-214	4483.18	1120.62	5.	2.	0.003	450.78	0.189s
Bi-214	4953.00	1238.02	0.	1.	0.002	200.00	0.250s
Bi-214	5510.42	1377.30	3.	1.	0.002	412.31	0.179s
K-40	5842.91	1460.37	10.	4.	0.006	311.68	0.321s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	2.1850E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	0.000E+00	%	1.040E-04	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	%	3.649E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.560E-04	G
Ac-228	N	4.7467E-04	911.07	4.956E-04	?(	1.101E-05	G K
			969.11	3.951E-04	(	8.628E-05	G
			338.32	7.032E-04	+	1.386E-04	G
			964.60	2.740E-04	-	2.639E-04	G
			794.70	0.000E+00	&	2.664E-04	G
			463.00	6.431E-04	?(	1.088E-04	G
			209.28	1.002E-03	+	2.426E-04	G
			270.23	7.290E-04	+	2.499E-04	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 13:29:43 Page 4
4714781 Spectrum name: Win00508.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.764E-04	-	1.778E-04	X
		327.64	0.000E+00	&	2.125E-04	G
Pb-212	N 4.9173E-04	238.62	4.861E-04	(	1.514E-05	G K
		77.11	5.057E-04	(	4.722E-05	Energy duplication
		74.81	0.000E+00	%	8.675E-05	Energy duplication
CS-137	1.2195E-04	661.66	1.219E-04	(	2.710E-06	G
Th-234	N 8.2576E-04	92.35	9.040E-04	(	1.281E-04	G
		63.29	7.144E-04	(	2.050E-04	G
Pb-214	N 3.5308E-04	351.92	3.284E-04	*(	1.291E-05	G K

```
                    WI07-0859   D2 Bag# S-129   Grid C1-3,5 080407
                            295.21 4.009E-04 @(  6.264E-06          G
                             77.11 0.000E+00 %   1.258E-04Energy duplication
                            241.98 5.535E-04 +   1.610E-04          G
                             74.81 7.941E-04 +   1.944E-04Energy duplication
                             87.30 5.950E-04 +   1.839E-04          X

Pb-210   N   8.0975E-04      46.50 8.097E-04 ?(  3.450E-04          G

AM-241       4.9296E-03      59.54 4.930E-03  (  4.463E-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  04-AUG-2007 13:29:43 Page    5
4714781                          Spectrum name: Win00508.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 #      7.9715E-01    2.351E-01    2.370E-01
K-40     <    9.3406E-01
Ac-228        1.7318E+00    5.163E-01    5.204E-01
Pb-212        1.7940E+00    2.608E-01    2.693E-01
CS-137        4.4489E-01    1.326E-01    1.337E-01
Th-234        3.0126E+00    1.076E+00    1.079E+00
Pb-214        1.2882E+00    2.225E-01    2.277E-01
Pb-210 #      2.9542E+00    3.212E+00    3.213E+00
AM-241        1.7985E+01    8.520E-01    1.081E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0859 D2 Bag# S-129 Grid C1-3,5 080407

< - 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) 3.0007347E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0865 D2 Bag# S-126 Grid E4-1 080507

Sample description
WI07-0865 D2 Bag # S-126 Grid E4-1 080507

Spectrum Filename: C:\User\Win00519.An1

Acquisition information
Start time: 05-Aug-2007 13:48:44
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: 3.1260E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1260E+02) = 3.1990E+03
Detection limit method: Traditional ORTEC method

WI07-0865 D2 Bag# S-126 Grid E4-1 080507

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: 0.1088

********** 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	5265.	11633.	19.389	2.56	0.854	-	D
17.89	4.43	14634.	9359.	15.598	4.20	0.855	-	D
2332.96	583.28	0.	77.	0.128	22.79	0.906	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	184.97	46.42	89.	51.	0.085	71.27	0.348s
AM-241	237.60	59.58	237.	2119.	3.532	5.23	0.857
Th-234	252.67	63.34	56.	44.	0.073	68.25	0.288s
Pb-214	298.54	74.81	68.	103.	0.172	30.01	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	336.45	0.249D
Pb-212	307.74	77.11	64.	157.	0.262	21.45	0.919D
Pb-214	307.74	77.11	196.	0.	0.000	159.99	0.549D
Pb-214	348.28	87.24	42.	58.	0.096	49.95	1.123s
Th-234	368.72	92.35	79.	41.	0.069	68.34	0.933D
Ac-228	380.72	95.35	31.	3.	0.005	505.72	0.935D
Ac-228	837.34	209.48	17.	34.	0.056	55.90	0.784
Pb-212	953.94	238.62	16.	239.	0.398	13.77	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	35.	35.	0.058	58.42	1.060D
Ac-228	1081.57	270.52	11.	26.	0.043	64.78	0.654s
Pb-214	1180.17	295.17	8.	66.	0.109	30.24	1.066
Ac-228	1310.35	327.70	5.	17.	0.028	69.10	0.311s
Ac-228	1352.20	338.16	7.	62.	0.104	30.65	1.259

WI07-0865 D2 Bag# S-126 Grid E4-1 080507

Pb-214	1407.80	352.06	12.	120.	0.199	22.71	1.232
Ac-228	1851.00	462.83	5.	0.	0.000	0.00	0.000s
Bi-214	2436.34	609.12	0.	71.	0.118	23.74	1.406
CS-137	2643.00	660.77	13.	2.	0.004	572.96	0.000s
Bi-214	3072.43	768.08	0.	13.	0.022	55.47	0.458s
Ac-228	3173.67	793.38	6.	2.	0.002	626.57	0.198s
Ac-228	3645.57	911.31	0.	57.	0.095	26.49	0.685s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	12.	0.021	59.71	1.595D
Ac-228	3876.86	969.11	0.	25.	0.041	40.40	1.598D
Bi-214	4483.87	1120.79	0.	15.	0.025	51.64	0.687s
Bi-214	4953.75	1238.20	0.	4.	0.007	100.00	0.375s
Bi-214	5508.00	1376.69	0.	6.	0.010	81.65	0.250s
K-40	5844.68	1460.82	0.	41.	0.068	31.23	0.958s
Ac-228	6348.21	1586.62	3.	2.	0.003	389.87	0.447s
Bi-214	7060.67	1764.63	4.	2.	0.002	401.85	0.204s

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	3.3874E-04	609.31	3.302E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	2.712E-04	-	2.286E-04	G
			768.36	6.774E-04	+	2.930E-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	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	6.8329E-04	911.07	6.277E-04	?(	1.101E-05	G K
			969.11	4.758E-04	-	1.460E-04	G
			338.32	7.305E-04	(	4.905E-05	G
			964.60	7.634E-04	(	1.068E-04	G
			794.70	0.000E+00	&	2.664E-04	G
			463.00	0.000E+00	?	1.443E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 13:58:54 Page 4
8905696 Spectrum name: Win00519.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.124E-04	(	1.356E-04	G
		270.23	8.019E-04	(	1.652E-04	G
		1588.00	0.000E+00	&	5.376E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	6.923E-04	?(	1.507E-04	G
Pb-212	N 5.6393E-04	238.62	5.486E-04	(	1.406E-05	G K
		77.11	6.018E-04	(	4.511E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.626E-05	G
Th-234	N 6.4559E-04	92.35	5.147E-04	(	1.629E-04	G
		63.29	8.319E-04	$(	2.120E-04	G

```
Pb-214   N   4.3785E-04    351.92 4.426E-04  (  2.046E-05          G K
                           295.21 4.103E-04  (  2.915E-05          G
                            77.11 0.000E+00 ?   1.334E-04Energy duplication
                           241.98 4.849E-04  (  1.227E-04          G
                            74.81 1.153E-03 +   2.125E-04Energy duplication
                            87.30 8.344E-04 +   2.126E-04          X

Pb-210   N   1.0445E-03     46.50 1.045E-03 ?(  2.825E-04          G

AM-241       4.3633E-03     59.54 4.363E-03  (  4.587E-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 05-AUG-2007 13:58:54 Page 5
8905696 Spectrum name: Win00519.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	1.0836E+00	2.572E-01	2.604E-01
K-40 #	5.7746E+00	1.804E+00	1.817E+00
Ac-228	2.1858E+00	4.792E-01	4.862E-01
Pb-212	1.8040E+00	2.299E-01	2.397E-01
CS-137 <	5.2013E-02		
Th-234	2.0652E+00	9.974E-01	9.985E-01
Pb-214	1.4007E+00	3.181E-01	3.224E-01
Pb-210 #	3.3414E+00	2.381E+00	2.383E+00
AM-241	1.3958E+01	7.296E-01	8.940E-01

- All peaks for activity calculation had bad shape.

WI07-0865 D2 Bag# S-126 Grid E4-1 080507

* - 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) 3.1613440E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.L. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0866 D2 Bag# S-128 Grid E4-1,3 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:15:35 Page 1
8905696 Spectrum name: Win00535.An1

Sample description
WI07-0866 D2 Bag # S-128 Grid E4-1,3 080607

Spectrum Filename: C:\User\Win00535.An1

Acquisition information
Start time: 06-Aug-2007 10:05:25
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: 2.6710E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6710E+02) = 3.7439E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:15:35 Page 2
8905696 Spectrum name: Win00535.An1

WI07-0866 D2 Bag# S-128 Grid E4-1,3 080607

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: 0.1093

********** 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
14.67	3.85	5295.	21920.	36.533	1.89	2.180	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	186.36	46.77	90.	43.	0.072	82.29	1.023s
AM-241	237.67	59.59	162.	1624.	2.707	5.87	0.983
Th-234	253.32	63.51	71.	49.	0.082	72.85	0.798
Pb-214	298.54	74.81	46.	92.	0.153	29.46	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	2734.96	0.329D
Pb-212	307.74	77.11	42.	170.	0.284	18.68	0.919D
Pb-214	307.74	77.11	140.	0.	0.000	354.02	0.319D
Pb-214	348.12	87.20	28.	50.	0.084	44.88	0.664s
Th-234	371.20	92.97	39.	91.	0.152	34.54	1.593s
Ac-228	380.72	95.35	24.	0.	0.000	0.00	0.935
Ac-228	830.56	207.79	19.	34.	0.057	62.58	0.250s
Pb-212	953.94	238.62	17.	185.	0.309	15.97	1.057D
Pb-214	967.37	241.98	30.	22.	0.037	81.84	1.060D
Ac-228	1080.85	270.35	7.	41.	0.069	40.55	0.358s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:15:35 Page 3
8905696 Spectrum name: Win00535.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.22	295.18	8.	52.	0.086	34.24	0.410s
Ac-228	1308.67	327.29	7.	31.	0.052	49.53	0.476s
Ac-228	1351.53	338.00	7.	63.	0.106	30.33	1.521s
Pb-214	1407.83	352.07	4.	88.	0.147	23.25	0.534s
Ac-228	1843.00	460.83	0.	24.	0.040	40.82	0.250s

WI07-0866 D2 Bag# S-128 Grid E4-1,3 080607

Bi-214	2437.79	609.48	2.	56.	0.093	28.89	1.230
CS-137	2644.00	661.02	0.	12.	0.020	57.74	0.250s
Bi-214	3060.89	765.20	6.	1.	0.002	720.24	0.230s
Ac-228	3179.50	794.84	0.	9.	0.015	66.67	0.250s
Ac-228	3646.14	911.45	0.	30.	0.050	36.51	0.455s
Bi-214	3734.00	933.41	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	2.	7.	0.012	87.97	1.595D
Ac-228	3876.86	969.11	2.	21.	0.034	48.64	1.598D
Bi-214	4482.25	1120.39	0.	12.	0.020	57.74	0.875s
Bi-214	4953.12	1238.05	0.	14.	0.023	53.45	0.458s
Bi-214	5510.50	1377.32	0.	2.	0.003	141.42	0.500s
K-40	5845.05	1460.91	0.	43.	0.072	30.50	1.749
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.39	1765.06	0.	18.	0.030	47.14	0.687s

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	2.6461E-04	609.31	2.581E-04	(	1.298E-05	G K
			1764.49	6.405E-04	+	2.320E-04	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-04	G
			768.36	0.000E+00	&	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.8932E-03	1460.81	1.893E-03	(	4.403E-05	G
Ac-228	N	3.8133E-04	911.07	3.304E-04	?(	1.101E-05	G K
			969.11	4.017E-04	(	5.259E-05	G
			338.32	7.422E-04	+	1.447E-04	G
			964.60	4.569E-04	(	1.455E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	9.355E-04	&	2.902E-04	G
			209.28	7.194E-04	&	2.287E-04	G
			270.23	1.291E-03	+	3.221E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:15:35 Page 4
8905696 Spectrum name: Win00535.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00		1.434E-04	X
		327.64	1.276E-03	+	3.760E-04	G
Pb-212	N 4.2565E-04	238.62	4.256E-04	(	1.451E-05	G K
		77.11	6.526E-04	+	8.077E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 1.0534E-03	92.35	1.135E-03	&(	1.166E-04	G
		63.29	9.367E-04	$(	2.365E-04	G
Pb-214	N 3.2329E-04	351.92	3.272E-04	(	1.205E-05	G K

```
                    WI07-0866   D2 Bag# S-128   Grid E4-1,3   080607
                              295.21 3.226E-04  (  2.760E-05          G
                               77.11 0.000E+00 %   1.131E-04Energy duplication
                              241.98 3.058E-04  (  1.140E-04          G
                               74.81 1.028E-03 +   1.911E-04Energy duplication
                               87.30 7.328E-04 +   1.886E-04          X

Pb-210   N   8.7779E-04      46.50 8.778E-04  (  2.843E-04          G

AM-241       3.3440E-03      59.54 3.344E-03  (  3.811E-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  06-AUG-2007 10:15:35 Page    5
 8905696                          Spectrum name: Win00535.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	9.9068E-01	2.862E-01	2.886E-01
K-40	7.0880E+00	2.162E+00	2.178E+00
Ac-228	1.4277E+00	4.498E-01	4.530E-01
Pb-212	1.5936E+00	2.545E-01	2.614E-01
CS-137 #	1.2175E-01	7.029E-02	7.044E-02
Th-234	3.9438E+00	1.362E+00	1.365E+00
Pb-214	1.2104E+00	2.814E-01	2.850E-01
Pb-210 #	3.2864E+00	2.704E+00	2.705E+00
AM-241	1.2520E+01	7.349E-01	8.689E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0866 D2 Bag# S-128 Grid E4-1,3 080607

< - 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) 3.2182022E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Ferry
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07 - 0867 D1 Bag #S-130 Grid E3-1,4 080607

```
     ORTEC g v - i (  63) wan32  G53W2.06  06-AUG-2007 10:18:52 Page    1
8905696                          Spectrum name: Win00354.An1

Sample description
     WI07-0867  D1  Bag # S-130 Grid E3-1,4   080607


Spectrum Filename: C:\User\Win00354.An1

Acquisition information
       Start time:                 06-Aug-2007 10:08:40
       Live time:                600
       Real time:                603
       Dead time:                  0.55 %
       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:                3.3320E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.3320E+02) =
                                   3.0012E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  06-AUG-2007 10:18:52 Page    2
8905696                          Spectrum name: Win00354.An1
```

WI07 - 0867 D1 Bag #S-130 Grid E3-1,4 080607

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: 0.1736

********** 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	187.	901.	1.502	8.93	1.442	CU-64	s
103.07	25.94	40.	62.	0.104	46.98	0.797	U-237	
219.43	55.02	188.	44.	0.074	101.82	0.389	HF-181	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	184.97	46.41	94.	18.	0.031	172.55	0.486s
AM-241	237.83	59.62	323.	2759.	4.598	4.64	0.965
Th-234	253.21	63.46	46.	38.	0.063	69.82	0.417s
Pb-214	298.61	74.81	74.	92.	0.154	33.62	0.971D
Pb-212	298.63	74.81	106.	0.	0.000	2606.59	0.411D
Pb-212	307.80	77.11	61.	145.	0.242	22.52	0.972D
Pb-214	307.80	77.11	226.	0.	0.000	100.26	0.000D
Pb-214	347.76	87.09	47.	55.	0.092	52.49	1.344s
Th-234	368.79	92.35	47.	36.	0.059	64.30	0.985D
Ac-228	380.79	95.35	43.	2.	0.003	922.29	0.987D
Ac-228	836.51	209.24	25.	19.	0.032	108.63	0.668s
Pb-212	954.08	238.62	28.	185.	0.308	16.80	1.099D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	34.	19.	0.032	97.62	1.101D
Ac-228	1081.58	270.49	8.	32.	0.053	48.95	1.067
Pb-214	1180.30	295.16	21.	50.	0.084	50.08	0.604s
Ac-228	1312.01	328.08	13.	20.	0.033	89.49	0.598s
Ac-228	1353.67	338.49	7.	60.	0.101	31.31	0.386s

WI07 - 0867 D1 Bag #S-130 Grid E3-1,4 080607

Pb-214	1408.27	352.13	17.	65.	0.109	35.90	0.977
Ac-228	1852.61	463.18	3.	11.	0.018	82.92	0.255s
Bi-214	2438.61	609.62	0.	57.	0.095	26.49	0.400s
CS-137	2646.17	661.49	0.	24.	0.040	40.82	0.416s
Bi-214	3072.56	768.05	3.	1.	0.002	412.31	0.322s
Ac-228	3178.00	794.39	2.	0.	0.001	368.18	0.000s
Ac-228	3647.05	911.61	0.	38.	0.063	32.44	0.521s
Bi-214	3738.00	934.33	0.	5.	0.008	89.44	0.375s
Ac-228	3859.13	964.60	0.	8.	0.014	69.54	1.589D
Ac-228	3877.18	969.11	2.	32.	0.054	37.30	1.591D
Bi-214	4479.00	1119.49	0.	5.	0.008	89.44	0.250s
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	5846.98	1461.31	0.	46.	0.077	29.49	0.328s
Ac-228	6348.00	1586.50	0.	4.	0.007	100.00	0.250s
Bi-214	7062.50	1765.02	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	3.0409E-04	609.31	2.917E-04	(	5.117E-06	G K
			1764.49	3.404E-04	?(	3.783E-05	G
			1120.29	1.312E-04	-	9.711E-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	5.269E-04	+	3.901E-04	G
K-40	N	2.1654E-03	1460.81	2.165E-03	(	4.707E-05	G
Ac-228	N	4.7979E-04	911.07	4.543E-04	(	1.195E-05	G K
			969.11	6.756E-04	+	1.843E-04	G
			338.32	7.948E-04	+	1.592E-04	G
			964.60	5.532E-04	(	6.688E-05	G
			794.70	0.000E+00	%	1.642E-04	G
			463.00	4.620E-04	?(	1.356E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:18:52 Page 4
8905696 Spectrum name: Win00354.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.603E-04	?(	1.839E-04	G
		270.23	1.133E-03	+	3.350E-04	G
		1588.00	6.196E-04	&(	1.549E-04	G
		95.35	0.000E+00	%	2.252E-04	X
		327.64	9.013E-04	+	3.959E-04	G
Pb-212	N 4.8392E-04	238.62	4.839E-04	(	2.099E-05	G K
		77.11	6.711E-04	+	9.622E-05	Energy duplication
		74.81	0.000E+00	%	1.182E-04	Energy duplication
CS-137	7.1363E-05	661.66	7.136E-05	?(	2.973E-06	G
Th-234	N 6.6800E-04	92.35	5.218E-04	(	1.506E-04	G
		63.29	8.761E-04	$(	2.330E-04	G

```
Pb-214    N   3.0008E-04    351.92 2.716E-04  (  2.617E-05          G K
                            295.21 3.551E-04 ?(  4.936E-05          G
                             77.11 0.000E+00 ?   1.726E-04Energy duplication
                            241.98 3.006E-04  (  1.377E-04          G
                             74.81 1.245E-03 +   2.530E-04Energy duplication
                             87.30 9.553E-04 +   2.554E-04          X

Pb-210    N   4.3337E-04     46.50 4.334E-04 ?(  3.340E-04          G

AM-241        6.8401E-03     59.54 6.840E-03  (  6.426E-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	9.1264E-01	2.418E-01	2.433E-01
K-40	6.4988E+00	1.916E+00	1.926E+00
Ac-228	1.4400E+00	4.672E-01	4.691E-01
Pb-212	1.4523E+00	2.440E-01	2.477E-01
CS-137 #	2.1417E-01	8.744E-02	8.768E-02
Th-234	2.0048E+00	9.515E-01	9.526E-01
Pb-214	9.0060E-01	3.233E-01	3.244E-01
Pb-210 #C	1.3006E+00	2.244E+00	2.244E+00
AM-241	2.0528E+01	9.534E-01	1.219E+00

- All peaks for activity calculation had bad shape.

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* - 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) 3.5252365E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0864 D2 Bag# S-131 Grid E2-4 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 11:34:12 Page 1
8905696 Spectrum name: Win00517.An1

Sample description
WI07-0864 D2 Bag#131 Grid E2-4 080507

Spectrum Filename: C:\User\Win00517.An1

Acquisition information
Start time: 05-Aug-2007 11:24:01
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: 2.7100E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7100E+02) = 3.6900E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 11:34:12 Page 2
8905696 Spectrum name: Win00517.An1

WI07-0864 D2 Bag# S-131 Grid E2-4 080507

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 Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.02	3.35	7713.	11728.	19.547	2.81	0.854	-	D
17.14	4.63	12736.	9477.	15.795	3.95	0.855	-	D
70.83	17.89	124.	56.	0.093	73.89	0.446	MO-99	s
104.52	26.31	42.	97.	0.162	30.79	0.551	U-237	s
199.25	49.99	665.	207.	0.345	48.64	0.566	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	184.32	46.26	160.	21.	0.035	181.13	0.915
AM-241	237.52	59.56	630.	6842.	11.403	2.88	0.861
Th-234	252.99	63.42	52.	28.	0.047	99.15	0.504s
Pb-214	298.54	74.81	40.	103.	0.172	26.17	0.917D
Pb-212	298.56	74.81	96.	0.	0.000	930.95	0.427D
Pb-212	307.74	77.11	43.	131.	0.218	22.59	0.919D
Pb-214	307.74	77.11	180.	0.	0.000	99.72	0.228D
Pb-214	348.23	87.23	33.	41.	0.068	56.57	0.430s
Th-234	368.72	92.35	49.	43.	0.072	54.96	0.933D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 11:34:12 Page 3
8905696 Spectrum name: Win00517.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	27.	16.	0.027	105.25	0.935D
Ac-228	836.59	209.29	24.	25.	0.042	88.00	0.420s
Pb-212	953.94	238.62	16.	202.	0.337	15.10	1.057D
Pb-214	967.37	241.98	23.	18.	0.030	88.19	1.060D
Ac-228	1078.79	269.83	7.	26.	0.043	58.33	0.639s

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Pb-214	1180.36	295.21	4.	45.	0.075	33.55	1.191
Ac-228	1310.83	327.83	0.	30.	0.050	36.51	0.500s
Ac-228	1352.41	338.22	12.	39.	0.065	47.83	0.929
Pb-214	1407.53	351.99	6.	66.	0.110	28.75	0.897
Ac-228	1851.19	462.88	3.	23.	0.039	50.36	0.644s
Bi-214	2436.88	609.25	3.	55.	0.092	29.17	0.775s
CS-137	2646.79	661.71	0.	29.	0.048	37.14	0.614s
Bi-214	3071.67	767.89	0.	6.	0.010	81.65	0.375s
Ac-228	3181.15	795.25	0.	13.	0.022	55.47	0.312s
Ac-228	3645.15	911.21	2.	38.	0.062	36.27	0.879s
Bi-214	3734.00	933.41	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	3.	3.	0.004	225.39	1.595D
Ac-228	3876.86	969.11	3.	21.	0.035	50.24	1.598D
Bi-214	4482.19	1120.37	0.	17.	0.028	48.51	0.417s
Bi-214	4951.25	1237.58	2.	1.	0.002	416.33	0.188s
Bi-214	5510.50	1377.32	0.	10.	0.017	63.25	0.500s
K-40	5843.71	1460.57	0.	34.	0.057	34.30	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7059.08	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	2.6445E-04	609.31	2.573E-04	(	1.331E-05	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	0.000E+00	%	2.034E-04	G
			768.36	3.127E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.082E-03	+	5.410E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	4.2718E-04	911.07	4.130E-04	(	3.074E-05	G K
			969.11	4.033E-04	(	5.999E-05	G
			338.32	4.571E-04	?(	6.357E-05	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 11:34:12 Page 4
8905696 Spectrum name: Win00517.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	0.000E+00	%	2.427E-04	G
		794.70	7.644E-04	+	3.306E-04	G
		463.00	9.030E-04	+	3.012E-04	G
		209.28	5.290E-04	?(	1.576E-04	G
		270.23	8.123E-04	+	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	3.064E-04	-	1.885E-04	X
		327.64	1.222E-03	+	3.365E-04	G
Pb-212 N	4.7500E-04	238.62	4.650E-04	(	1.401E-05	G K
		77.11	4.998E-04	(	3.765E-05	Energy duplication
		74.81	0.000E+00	%	9.305E-05	Energy duplication
CS-137	7.8587E-05	661.66	7.859E-05	(	2.710E-06	G

```
Th-234    N   5.3656E-04      92.35 5.388E-04  (  1.297E-04          G
                              63.29 5.334E-04 ?(  2.040E-04          G

Pb-214    N   2.5642E-04     351.92 2.444E-04  (  1.481E-05          G K
                             295.21 2.819E-04  (  2.113E-05          G
                              77.11 0.000E+00 ?   1.278E-04Energy duplication
                             241.98 2.506E-04  (  1.007E-04          G
                              74.81 1.153E-03 +   1.944E-04Energy duplication
                              87.30 5.950E-04 +   1.839E-04          X

Pb-210    N   4.3209E-04      46.50 4.321E-04 ?(  3.753E-04          G

AM-241        1.4089E-02      59.54 1.409E-02  (  7.413E-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

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 11:34:12 Page 5
8905696 Spectrum name: Win00517.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	9.7582E-01	2.846E-01	2.869E-01
K-40 #	5.5238E+00	1.895E+00	1.906E+00
Ac-228	1.5763E+00	4.641E-01	4.679E-01
Pb-212	1.7528E+00	2.381E-01	2.470E-01
CS-137	2.8999E-01	1.077E-01	1.083E-01
Th-234	1.9799E+00	1.088E+00	1.089E+00
Pb-214	9.4620E-01	2.720E-01	2.743E-01
Pb-210 #C	1.5944E+00	2.888E+00	2.888E+00

WI07-0864 D2 Bag# S-131 Grid E2-4 080507

AM-241	5.1988E+01	1.495E+00	2.437E+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) 6.6626755E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0862 D2 Bag# S-132 Grid E2,E3 080407

Sample description
WI07- 0862 D2 Bag# S-132 E2, E3 080407

Spectrum Filename: C:\User\Win00512.An1

Acquisition information

Start time:	04-Aug-2007 14:19:18
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:	3.4580E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.4580E+02) = 2.8918E+03
Detection limit method:	Traditional ORTEC method

WI07-0862 D2 Bag# S-132 Grid E2,E3 080407

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: 0.1123

********** 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	
11.67	2.91	6971.	10306.	17.176	3.02	0.854	-	D
15.84	3.95	14367.	9722.	16.204	4.03	0.855	-	D
69.30	17.51	55.	57.	0.095	55.42	0.539	MO-99	s
104.72	26.36	32.	98.	0.164	28.82	0.937	AM-241	s
2332.60	583.19	0.	81.	0.135	22.22	0.666	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	185.73	46.61	227.	34.	0.056	154.66	0.376s
AM-241	237.43	59.53	712.	6940.	11.568	2.87	0.918
Th-234	253.36	63.52	75.	40.	0.067	84.33	0.659s
Pb-214	298.54	74.81	82.	127.	0.212	26.82	0.917D
Pb-212	298.56	74.81	118.	0.	0.000	774.60	0.406D
Pb-212	307.74	77.11	67.	204.	0.340	18.00	0.919D
Pb-214	307.74	77.11	187.	0.	0.000	640.03	0.346D
Pb-214	347.94	87.16	59.	58.	0.097	51.38	0.687s
Th-234	368.72	92.35	52.	65.	0.109	39.74	0.933D
Ac-228	380.72	95.35	39.	10.	0.017	184.06	0.936D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:39:46 Page 3
8905696 Spectrum name: Win00512.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	837.04	209.41	23.	56.	0.094	42.49	0.631s
Pb-212	953.94	238.62	36.	195.	0.325	16.78	1.057D
Pb-214	967.37	241.98	38.	35.	0.059	59.55	1.060D
Ac-228	1079.22	269.94	18.	24.	0.039	78.35	0.339s
Pb-214	1180.58	295.27	16.	62.	0.103	35.43	0.975

WI07-0862 D2 Bag# S-132 Grid E2,E3 080407

Ac-228	1308.91	327.34	14.	25.	0.041	71.65	1.054
Ac-228	1353.13	338.40	12.	52.	0.087	37.37	0.416s
Pb-214	1406.99	351.86	8.	133.	0.222	19.58	1.171
Ac-228	1852.01	463.08	4.	29.	0.048	50.20	0.403s
Bi-214	2436.57	609.18	4.	96.	0.161	22.11	1.109s
CS-137	2636.08	659.04	0.	22.	0.037	42.64	0.750s
Bi-214	3065.33	766.31	0.	12.	0.020	57.74	0.375s
Ac-228	3176.00	793.97	0.	15.	0.025	51.64	0.250s
Ac-228	3645.38	911.27	0.	52.	0.087	27.74	1.312
Bi-214	3737.33	934.24	1.	1.	0.001	339.93	0.197s
Ac-228	3858.81	964.60	0.	14.	0.023	55.91	1.595D
Ac-228	3876.86	969.11	1.	27.	0.044	40.73	1.598D
Bi-214	4481.29	1120.15	0.	21.	0.035	43.64	0.500s
Bi-214	4950.33	1237.35	2.	2.	0.003	311.13	0.871s
Bi-214	5512.00	1377.69	0.	10.	0.017	63.25	0.500s
K-40	5844.49	1460.77	0.	45.	0.075	29.81	1.449s
Ac-228	6352.50	1587.70	0.	7.	0.012	75.59	0.375s
Bi-214	7060.80	1764.66	0.	7.	0.012	75.59	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.6348E-04	609.31	4.480E-04	@(	1.513E-05	G K
			1764.49	2.491E-04	-	1.521E-04	G
			1120.29	5.110E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.286E-04	G
			768.36	6.253E-04	&	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.082E-03	+	5.410E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	?(	4.403E-05	G
Ac-228	N	5.7503E-04	911.07	5.727E-04	(	1.101E-05	G K
			969.11	5.168E-04	(	4.345E-05	G
			338.32	6.153E-04	(	6.475E-05	G
			964.60	8.385E-04	+	3.590E-04	G

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8905696 Spectrum name: Win00512.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	8.820E-04	+	3.528E-04	G
		463.00	1.117E-03	+	3.367E-04	G
		209.28	1.192E-03	+	2.768E-04	G
		270.23	7.342E-04	(	2.011E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	1.961E-04	-	2.006E-04	X
		327.64	1.011E-03	+	3.806E-04	G
Pb-212	N 4.4819E-04	238.62	4.482E-04	(	2.077E-05	G K
		77.11	7.816E-04	+	9.106E-05	Energy duplication
		74.81	0.000E+00	%	1.028E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	&(	2.710E-06	G

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                    WI07-0862   D2 Bag# S-132   Grid E2,E3   080407
Th-234    N   7.9603E-04      92.35 8.154E-04  (  1.332E-04          G
                              63.29 7.684E-04 $(  2.425E-04          G

Pb-214    N   4.9293E-04     351.92 4.938E-04  (  1.647E-05          G K
                             295.21 3.884E-04 -   8.144E-05          G
                              77.11 0.000E+00 %   1.301E-04Energy duplication
                             241.98 4.885E-04  (  1.271E-04          G
                              74.81 1.419E-03 +   2.338E-04Energy duplication
                              87.30 8.465E-04 +   2.293E-04          X

Pb-210    N   6.8726E-04      46.50 6.873E-04 ?(  4.456E-04          G

AM-241        1.4291E-02      59.54 1.429E-02  (  7.877E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  04-AUG-2007 14:39:46 Page    5
 8905696                          Spectrum name: Win00512.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 #	1.3403E+00	2.964E-01	3.006E-01
K-40 #	5.7295E+00	1.708E+00	1.722E+00
Ac-228	1.6629E+00	4.150E-01	4.196E-01
Pb-212	1.2961E+00	2.175E-01	2.228E-01
CS-137 #	1.7240E-01	7.351E-02	7.381E-02
Th-234	2.3020E+00	9.148E-01	9.164E-01
Pb-214	1.4255E+00	2.791E-01	2.842E-01
Pb-210 #C	1.9875E+00	3.074E+00	3.074E+00
AM-241	4.1329E+01	1.186E+00	1.935E+00

WI07-0862 D2 Bag# S-132 Grid E2,E3 080407

- 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) 5.7244793E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Ferry
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0863 D2 Bag# S-133 Grid D2-3 080407

Sample description
WI07- 0863 D2 Bag# S-133 D2-3 080407

Spectrum Filename: C:\User\Win00513.An1

Acquisition information
Start time: 04-Aug-2007 14:46:46
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: 3.2590E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2590E+02) = 3.0684E+03
Detection limit method: Traditional ORTEC method

WI07-0863 D2 Bag# S-133 Grid D2-3 080407

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: 0.1381

********** 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	4260.	22225.	37.042	1.78	2.323	CU-64	s
69.72	17.61	93.	186.	0.309	24.75	1.067	MO-99	s
83.80	21.13	65.	160.	0.266	25.33	1.380	TC-99M	s
104.19	26.23	81.	245.	0.408	19.47	0.999	U-237	s
127.75	32.12	98.	286.	0.476	18.44	0.880	XE-138	s
197.92	49.66	1590.	497.	0.828	31.33	1.514	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	185.63	46.59	621.	0.	0.000	0.00	0.893
AM-241	237.45	59.54	1311.	17626.	29.377	1.72	0.947
Th-234	253.35	63.51	65.	59.	0.098	59.72	0.662s
Pb-214	298.54	74.81	60.	90.	0.150	32.17	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	260.77	0.316D
Pb-212	307.74	77.11	50.	136.	0.226	22.69	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	256.36	0.458D
Pb-214	347.24	86.98	39.	37.	0.062	68.48	0.520s
Th-234	368.72	92.35	49.	40.	0.066	59.15	0.933D

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:56:58 Page 3
8905696 Spectrum name: Win00513.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	27.	13.	0.021	129.26	0.935D
Ac-228	835.47	209.01	27.	43.	0.072	60.92	0.472s
Pb-212	953.94	238.62	16.	186.	0.309	15.92	1.057D
Pb-214	967.37	241.98	27.	30.	0.049	62.07	1.060D
Ac-228	1078.83	269.84	6.	32.	0.054	45.48	0.702s

WI07-0863 D2 Bag# S-133 Grid D2-3 080407

Pb-214	1180.86	295.34	5.	41.	0.069	36.50	0.836
Ac-228	1310.00	327.62	4.	0.	0.000	0.00	0.000s
Ac-228	1353.28	338.43	17.	42.	0.071	50.57	0.776s
Pb-214	1407.23	351.92	7.	80.	0.133	26.79	0.629s
Ac-228	1839.99	460.08	4.	27.	0.045	51.83	0.248s
Bi-214	2436.89	609.26	0.	66.	0.110	24.62	0.402s
CS-137	2647.00	661.77	24.	0.	0.000	0.00	0.000s
Bi-214	3075.00	768.73	0.	1.	0.002	200.00	0.250s
Ac-228	3181.08	795.24	0.	13.	0.022	55.47	0.375s
Ac-228	3647.04	911.68	0.	47.	0.078	29.17	1.125s
Bi-214	3734.78	933.60	1.	1.	0.002	346.41	0.218s
Ac-228	3858.81	964.60	3.	3.	0.005	198.12	1.595D
Ac-228	3876.86	969.11	2.	27.	0.045	41.24	1.598D
Bi-214	4482.00	1120.33	0.	13.	0.022	55.47	0.625s
Bi-214	4956.33	1238.85	0.	6.	0.010	81.65	0.250s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5845.71	1461.07	0.	52.	0.087	27.74	1.000s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7062.12	1764.99	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	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.2506E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	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	%	2.489E-04	G
K-40	N	2.2894E-03	1460.81	2.289E-03	(	4.403E-05	G
Ac-228	N	5.1485E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	5.231E-04	(	4.938E-05	G
			338.32	4.961E-04	(	7.378E-05	G

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:56:58 Page 4
8905696 Spectrum name: Win00513.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	1.863E-04	-	2.466E-04	G
		794.70	7.644E-04	+	3.306E-04	G
		463.00	1.046E-03	&	3.270E-04	G
		209.28	9.134E-04	+	2.612E-04	G
		270.23	1.010E-03	+	2.884E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.446E-04	-	1.823E-04	X
		327.64	0.000E+00	?	1.373E-04	G
Pb-212	N 4.2656E-04	238.62	4.266E-04	(	1.436E-05	G K
		77.11	5.189E-04	+	7.578E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	2.094E-05	G

```
Th-234   N   7.5383E-04     92.35 4.961E-04  (  1.302E-04          G
                            63.29 1.121E-03  (  2.272E-04          G

Pb-214   N   2.8276E-04    351.92 2.951E-04 @(  1.616E-05          G K
                           295.21 2.589E-04 ?(  2.252E-05          G
                            77.11 0.000E+00 %   1.178E-04Energy duplication
                           241.98 4.093E-04 +   1.547E-04          G
                            74.81 1.005E-03 +   1.990E-04Energy duplication
                            87.30 5.369E-04 +   1.863E-04          X

Pb-210   N   0.0000E+00     46.50 0.000E+00     7.298E-04          G

AM-241       3.6294E-02     59.54 3.629E-02  (  1.065E-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
```

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 14:56:58 Page 5
8905696 Spectrum name: Win00513.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		9.9743E-01	2.456E-01	2.484E-01
K-40		7.0250E+00	1.948E+00	1.966E+00
Ac-228		1.5798E+00	3.764E-01	3.810E-01
Pb-212		1.3089E+00	2.084E-01	2.141E-01
CS-137	<	6.4263E-02		
Th-234		2.3131E+00	9.721E-01	9.736E-01
Pb-214		8.6763E-01	1.964E-01	1.991E-01
Pb-210	<	2.2393E+00		

WI07-0863 D2 Bag# S-133 Grid D2-3 080407

AM-241	1.1137E+02	1.920E+00	4.548E+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) 1.2545837E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0870 D2 Bag# S-134 Grid D2-4,5 080607

Sample description
WI07-0870 D2 Bag # S-134 Grid D2-4,5 080607

Spectrum Filename: C:\User\Win00536.An1

Acquisition information
Start time: 06-Aug-2007 10:25:56
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: 3.6340E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6340E+02) = 2.7518E+03
Detection limit method: Traditional ORTEC method

WI07-0870 D2 Bag# S-134 Grid D2-4,5 080607

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: 0.0695

********** 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	5716.	10805.	18.008	2.76	0.854	-	D
17.05	4.24	13356.	9466.	15.776	4.02	0.855	-	D
105.12	26.46	35.	94.	0.157	31.55	0.869	AM-241	
128.25	32.24	74.	110.	0.183	38.32	0.772	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	186.40	46.78	270.	32.	0.054	173.63	0.631s
AM-241	237.61	59.58	657.	7075.	11.792	2.78	0.871
Th-234	252.57	63.32	55.	58.	0.097	54.58	0.940s
Pb-214	298.54	74.81	73.	109.	0.182	29.16	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	441.70	0.742D
Pb-212	307.74	77.11	61.	162.	0.271	20.73	0.919D
Pb-214	307.74	77.11	158.	0.	0.000	357.24	0.788D
Pb-214	347.92	87.15	54.	47.	0.078	61.52	0.672s
Th-234	371.51	93.05	43.	83.	0.139	37.16	0.504s
Ac-228	380.72	95.35	36.	0.	0.000	0.00	0.935
Ac-228	836.08	209.17	22.	40.	0.066	57.73	0.611s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:36:08 Page 3
8905696 Spectrum name: Win00536.Anl

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	31.	198.	0.330	16.33	1.057D
Pb-214	967.37	241.98	33.	38.	0.064	52.94	1.060D
Ac-228	1080.99	270.38	14.	37.	0.062	54.05	0.472s
Pb-214	1181.07	295.39	11.	62.	0.103	33.25	1.187
Ac-228	1310.99	327.86	3.	27.	0.045	47.16	0.714s

WI07-0870 D2 Bag# S-134 Grid D2-4,5 080607

Ac-228	1353.46	338.48	3.	33.	0.056	39.40	1.146
Pb-214	1407.31	351.94	2.	113.	0.188	19.48	1.139
Ac-228	1852.59	463.23	2.	20.	0.033	52.10	0.362s
Bi-214	2436.99	609.28	4.	80.	0.134	24.58	1.104
CS-137	2646.72	661.69	2.	30.	0.051	41.08	1.393
Bi-214	3072.44	768.09	0.	17.	0.028	48.51	0.562s
Ac-228	3180.27	795.03	0.	21.	0.035	43.64	0.375s
Ac-228	3646.58	911.56	0.	38.	0.063	32.44	0.394s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	5.	10.	0.017	86.48	1.595D
Ac-228	3876.86	969.11	1.	28.	0.047	39.28	1.598D
Bi-214	4481.23	1120.13	0.	14.	0.023	53.45	0.312s
Bi-214	4953.00	1238.02	0.	3.	0.005	115.47	0.750s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.83	1461.10	0.	59.	0.098	26.04	0.952s
Ac-228	6340.67	1584.74	0.	9.	0.015	66.67	0.375s
Bi-214	7059.67	1764.38	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	3.7079E-04	609.31	3.736E-04	(	1.513E-05	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	8.859E-04	+	3.310E-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	2.5976E-03	1460.81	2.598E-03	?(	4.403E-05	G
Ac-228	N	4.6541E-04	911.07	4.185E-04	?(	1.101E-05	G K
			969.11	5.422E-04	(	3.981E-05	G
			338.32	3.907E-04	(	3.355E-05	G
			964.60	6.341E-04	(	2.232E-04	G
			794.70	1.235E-03	+	4.116E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:36:08 Page 4
8905696 Spectrum name: Win00536.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.731E-04	+	2.788E-04	G
		209.28	8.429E-04	+	2.464E-04	G
		270.23	1.156E-03	+	3.315E-04	G
		1588.00	1.307E-03	&	6.931E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	1.093E-03	+	3.365E-04	G
Pb-212	N 4.5452E-04	238.62	4.545E-04	(	1.942E-05	G K
		77.11	6.218E-04	+	8.278E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	8.2652E-05	661.66	8.265E-05	(	7.564E-06	G
Th-234	N 1.0666E-03	92.35	1.040E-03	&(	1.217E-04	G

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                WI07-0870   D2 Bag# S-134   Grid D2-4,5   080607
                                63.29 1.105E-03 *(  2.096E-04          G

Pb-214    N    4.0674E-04     351.92 4.173E-04  (  1.006E-05          G K
                              295.21 3.863E-04  (  3.312E-05          G
                               77.11 0.000E+00 %   1.198E-04Energy duplication
                              241.98 5.316E-04 +   1.718E-04          G
                               74.81 1.221E-03 +   2.186E-04Energy duplication
                               87.30 6.820E-04 +   2.136E-04          X

Pb-210    N    6.6345E-04      46.50 6.634E-04 ?(  4.843E-04          G

AM-241         1.4568E-02      59.54 1.457E-02  (  7.568E-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  06-AUG-2007 10:36:08 Page    5
 8905696                          Spectrum name: Win00536.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       1.0203E+00    2.508E-01    2.537E-01
 K-40   #     7.1482E+00    1.861E+00    1.880E+00
 Ac-228       1.2807E+00    3.452E-01    3.486E-01
 Pb-212       1.2507E+00    2.042E-01    2.095E-01
 CS-137       2.2744E-01    9.344E-02    9.384E-02
 Th-234 #     2.9352E+00    9.690E-01    9.714E-01
 Pb-214       1.1193E+00    2.157E-01    2.197E-01
 Pb-210 #C    1.8257E+00    3.170E+00    3.170E+00
 AM-241       4.0089E+01    1.116E+00    1.857E+00
```

WI07-0870 D2 Bag# S-134 Grid D2-4,5 080607

- 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) 5.6896648E+01 pCi/g

The library has energies which are not separable.

Analyzed by: H.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07 - 0871 D1 Bag #S-135 Grid D2-4 080607

```
     ORTEC g v - i (  63) wan32  G53W2.06  06-AUG-2007 12:43:26 Page    1
8905696                          Spectrum name: Win00355.An1

Sample description
     WI07-0871  D1  Bag #135 Grid  D2-4  080607


Spectrum Filename: C:\User\Win00355.An1

Acquisition information
       Start time:                 06-Aug-2007 12:33:16
       Live time:                600
       Real time:                602
       Dead time:                  0.31 %
       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:                4.0460E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  4.0460E+02) =
                                   2.4716E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  06-AUG-2007 12:43:26 Page    2
8905696                          Spectrum name: Win00355.An1
```

WI07 - 0871 D1 Bag #S-135 Grid D2-4 080607

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: 0.3018

********** 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	
29.45	7.54	603.	609.	1.016	17.43	2.113	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	180.27	45.23	68.	22.	0.037	141.00	0.419s
AM-241	237.51	59.54	245.	438.	0.729	20.91	1.241s
Th-234	254.22	63.72	37.	3.	0.005	585.00	0.459s
Pb-214	300.55	75.30	152.	66.	0.110	75.66	1.273s
Pb-212	298.63	74.81	115.	0.	0.000	184.45	0.537D
Pb-212	307.80	77.11	28.	0.	0.000	0.00	0.292D
Pb-214	307.80	77.11	28.	0.	0.000	0.00	0.292D
Pb-214	353.63	88.56	64.	25.	0.042	117.85	0.323s
Th-234	368.79	92.35	45.	10.	0.016	205.61	0.985D
Ac-228	380.79	95.35	41.	4.	0.007	466.29	0.987D
Ac-228	834.17	208.66	12.	5.	0.009	207.48	0.191s
Pb-212	954.08	238.62	139.	31.	0.051	114.05	1.099D
Pb-214	967.50	241.98	74.	5.	0.008	485.65	1.101D
Ac-228	1081.73	270.53	22.	32.	0.053	70.02	0.300s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 12:43:26 Page 3
8905696 Spectrum name: Win00355.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1185.43	296.44	20.	27.	0.045	72.95	0.387s
Ac-228	1311.75	328.01	7.	2.	0.003	400.00	0.309s
Ac-228	1350.73	337.75	24.	6.	0.010	294.39	0.249s
Pb-214	1407.50	351.94	37.	86.	0.143	40.25	1.041s
Ac-228	1843.00	460.78	0.	9.	0.015	66.67	0.250s

Bi-214	2436.20	609.02	19.	54.	0.089	48.08	0.305s
CS-137	2645.33	661.28	1.	0.	0.001	240.37	0.197s
Bi-214	3071.00	767.66	1.	2.	0.003	200.00	0.089s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3643.03	910.60	0.	42.	0.070	30.86	0.333s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	5.	11.	0.018	87.75	1.589D
Ac-228	3877.18	969.11	17.	1.	0.001	1586.13	1.591D
Bi-214	4482.00	1120.24	1.	0.	0.000	0.00	0.000s
Bi-214	4950.67	1237.35	2.	1.	0.002	447.21	0.187s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5844.50	1460.69	5.	0.	0.000	0.00	0.292s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	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	2.7463E-04	609.31	2.746E-04	@(	3.448E-05	G K
			1764.49	0.000E+00	?	7.565E-05	G
			1120.29	0.000E+00	?	5.247E-05	G
			1238.11	0.000E+00	%	2.186E-04	G
			768.36	0.000E+00	%	1.707E-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	?	1.742E-04	G
Ac-228	N	5.3429E-04	911.07	5.021E-04	(	1.195E-05	G K
			969.11	0.000E+00	%	1.372E-04	G
			338.32	0.000E+00	%	1.088E-04	G
			964.60	7.059E-04	(	2.567E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	3.898E-04	&	2.067E-04	G
			209.28	0.000E+00	&	1.539E-04	G
			270.23	1.127E-03	+	3.862E-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	%	2.252E-04	X
		327.64	0.000E+00	%	2.187E-04	G
Pb-212	N 8.0716E-05	238.62	8.072E-05	(	4.500E-05	G K
		77.11	0.000E+00	?	3.700E-05	Energy duplication
		74.81	0.000E+00	&	1.227E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	5.947E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.616E-04	G
		63.29	0.000E+00	%	2.181E-04	G
Pb-214	N 3.6453E-04	351.92	3.561E-04	*(	3.806E-05	G K

```
                    WI07 - 0871  D1 Bag #S-135 Grid D2-4  080607
                           295.21 1.911E-04 &   7.225E-05         G
                            77.11 0.000E+00 ?   6.343E-05Energy duplication
                           241.98 0.000E+00 %   2.059E-04         G
                            74.81 8.917E-04 +   2.890E-04         X
                            87.30 4.316E-04 &(  2.041E-04         X

Pb-210   N   5.2317E-04     46.50 5.232E-04 &(  2.845E-04         G

AM-241       1.0851E-03     59.54 1.085E-03 *(  5.617E-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  06-AUG-2007 12:43:26 Page    5
8905696                                Spectrum name: Win00355.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 #      6.7877E-01    3.264E-01    3.270E-01
K-40     <    4.3067E-01
Ac-228        1.3205E+00    4.075E-01    4.094E-01
Pb-212        1.9950E-01    2.275E-01    2.276E-01
CS-137   <    1.4698E-02
Th-234   <    3.9931E-01
Pb-214        9.0097E-01    3.626E-01    3.636E-01
Pb-210        1.2931E+00    1.823E+00    1.823E+00
AM-241 #      2.6818E+00    5.607E-01    5.695E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07 - 0871 D1 Bag #S-135 Grid D2-4 080607

< - 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) 7.0746346E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1002 D2 Bag# S-136 Grid D1-3 080707

Sample description
WI07-1002 D2 Bag 3 S-136 Grid D1-3 080707

Spectrum Filename: C:\User\Win00565.An1

Acquisition information

Start time:	07-Aug-2007 14:42:30
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:	4.1080E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.1080E+02) = 2.4343E+03
Detection limit method:	Traditional ORTEC method

WI07-1002 D2 Bag# S-136 Grid D1-3 080707

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: 0.1290

********** 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	2.93	5144.	11032.	18.387	2.65	0.854	-	D
17.68	4.39	13432.	8663.	14.438	4.35	0.855	-	D
103.75	26.12	34.	59.	0.098	46.64	0.713	U-237	s
127.39	32.03	48.	92.	0.154	34.78	0.970	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	184.69	46.35	93.	18.	0.029	167.87	0.720
AM-241	237.43	59.53	295.	3689.	6.148	3.73	0.892
Th-234	251.03	62.93	54.	48.	0.080	60.38	0.823s
Pb-214	298.54	74.81	81.	105.	0.176	30.99	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	193.93	0.315D
Pb-212	307.74	77.11	60.	153.	0.255	21.63	0.919D
Pb-214	307.74	77.11	146.	0.	0.000	3556.06	0.367D
Pb-214	348.77	87.36	76.	42.	0.070	79.69	0.435s
Th-234	368.72	92.35	61.	39.	0.065	64.71	0.933D
Ac-228	380.72	95.35	40.	5.	0.009	343.33	0.935D
Ac-228	835.73	209.08	26.	21.	0.036	96.93	0.762s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:52:42 Page 3
8905696 Spectrum name: Win00565.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	18.	205.	0.342	15.12	1.057D
Pb-214	967.37	241.98	37.	39.	0.065	54.28	1.060D
Ac-228	1079.83	270.09	14.	28.	0.047	61.72	0.385s
Pb-214	1181.00	295.37	8.	69.	0.116	29.75	1.095s
Ac-228	1311.80	328.07	16.	13.	0.022	135.13	0.368s

WI07-1002 D2 Bag# S-136 Grid D1-3 080707

Ac-228	1351.50	337.99	19.	47.	0.079	45.46	0.508s
Pb-214	1406.68	351.78	7.	107.	0.178	22.00	1.136
Ac-228	1852.81	463.28	0.	32.	0.053	35.36	0.417s
Bi-214	2437.51	609.41	0.	80.	0.133	22.36	0.889s
CS-137	2646.50	661.64	0.	22.	0.037	42.64	0.500s
Bi-214	3074.80	768.68	0.	13.	0.022	55.47	0.687s
Ac-228	3181.20	795.27	0.	18.	0.030	47.14	0.625s
Ac-228	3644.41	911.02	0.	57.	0.095	26.49	0.765s
Bi-214	3731.89	932.88	3.	3.	0.005	216.02	0.230s
Ac-228	3858.78	964.59	19.	0.	0.000	0.00	1.595
Ac-228	3877.65	969.31	0.	34.	0.057	34.30	0.437s
Bi-214	4481.18	1120.12	0.	17.	0.028	48.51	0.417s
Bi-214	4952.83	1237.98	0.	8.	0.013	70.71	0.312s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.250s
K-40	5845.00	1460.90	0.	67.	0.112	24.43	1.165s
Ac-228	6355.00	1588.32	0.	4.	0.007	100.00	0.750s
Bi-214	7062.11	1764.99	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.6730E-04	609.31	3.720E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	6.774E-04	+	2.930E-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	&	3.887E-04	G
K-40	N	2.9499E-03	1460.81	2.950E-03	?(	4.403E-05	G
Ac-228	N	6.1572E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	6.602E-04	(	1.942E-05	G
			338.32	5.547E-04	(	7.771E-05	G
			964.60	0.000E+00	%	4.082E-04	G
			794.70	1.058E-03	+	3.834E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	1.247E-03	+	3.319E-04	G
		209.28	4.514E-04	-	2.160E-04	G
		270.23	8.748E-04	+	3.024E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	5.362E-04	(	2.504E-04	G
Pb-212	N 4.7157E-04	238.62	4.716E-04	(	1.491E-05	G K
		77.11	5.857E-04	+	8.102E-05	Energy duplication
		74.81	0.000E+00	?	8.939E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 6.6453E-04	92.35	4.890E-04	(	1.440E-04	G

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                    WI07-1002   D2 Bag# S-136   Grid D1-3   080707
                                 63.29 9.144E-04 @(  2.077E-04          G

Pb-214    N   4.0924E-04       351.92 3.963E-04  (  1.583E-05          G K
                               295.21 4.343E-04 *(  2.786E-05          G
                                77.11 0.000E+00 %   1.154E-04Energy duplication
                               241.98 5.412E-04 +   1.775E-04          G
                                74.81 1.176E-03 +   2.209E-04Energy duplication
                                87.30 6.119E-04 +   2.303E-04          X

Pb-210    N   3.6064E-04        46.50 3.606E-04 ?(  2.893E-04          G

AM-241        7.5962E-03        59.54 7.596E-03  (  5.106E-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  07-AUG-2007 14:52:42 Page    5
 8905696                          Spectrum name: Win00565.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	8.9412E-01	1.999E-01	2.027E-01
K-40 #	7.1808E+00	1.755E+00	1.775E+00
Ac-228	1.4988E+00	3.970E-01	4.010E-01
Pb-212	1.1479E+00	1.736E-01	1.789E-01
CS-137 #	1.4513E-01	6.188E-02	6.213E-02
Th-234	1.6177E+00	7.159E-01	7.168E-01
Pb-214	9.9621E-01	1.843E-01	1.881E-01
Pb-210 #C	8.7791E-01	1.474E+00	1.474E+00
AM-241	1.8491E+01	6.889E-01	9.711E-01

WI07-1002 D2 Bag# S-136 Grid D1-3 080707

- 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) 3.2849678E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1003 D2 Bag# S-137 Grid D1-3 080707

Sample description
WI07-1003 D2 Bag S-137 Grid D1-3 080707

Spectrum Filename: C:\User\Win00561.An1

Acquisition information

Start time:	07-Aug-2007 13:30:26
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:	4.0120E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.0120E+02) = 2.4925E+03
Detection limit method:	Traditional ORTEC method

WI07-1003 D2 Bag# S-137 Grid D1-3 080707

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: 0.1032

********** 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	4707.	23769.	39.615	1.74	2.251	CU-64	s
127.82	32.14	54.	88.	0.147	37.01	0.620	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	185.48	46.55	84.	29.	0.048	103.45	0.667
AM-241	237.41	59.53	291.	2539.	4.232	4.79	0.900
Th-234	252.81	63.38	34.	23.	0.039	84.79	0.708
Pb-214	298.54	74.81	44.	89.	0.149	29.73	0.917D
Pb-212	298.56	74.81	84.	0.	0.000	439.70	0.211D
Pb-212	307.74	77.11	50.	130.	0.216	23.43	0.919D
Pb-214	307.74	77.11	166.	0.	0.000	153.20	0.000D
Pb-214	348.37	87.26	48.	30.	0.050	87.94	1.077
Th-234	368.72	92.35	57.	28.	0.046	86.64	0.933D
Ac-228	380.72	95.35	22.	1.	0.002	1090.15	0.935D
Ac-228	837.47	209.51	14.	19.	0.032	82.21	0.689s
Pb-212	953.94	238.62	21.	165.	0.274	17.49	1.057D
Pb-214	967.37	241.98	27.	24.	0.040	73.80	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:44:25 Page 3
8905696 Spectrum name: Win00561.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.87	269.85	10.	25.	0.042	66.13	0.554s
Pb-214	1180.24	295.19	12.	63.	0.105	33.45	0.629s
Ac-228	1305.33	326.45	5.	3.	0.004	291.55	0.371s
Ac-228	1352.80	338.31	8.	54.	0.091	35.19	1.151s
Pb-214	1407.33	351.94	0.	87.	0.145	21.44	1.400s

WI07-1003 D2 Bag# S-137 Grid D1-3 080707

Ac-228	1849.72	462.51	0.	25.	0.042	40.00	0.525s
Bi-214	2437.94	609.52	5.	46.	0.077	34.65	0.745s
CS-137	2645.85	661.48	0.	16.	0.027	50.00	0.500s
Bi-214	3073.09	768.25	0.	11.	0.018	60.30	0.500s
Ac-228	3176.67	794.13	4.	1.	0.002	642.91	0.179s
Ac-228	3646.11	911.45	0.	36.	0.060	33.33	0.802s
Bi-214	3738.00	934.41	1.	0.	0.000	260.34	0.000s
Ac-228	3858.81	964.60	2.	10.	0.017	73.74	1.595D
Ac-228	3876.86	969.11	1.	25.	0.042	41.06	1.598D
Bi-214	4478.33	1119.41	0.	10.	0.017	63.25	0.375s
Bi-214	4955.38	1238.61	0.	8.	0.013	70.71	0.500s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.69	1461.07	0.	85.	0.142	21.69	1.249s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.96	4.	1.	0.001	582.14	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	2.2115E-04	609.31	2.139E-04	(	1.721E-05	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	2.433E-04	&(	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-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	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.7424E-03	1460.81	3.742E-03	(	4.403E-05	G
Ac-228	N	4.8057E-04	911.07	3.965E-04	(	1.101E-05	G K
			969.11	4.895E-04	(	3.597E-05	G
			338.32	6.368E-04	*(	5.212E-05	G
			964.60	6.240E-04	(	1.548E-04	G
			794.70	0.000E+00	%	2.176E-04	G
			463.00	9.744E-04	+	2.958E-04	G
			209.28	4.020E-04	?(	1.230E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:44:25 Page 4
8905696 Spectrum name: Win00561.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.811E-04	+	2.775E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.406E-04	X
		327.64	0.000E+00	&	1.845E-04	G
Pb-212	N 3.7840E-04	238.62	3.784E-04	(	1.622E-05	G K
		77.11	4.960E-04	+	7.458E-05	Energy duplication
		74.81	0.000E+00	%	8.725E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 3.8401E-04	92.35	3.437E-04	(	1.401E-04	G
		63.29	4.413E-04	?(	1.665E-04	G

```
                    WI07-1003   D2 Bag# S-137   Grid D1-3   080707
Pb-214    N   3.5118E-04    351.92 3.222E-04  (  3.704E-06          G K
                            295.21 3.947E-04  (  3.398E-05          G
                             77.11 0.000E+00 ?   1.231E-04Energy duplication
                            241.98 3.311E-04  (  1.089E-04          G
                             74.81 9.976E-04 +   1.877E-04Energy duplication
                             87.30 4.353E-04  (  1.496E-04          X

Pb-210    N   5.9200E-04     46.50 5.920E-04 ?(  2.750E-04          G

AM-241        5.2282E-03     59.54 5.228E-03  (  5.072E-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  07-AUG-2007 13:44:25 Page    5
 8905696                          Spectrum name: Win00561.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	5.5123E-01	1.910E-01	1.921E-01
K-40	9.3279E+00	2.024E+00	2.054E+00
Ac-228	1.1978E+00	3.052E-01	3.085E-01
Pb-212	9.4316E-01	1.650E-01	1.687E-01
CS-137 #	1.0807E-01	5.404E-02	5.419E-02
Th-234	9.5716E-01	5.802E-01	5.806E-01
Pb-214	8.7532E-01	1.877E-01	1.905E-01
Pb-210 #	1.4756E+00	1.526E+00	1.527E+00
AM-241	1.3031E+01	6.246E-01	7.892E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-1003 D2 Bag# S-137 Grid D1-3 080707

& - 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) 2.8467537E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1004 D2 Bag# S-138 Grid D1-3,4 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 15:32:07 Page 1
8905696 Spectrum name: Win00566.An1

Sample description
WI07-1004 D2 Bag 3 S-138 Grid D1-3,4 080707

Spectrum Filename: C:\User\Win00566.An1

Acquisition information
Start time: 07-Aug-2007 15:21:55
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: 3.9660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9660E+02) = 2.5214E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 15:32:07 Page 2
8905696 Spectrum name: Win00566.An1

WI07-1004 D2 Bag# S-138 Grid D1-3,4 080707

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: 0.1063

********** 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	2.92	5841.	13930.	23.216	2.30	0.854	- D
17.95	4.45	17460.	9703.	16.171	4.35	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	182.66	45.85	344.	32.	0.052	189.44	0.348s
AM-241	237.44	59.54	618.	3266.	5.444	4.60	0.945
Th-234	254.01	63.68	245.	65.	0.108	91.36	1.070
Pb-214	298.54	74.81	210.	98.	0.163	46.44	0.917D
Pb-212	298.56	74.81	125.	0.	0.000	184.58	0.677D
Pb-212	307.74	77.11	176.	157.	0.262	28.67	0.919D
Pb-214	307.74	77.11	300.	0.	0.000	811.65	0.264D
Pb-214	345.88	86.64	160.	65.	0.108	76.92	0.664s
Th-234	368.72	92.35	142.	53.	0.088	69.41	0.933D
Ac-228	380.72	95.35	93.	9.	0.015	316.89	0.935D
Ac-228	835.27	208.96	34.	44.	0.074	65.32	0.552s
Pb-212	953.94	238.62	33.	215.	0.358	15.59	1.057D
Pb-214	967.37	241.98	40.	36.	0.061	59.22	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 15:32:07 Page 3
8905696 Spectrum name: Win00566.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.01	270.39	19.	25.	0.042	73.87	0.292s
Pb-214	1179.67	295.04	8.	76.	0.127	27.90	0.637s
Ac-228	1310.38	327.71	9.	44.	0.073	43.95	0.338s
Ac-228	1352.80	338.31	15.	55.	0.091	41.52	0.387s
Pb-214	1407.17	351.90	22.	97.	0.162	29.98	1.209

WI07-1004 D2 Bag# S-138 Grid D1-3,4 080707

Ac-228	1852.04	463.09	2.	16.	0.027	60.91	0.953s
Bi-214	2438.09	609.56	0.	66.	0.110	24.62	0.651s
CS-137	2647.11	661.79	0.	28.	0.047	37.80	0.531s
Bi-214	3073.59	768.37	3.	16.	0.027	64.32	0.237s
Ac-228	3183.62	795.87	0.	20.	0.033	44.72	0.375s
Ac-228	3644.84	911.13	0.	62.	0.103	25.40	1.133s
Bi-214	3732.50	933.03	0.	7.	0.012	75.59	0.500s
Ac-228	3858.81	964.60	4.	14.	0.024	65.20	1.595D
Ac-228	3876.86	969.11	2.	32.	0.054	37.09	1.598D
Bi-214	4482.17	1120.37	0.	13.	0.022	55.47	0.500s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.96	1461.14	0.	78.	0.130	22.65	1.443s
Ac-228	6354.82	1588.28	0.	11.	0.018	60.30	0.875s
Bi-214	7060.20	1764.51	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	3.0421E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	8.425E-04	+	3.483E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	6.802E-04	&	4.154E-04	G
K-40	N	3.4342E-03	1460.81	3.434E-03	(	4.403E-05	G
Ac-228	N	6.8036E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	6.261E-04	(	4.737E-05	G
			338.32	6.407E-04	(	7.102E-05	G
			964.60	8.822E-04	(	2.018E-04	G
			794.70	1.176E-03	&	4.024E-04	G
			463.00	6.431E-04	(	1.088E-04	G
			209.28	9.416E-04	+	2.768E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.915E-04	(	2.072E-04	G
		1588.00	1.598E-03	+	7.577E-04	G
		95.35	0.000E+00	%	2.849E-04	X
		327.64	1.792E-03	+	4.401E-04	G
Pb-212	N 4.9429E-04	238.62	4.943E-04	(	1.983E-05	G K
		77.11	6.023E-04	+	1.007E-04	Energy duplication
		74.81	0.000E+00	?	1.057E-04	Energy duplication
CS-137	7.5877E-05	661.66	7.588E-05	?(	2.710E-06	G
Th-234	N 8.9867E-04	92.35	6.601E-04	(	2.167E-04	G
		63.29	1.238E-03	(	4.313E-04	G

```
                WI07-1004   D2 Bag# S-138   Grid D1-3,4   080707
Pb-214   N   4.1248E-04    351.92 3.605E-04  (  2.630E-05          G K
                           295.21 4.782E-04  (  2.786E-05          G
                            77.11 0.000E+00 %   1.641E-04Energy duplication
                           241.98 5.022E-04  (  1.303E-04          G
                            74.81 1.094E-03 +   2.826E-04Energy duplication
                            87.30 9.432E-04 &   3.152E-04          X

Pb-210   N   6.4303E-04     46.50 6.430E-04 &(  5.454E-04          G

AM-241       6.7258E-03     59.54 6.726E-03  (  7.341E-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  07-AUG-2007 15:32:07 Page    5
 8905696                          Spectrum name: Win00566.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	7.6705E-01	1.888E-01	1.910E-01
K-40	8.6590E+00	1.961E+00	1.988E+00
Ac-228	1.7155E+00	3.746E-01	3.800E-01
Pb-212	1.2463E+00	1.942E-01	1.998E-01
CS-137 #	1.9132E-01	7.231E-02	7.268E-02
Th-234	2.2659E+00	1.300E+00	1.301E+00
Pb-214	1.0400E+00	2.496E-01	2.526E-01
Pb-210 #C	1.6214E+00	3.072E+00	3.072E+00
AM-241	1.6959E+01	7.794E-01	1.001E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-1004 D2 Bag# S-138 Grid D1-3,4 080707

& - 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) 3.4465233E+01 pCi/g

The library has energies which are not separable.

Analyzed by: A.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0995 D2 Bag# S-139 Grid D1-2 080607

Sample description
WI07-0995 D2 Bag S-139 Grid D1-2 080707

Spectrum Filename: C:\User\Win00560.An1

Acquisition information

Start time:	07-Aug-2007 13:14:24
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:	3.7130E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.7130E+02) = 2.6932E+03
Detection limit method:	Traditional ORTEC method

WI07-0995 D2 Bag# S-139 Grid D1-2 080607

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: 0.1181

********** 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	
14.73	3.87	4464.	23999.	39.998	1.70	2.313	CU-64	s
104.73	26.36	33.	102.	0.170	27.42	0.705	AM-241	
128.36	32.27	51.	164.	0.273	22.36	0.935	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	186.00	46.68	172.	8.	0.013	558.57	0.000s
AM-241	237.52	59.56	643.	6978.	11.630	2.79	0.952
Th-234	253.13	63.46	43.	58.	0.097	50.25	0.777s
Pb-214	298.54	74.81	57.	106.	0.177	27.98	0.917D
Pb-212	298.56	74.81	101.	0.	0.000	480.74	0.417D
Pb-212	307.74	77.11	57.	111.	0.186	26.88	0.919D
Pb-214	307.74	77.11	121.	0.	0.000	782.50	0.342D
Pb-214	348.17	87.21	27.	35.	0.059	58.40	0.603s
Th-234	368.72	92.35	48.	26.	0.043	85.65	0.933D
Ac-228	380.72	95.35	20.	3.	0.006	388.71	0.935D
Ac-228	839.52	210.03	26.	32.	0.052	72.18	0.313s
Pb-212	953.94	238.62	30.	145.	0.241	19.79	1.057D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:24:35 Page 3
8905696 Spectrum name: Win00560.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	39.	21.	0.035	94.05	1.060D
Ac-228	1079.92	270.11	20.	22.	0.037	100.41	0.470s
Pb-214	1179.25	294.94	6.	51.	0.085	33.96	0.425s
Ac-228	1300.19	325.16	7.	22.	0.036	69.01	0.304s
Ac-228	1353.74	338.55	13.	47.	0.078	43.80	0.368s

WI07-0995 D2 Bag# S-139 Grid D1-2 080607

Pb-214	1406.84	351.82	14.	75.	0.125	29.41	0.780s
Ac-228	1849.61	462.48	5.	8.	0.014	117.30	0.263s
Bi-214	2438.28	609.60	4.	50.	0.083	33.90	1.282
CS-137	2647.43	661.87	2.	9.	0.015	82.68	0.398s
Bi-214	3071.00	767.73	0.	9.	0.015	66.67	0.250s
Ac-228	3183.33	795.80	0.	8.	0.013	70.71	0.250s
Ac-228	3646.50	911.54	0.	36.	0.060	33.33	0.437s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	4.	9.	0.014	95.62	1.595D
Ac-228	3876.86	969.11	4.	23.	0.039	47.97	1.598D
Bi-214	4485.14	1121.11	0.	8.	0.013	70.71	0.375s
Bi-214	4954.33	1238.35	0.	14.	0.023	53.45	0.750s
Bi-214	5510.33	1377.28	2.	1.	0.002	416.33	0.197s
K-40	5845.86	1461.11	0.	81.	0.135	22.22	1.305s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7061.25	1764.77	0.	10.	0.017	63.25	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	2.2263E-04	609.31	2.317E-04	?(	1.595E-05	G K
			1764.49	3.558E-04	+	1.779E-04	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-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	%	3.246E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.5662E-03	1460.81	3.566E-03	(	4.403E-05	G
Ac-228	N	4.7679E-04	911.07	3.965E-04	(	1.101E-05	G K
			969.11	4.496E-04	(	6.442E-05	G
			338.32	5.469E-04	?(	6.666E-05	G
			964.60	5.370E-04	(	2.145E-04	G
			794.70	4.704E-04	&(	5.880E-05	G
			463.00	3.248E-04	-	2.192E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:24:35 Page 4
8905696 Spectrum name: Win00560.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	6.665E-04	&(	1.621E-04	G
		270.23	6.873E-04	(	2.138E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.406E-04	X
		327.64	8.823E-04	&	3.312E-04	G
Pb-212	N	3.3272E-04	238.62	3.327E-04	(	1.905E-05	G K
		77.11	4.268E-04	+	7.211E-05	Energy duplication
		74.81	0.000E+00	%	9.535E-05	Energy duplication
CS-137		2.4841E-05	661.66	2.484E-05	?(	6.718E-06	G
Th-234	N	6.4770E-04	92.35	3.221E-04	(	1.289E-04	G
			63.29	1.111E-03	*(	1.858E-04	G

```
Pb-214   N   2.9202E-04    351.92 2.778E-04  (  2.154E-05          G K
                           295.21 3.195E-04  (  2.506E-05          G
                            77.11 0.000E+00 %   1.056E-04Energy duplication
                           241.98 2.923E-04  (  1.290E-04          G
                            74.81 1.183E-03 +   2.072E-04Energy duplication
                            87.30 5.127E-04 +   1.690E-04          X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   3.977E-04          G

AM-241       1.4368E-02     59.54 1.437E-02  (  7.489E-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  07-AUG-2007 13:24:35 Page    5
 8905696                          Spectrum name: Win00560.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 #	5.9959E-01	2.033E-01	2.045E-01
K-40	9.6048E+00	2.134E+00	2.165E+00
Ac-228	1.2841E+00	3.420E-01	3.454E-01
Pb-212	8.9609E-01	1.773E-01	1.805E-01
CS-137 #	6.6902E-02	5.532E-02	5.538E-02
Th-234	1.7444E+00	8.661E-01	8.670E-01
Pb-214	7.8647E-01	2.313E-01	2.332E-01
Pb-210 <	1.0710E+00		
AM-241	3.8697E+01	1.078E+00	1.793E+00

- All peaks for activity calculation had bad shape.

WI07-0995 D2 Bag# S-139 Grid D1-2 080607

* - 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) 5.3679688E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0996 D2 Bag# S-140 Grid D1-2 080707

```
     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 14:00:10 Page    1
8905696                          Spectrum name: Win00562.An1

Sample description
     WI07-0996  D2   Bag S-140 Grid D1-2  080707


Spectrum Filename: C:\User\Win00562.An1

Acquisition information
       Start time:                 07-Aug-2007 13:49:59
       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:                3.9420E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.9420E+02) =
                                   2.5368E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 14:00:10 Page    2
8905696                          Spectrum name: Win00562.An1
```

WI07-0996 D2 Bag# S-140 Grid D1-2 080707

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: 0.0766

********** 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	
12.03	3.35	7705.	12641.	21.068	2.65	0.854	-	D
17.15	4.63	12483.	10147.	16.912	3.69	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	184.72	46.36	63.	8.	0.013	300.52	0.299s
AM-241	237.37	59.52	213.	2324.	3.873	4.80	0.959
Th-234	252.65	63.34	48.	30.	0.051	88.77	0.443s
Pb-214	298.54	74.81	53.	70.	0.116	37.98	0.917D
Pb-212	298.56	74.81	68.	0.	0.000	848.34	0.000D
Pb-212	307.74	77.11	70.	118.	0.197	27.10	0.919D
Pb-214	307.74	77.11	147.	0.	0.000	0.00	0.506D
Pb-214	347.65	87.09	38.	54.	0.089	50.81	1.051
Th-234	368.72	92.35	71.	51.	0.086	53.97	0.933D
Ac-228	380.72	95.35	22.	9.	0.015	163.21	0.935D
Ac-228	835.93	209.13	14.	38.	0.063	50.74	0.630s
Pb-212	953.94	238.62	13.	172.	0.287	16.35	1.057D
Pb-214	967.37	241.98	33.	32.	0.054	61.61	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:00:10 Page 3
8905696 Spectrum name: Win00562.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.65	270.05	14.	25.	0.042	67.72	0.510s
Pb-214	1179.02	294.88	10.	68.	0.112	30.66	1.042s
Ac-228	1310.17	327.66	7.	16.	0.027	78.40	0.325s
Ac-228	1352.62	338.27	10.	42.	0.070	43.99	1.696s
Pb-214	1407.12	351.89	17.	83.	0.139	31.24	1.400s

WI07-0996 D2 Bag# S-140 Grid D1-2 080707

Ac-228	1851.91	463.06	0.	15.	0.025	51.64	0.708s
Bi-214	2437.36	609.37	2.	40.	0.066	35.17	1.154
CS-137	2649.22	662.32	2.	14.	0.024	60.47	0.407s
Bi-214	3071.78	767.92	2.	2.	0.003	244.95	0.218s
Ac-228	3178.20	794.52	0.	8.	0.013	70.71	0.500s
Ac-228	3645.15	911.21	0.	31.	0.052	35.92	0.312s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	0.	9.	0.015	66.62	1.595D
Ac-228	3876.86	969.11	1.	21.	0.035	45.41	1.598D
Bi-214	4481.25	1120.14	0.	22.	0.037	42.64	0.687s
Bi-214	4957.00	1239.02	0.	10.	0.017	63.25	0.250s
Bi-214	5513.00	1377.94	1.	0.	0.000	260.34	0.000s
K-40	5845.51	1461.02	0.	87.	0.145	21.44	2.124
Ac-228	6353.33	1587.90	0.	3.	0.005	115.47	0.250s
Bi-214	7060.60	1764.61	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	1.8222E-04	609.31	1.837E-04	(	1.298E-05	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	5.353E-04	+	1.740E-04	G
			1238.11	6.779E-04	&	3.390E-04	G
			768.36	0.000E+00	%	1.757E-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	3.8304E-03	1460.81	3.830E-03	(	4.403E-05	G
Ac-228	N	4.3216E-04	911.07	3.414E-04	?(	1.101E-05	G K
			969.11	4.094E-04	(	3.772E-05	G
			338.32	4.922E-04	(	5.860E-05	G
			964.60	5.563E-04	(	6.173E-05	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	5.847E-04	?(	3.898E-05	G
			209.28	8.005E-04	+	2.266E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:00:10 Page 4
8905696 Spectrum name: Win00562.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.811E-04	+	2.920E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	1.720E-04	-	1.616E-04	X
		327.64	6.516E-04	(	1.741E-04	G
Pb-212	N 4.1216E-04	238.62	3.955E-04	(	1.288E-05	G K
		77.11	4.534E-04	(	4.711E-05	Energy duplication
		74.81	0.000E+00	%	7.903E-05	Energy duplication
CS-137	3.8842E-05	661.66	3.884E-05	?(	6.485E-06	G
Th-234	N 6.1532E-04	92.35	6.416E-04	(	1.546E-04	G
		63.29	5.779E-04	?(	1.958E-04	G

WI07-0996 D2 Bag# S-140 Grid D1-2 080707

```
Pb-214   N   3.5884E-04    351.92 3.086E-04  (  2.332E-05         G K
                           295.21 4.228E-04 @(  3.062E-05         G
                            77.11 0.000E+00 ?   1.159E-04Energy duplication
                           241.98 4.441E-04  (  1.193E-04         G
                            74.81 7.799E-04 +   1.807E-04Energy duplication
                            87.30 7.763E-04 +   2.032E-04         X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   2.537E-04         G

AM-241       4.7848E-03     59.54 4.785E-03  (  4.358E-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 07-AUG-2007 14:00:10 Page 5
8905696 Spectrum name: Win00562.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	4.6226E-01	1.626E-01	1.635E-01
K-40	9.7169E+00	2.084E+00	2.115E+00
Ac-228	1.0963E+00	2.631E-01	2.663E-01
Pb-212	1.0456E+00	1.655E-01	1.700E-01
CS-137 #	9.8533E-02	5.958E-02	5.970E-02
Th-234	1.5609E+00	8.108E-01	8.116E-01
Pb-214	9.1029E-01	2.293E-01	2.319E-01
Pb-210 <	6.4353E-01		
AM-241	1.2138E+01	5.822E-01	7.354E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0996 D2 Bag# S-140 Grid D1-2 080707

& - 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) 2.7028679E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0997 D1 Bag #S-141 Grid D1-4 080707

```
     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 13:39:18 Page    1
8905696                          Spectrum name: Win00375.An1

Sample description
     WI07-0997  D1 Bag S-141  Grid D1-4   080707


Spectrum Filename: C:\User\Win00375.An1

Acquisition information
       Start time:                 07-Aug-2007 13:29:07
       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:                4.1430E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  4.1430E+02) =
                                   2.4137E+03
       Detection limit method:     Traditional ORTEC method

□

     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 13:39:18 Page    2
8905696                          Spectrum name: Win00375.An1
```

WI07 - 0997 D1 Bag #S-141 Grid D1-4 080707

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: 0.1833

********** 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	
28.52	7.31	663.	2843.	4.738	5.16	1.434	CU-64	s
290.99	72.83	49.	30.	0.050	75.25	0.969	BI-207	D
2333.44	583.34	0.	65.	0.108	24.81	0.571	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	187.77	47.11	153.	48.	0.080	104.96	0.388s
AM-241	237.63	59.57	310.	1090.	1.816	10.36	1.053s
Th-234	260.27	65.23	78.	26.	0.043	127.10	0.363s
Pb-214	298.61	74.81	95.	93.	0.156	36.04	0.971D
Pb-212	298.63	74.81	116.	0.	0.000	3052.87	0.180D
Pb-212	307.80	77.11	113.	93.	0.155	38.32	0.972D
Pb-214	307.80	77.11	193.	0.	0.000	122.12	0.000D
Pb-214	347.88	87.12	64.	31.	0.052	96.34	0.686s
Th-234	368.79	92.35	69.	22.	0.037	112.33	0.985D
Ac-228	380.79	95.35	51.	10.	0.017	208.17	0.987D
Ac-228	836.69	209.29	17.	27.	0.045	71.11	0.725s
Pb-212	954.08	238.62	55.	136.	0.226	23.16	1.099D

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:39:18 Page 3
8905696 Spectrum name: Win00375.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	50.	26.	0.043	88.15	1.101D
Ac-228	1081.48	270.47	18.	37.	0.061	60.30	0.374s
Pb-214	1181.32	295.42	14.	52.	0.087	41.25	1.166
Ac-228	1307.90	327.05	2.	18.	0.030	55.73	0.697s
Ac-228	1352.11	338.10	17.	49.	0.081	48.82	0.428s

WI07 - 0997 D1 Bag #S-141 Grid D1-4 080707

Pb-214	1407.61	351.97	14.	71.	0.118	31.59	0.863s
Ac-228	1850.70	462.70	3.	23.	0.038	53.75	0.271s
Bi-214	2436.84	609.18	7.	49.	0.082	36.62	1.493s
CS-137	2641.00	660.20	0.	17.	0.028	48.51	0.250s
Bi-214	3074.67	768.57	1.	0.	0.001	240.37	0.197s
Ac-228	3180.25	794.96	2.	1.	0.002	314.25	0.311s
Ac-228	3647.94	911.83	3.	38.	0.064	36.69	1.420
Bi-214	3733.00	933.08	0.	6.	0.010	81.65	0.250s
Ac-228	3859.13	964.60	2.	6.	0.009	115.02	1.589D
Ac-228	3877.18	969.11	6.	22.	0.037	52.69	1.591D
Bi-214	4482.00	1120.24	0.	12.	0.020	57.74	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.61	1.	0.	0.000	0.00	0.000s
K-40	5847.31	1461.39	15.	50.	0.084	43.31	1.054s
Ac-228	6355.50	1588.37	0.	4.	0.007	100.00	0.500s
Bi-214	7060.90	1764.62	0.	11.	0.018	60.30	0.875s

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	2.6651E-04	609.31	2.508E-04	*(	2.188E-05	G K
			1764.49	4.161E-04	+	1.973E-04	G
			1120.29	3.148E-04	?(	2.624E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	0.000E+00	%	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.318E-04	G
			934.06	6.323E-04	&	4.215E-04	G
K-40	N	2.3694E-03	1460.81	2.369E-03	?(	2.796E-04	G
Ac-228	N	5.0378E-04	911.07	4.563E-04	(	3.506E-05	G K
			969.11	4.649E-04	(	8.353E-05	G
			338.32	6.411E-04	?(	8.443E-05	G
			964.60	3.749E-04	(	1.836E-04	G
			794.70	0.000E+00	%	1.923E-04	G
			463.00	9.817E-04	+	3.347E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 13:39:18 Page 4
8905696 Spectrum name: Win00375.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	6.541E-04	?(	1.539E-04	G
		270.23	1.299E-03	+	3.896E-04	G
		1588.00	6.196E-04	?(	1.549E-04	G
		95.35	0.000E+00	%	2.602E-04	X
		327.64	8.173E-04	&	3.137E-04	G
Pb-212	N 3.7680E-04	238.62	3.549E-04	(	2.890E-05	G K
		77.11	4.310E-04	(	7.182E-05	Energy duplication
		74.81	0.000E+00	%	1.234E-04	Energy duplication
CS-137	5.0549E-05	661.66	5.055E-05	&(	2.973E-06	G
Th-234	N 4.4133E-04	92.35	3.303E-04	(	1.794E-04	G
		63.29	5.994E-04	&(	2.997E-04	G

```
Pb-214   N   3.2914E-04    351.92 2.945E-04 *(  2.430E-05         G K
                           295.21 3.680E-04  (  4.116E-05         G
                            77.11 0.000E+00 ?   1.597E-04Energy duplication
                           241.98 4.017E-04  (  1.662E-04         G
                            74.81 1.261E-03 +   2.688E-04Energy duplication
                            87.30 5.352E-04 +   2.468E-04         X

Pb-210   N   1.1244E-03     46.50 1.124E-03 &(  4.217E-04         G

AM-241       2.7011E-03     59.54 2.701E-03 *(  6.303E-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
   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 #	6.4327E-01	2.199E-01	2.207E-01
K-40 #	5.7190E+00	2.477E+00	2.482E+00
Ac-228	1.2160E+00	3.780E-01	3.797E-01
Pb-212	9.0949E-01	2.036E-01	2.054E-01
CS-137 #	1.2201E-01	5.918E-02	5.930E-02
Th-234	1.0652E+00	9.034E-01	9.038E-01
Pb-214	7.9444E-01	2.509E-01	2.520E-01
Pb-210 #	2.7140E+00	2.849E+00	2.849E+00
AM-241 #	6.5196E+00	6.755E-01	7.173E-01

- All peaks for activity calculation had bad shape.

WI07 - 0997 D1 Bag #S-141 Grid D1-4 080707

* - 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) 1.9703114E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0998 D1 Bag #S-142 Grid D1-5 080707

Sample description
WI07-0998 D1 Bag S-142 Grid D1-5 080707

Spectrum Filename: C:\User\Win00376.An1

Acquisition information

Start time:	07-Aug-2007 13:51:06
Live time:	600
Real time:	602
Dead time:	0.38 %
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:	3.5330E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.5330E+02) = 2.8305E+03
Detection limit method:	Traditional ORTEC method

WI07 - 0998 D1 Bag #S-142 Grid D1-5 080707

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	
28.63	7.34	754.	1953.	3.256	7.12	1.534	CU-64	s
232.21	58.26	466.	316.	0.526	22.38	0.957	TA-182	D
243.22	61.01	336.	418.	0.697	15.78	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	186.00	46.67	36.	5.	0.009	325.85	0.000s
AM-241	237.51	59.54	651.	268.	0.447	29.55	0.958D
Th-234	252.51	63.29	130.	8.	0.014	400.87	0.961D
Pb-214	298.61	74.81	99.	25.	0.042	117.25	0.971D
Pb-212	298.63	74.81	45.	0.	0.000	485.49	0.178D
Pb-212	307.80	77.11	117.	19.	0.032	166.37	0.972D
Pb-214	307.80	77.11	128.	0.	0.000	199.09	0.295D
Pb-214	350.00	87.65	16.	0.	0.001	974.68	0.000s
Th-234	377.00	94.40	35.	14.	0.024	149.98	0.399s
Ac-228	380.79	95.35	13.	0.	0.000	0.00	0.458D
Ac-228	841.95	210.60	8.	15.	0.025	83.27	0.260s
Pb-212	954.32	238.69	50.	206.	0.343	21.27	3.076s

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:01:15 Page 3
8905696 Spectrum name: Win00376.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	68.	0.	0.000	0.00	1.101
Ac-228	1083.08	270.86	9.	23.	0.038	66.79	0.555s
Pb-214	1173.79	293.54	27.	16.	0.027	130.80	0.561s
Ac-228	1308.80	327.28	4.	3.	0.005	221.11	0.376s
Ac-228	1352.50	338.20	5.	2.	0.003	389.87	0.333s

WI07 - 0998 D1 Bag #S-142 Grid D1-5 080707

Pb-214	1406.19	351.62	9.	80.	0.133	28.90	0.346s
Ac-228	1842.96	460.77	6.	9.	0.015	127.66	0.240s
Bi-214	2436.03	608.98	4.	40.	0.066	39.95	0.325s
CS-137	2647.00	661.70	2.	0.	0.001	368.18	0.000s
Bi-214	3073.33	768.24	0.	7.	0.012	75.59	0.312s
Ac-228	3189.86	797.36	0.	14.	0.023	53.45	0.375s
Ac-228	3645.00	911.09	2.	0.	0.000	0.00	0.000s
Bi-214	3737.00	934.08	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3876.67	968.98	1.	0.	0.001	240.37	0.197s
Bi-214	4482.00	1120.24	1.	0.	0.000	0.00	0.000s
Bi-214	4952.60	1237.83	2.	0.	0.001	331.66	0.350s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5855.00	1463.31	28.	10.	0.017	233.24	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.14	1764.43	1.	1.	0.002	281.40	0.440s

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	2.0299E-04	609.31	2.030E-04	*(	1.784E-05	G K
			1764.49	0.000E+00	%	9.689E-05	G
			1120.29	0.000E+00	?	5.247E-05	G
			1238.11	0.000E+00	%	1.866E-04	G
			768.36	3.982E-04	+	2.432E-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	&	4.346E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	3.062E-05	G K
			969.11	0.000E+00	%	4.207E-05	G
			338.32	0.000E+00	%	5.631E-05	G
			964.60	0.000E+00	%	6.688E-05	G
			794.70	8.976E-04	&	3.728E-04	G
			463.00	3.898E-04	&	2.599E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:01:15 Page 4
8905696 Spectrum name: Win00376.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	3.634E-04	&	1.769E-04	G
		270.23	8.146E-04	&	3.016E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	?	1.266E-04	X
		327.64	0.000E+00	%	1.959E-04	G
Pb-212	N 5.3796E-04	238.62	5.380E-04	*(	2.739E-05	G K
		77.11	8.842E-05	-	7.863E-05	Energy duplication
		74.81	0.000E+00	%	7.869E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	7.617E-06	G
Th-234	N 2.0807E-04	92.35	2.081E-04	&(	1.302E-04	G
		63.29	0.000E+00	%	3.947E-04	G

```
Pb-214   N   3.3298E-04    351.92 3.312E-04 *(  2.016E-05          G K
                           295.21 1.156E-04 &   6.927E-05          G
                            77.11 0.000E+00 ?   1.310E-04Energy duplication
                           241.98 0.000E+00 %   1.916E-04          G
                            74.81 3.438E-04  (  1.966E-04Energy duplication
                            87.30 0.000E+00 %   1.067E-04          X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   2.242E-04          G

AM-241       6.6489E-04     59.54 6.649E-04  (  9.069E-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
   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 #	5.7455E-01	2.295E-01	2.302E-01
K-40 <	1.2301E+00		
Ac-228 B<	8.6673E-02		
Pb-212	1.5227E+00	3.239E-01	3.270E-01
CS-137 <	2.1559E-02		
Th-234 #	5.8894E-01	8.833E-01	8.834E-01
Pb-214	9.4248E-01	2.724E-01	2.738E-01
Pb-210 <	6.3448E-01		
AM-241	1.8819E+00	5.561E-01	5.604E-01

- All peaks for activity calculation had bad shape.

WI07 - 0998 D1 Bag #S-142 Grid D1-5 080707

* - 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) 5.5105925E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0999 D1 Bag #S-143 Grid D1-4 080707

```
     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 14:20:21 Page    1
8905696                          Spectrum name: Win00377.An1

Sample description
     WI07-0999  D1 Bag S-143  Grid D1-4   080707


Spectrum Filename: C:\User\Win00377.An1

Acquisition information
       Start time:                 07-Aug-2007 14:08:23
       Live time:                600
       Real time:                602
       Dead time:                  0.32 %
       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:                3.7970E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.7970E+02) =
                                   2.6337E+03
       Detection limit method:     Traditional ORTEC method

▯

     ORTEC g v - i (  63) wan32  G53W2.06  07-AUG-2007 14:20:21 Page    2
8905696                          Spectrum name: Win00377.An1
```

WI07 - 0999 D1 Bag #S-143 Grid D1-4 080707

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: 0.3025

********** 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	
231.63	58.18	444.	383.	0.638	18.64	0.957	TA-182	D
243.22	61.08	377.	468.	0.779	14.95	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	177.73	44.60	69.	22.	0.036	143.37	0.504s
AM-241	237.51	59.54	725.	309.	0.515	27.14	0.958D
Th-234	252.51	63.29	135.	4.	0.007	763.24	0.961D
Pb-214	298.61	74.81	68.	0.	0.000	0.00	0.281D
Pb-212	298.63	74.81	22.	0.	0.000	0.00	0.000D
Pb-212	314.71	78.84	40.	24.	0.039	99.25	0.456s
Pb-214	307.80	77.11	57.	0.	0.000	245.92	0.423D
Pb-214	349.06	87.42	48.	23.	0.038	112.37	0.664s
Th-234	368.79	92.35	39.	21.	0.034	96.97	0.984D
Ac-228	380.79	95.35	43.	10.	0.017	187.64	0.987D
Ac-228	836.67	209.28	7.	0.	0.000	0.00	0.281s
Pb-212	953.00	238.36	13.	0.	0.000	0.00	0.000s
Pb-214	967.50	241.98	17.	0.	0.000	0.00	0.549D

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:20:21 Page 3
8905696 Spectrum name: Win00377.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.90	270.57	10.	13.	0.022	100.88	0.795s
Pb-214	1172.29	293.16	26.	4.	0.007	437.58	0.413s
Ac-228	1308.56	327.21	3.	3.	0.005	216.02	0.377s
Ac-228	1354.00	338.57	4.	0.	0.000	0.00	0.000s
Pb-214	1411.15	352.85	18.	48.	0.079	48.43	0.331s

WI07 - 0999 D1 Bag #S-143 Grid D1-4 080707

Ac-228	1853.00	463.28	1.	0.	0.000	0.00	0.000s
Bi-214	2439.70	609.90	8.	10.	0.016	116.83	0.449s
CS-137	2643.00	660.70	0.	4.	0.007	100.00	0.250s
Bi-214	3073.43	768.26	0.	10.	0.017	63.25	0.312s
Ac-228	3179.33	794.73	1.	0.	0.001	240.37	0.197s
Ac-228	3652.08	912.86	4.	20.	0.032	60.89	0.319s
Bi-214	3735.00	933.58	0.	0.	0.001	223.61	0.100s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.197D
Ac-228	3877.50	969.19	0.	14.	0.023	53.45	0.500s
Bi-214	4483.50	1120.62	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	5847.43	1461.42	0.	76.	0.127	22.94	0.366s
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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	8.9552E-05	609.31	4.947E-05	?(	2.361E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	5.247E-05	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	5.689E-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	%	2.108E-04	G
K-40	N	3.5776E-03	1460.81	3.578E-03	*(	4.707E-05	G
Ac-228	N	2.6896E-04	911.07	2.331E-04	&(	3.817E-05	G K
			969.11	2.945E-04	?(	2.103E-05	G
			338.32	0.000E+00	?	4.442E-05	G
			964.60	0.000E+00	%	1.176E-04	G
			794.70	0.000E+00	%	1.282E-04	G
			463.00	0.000E+00	?	8.662E-05	G
			209.28	0.000E+00	%	1.078E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:20:21 Page 4
8905696 Spectrum name: Win00377.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.604E-04	$(	1.771E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.346E-04	$(	2.193E-04	X
		327.64	0.000E+00	%	1.833E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	?	1.472E-05	G K
		77.11	1.095E-04	&	5.469E-05	X
		74.81	0.000E+00	?	5.608E-05	Energy duplication
CS-137	1.1894E-05	661.66	1.189E-05	&(	2.973E-06	G
Th-234	N 3.0206E-04	92.35	3.021E-04	(	1.380E-04	G
		63.29	0.000E+00	%	3.961E-04	G

WI07 - 0999 D1 Bag #S-143 Grid D1-4 080707

& - 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) 1.5069961E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1000 D2 Bag# S-144 Grid D1-5 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:36:23 Page 1
8905696 Spectrum name: Win00564.An1

Sample description
WI07-1000 D2 Bag 3 S-144 Grid D1-5.080707

Spectrum Filename: C:\User\Win00564.An1

Acquisition information
Start time: 07-Aug-2007 14:26:12
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: 3.6090E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6090E+02) = 2.7709E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:36:23 Page 2
8905696 Spectrum name: Win00564.An1

WI07-1000 D2 Bag# S-144 Grid D1-5 080707

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: 0.1353

********** 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	4449.	26708.	44.513	1.58	2.302	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	184.22	46.24	113.	24.	0.041	160.46	0.319s
AM-241	237.39	59.52	205.	2562.	4.269	4.45	0.923
Th-234	251.81	63.13	52.	39.	0.065	73.19	0.806
Pb-214	298.54	74.81	59.	78.	0.130	35.75	0.917D
Pb-212	298.56	74.81	86.	0.	0.000	2630.59	0.483D
Pb-212	307.74	77.11	55.	127.	0.211	24.34	0.919D
Pb-214	307.74	77.11	125.	0.	0.000	1524.17	0.643D
Pb-214	347.92	87.15	35.	64.	0.107	41.02	0.629s
Th-234	368.72	92.35	51.	58.	0.096	43.85	0.933D
Ac-228	380.72	95.35	43.	4.	0.007	453.40	0.936D
Ac-228	836.59	209.29	18.	44.	0.072	50.84	0.563s
Pb-212	953.94	238.62	12.	189.	0.315	15.48	1.057D
Pb-214	967.37	241.98	34.	29.	0.048	67.78	1.060D
Ac-228	1079.48	270.00	8.	36.	0.060	48.43	0.307s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:36:23 Page 3
8905696 Spectrum name: Win00564.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.10	295.15	15.	68.	0.113	33.28	0.675s
Ac-228	1307.19	326.91	3.	22.	0.037	50.75	0.526s
Ac-228	1354.27	338.68	11.	45.	0.076	40.54	1.357
Pb-214	1407.29	351.93	7.	84.	0.140	24.67	1.432s
Ac-228	1850.23	462.64	8.	19.	0.032	77.68	0.278s

WI07-1000 D2 Bag# S-144 Grid D1-5 080707

Bi-214	2437.06	609.30	0.	70.	0.117	23.90	1.208s
CS-137	2649.00	662.27	2.	2.	0.003	311.13	0.000s
Bi-214	3071.00	767.73	1.	2.	0.003	200.00	0.089s
Ac-228	3177.33	794.30	0.	4.	0.007	100.00	0.250s
Ac-228	3646.00	911.42	0.	42.	0.070	30.86	0.823s
Bi-214	3733.83	933.37	1.	1.	0.001	366.67	0.223s
Ac-228	3858.81	964.60	0.	5.	0.008	88.81	1.595D
Ac-228	3876.86	969.11	0.	38.	0.063	32.59	1.598D
Bi-214	4480.56	1119.96	0.	12.	0.020	57.74	0.500s
Bi-214	4954.67	1238.43	0.	5.	0.008	89.44	0.375s
Bi-214	5512.67	1377.86	0.	6.	0.010	81.65	0.292s
K-40	5845.40	1461.00	0.	65.	0.108	24.81	1.978
Ac-228	6352.50	1587.70	0.	2.	0.003	141.42	0.500s
Bi-214	7058.89	1764.18	1.	1.	0.002	281.40	0.229s

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	3.1920E-04	609.31	3.255E-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	3.390E-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	6.492E-04	+	4.328E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	2.8618E-03	1460.81	2.862E-03	(	4.403E-05	G
Ac-228	N	4.8259E-04	911.07	4.625E-04	?(	1.101E-05	G K
			969.11	7.314E-04	+	1.785E-04	G
			338.32	5.313E-04	(	6.031E-05	G
			964.60	3.131E-04	-	2.299E-04	G
			794.70	2.352E-04	-	1.983E-04	G
			463.00	7.536E-04	+	3.066E-04	G
			209.28	9.204E-04	+	2.445E-04	G
			270.23	1.125E-03	+	3.091E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:36:23 Page 4
8905696 Spectrum name: Win00564.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	9.095E-04	&	3.090E-04	G
Pb-212	N 4.4856E-04	238.62	4.340E-04	(	1.266E-05	G K
		77.11	4.847E-04	(	4.226E-05	Energy duplication
		74.81	0.000E+00	%	8.825E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	9.139E-06	G
Th-234	N 7.2972E-04	92.35	7.204E-04	(	1.327E-04	G
		63.29	7.430E-04	(	2.040E-04	G
Pb-214	N 3.2629E-04	351.92	3.111E-04	(	1.583E-05	G K

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                    WI07-1000   D2 Bag# S-144   Grid D1-5   080707
                              295.21 4.260E-04 +   8.390E-05         G
                               77.11 0.000E+00 %   1.070E-04Energy duplication
                              241.98 4.017E-04  (  1.211E-04         G
                               74.81 8.735E-04 +   1.904E-04Energy duplication
                               87.30 9.335E-04 +   2.116E-04         X

Pb-210   N   4.9674E-04      46.50 4.967E-04  (  3.168E-04         G

AM-241       5.2748E-03      59.54 5.275E-03  (  4.277E-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  07-AUG-2007 14:36:23 Page    5
 8905696                          Spectrum name: Win00564.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	#	8.8444E-01	2.114E-01	2.140E-01
K-40		7.9296E+00	1.967E+00	1.989E+00
Ac-228		1.3372E+00	3.407E-01	3.443E-01
Pb-212		1.2429E+00	1.793E-01	1.852E-01
CS-137	<	2.5321E-02		
Th-234		2.0219E+00	8.625E-01	8.638E-01
Pb-214		9.0410E-01	2.230E-01	2.256E-01
Pb-210	C	1.3764E+00	2.208E+00	2.209E+00
AM-241		1.4616E+01	6.501E-01	8.458E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-1000 D2 Bag# S-144 Grid D1-5 080707

< - 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) 3.0312338E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07 - 1001 D1 Bag #S-145 Grid D3-2,5 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:37:53 Page 1
8905696 Spectrum name: Win00378.An1

Sample description
WI07-1001 D1 Bag S-145 Grid D3-2,5 080707

Spectrum Filename: C:\User\Win00378.An1

Acquisition information
Start time: 07-Aug-2007 14:27:27
Live time: 600
Real time: 602
Dead time: 0.31 %
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: 3.5440E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5440E+02) = 2.8217E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:37:53 Page 2
8905696 Spectrum name: Win00378.An1

WI07 - 1001 D1 Bag #S-145 Grid D3-2,5 080707

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	
28.89	7.51	366.	476.	0.794	14.60	0.916	CU-64	D
40.06	10.30	526.	342.	0.570	21.81	0.918	HG-203	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	186.11	46.69	33.	9.	0.015	212.57	0.260s
AM-241	237.31	59.49	284.	232.	0.387	39.89	0.886s
Th-234	251.67	63.08	34.	9.	0.015	198.14	0.169s
Pb-214	298.61	74.81	37.	0.	0.000	0.00	0.328D
Pb-212	298.63	74.81	36.	0.	0.000	282.26	0.400D
Pb-212	306.76	76.85	138.	161.	0.268	35.75	1.131s
Pb-214	307.80	77.11	113.	0.	0.000	118.51	0.508D
Pb-214	352.31	88.23	68.	32.	0.052	103.89	0.757s
Th-234	368.79	92.35	73.	29.	0.048	91.37	0.985D
Ac-228	380.79	95.35	52.	19.	0.032	117.18	0.987D
Ac-228	831.25	207.93	27.	24.	0.041	97.21	0.450s
Pb-212	946.53	236.74	50.	24.	0.041	104.78	0.714s
Pb-214	967.50	241.98	7.	0.	0.000	0.00	0.167D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:37:53 Page 3
8905696 Spectrum name: Win00378.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.56	269.73	8.	3.	0.005	290.59	0.407s
Pb-214	1181.86	295.55	23.	19.	0.031	105.22	0.870
Ac-228	1306.16	326.62	6.	14.	0.024	75.65	0.331s
Ac-228	1352.00	338.07	7.	3.	0.006	236.64	0.000s
Pb-214	1408.00	352.07	8.	0.	0.000	0.00	0.000s

WI07 - 1001 D1 Bag #S-145 Grid D3-2,5 080707

Ac-228	1853.00	463.28	1.	0.	0.000	0.00	0.000s
Bi-214	2431.91	607.95	14.	20.	0.033	86.83	0.286s
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	3644.44	910.95	0.	55.	0.092	26.97	0.365s
Bi-214	3735.00	933.58	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	4.	2.	0.004	292.19	1.589D
Ac-228	3877.18	969.11	5.	4.	0.006	199.63	1.591D
Bi-214	4483.40	1120.59	0.	17.	0.028	48.51	0.437s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5510.40	1377.21	0.	5.	0.008	89.44	0.312s
K-40	5838.84	1459.28	4.	12.	0.019	86.38	0.282s
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	2.1089E-04	609.31	1.015E-04	&(	2.992E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	4.460E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	?	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.794E-04	?(	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	5.4920E-04	1460.81	5.492E-04	&(	1.641E-04	G
Ac-228	N	6.4966E-04	911.07	6.575E-04	?(	1.195E-05	G K
			969.11	7.947E-05	-	1.004E-04	G
			338.32	0.000E+00	%	6.587E-05	G
			964.60	0.000E+00	%	2.675E-04	G
			794.70	0.000E+00	?	6.411E-05	G
			463.00	0.000E+00	?	8.662E-05	G
			209.28	5.895E-04	&(	1.895E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:37:53 Page 4
8905696 Spectrum name: Win00378.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.848E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	4.263E-04	-	2.798E-04	X
		327.64	6.645E-04	&(	1.766E-04	G
Pb-212	N 2.5981E-04	238.62	6.414E-05	&(	2.739E-05	G K
		77.11	7.446E-04	*(	7.918E-05	X
		74.81	0.000E+00	%	7.103E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	2.973E-06	G
Th-234	N 4.2536E-04	92.35	4.254E-04	(	1.850E-04	G
		63.29	2.113E-04	-	2.256E-04	G

```
                    WI07 - 1001  D1 Bag #S-145 Grid D3-2,5  080707
Pb-214   N   0.0000E+00    351.92 0.000E+00 ?   1.884E-05         G K
                           295.21 1.321E-04 ?   6.850E-05         G
                            77.11 0.000E+00 &   1.230E-04Energy duplication
                           241.98 0.000E+00 ?   6.729E-05         G
                            74.81 0.000E+00 %   1.227E-04Energy duplication
                            87.30 5.438E-04 &   2.517E-04         X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   2.267E-04         G

AM-241       5.7600E-04     59.54 5.760E-04 *(  6.030E-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  07-AUG-2007 14:37:53 Page    5
 8905696                          Spectrum name: Win00378.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 #     5.9505E-01    2.653E-01    2.659E-01
 K-40   #     1.5497E+00    1.339E+00    1.339E+00
 Ac-228       1.8331E+00    4.944E-01    4.973E-01
 Pb-212 #     7.3308E-01    2.620E-01    2.629E-01
 CS-137  <    8.3901E-03
 Th-234       1.2002E+00    1.097E+00    1.097E+00
 Pb-214 B<    5.3148E-02
 Pb-210  <    6.3976E-01
 AM-241 #     1.6253E+00    6.483E-01    6.511E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07 - 1001 D1 Bag #S-145 Grid D3-2,5 080707

& - 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) 7.5364232E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 1005 D1 Bag #S-146 Grid D3-2 080707

Sample description
WI07-1005 D1 Bag S-146 Grid D3-2 080707

Spectrum Filename: C:\User\D2 Samples\WI07-1002 D2 Bag # S-136 Grid D1-3 080707.An1

Acquisition information

Start time:	07-Aug-2007 14:44:07
Live time:	600
Real time:	602
Dead time:	0.31 %
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:	3.5360E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.5360E+02) = 2.8281E+03

Detection limit method: Traditional ORTEC method

WI07 - 1005 D1 Bag #S-146 Grid D3-2 080707

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	
26.20	6.73	223.	56.	0.093	80.02	0.529	CU-64	s
242.70	60.98	146.	156.	0.261	27.07	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	187.00	46.92	14.	2.	0.003	503.32	0.000s
AM-241	237.51	59.54	258.	126.	0.209	40.36	0.958D
Th-234	252.51	63.29	81.	19.	0.031	145.22	0.961D
Pb-214	298.61	74.81	140.	51.	0.085	71.55	0.971D
Pb-212	298.63	74.81	42.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	160.	52.	0.087	73.48	0.972D
Pb-214	307.80	77.11	113.	0.	0.000	103.71	1.227D
Pb-214	348.00	87.15	17.	0.	0.000	0.00	0.000s
Th-234	368.00	92.15	21.	0.	0.000	0.00	0.000s
Ac-228	380.79	95.35	26.	0.	0.000	0.00	0.328D
Ac-228	835.76	209.06	22.	6.	0.011	252.85	0.220s
Pb-212	955.87	239.07	84.	149.	0.248	32.02	0.975s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:54:16 Page 3
8905696 Spectrum name: WI07-1002 D2 Bag # S-136 Grid

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	30.	0.	0.000	0.00	0.000D
Ac-228	1082.20	270.65	25.	20.	0.033	113.80	0.276s
Pb-214	1179.20	294.89	28.	53.	0.088	52.42	0.481s
Ac-228	1309.00	327.33	2.	0.	0.001	331.66	0.071s
Ac-228	1354.00	338.57	7.	1.	0.001	718.02	0.000s

WI07 - 1005 D1 Bag #S-146 Grid D3-2 080707

Pb-214	1407.00	351.82	10.	0.	0.000	0.00	0.104s
Ac-228	1850.14	462.56	0.	22.	0.037	42.64	0.375s
Bi-214	2439.72	609.90	4.	59.	0.098	30.83	0.361s
CS-137	2646.38	661.54	1.	4.	0.006	131.59	0.460s
Bi-214	3077.26	769.22	2.	4.	0.006	153.86	0.240s
Ac-228	3167.33	791.73	0.	10.	0.017	63.25	0.250s
Ac-228	3646.00	911.34	23.	14.	0.023	156.78	0.000s
Bi-214	3736.67	934.00	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.197D
Ac-228	3870.01	967.32	4.	36.	0.061	42.88	0.331s
Bi-214	4483.00	1120.49	1.	0.	0.000	0.00	0.000s
Bi-214	4950.50	1237.31	0.	9.	0.015	66.67	0.500s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5852.20	1462.61	18.	5.	0.008	407.08	0.247s
Ac-228	6350.83	1587.20	1.	1.	0.001	366.67	0.223s
Bi-214	7067.33	1766.22	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9120E-04	609.31	3.002E-04	*(	1.784E-05	G K
			1764.49	2.648E-04	&(	3.783E-05	G
			1120.29	0.000E+00	?	5.247E-05	G
			1238.11	6.558E-04	+	3.477E-04	G
			768.36	1.991E-04	&	2.106E-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	&	3.437E-04	G
Ac-228	N	4.7310E-04	911.07	1.634E-04	?(	8.786E-05	G K
			969.11	7.678E-04	&(	7.449E-05	G
			338.32	0.000E+00	%	5.969E-05	G
			964.60	0.000E+00	%	1.176E-04	G
			794.70	6.411E-04	&(	6.411E-05	G
			463.00	9.528E-04	?(	4.331E-05	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:54:16 Page 4
8905696 Spectrum name: WI07-1002 D2 Bag # S-136 Grid

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	1.938E-04	G
		270.23	6.966E-04	?(	2.704E-04	G
		1588.00	0.000E+00	%	3.968E-04	G
		95.35	0.000E+00	%	1.730E-04	X
		327.64	0.000E+00	%	1.174E-04	G
Pb-212	N 3.9006E-04	238.62	3.901E-04	*(	3.527E-05	G K
		77.11	2.427E-04	-	9.758E-05	Energy duplication
		74.81	0.000E+00	?	7.589E-05	Energy duplication
CS-137	1.1398E-05	661.66	1.140E-05	?(	6.266E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	?	1.028E-04	G
		63.29	4.277E-04	$	3.378E-04	G

```
Pb-214   N   0.0000E+00    351.92 0.000E+00 ?   2.078E-05          G K
                           295.21 3.751E-04 *   9.369E-05          G
                            77.11 0.000E+00 &   1.230E-04Energy duplication
                           241.98 0.000E+00 %   1.307E-04          G
                            74.81 6.873E-04 $   2.709E-04Energy duplication
                            87.30 0.000E+00 ?   1.097E-04          X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   1.447E-04          G

AM-241       3.1140E-04     59.54 3.114E-04  (  5.761E-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 07-AUG-2007 14:54:16 Page 5
8905696 Spectrum name: WI07-1002 D2 Bag # S-136 Grid

```
   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 #	8.2354E-01	2.539E-01	2.550E-01
K-40 <	9.7193E-01		
Ac-228 #	1.3380E+00	5.688E-01	5.702E-01
Pb-212	1.1031E+00	3.532E-01	3.547E-01
CS-137 #	3.2235E-02	4.242E-02	4.243E-02
Th-234 <	2.9076E-01		
Pb-214 B<	5.8781E-02		
Pb-210 <	4.0934E-01		
AM-241	8.8065E-01	3.554E-01	3.569E-01

- All peaks for activity calculation had bad shape.

WI07 - 1005 D1 Bag #S-146 Grid D3-2 080707

* - 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) 4.1774783E+00 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1006 D2 Bag# S-147 Grid D2 080807

Sample description
WI07-1006 D2 Bag # S-147 Grid D2-1,2 080807

Spectrum Filename: C:\User\Win00569.An1

Acquisition information
Start time: 08-Aug-2007 08:20:45
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: 4.0190E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0190E+02) = 2.4882E+03
Detection limit method: Traditional ORTEC method

WI07-1006 D2 Bag# S-147 Grid D2 080807

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	
11.82	2.93	4495.	7674.	12.789	3.36	0.854	-	D
17.73	4.41	12294.	6133.	10.222	5.72	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	177.70	44.60	167.	15.	0.025	291.26	0.452s
AM-241	237.62	59.58	527.	4553.	7.589	3.63	0.966
Th-234	252.91	63.40	58.	42.	0.069	67.41	0.347s
Pb-214	298.54	74.81	104.	107.	0.178	33.33	0.917D
Pb-212	298.56	74.81	155.	0.	0.000	313.28	0.469D
Pb-212	307.74	77.11	78.	197.	0.328	19.09	0.919D
Pb-214	307.74	77.11	215.	0.	0.000	357.82	0.000D
Pb-214	347.70	87.10	46.	59.	0.099	46.47	0.438s
Th-234	368.72	92.35	66.	44.	0.074	60.14	0.933D
Ac-228	380.72	95.35	39.	4.	0.006	476.19	0.935D
Ac-228	836.37	209.24	22.	41.	0.069	50.74	1.006s
Pb-212	953.94	238.62	21.	233.	0.389	14.23	1.057D
Pb-214	967.37	241.98	32.	38.	0.063	53.10	1.060D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 08:54:46 Page 3
8905696 Spectrum name: Win00569.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.07	270.15	10.	41.	0.068	44.80	0.771s
Pb-214	1180.91	295.35	10.	98.	0.162	24.02	0.990
Ac-228	1305.97	326.61	9.	30.	0.050	54.16	0.244s
Ac-228	1353.39	338.46	16.	68.	0.113	35.78	0.828s
Pb-214	1407.30	351.94	10.	134.	0.224	20.05	0.858s

WI07-1006 D2 Bag# S-147 Grid D2 080807

Ac-228	1850.96	462.82	3.	27.	0.044	48.09	0.565s
Bi-214	2438.06	609.55	0.	87.	0.145	21.44	1.134
CS-137	2641.56	660.41	4.	22.	0.037	57.56	0.296s
Bi-214	3073.07	768.24	2.	9.	0.015	86.07	0.412s
Ac-228	3168.00	791.97	0.	17.	0.028	48.51	0.250s
Ac-228	3645.83	911.38	0.	65.	0.108	24.81	0.968s
Bi-214	3736.00	933.91	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	17.	0.028	48.69	1.595D
Ac-228	3876.86	969.11	2.	32.	0.054	37.31	1.598D
Bi-214	4483.52	1120.71	0.	27.	0.045	38.49	0.350s
Bi-214	4949.83	1237.23	2.	2.	0.003	311.13	0.223s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.69	1461.07	0.	64.	0.107	25.00	1.687
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1091E-04	609.31	4.046E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	6.570E-04	+	1.914E-04	G
			1238.11	0.000E+00	&	2.286E-04	G
			768.36	4.690E-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	?	1.943E-04	G
K-40	N	2.8178E-03	1460.81	2.818E-03	(	4.403E-05	G
Ac-228	N	7.1734E-04	911.07	7.158E-04	(	1.101E-05	G K
			969.11	6.235E-04	(	4.868E-05	G
			338.32	7.969E-04	(	7.241E-05	G
			964.60	1.042E-03	+	3.908E-04	G
			794.70	9.995E-04	&	3.735E-04	G
			463.00	1.039E-03	+	3.220E-04	G
			209.28	8.746E-04	(	1.503E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 08:54:46 Page 4
8905696 Spectrum name: Win00569.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.281E-03	+	3.315E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.885E-04	X
		327.64	1.222E-03	&	3.806E-04	G
Pb-212	N 5.3571E-04	238.62	5.357E-04	(	1.605E-05	G K
		77.11	7.535E-04	+	9.172E-05	Energy duplication
		74.81	0.000E+00	%	1.172E-04	Energy duplication
CS-137	6.0069E-05	661.66	6.007E-05	&(	8.980E-06	G
Th-234	N 6.5075E-04	92.35	5.503E-04	(	1.496E-04	G
		63.29	7.938E-04	$(	2.155E-04	G

```
                    WI07-1006   D2 Bag# S-147   Grid D2   080807
Pb-214   N   5.3524E-04    351.92 4.981E-04  (  1.893E-05         G K
                           295.21 6.108E-04  (  3.062E-05         G
                            77.11 0.000E+00 %   1.393E-04Energy duplication
                           241.98 5.259E-04  (  1.177E-04         G
                            74.81 1.189E-03 +   2.349E-04Energy duplication
                            87.30 8.586E-04 +   2.177E-04         X

Pb-210   N   0.0000E+00     46.50 0.000E+00 &   3.998E-04         G

AM-241       9.3759E-03     59.54 9.376E-03  (  6.787E-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  08-AUG-2007 08:54:46 Page    5
 8905696                          Spectrum name: Win00569.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	1.0224E+00	2.192E-01	2.226E-01
K-40	7.0111E+00	1.753E+00	1.772E+00
Ac-228	1.7849E+00	3.416E-01	3.481E-01
Pb-212	1.3329E+00	1.896E-01	1.961E-01
CS-137 #	1.4946E-01	8.603E-02	8.622E-02
Th-234	1.6192E+00	7.314E-01	7.323E-01
Pb-214	1.3318E+00	2.670E-01	2.716E-01
Pb-210 <	9.9480E-01		
AM-241	2.3329E+01	8.472E-01	1.210E+00

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-1006 D2 Bag# S-147 Grid D2 080807

& - 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) 3.7580833E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1007 D2 Bag# S-148 Grid D2 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 09:11:37 Page 1
8905696 Spectrum name: Win00570.An1

Sample description
WI07-1007 D2 Bag # S-148 Grid D2-1,2 080807

Spectrum Filename: C:\User\Win00570.An1

Acquisition information
Start time: 08-Aug-2007 09:01:27
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: 3.9770E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9770E+02) = 2.5145E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 09:11:37 Page 2
8905696 Spectrum name: Win00570.An1

WI07-1007 D2 Bag# S-148 Grid D2 080807

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: 0.1520

********** 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	3303.	17310.	28.850	2.02	2.284	CU-64	s
104.99	26.43	43.	79.	0.131	37.36	0.797	AM-241	s
197.95	49.71	490.	149.	0.248	45.20	0.895	EU-155	D
359.49	90.01	56.	57.	0.095	45.87	0.931	PB-214	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	267.	16.	0.027	293.54	0.893D
AM-241	237.65	59.59	431.	5206.	8.677	3.18	0.944
Th-234	251.95	63.16	80.	62.	0.103	59.66	0.707s
Pb-214	298.54	74.81	90.	133.	0.222	26.55	0.917D
Pb-212	298.56	74.81	144.	0.	0.000	854.40	0.385D
Pb-212	307.74	77.11	71.	188.	0.314	19.29	0.919D
Pb-214	307.74	77.11	180.	0.	0.000	1696.21	0.456D
Pb-214	348.51	87.30	67.	54.	0.090	50.82	0.928D
Th-234	368.72	92.35	75.	36.	0.060	75.15	0.933D
Ac-228	380.72	95.35	44.	23.	0.038	92.94	0.935D
Ac-228	836.16	209.19	32.	44.	0.074	56.54	0.532s

0

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 09:11:37 Page 3
8905696 Spectrum name: Win00570.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	22.	257.	0.428	13.51	1.057D
Pb-214	967.37	241.98	31.	42.	0.069	49.17	1.060D
Ac-228	1082.05	270.64	21.	53.	0.088	45.83	0.768s
Pb-214	1179.86	295.09	10.	69.	0.115	30.72	1.080s
Ac-228	1312.11	328.14	9.	31.	0.051	51.26	0.618s

WI07-1007 D2 Bag# S-148 Grid D2 080807

Ac-228	1352.98	338.36	8.	46.	0.077	37.74	1.145
Pb-214	1407.35	351.95	18.	121.	0.201	23.80	1.079
Ac-228	1854.08	463.60	3.	18.	0.031	57.84	0.398s
Bi-214	2436.82	609.24	3.	76.	0.126	24.88	1.176
CS-137	2645.00	661.27	0.	20.	0.033	44.72	0.312s
Bi-214	3073.60	768.38	2.	0.	0.001	331.66	0.350s
Ac-228	3172.00	792.97	0.	12.	0.020	57.74	0.250s
Ac-228	3645.92	911.40	0.	65.	0.108	24.81	0.750s
Bi-214	3733.00	933.16	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	3.	14.	0.023	66.63	1.595D
Ac-228	3876.86	969.11	7.	29.	0.048	46.16	1.598D
Bi-214	4481.11	1120.10	0.	22.	0.037	42.64	0.875s
Bi-214	4949.50	1237.14	0.	7.	0.012	75.59	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.12	1460.93	0.	58.	0.097	26.26	1.530
Ac-228	6354.67	1588.24	1.	0.	0.001	240.37	0.197s
Bi-214	7056.29	1763.53	4.	2.	0.003	336.65	0.179s

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	3.5266E-04	609.31	3.527E-04	(	1.426E-05	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	5.353E-04	+	1.740E-04	G
			1238.11	4.746E-04	&	2.898E-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	?	1.082E-04	G
			934.06	5.830E-04	&	3.887E-04	G
K-40	N	2.5536E-03	1460.81	2.554E-03	(	4.403E-05	G
Ac-228	N	7.4982E-04	911.07	7.158E-04	(	1.101E-05	G K
			969.11	5.545E-04	-	1.748E-04	G
			338.32	5.391E-04	-	1.278E-04	G
			964.60	8.375E-04	(	1.955E-04	G
			794.70	7.056E-04	&(	5.880E-05	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 09:11:37 Page 4
8905696 Spectrum name: Win00570.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	7.146E-04	(	1.116E-04	G
		209.28	9.416E-04	*(	1.815E-04	G
		270.23	1.656E-03	+	3.960E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	4.373E-04	-	2.328E-04	X
		327.64	1.249E-03	+	3.852E-04	G
Pb-212	N 5.9045E-04	238.62	5.904E-04	(	1.646E-05	G K
		77.11	7.209E-04	+	8.907E-05	Energy duplication
		74.81	0.000E+00	%	1.132E-04	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	(	2.710E-06	G
Th-234	N 7.5315E-04	92.35	4.525E-04	(	1.589E-04	G

WI07-1007 D2 Bag# S-148 Grid D2 080807

```
                                  63.29 1.181E-03 *(  2.507E-04          G

Pb-214    N    4.5748E-04       351.92 4.469E-04  (  2.436E-05          G K
                                295.21 4.322E-04 @(  3.132E-05          G
                                 77.11 0.000E+00 %   1.277E-04Energy duplication
                                241.98 5.747E-04  (  1.168E-04          G
                                 74.81 1.487E-03 +   2.413E-04Energy duplication
                                 87.30 7.831E-04 +   2.331E-04          X

Pb-210    N    0.0000E+00        46.50 0.000E+00 %   4.960E-04          G

AM-241         1.0721E-02        59.54 1.072E-02  (  6.147E-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  08-AUG-2007 09:11:37 Page    5
 8905696                          Spectrum name: Win00570.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	8.8675E-01	2.207E-01	2.232E-01
K-40	6.4209E+00	1.686E+00	1.703E+00
Ac-228	1.8854E+00	4.608E-01	4.661E-01
Pb-212	1.4847E+00	2.005E-01	2.081E-01
CS-137 #	1.3628E-01	6.095E-02	6.117E-02
Th-234	1.8938E+00	9.085E-01	9.096E-01
Pb-214	1.1503E+00	2.403E-01	2.442E-01
Pb-210 <	1.2471E+00		
AM-241	2.6956E+01	8.575E-01	1.316E+00

WI07-1007 D2 Bag# S-148 Grid D2 080807

- 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) 4.0814526E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1008 D2 Bag# S-149 Grid D2-3,4 080707

```
     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 10:01:30 Page    1
8905696                          Spectrum name: Win00571.An1

Sample description
     WI07-1008  D2    Bag # S-149 Grid D2-3,4  080807


Spectrum Filename: C:\User\Win00571.An1

Acquisition information
       Start time:                 08-Aug-2007 09:51:18
       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:                3.8240E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.8240E+02) =
                                   2.6151E+03
       Detection limit method:     Traditional ORTEC method

     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 10:01:30 Page    2
8905696                          Spectrum name: Win00571.An1
```

WI07-1008 D2 Bag# S-149 Grid D2-3,4 080707

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: 0.1576

********** 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	2.91	4429.	9728.	16.213	2.80	0.854	-	D
17.69	4.39	12024.	7052.	11.753	5.00	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	184.43	46.29	187.	40.	0.067	119.36	0.305s
AM-241	237.70	59.60	412.	5810.	9.682	2.93	0.881
Th-234	253.43	63.53	90.	86.	0.143	49.11	0.801s
Pb-214	298.54	74.81	67.	128.	0.214	25.18	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	323.73	0.312D
Pb-212	307.74	77.11	84.	181.	0.301	20.69	0.919D
Pb-214	307.74	77.11	257.	0.	0.000	129.34	0.420D
Pb-214	347.71	87.10	65.	62.	0.103	52.79	0.754
Th-234	368.72	92.35	61.	48.	0.079	54.88	0.933D
Ac-228	380.72	95.35	36.	11.	0.018	170.41	0.935D
Ac-228	836.94	209.38	31.	42.	0.070	60.72	0.490s
Pb-212	953.94	238.62	29.	301.	0.501	12.59	1.057D
Pb-214	967.37	241.98	35.	37.	0.062	55.62	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.15	270.67	15.	34.	0.057	57.03	1.102
Pb-214	1180.95	295.36	12.	94.	0.157	26.69	0.772s
Ac-228	1311.69	328.04	7.	25.	0.042	55.62	0.692s
Ac-228	1352.76	338.31	8.	88.	0.146	26.08	1.785s
Pb-214	1407.63	352.02	16.	115.	0.191	22.68	0.752s

WI07-1008 D2 Bag# S-149 Grid D2-3,4 080707

Ac-228	1852.02	463.08	5.	16.	0.027	69.15	0.375s
Bi-214	2436.61	609.19	0.	79.	0.132	22.50	1.704s
CS-137	2646.10	661.54	4.	18.	0.031	71.10	0.237s
Bi-214	3070.00	767.48	0.	11.	0.018	60.30	0.250s
Ac-228	3179.43	794.82	2.	10.	0.017	80.00	0.318s
Ac-228	3646.11	911.45	0.	62.	0.103	25.40	1.440
Bi-214	3736.55	934.05	3.	1.	0.001	618.24	0.315s
Ac-228	3858.81	964.60	0.	18.	0.030	47.72	1.595D
Ac-228	3876.86	969.11	7.	47.	0.079	32.80	1.598D
Bi-214	4482.88	1120.54	0.	17.	0.028	48.51	0.375s
Bi-214	4953.75	1238.20	0.	10.	0.017	63.25	0.312s
Bi-214	5505.00	1375.94	0.	8.	0.013	70.71	0.750s
K-40	5844.00	1460.65	26.	3.	0.006	565.69	0.000s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7059.00	1764.21	0.	14.	0.023	53.45	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	3.7876E-04	609.31	3.674E-04	(	4.650E-06	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	5.732E-04	&	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	&	4.902E-04	G
			934.06	0.000E+00	%	3.277E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.580E-04	G
Ac-228	N	6.8891E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	9.213E-04	+	2.117E-04	G
			338.32	1.027E-03	+	1.684E-04	G
			964.60	1.102E-03	+	4.025E-04	G
			794.70	5.880E-04	?(	1.506E-04	G
			463.00	6.366E-04	(	1.402E-04	G
			209.28	8.852E-04	(	1.780E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.062E-03	+	3.253E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.063E-04	-	1.966E-04	X
		327.64	1.018E-03	+	3.468E-04	G
Pb-212	N 6.9091E-04	238.62	6.906E-04	(	1.856E-05	G K
		77.11	6.916E-04	(	5.167E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	5.0133E-05	661.66	5.013E-05	?(	9.597E-06	G
Th-234	N 5.9355E-04	92.35	5.936E-04	(	1.447E-04	G
		63.29	1.638E-03	+	3.671E-04	G

```
                WI07-1008   D2 Bag# S-149   Grid D2-3,4   080707
Pb-214   N   4.3964E-04    351.92 4.247E-04  (  2.310E-05          G K
                           295.21 5.920E-04 +   9.482E-05          G
                            77.11 0.000E+00 ?   1.520E-04Energy duplication
                           241.98 5.139E-04  (  1.225E-04          G
                            74.81 1.433E-03 +   2.261E-04Energy duplication
                            87.30 8.997E-04 +   2.386E-04          X

Pb-210   N   8.1655E-04     46.50 8.166E-04  (  4.051E-04          G

AM-241       1.1963E-02     59.54 1.196E-02  (  6.018E-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  08-AUG-2007 10:01:30 Page    5
 8905696                          Spectrum name: Win00571.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 #	9.9049E-01	2.229E-01	2.260E-01
K-40 <	9.3630E-01		
Ac-228	1.8015E+00	4.576E-01	4.626E-01
Pb-212	1.8068E+00	2.188E-01	2.290E-01
CS-137 #	1.3110E-01	9.321E-02	9.334E-02
Th-234	1.5522E+00	8.519E-01	8.527E-01
Pb-214	1.1497E+00	2.608E-01	2.643E-01
Pb-210	2.1353E+00	2.549E+00	2.549E+00
AM-241	3.1283E+01	9.172E-01	1.477E+00

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-1008 D2 Bag# S-149 Grid D2-3,4 080707

& - 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) 4.0849979E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1009 D2 Bag# S-150 Ditch 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:23:48 Page 1
8905696 Spectrum name: Win00572.An1

Sample description
WI07-1009 D2 Bag # S-150 Ditch 4,5,6, 080807

Spectrum Filename: C:\User\Win00572.An1

Acquisition information
Start time: 08-Aug-2007 10:13:37
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: 3.8750E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8750E+02) = 2.5806E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:23:48 Page 2
8905696 Spectrum name: Win00572.An1

WI07-1009 D2 Bag# S-150 Ditch 080807

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: 0.0979

********** 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	6422.	9568.	15.946	3.13	0.854	-	D
15.75	3.93	13743.	8730.	14.551	4.36	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	186.04	46.69	47.	61.	0.102	48.02	1.077s
AM-241	237.57	59.57	129.	658.	1.097	10.41	0.883
Th-234	252.47	63.29	78.	52.	0.087	68.54	0.744s
Pb-214	298.54	74.81	84.	110.	0.183	30.33	0.917D
Pb-212	298.56	74.81	117.	0.	0.000	261.41	0.487D
Pb-212	307.74	77.11	80.	138.	0.229	25.10	0.919D
Pb-214	307.74	77.11	166.	0.	0.000	225.41	0.671D
Pb-214	348.71	87.35	54.	63.	0.105	48.73	1.301s
Th-234	368.72	92.35	92.	29.	0.048	100.63	0.933D
Ac-228	380.72	95.35	51.	3.	0.005	742.89	0.935D
Ac-228	837.12	209.43	24.	37.	0.062	60.43	1.212s
Pb-212	953.94	238.62	37.	192.	0.320	17.02	1.057D
Pb-214	967.37	241.98	40.	33.	0.054	65.28	1.060D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:23:48 Page 3
8905696 Spectrum name: Win00572.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.99	270.13	17.	29.	0.049	68.71	0.327s
Pb-214	1180.92	295.35	11.	58.	0.097	33.06	0.889
Ac-228	1306.97	326.86	9.	4.	0.006	266.60	0.295s
Ac-228	1352.52	338.25	4.	70.	0.117	26.84	1.045s
Pb-214	1407.13	351.89	6.	103.	0.171	22.13	0.931

WI07-1009 D2 Bag# S-150 Ditch 080807

Ac-228	1843.80	461.03	3.	14.	0.023	72.84	0.471s
Bi-214	2437.86	609.50	0.	86.	0.143	21.57	1.656s
CS-137	2646.74	661.70	0.	24.	0.040	40.82	0.455s
Bi-214	3073.50	768.35	0.	12.	0.020	57.74	0.375s
Ac-228	3179.00	794.72	1.	0.	0.000	0.00	0.000s
Ac-228	3645.97	911.41	0.	68.	0.113	24.25	0.812s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	6.	0.009	123.59	1.595D
Ac-228	3876.86	969.11	3.	29.	0.049	40.47	1.598D
Bi-214	4482.53	1120.46	0.	15.	0.025	51.64	0.500s
Bi-214	4953.83	1238.23	0.	8.	0.013	70.71	0.437s
Bi-214	5512.00	1377.69	2.	0.	0.001	412.31	0.000s
K-40	5845.89	1461.12	0.	45.	0.075	29.81	1.374s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.29	1764.53	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	3.9134E-04	609.31	3.999E-04	(	4.650E-06	G K
			1764.49	2.847E-04	-	1.612E-04	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	3.246E-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	7.8264E-04	911.07	7.489E-04	(	1.101E-05	G K
			969.11	5.663E-04	-	1.654E-04	G
			338.32	8.223E-04	@(	3.883E-05	G
			964.60	3.467E-04	-	2.921E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	5.457E-04	&	2.476E-04	G
			209.28	7.829E-04	@(	1.576E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:23:48 Page 4
8905696 Spectrum name: Win00572.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.164E-04	?(	1.967E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.100E-04	X
		327.64	0.000E+00	&	2.290E-04	G
Pb-212	N 4.6552E-04	238.62	4.407E-04	(	2.101E-05	G K
		77.11	5.270E-04	(	5.048E-05	Energy duplication
		74.81	0.000E+00	%	1.024E-04	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 6.2525E-04	92.35	3.619E-04	(	1.756E-04	G
		63.29	1.000E-03	@(	2.469E-04	G

WI07-1009 D2 Bag# S-150 Ditch 080807

Pb-214	N	3.8378E-04	351.92	3.802E-04	(	1.516E-05	G K
			295.21	3.644E-04	(	3.246E-05	G
			77.11	0.000E+00	%	1.231E-04	Energy duplication
			241.98	4.510E-04	(	1.314E-04	G
			74.81	1.227E-03	+	2.255E-04	Energy duplication
			87.30	9.118E-04	+	2.293E-04	X
Pb-210	N	1.2520E-03	46.50	1.252E-03	*(	2.077E-04	G
AM-241		1.3549E-03	59.54	1.355E-03	(	3.412E-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 08-AUG-2007 10:23:48 Page 5
8905696 Spectrum name: Win00572.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 #	1.0099E+00	2.178E-01	2.211E-01
K-40	5.1129E+00	1.524E+00	1.536E+00
Ac-228	2.0197E+00	4.899E-01	4.957E-01
Pb-212	1.2013E+00	1.821E-01	1.876E-01
CS-137 #	1.6784E-01	6.852E-02	6.882E-02
Th-234	1.6135E+00	9.823E-01	9.830E-01
Pb-214	9.9039E-01	2.192E-01	2.223E-01
Pb-210 #	3.2311E+00	1.552E+00	1.553E+00
AM-241	3.4965E+00	3.641E-01	3.865E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-1009 D2 Bag# S-150 Ditch 080807

& - 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) 1.8843300E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1010 D2 Bag# S-151 Ditch 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:48:54 Page 1
8905696 Spectrum name: Win00573.An1

Sample description
WI07-1010 D2 Bag # S-151 Ditch 4,5,6, 080807

Spectrum Filename: C:\User\Win00573.An1

Acquisition information
Start time: 08-Aug-2007 10:30:20
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: 4.0510E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0510E+02) =
2.4685E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:48:54 Page 2
8905696 Spectrum name: Win00573.An1

WI07-1010 D2 Bag# S-151 Ditch 080807

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: 0.0857

********** 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	
14.73	3.87	5283.	21484.	35.807	1.92	2.301	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	184.80	46.38	68.	56.	0.093	63.55	0.382s
AM-241	237.13	59.46	126.	320.	0.533	17.94	1.017s
Th-234	252.57	63.32	90.	63.	0.105	65.29	0.356s
Pb-214	298.54	74.81	84.	101.	0.168	32.55	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	205.29	0.637D
Pb-212	307.74	77.11	90.	206.	0.344	19.06	0.919D
Pb-214	307.74	77.11	194.	0.	0.000	188.26	0.489D
Pb-214	348.24	87.23	79.	57.	0.094	63.25	0.945
Th-234	368.72	92.35	75.	65.	0.109	44.89	0.933D
Ac-228	380.72	95.35	36.	5.	0.008	386.18	0.935D
Ac-228	836.75	209.33	24.	42.	0.070	51.44	0.499s
Pb-212	953.94	238.62	58.	253.	0.422	15.17	1.057D
Pb-214	967.37	241.98	37.	45.	0.075	48.55	1.060D
Ac-228	1081.33	270.46	26.	32.	0.054	70.23	0.987

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.70	295.30	7.	104.	0.174	22.13	1.238
Ac-228	1309.79	327.56	8.	24.	0.041	58.15	0.276s
Ac-228	1352.78	338.31	12.	81.	0.135	28.04	1.079
Pb-214	1407.09	351.88	10.	140.	0.234	19.50	1.187
Ac-228	1852.35	463.17	9.	34.	0.057	53.75	0.830s

WI07-1010 D2 Bag# S-151 Ditch 080807

Bi-214	2438.56	609.67	0.	95.	0.158	20.52	0.859s
CS-137	2648.05	662.03	0.	39.	0.065	32.03	1.583s
Bi-214	3074.46	768.59	0.	15.	0.025	51.64	0.541s
Ac-228	3179.00	794.72	1.	0.	0.000	0.00	0.000s
Ac-228	3645.94	911.40	0.	69.	0.115	24.08	0.937s
Bi-214	3736.67	934.08	0.	10.	0.017	63.25	0.375s
Ac-228	3858.81	964.60	2.	13.	0.022	63.25	1.595D
Ac-228	3876.86	969.11	1.	33.	0.056	35.09	1.598D
Bi-214	4482.75	1120.51	0.	32.	0.053	35.36	1.187s
Bi-214	4954.65	1238.43	8.	7.	0.012	181.70	0.517s
Bi-214	5509.00	1376.94	0.	8.	0.013	70.71	0.250s
K-40	5846.32	1461.23	0.	53.	0.088	27.47	1.366s
Ac-228	6353.33	1587.90	0.	6.	0.010	81.65	0.375s
Bi-214	7057.17	1763.75	2.	2.	0.003	311.13	0.646s

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	4.4809E-04	609.31	4.418E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	7.786E-04	+	2.072E-04	G
			1238.11	4.972E-04	?(	3.015E-04	G
			768.36	7.817E-04	+	3.127E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	+	4.902E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	2.3335E-03	1460.81	2.333E-03	(	4.403E-05	G
Ac-228	N	8.0249E-04	911.07	7.599E-04	@(	1.101E-05	G K
			969.11	6.501E-04	(	3.173E-05	G
			338.32	9.493E-04	(	6.357E-05	G
			964.60	8.041E-04	(	1.573E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	1.325E-03	+	3.815E-04	G
			209.28	8.922E-04	(	1.570E-04	G
			270.23	1.015E-03	(	2.393E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:48:54 Page 4
8905696 Spectrum name: Win00573.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.843E-04	X
		327.64	9.977E-04	(	1.794E-04	G
Pb-212	N 5.8195E-04	238.62	5.819E-04	(	2.588E-05	G K
		77.11	7.891E-04	+	9.508E-05	Energy duplication
		74.81	0.000E+00	%	9.716E-05	Energy duplication
CS-137	1.0569E-04	661.66	1.057E-04	(	2.710E-06	G
Th-234	N 9.7363E-04	92.35	8.145E-04	(	1.589E-04	G
		63.29	1.200E-03	@(	2.653E-04	G
Pb-214	N 5.3731E-04	351.92	5.204E-04	(	1.893E-05	G K

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                    WI07-1010   D2 Bag# S-151   Ditch    080807
                          295.21 6.536E-04 +   9.652E-05          G
                           77.11 0.000E+00 ?   1.325E-04Energy duplication
                          241.98 6.215E-04  (  1.261E-04          G
                           74.81 1.125E-03 +   2.203E-04Energy duplication
                           87.30 8.223E-04 +   2.467E-04          X

Pb-210   N   1.1432E-03     46.50 1.143E-03 *(  2.485E-04          G

AM-241       6.5892E-04     59.54 6.589E-04  (  3.373E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 10:48:54 Page    5
8905696                          Spectrum name: Win00573.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 #	1.1061E+00	2.270E-01	2.307E-01
K-40	5.7602E+00	1.582E+00	1.597E+00
Ac-228	1.9810E+00	3.854E-01	3.925E-01
Pb-212	1.4365E+00	2.179E-01	2.244E-01
CS-137 #	2.6089E-01	8.355E-02	8.414E-02
Th-234	2.4034E+00	9.522E-01	9.538E-01
Pb-214	1.3264E+00	2.587E-01	2.634E-01
Pb-210 #	2.8220E+00	1.793E+00	1.795E+00
AM-241 #	1.6266E+00	2.918E-01	2.980E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-1010 D2 Bag# S-151 Ditch 080807

< - 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) 1.8723089E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07 - 1011 D1 Bag #S-152 Ditch 080807

Sample description
WI07-1011 D1 Bag S-152 Ditch 2,3 080807

Spectrum Filename: C:\User\Win00382.An1

Acquisition information
Start time: 08-Aug-2007 10:29:28
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: 2.6710E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6710E+02) = 3.7439E+03
Detection limit method: Traditional ORTEC method

WI07 - 1011 D1 Bag #S-152 Ditch 080807

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: 0.1801

********** 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	
29.81	7.63	525.	707.	1.178	14.99	2.092	CU-64	s
231.55	57.94	319.	342.	0.571	18.28	0.957	TA-182	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	184.32	46.25	52.	30.	0.050	93.02	0.958
AM-241	237.51	59.54	585.	439.	0.732	18.28	0.958D
Th-234	258.60	64.81	42.	9.	0.015	258.20	0.277s
Pb-214	298.61	74.81	93.	17.	0.028	170.49	0.971D
Pb-212	298.63	74.81	63.	0.	0.000	164.65	0.393D
Pb-212	307.80	77.11	105.	25.	0.041	123.27	0.972D
Pb-214	307.80	77.11	95.	0.	0.000	404.15	0.000D
Pb-214	349.00	87.40	15.	1.	0.001	1024.15	0.000s
Th-234	368.79	92.35	42.	4.	0.007	454.62	0.985D
Ac-228	380.79	95.35	43.	14.	0.024	140.63	0.987D
Ac-228	833.43	208.47	28.	26.	0.043	94.84	0.569s
Pb-212	954.08	238.62	61.	55.	0.092	48.06	1.099D
Pb-214	967.50	241.98	41.	12.	0.021	156.95	1.101D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:39:37 Page 3
8905696 Spectrum name: Win00382.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.67	270.01	5.	3.	0.005	232.54	0.187s
Pb-214	1175.29	293.91	20.	8.	0.013	206.16	0.303s
Ac-228	1312.00	328.08	3.	2.	0.003	322.49	0.000s
Ac-228	1354.63	338.73	11.	25.	0.042	63.38	0.451s
Pb-214	1407.83	352.02	22.	58.	0.096	46.83	0.361s

WI07 - 1011 D1 Bag #S-152 Ditch 080807

Ac-228	1850.84	462.74	1.	3.	0.005	163.44	0.975
Bi-214	2432.15	608.01	5.	51.	0.085	34.82	0.809s
CS-137	2645.17	661.24	3.	1.	0.002	360.56	0.211s
Bi-214	3071.17	767.70	0.	7.	0.012	75.59	0.312s
Ac-228	3179.00	794.64	1.	0.	0.000	0.00	0.000s
Ac-228	3647.60	911.74	0.	50.	0.083	28.28	0.394s
Bi-214	3743.25	935.64	0.	7.	0.012	75.59	0.375s
Ac-228	3859.13	964.60	3.	4.	0.007	159.71	1.589D
Ac-228	3877.18	969.11	7.	3.	0.005	259.15	1.591D
Bi-214	4479.78	1119.69	1.	1.	0.002	346.41	0.217s
Bi-214	4954.00	1238.18	0.	0.	0.001	223.61	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5853.47	1462.93	0.	40.	0.067	31.62	0.364s
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	2.7523E-04	609.31	2.618E-04	&(	1.867E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	0.000E+00	%	6.720E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	3.982E-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	7.377E-04	&	4.505E-04	G
K-40	N	1.8830E-03	1460.81	1.883E-03	&(	4.707E-05	G
Ac-228	N	6.0213E-04	911.07	5.977E-04	(	1.195E-05	G K
			969.11	0.000E+00	%	1.052E-04	G
			338.32	3.337E-04	-	1.186E-04	G
			964.60	2.653E-04	-	2.859E-04	G
			794.70	0.000E+00	?	1.282E-04	G
			463.00	1.227E-04	-	1.461E-04	G
			209.28	6.299E-04	&(	1.938E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 10:39:37 Page 4
8905696 Spectrum name: Win00382.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.605E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	3.199E-04	-	2.519E-04	X
		327.64	0.000E+00	%	1.696E-04	G
Pb-212	N 1.3626E-04	238.62	1.448E-04	(	3.018E-05	G K
		77.11	1.151E-04	(	6.941E-05	Energy duplication
		74.81	0.000E+00	?	9.203E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.003E-05	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.484E-04	G
		63.29	0.000E+00	&	2.447E-04	G

WI07 - 1011 D1 Bag #S-152 Ditch 080807

```
Pb-214    N   2.3083E-04    351.92 2.390E-04 *(  3.004E-05          G K
                            295.21 0.000E+00 &   5.662E-05          G
                             77.11 0.000E+00 %   1.133E-04Energy duplication
                            241.98 1.941E-04  (  1.501E-04          G
                             74.81 2.260E-04  (  1.914E-04Energy duplication
                             87.30 0.000E+00 %   1.067E-04          X

Pb-210    N   7.0277E-04     46.50 7.028E-04  (  2.509E-04          G

AM-241        1.0883E-03     59.54 1.088E-03  (  8.605E-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 08-AUG-2007 10:39:37 Page 5
8905696 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 #      1.0304E+00    3.588E-01    3.601E-01
K-40   #      7.0497E+00    2.229E+00    2.239E+00
Ac-228        2.2543E+00    6.376E-01    6.411E-01
Pb-212        5.1016E-01    2.452E-01    2.456E-01
CS-137  <     3.7542E-02
Th-234  <     5.5564E-01
Pb-214        8.6420E-01    4.047E-01    4.055E-01
Pb-210        2.6311E+00    2.447E+00    2.448E+00
AM-241        4.0745E+00    7.446E-01    7.598E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07 - 1011 D1 Bag #S-152 Ditch 080807

& - 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) 1.8414364E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 2D1 Bag #S-153 Ditch 080807

Sample description
WI07-1012 D1 Bag S-153 Ditch 1,2,3 080807

Spectrum Filename: C:\User\Win00383.An1

Acquisition information

Start time:	08-Aug-2007 10:55:14
Live time:	600
Real time:	603
Dead time:	0.49 %
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:	4.1980E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.1980E+02) = 2.3821E+03
Detection limit method:	Traditional ORTEC method

WI07 - 2D1 Bag #S-153 Ditch 080807

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: 0.1427

********** 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	
28.20	7.23	128.	470.	0.783	12.89	1.327	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	187.60	47.07	74.	8.	0.013	368.78	0.375s
AM-241	237.83	59.62	199.	1397.	2.329	6.59	0.962
Th-234	254.02	63.67	65.	39.	0.065	80.24	0.343s
Pb-214	298.61	74.81	65.	104.	0.173	29.54	0.971D
Pb-212	298.63	74.81	88.	0.	0.000	110.94	0.610D
Pb-212	307.80	77.11	58.	160.	0.266	20.81	0.972D
Pb-214	307.80	77.11	208.	0.	0.000	109.28	0.204D
Pb-214	347.51	87.03	70.	54.	0.090	64.04	0.831
Th-234	368.79	92.35	59.	58.	0.096	46.06	0.985D
Ac-228	380.79	95.35	39.	2.	0.004	786.46	0.987D
Ac-228	837.39	209.46	26.	36.	0.061	63.49	0.895
Pb-212	954.08	238.62	39.	181.	0.301	17.82	1.099D
Pb-214	967.50	241.98	45.	22.	0.037	94.26	1.101D
Ac-228	1080.84	270.30	10.	25.	0.042	61.97	1.013

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:13:27 Page 3
8905696 Spectrum name: Win00383.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.17	295.13	12.	48.	0.081	39.61	0.690s
Ac-228	1311.71	328.00	12.	40.	0.068	50.62	0.394s
Ac-228	1352.69	338.25	5.	41.	0.069	36.50	0.526s
Pb-214	1407.18	351.86	11.	73.	0.122	28.92	0.518s
Ac-228	1851.67	462.94	7.	3.	0.006	260.77	0.207s

WI07 - 2D1 Bag #S-153 Ditch 080807

Bi-214	2438.27	609.54	7.	66.	0.109	30.44	0.870s
CS-137	2641.00	660.20	0.	21.	0.035	43.64	0.375s
Bi-214	3071.25	767.72	0.	10.	0.017	63.25	0.375s
Ac-228	3179.00	794.64	2.	3.	0.004	208.42	0.088s
Ac-228	3647.00	911.59	3.	49.	0.082	31.88	1.207
Bi-214	3738.00	934.33	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	0.	16.	0.026	51.23	1.589D
Ac-228	3877.18	969.11	1.	35.	0.058	35.19	1.591D
Bi-214	4484.87	1120.96	0.	15.	0.025	51.64	0.500s
Bi-214	4953.82	1238.14	0.	16.	0.027	50.00	0.281s
Bi-214	5507.00	1376.36	0.	3.	0.005	115.47	0.250s
K-40	5847.10	1461.34	0.	53.	0.088	27.47	1.440
Ac-228	6351.00	1587.24	0.	6.	0.010	81.65	0.250s
Bi-214	7061.60	1764.79	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	3.3346E-04	609.31	3.360E-04	(	2.232E-05	G K
			1764.49	2.648E-04	?(	3.783E-05	G
			1120.29	3.935E-04	?(	2.624E-05	G
			1238.11	1.166E-03	+	4.502E-04	G
			768.36	5.689E-04	+	2.844E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.477E-04	&(	1.159E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	2.4949E-03	1460.81	2.495E-03	?(	4.707E-05	G
Ac-228	N	6.6789E-04	911.07	5.858E-04	?(	3.586E-05	G K
			969.11	7.300E-04	(	4.595E-05	G
			338.32	5.445E-04	(	4.737E-05	G
			964.60	1.053E-03	+	4.132E-04	G
			794.70	0.000E+00	%	2.373E-04	G
			463.00	0.000E+00	%	2.166E-04	G
			209.28	8.843E-04	(	1.856E-04	G
			270.23	8.854E-04	?(	1.771E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:13:27 Page 4
8905696 Spectrum name: Win00383.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	9.294E-04	?(	1.549E-04	G
		95.35	0.000E+00	%	2.155E-04	X
		327.64	1.856E-03	+	4.953E-04	G
Pb-212	N 4.7301E-04	238.62	4.730E-04	(	2.456E-05	G K
		77.11	7.388E-04	+	9.891E-05	Energy duplication
		74.81	0.000E+00	?	1.077E-04	Energy duplication
CS-137	6.2443E-05	661.66	6.244E-05	&(	2.973E-06	G
Th-234	N 8.6846E-04	92.35	8.469E-04	(	1.675E-04	G
		63.29	8.991E-04	$(	2.746E-04	G
Pb-214	N 3.2202E-04	351.92	3.048E-04	(	2.139E-05	G K

```
                        WI07 - 2D1 Bag #S-153  Ditch   080807
                            295.21 3.433E-04  (  3.910E-05          G
                             77.11 0.000E+00 ?   1.659E-04Energy duplication
                            241.98 3.528E-04  (  1.567E-04          G
                             74.81 1.400E-03 +   2.552E-04Energy duplication
                             87.30 9.322E-04 +   2.806E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 &   3.101E-04          G

AM-241       3.4639E-03      59.54 3.464E-03  (  5.069E-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  08-AUG-2007 11:13:27 Page    5
 8905696                          Spectrum name: Win00383.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       7.9432E-01    2.418E-01    2.429E-01
 K-40   #     5.9431E+00    1.633E+00    1.642E+00
 Ac-228       1.5910E+00    3.570E-01    3.600E-01
 Pb-212       1.1268E+00    2.008E-01    2.036E-01
 CS-137 #     1.4874E-01    6.492E-02    6.507E-02
 Th-234       2.0687E+00    9.528E-01    9.540E-01
 Pb-214       7.6707E-01    2.218E-01    2.230E-01
 Pb-210  <    7.3869E-01
 AM-241       8.2513E+00    5.436E-01    6.235E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07 - 2D1 Bag #S-153 Ditch 080807

< - 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) 2.0691099E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 1013 D1 Bag #S-154 Ditch 080807

```
     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 13:31:35 Page    1
8905696                          Spectrum name: Win00388.An1

Sample description
     WI07-1013  D1   Bag S-154  Ditch 3-2  080807


Spectrum Filename: C:\User\Win00388.An1

Acquisition information
       Start time:                 08-Aug-2007 13:18:30
       Live time:                600
       Real time:                602
       Dead time:                  0.36 %
       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:                2.9750E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.9750E+02) =
                                   3.3613E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 13:31:35 Page    2
8905696                          Spectrum name: Win00388.An1
```

WI07 - 1013 D1 Bag #S-154 Ditch 080807

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: 0.4877

********** 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	
27.19	6.98	388.	167.	0.278	41.61	0.762	CU-64	
230.96	57.90	311.	458.	0.763	14.36	0.957	TA-182	D
243.69	61.08	403.	493.	0.821	14.63	0.960	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	184.00	46.17	20.	1.	0.002	1113.55	0.100s
AM-241	237.51	59.54	696.	351.	0.584	23.83	0.958D
Th-234	252.51	63.29	54.	0.	0.000	0.00	0.200D
Pb-214	298.61	74.81	46.	0.	0.000	0.00	0.515D
Pb-212	298.63	74.81	32.	0.	0.000	707.11	0.143D
Pb-212	313.54	78.54	90.	22.	0.037	150.08	0.329s
Pb-214	307.80	77.11	98.	0.	0.000	117.12	0.346D
Pb-214	355.30	88.98	48.	8.	0.014	287.39	0.196s
Th-234	368.79	92.35	67.	10.	0.017	237.46	0.985D
Ac-228	380.79	95.35	61.	4.	0.007	533.64	0.987D
Ac-228	837.00	209.37	3.	0.	0.000	0.00	0.000s
Pb-212	947.66	237.02	65.	39.	0.064	82.83	0.892

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:31:35 Page 3
8905696 Spectrum name: Win00388.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	17.	0.	0.000	0.00	0.262D
Ac-228	1081.00	270.35	3.	0.	0.000	0.00	0.000s
Pb-214	1178.43	294.69	10.	30.	0.051	57.82	0.567s
Ac-228	1310.00	327.58	3.	0.	0.000	0.00	0.000s
Ac-228	1348.85	337.28	21.	9.	0.015	197.52	0.301s

WI07 - 1013 D1 Bag #S-154 Ditch 080807

Pb-214	1410.81	352.77	40.	22.	0.037	118.07	0.453s
Ac-228	1857.00	464.28	0.	20.	0.033	44.72	0.333s
Bi-214	2442.78	610.67	12.	12.	0.020	129.10	0.288s
CS-137	2648.25	662.01	0.	5.	0.008	89.44	0.312s
Bi-214	3075.00	768.65	1.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.64	0.	1.	0.002	200.00	0.250s
Ac-228	3638.38	909.44	12.	7.	0.012	169.10	0.303s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.440D
Ac-228	3875.25	968.63	3.	5.	0.008	157.79	0.312s
Bi-214	4482.00	1120.24	2.	1.	0.001	478.42	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	5844.02	1460.57	6.	13.	0.022	93.58	0.461s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	0.	0.	0.001	223.61	0.100s

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	6.1408E-05	609.31	6.141E-05	&(	2.776E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	0.000E+00	%	7.871E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	0.000E+00	?	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.318E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	6.1196E-04	1460.81	6.120E-04	?(	1.883E-04	G
Ac-228	N	1.5342E-04	911.07	8.767E-05	&(	6.403E-05	G K
			969.11	9.816E-05	?(	6.584E-05	G
			338.32	1.186E-04	&(	9.221E-05	G
			964.60	0.000E+00	%	1.260E-04	G
			794.70	0.000E+00	%	1.282E-04	G
			463.00	8.662E-04	&(	4.331E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	7.883E-05	G
		270.23	0.000E+00	?	1.063E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.680E-04	X
		327.64	0.000E+00	?	1.375E-04	G
Pb-212	N 1.0160E-04	238.62	1.012E-04	&(	3.126E-05	G K
		77.11	1.025E-04	&(	6.435E-05	X
		74.81	0.000E+00	%	6.677E-05	Energy duplication
CS-137	1.4867E-05	661.66	1.487E-05	?(	2.973E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.898E-04	G
		63.29	0.000E+00	&	2.514E-04	G

WI07 - 1013 D1 Bag #S-154 Ditch 080807

Pb-214	N	1.3381E-04	351.92	9.145E-05	&(	3.932E-05	G K
			295.21	2.159E-04	*(	3.616E-05	G
			77.11	0.000E+00	&	1.148E-04	Energy duplication
			241.98	0.000E+00	&	1.009E-04	G
			74.81	0.000E+00	&	1.365E-04	Energy duplication
			87.30	0.000E+00	&	1.915E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	1.640E-04	G
AM-241		8.6896E-04	59.54	8.690E-04	(	9.378E-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 08-AUG-2007 13:31:35 Page 5
8905696 Spectrum name: Win00388.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	#	2.0641E-01	2.665E-01	2.665E-01
K-40	#	2.0570E+00	1.925E+00	1.926E+00
Ac-228	C	5.1570E-01	2.306E-01	2.311E-01
Pb-212		3.4150E-01	2.829E-01	2.830E-01
CS-137	#	4.9974E-02	4.470E-02	4.472E-02
Th-234	<	6.3784E-01		
Pb-214		4.4977E-01	2.601E-01	2.604E-01
Pb-210	<	5.5119E-01		
AM-241		2.9209E+00	6.959E-01	7.043E-01

- All peaks for activity calculation had bad shape.

WI07 - 1013 D1 Bag #S-154 Ditch 080807

* - 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) 6.5412588E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 1014 D1 Bag #S-155 Ditch 080807

Sample description
WI07-1014 D1 Bag S-155 Ditch 2-1 080807

Spectrum Filename: C:\User\Win00387.An1

Acquisition information

Start time:	08-Aug-2007 13:03:10
Live time:	600
Real time:	602
Dead time:	0.34 %
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:	3.1530E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.1530E+02) = 3.1716E+03
Detection limit method:	Traditional ORTEC method

WI07 - 1014 D1 Bag #S-155 Ditch 080807

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	
231.45	58.08	555.	578.	0.963	14.22	0.957	TA-182	D
243.42	61.07	561.	610.	1.017	13.64	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	182.33	45.75	81.	9.	0.015	323.18	0.199s
AM-241	237.51	59.54	1002.	422.	0.704	23.32	0.958D
Th-234	252.51	63.29	25.	0.	0.000	0.00	0.455D
Pb-214	298.61	74.81	91.	0.	0.000	0.00	0.308D
Pb-212	298.63	74.81	39.	0.	0.000	203.32	0.509D
Pb-212	304.78	76.35	88.	66.	0.110	55.05	0.453s
Pb-214	307.80	77.11	49.	0.	0.000	335.88	0.260D
Pb-214	353.27	88.47	62.	9.	0.014	314.12	1.056
Th-234	365.78	91.60	43.	37.	0.061	67.30	1.157
Ac-228	380.79	95.35	28.	0.	0.000	0.00	0.239D
Ac-228	836.00	209.12	5.	0.	0.000	0.00	0.000s
Pb-212	954.35	238.69	78.	175.	0.292	27.78	0.523s
Pb-214	967.50	241.98	24.	0.	0.000	0.00	0.000D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:14:24 Page 3
8905696 Spectrum name: Win00387.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.64	270.25	8.	22.	0.038	62.06	0.494s
Pb-214	1180.00	295.09	6.	1.	0.002	632.46	0.000s
Ac-228	1309.75	327.51	5.	1.	0.002	637.70	0.375s
Ac-228	1350.08	337.59	19.	50.	0.083	47.90	0.435s
Pb-214	1398.53	349.70	36.	55.	0.092	55.74	0.254s

WI07 - 1014 D1 Bag #S-155 Ditch 080807

Ac-228	1849.25	462.34	3.	8.	0.013	106.14	0.417s
Bi-214	2431.59	607.87	18.	48.	0.080	50.52	0.665s
CS-137	2648.00	661.95	2.	0.	0.000	0.00	0.000s
Bi-214	3077.00	769.15	0.	8.	0.013	70.71	0.250s
Ac-228	3177.40	794.24	0.	7.	0.012	75.59	0.500s
Ac-228	3650.36	912.43	0.	49.	0.082	28.57	0.275s
Bi-214	3736.00	933.83	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.000D
Ac-228	3884.88	971.04	3.	12.	0.020	78.88	0.314s
Bi-214	4480.83	1119.95	1.	2.	0.003	227.82	0.223s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5505.00	1375.86	0.	3.	0.005	115.47	0.250s
K-40	5841.27	1459.88	8.	11.	0.018	115.47	0.225s
Ac-228	6355.00	1588.24	0.	2.	0.003	141.42	0.250s
Bi-214	7062.00	1764.89	0.	4.	0.007	100.00	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	2.7224E-04	609.31	2.456E-04	&(	3.337E-05	G K
			1764.49	1.513E-04	-	1.276E-04	G
			1120.29	0.000E+00	%	7.871E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	4.551E-04	&(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.477E-04	&(	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	5.1782E-04	1460.81	5.178E-04	&(	2.133E-04	G
Ac-228	N	6.2244E-04	911.07	5.858E-04	&(	1.195E-05	G K
			969.11	2.559E-04	&	1.262E-04	G
			338.32	6.565E-04	&(	8.841E-05	G
			964.60	0.000E+00	?	1.338E-04	G
			794.70	4.488E-04	-	2.741E-04	G
			463.00	3.320E-04	&	2.259E-04	G
			209.28	0.000E+00	?	8.968E-05	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:14:24 Page 4
8905696 Spectrum name: Win00387.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
			270.23	7.969E-04	?(	1.560E-04	G
			1588.00	3.098E-04	-	3.968E-04	G
			95.35	0.000E+00	%	1.801E-04	X
			327.64	0.000E+00	%	1.833E-04	G
Pb-212	N	4.5812E-04	238.62	4.581E-04	*(	3.403E-05	G K
			77.11	3.053E-04	&	8.351E-05	X
			74.81	0.000E+00	%	7.343E-05	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	7.617E-06	G
Th-234	N	5.3854E-04	92.35	5.385E-04	&(	1.443E-04	G
			63.29	0.000E+00	&	1.750E-04	G

```
                    WI07 - 1014  D1 Bag #S-155 Ditch   080807
Pb-214   N   2.2863E-04    351.92 2.286E-04 &(  3.741E-05          G K
                           295.21 0.000E+00 %   3.026E-05          G
                            77.11 0.000E+00 %   8.269E-05Energy duplication
                           241.98 0.000E+00 %   1.168E-04          G
                            74.81 0.000E+00 &   1.892E-04Energy duplication
                            87.30 0.000E+00 &   2.145E-04          X

Pb-210   N   0.0000E+00     46.50 0.000E+00 &   3.262E-04          G

AM-241       1.0471E-03     59.54 1.047E-03  (  1.122E-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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  08-AUG-2007 13:14:24 Page    5
8905696                                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   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214 #     8.6342E-01    4.159E-01    4.167E-01
K-40   #     1.6423E+00    1.896E+00    1.897E+00
Ac-228       1.9741E+00    5.491E-01    5.522E-01
Pb-212 #     1.4530E+00    4.037E-01    4.059E-01
CS-137  <    2.4157E-02
Th-234       1.7080E+00    1.149E+00    1.150E+00
Pb-214 #     7.2513E-01    4.042E-01    4.048E-01
Pb-210  <    1.0346E+00
AM-241       3.3208E+00    7.745E-01    7.842E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07 - 1014 D1 Bag #S-155 Ditch 080807

& - 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) 1.1686788E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1015 D2 Bag# S-156 Ditch 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:04:18 Page 1
8905696 Spectrum name: Win00574.An1

Sample description
WI07-1015 D2 Bag # S-156 Ditch 1, 080807

Spectrum Filename: C:\User\Win00574.An1

Acquisition information
Start time: 08-Aug-2007 10:54:04
Live time: 600
Real time: 604
Dead time: 0.70 %
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: 4.0940E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0940E+02) = 2.4426E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:04:18 Page 2
8905696 Spectrum name: Win00574.An1

WI07-1015 D2 Bag# S-156 Ditch 080807

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: 0.0572

********** 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	
11.60	2.90	2706.	5443.	9.072	3.83	0.854	-	D
15.71	3.93	8094.	5084.	8.474	5.74	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	187.22	46.99	1590.	67.	0.112	195.90	0.266s
AM-241	237.75	59.61	1960.	557.	0.928	30.92	0.921s
Th-234	252.70	63.35	1091.	72.	0.120	155.86	0.570s
Pb-214	298.54	74.81	959.	103.	0.171	87.63	0.918D
Pb-212	298.56	74.81	1053.	0.	0.000	146.08	0.334D
Pb-212	307.74	77.11	830.	134.	0.223	63.21	0.920D
Pb-214	307.74	77.11	735.	0.	0.000	218.21	0.742D
Pb-214	349.42	87.53	320.	27.	0.046	196.33	0.369s
Th-234	368.72	92.35	299.	19.	0.032	261.06	0.933D
Ac-228	380.72	95.35	399.	25.	0.042	227.31	0.935D
Ac-228	835.21	208.95	16.	14.	0.023	102.35	0.719s
Pb-212	953.94	238.62	83.	174.	0.290	21.22	1.057D
Pb-214	967.37	241.98	78.	28.	0.047	95.25	1.060D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:04:18 Page 3
8905696 Spectrum name: Win00574.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.58	270.28	10.	27.	0.045	55.92	1.143
Pb-214	1181.37	295.47	30.	70.	0.117	40.41	0.803s
Ac-228	1314.43	328.72	18.	36.	0.061	58.82	0.425s
Ac-228	1352.63	338.27	13.	38.	0.063	46.83	0.484s
Pb-214	1408.51	352.24	16.	139.	0.232	21.29	0.964s

WI07-1015 D2 Bag# S-156 Ditch 080807

Ac-228	1851.68	463.00	6.	12.	0.020	86.60	0.790s
Bi-214	2437.36	609.37	22.	50.	0.083	49.42	1.553
CS-137	2646.71	661.69	1.	5.	0.008	112.27	0.292s
Bi-214	3067.26	766.79	3.	12.	0.020	78.88	0.234s
Ac-228	3178.55	794.60	0.	13.	0.022	55.47	1.000s
Ac-228	3643.39	910.77	0.	64.	0.107	25.00	1.016s
Bi-214	3740.00	934.91	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	8.	7.	0.012	130.32	1.595D
Ac-228	3876.86	969.11	8.	30.	0.049	45.96	1.598D
Bi-214	4476.17	1118.87	0.	16.	0.027	50.00	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.50	1378.07	0.	4.	0.007	100.00	0.500s
K-40	5842.38	1460.24	27.	7.	0.012	306.39	0.318s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.29	1764.78	0.	19.	0.032	45.88	0.541s

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	2.8123E-04	609.31	2.325E-04	(	3.326E-05	G K
			1764.49	6.761E-04	+	2.379E-04	G
			1120.29	3.893E-04	&(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.340E-04	&	3.127E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	5.830E-04	&	3.887E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.857E-04	G
Ac-228	N	6.7863E-04	911.07	7.048E-04	(	1.101E-05	G K
			969.11	5.754E-04	(	8.974E-05	G
			338.32	4.453E-04	-	1.244E-04	G
			964.60	4.513E-04	-	3.704E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	4.677E-04	-	2.542E-04	G
			209.28	2.962E-04	-	1.748E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:04:18 Page 4
8905696 Spectrum name: Win00574.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.435E-04	(	1.562E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	5.706E-04	X
		327.64	1.486E-03	&	4.441E-04	G
Pb-212	N 3.9952E-04	238.62	3.995E-04	(	3.081E-05	G K
		77.11	5.131E-04	+	1.700E-04	Energy duplication
		74.81	0.000E+00		3.005E-04	Energy duplication
CS-137	1.3098E-05	661.66	1.310E-05	?(	5.710E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	3.210E-04	G
		63.29	1.375E-03	?	9.284E-04	G

WI07-1015 D2 Bag# S-156 Ditch 080807

Pb-214	N	4.8884E-04	351.92	5.148E-04	*(	2.288E-05	G K
			295.21	4.385E-04	(	5.176E-05	G
			77.11	0.000E+00	%	2.549E-04	Energy duplication
			241.98	3.933E-04	-	2.084E-04	G
			74.81	1.145E-03	+	5.200E-04	Energy duplication
			87.30	3.966E-04	-	3.896E-04	X
Pb-210	N	1.3677E-03	46.50	1.368E-03	?(	1.161E-03	G
AM-241		1.1469E-03	59.54	1.147E-03	@(	1.300E-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

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:04:18 Page 5
8905696 Spectrum name: Win00574.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	6.8693E-01	2.799E-01	2.811E-01
K-40 <	9.4222E-01		
Ac-228	1.6576E+00	3.919E-01	3.968E-01
Pb-212	9.7587E-01	2.071E-01	2.103E-01
CS-137 #	3.1993E-02	3.592E-02	3.594E-02
Th-234 <	7.8396E-01		
Pb-214	1.1940E+00	2.542E-01	2.582E-01
Pb-210 #C	3.3408E+00	6.545E+00	6.545E+00
AM-241 #	2.8015E+00	8.663E-01	8.725E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-1015 D2 Bag# S-156 Ditch 080807

& - 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) 1.0688747E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1016 D2 Bag# S-157 Ditch 080807

Sample description
WI07-1016 D2 Bag # S-157 Ditch 1,5 080807

Spectrum Filename: C:\User\Win00575.An1

Acquisition information
Start time: 08-Aug-2007 11:17:43
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: 3.1570E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1570E+02) = 3.1676E+03
Detection limit method: Traditional ORTEC method

WI07-1016 D2 Bag# S-157 Ditch 080807

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: 0.1449
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	188.00	47.18	113.	1.	0.002	2838.57	0.000s
AM-241	237.49	59.55	220.	1520.	2.534	6.59	1.424s
Th-234	249.47	62.54	74.	24.	0.040	130.70	0.333s
Pb-214	298.54	74.81	116.	65.	0.108	53.44	0.917D
Pb-212	298.56	74.81	51.	0.	0.000	0.00	0.000D
Pb-212	307.74	77.11	141.	99.	0.165	39.34	0.919D
Pb-214	307.74	77.11	184.	0.	0.000	787.40	0.224D
Pb-214	347.64	87.08	62.	80.	0.132	43.45	0.677s
Th-234	368.72	92.35	50.	37.	0.062	62.50	0.933D
Ac-228	380.72	95.35	41.	4.	0.007	468.31	0.936D
Ac-228	837.32	209.48	32.	37.	0.062	69.70	1.007
Pb-212	953.94	238.62	67.	189.	0.315	19.02	1.057D
Pb-214	967.37	241.98	26.	24.	0.039	74.26	1.060D
Ac-228	1080.66	270.30	16.	25.	0.042	75.87	0.702s
Pb-214	1179.37	294.97	10.	80.	0.132	27.45	0.549s
Ac-228	1314.33	328.70	7.	10.	0.016	114.16	0.243s
Ac-228	1353.12	338.39	15.	78.	0.129	31.72	1.232s
Pb-214	1406.86	351.83	11.	99.	0.165	24.77	1.508s
Ac-228	1853.02	463.34	3.	18.	0.031	57.84	0.349s
Bi-214	2435.31	608.86	23.	5.	0.008	350.51	0.661s
CS-137	2643.88	660.98	2.	2.	0.003	311.13	0.422s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3178.77	794.66	0.	13.	0.022	55.47	0.375s

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:27:53 Page 3
8905696 Spectrum name: Win00575.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	3645.63	911.33	0.	62.	0.103	25.40	0.295s
Bi-214	3733.67	933.33	2.	1.	0.002	447.21	0.187s
Ac-228	3858.81	964.60	1.	14.	0.023	60.14	1.595D
Ac-228	3876.86	969.11	0.	25.	0.042	40.16	1.598D
Bi-214	4483.18	1120.62	0.	20.	0.033	44.72	0.562s

WI07-1016 D2 Bag# S-157 Ditch 080807

Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5513.50	1378.07	0.	2.	0.003	141.42	0.500s
K-40	5846.21	1461.20	0.	47.	0.078	29.17	0.458s
Ac-228	6348.00	1586.57	0.	9.	0.015	66.67	0.250s
Bi-214	7061.00	1764.71	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	3.720E-05	G K
			1764.49	4.270E-04	?	1.930E-04	G
			1120.29	4.867E-04	?	1.665E-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	2.164E-04	?	2.771E-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	7.6006E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	4.842E-04	-	1.474E-04	G
			338.32	9.102E-04	*(	7.102E-05	G
			964.60	8.337E-04	(	1.419E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	7.146E-04	(	1.116E-04	G
			209.28	7.900E-04	(	1.793E-04	G
			270.23	7.863E-04	(	1.921E-04	G
			1588.00	1.307E-03	&	6.931E-04	G
			95.35	0.000E+00	%	1.926E-04	X
			327.64	3.937E-04	&	2.587E-04	G
Pb-212	N	4.1858E-04	238.62	4.342E-04	(	2.779E-05	G K
			77.11	3.798E-04	(	6.618E-05	Energy duplication
			74.81	0.000E+00	?	6.873E-05	Energy duplication

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:27:53 Page 4
8905696 Spectrum name: Win00575.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
CS-137		0.0000E+00	661.66	0.000E+00	%	9.139E-06	G
Th-234	N	4.6276E-04	92.35	4.667E-04	(	1.307E-04	G
			63.29	4.572E-04	&(	2.415E-04	G
Pb-214	N	3.5979E-04	351.92	3.667E-04	(	1.932E-05	G K
			295.21	4.980E-04	+	8.677E-05	G
			77.11	0.000E+00	%	1.292E-04	Energy duplication
			241.98	3.256E-04	(	1.077E-04	G
			74.81	7.204E-04	+	2.180E-04	Energy duplication
			87.30	1.154E-03	+	2.519E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	3.186E-04	G
AM-241		3.1309E-03	59.54	3.131E-03	*(	4.428E-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	

- -

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 11:27:53 Page 5
8905696 Spectrum name: Win00575.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	B<	1.1784E-01		
K-40	#	6.5547E+00	1.912E+00	1.928E+00
Ac-228		2.4076E+00	5.137E-01	5.215E-01
Pb-212		1.3259E+00	2.522E-01	2.571E-01
CS-137	<	2.8947E-02		
Th-234		1.4658E+00	9.161E-01	9.167E-01
Pb-214		1.1396E+00	2.823E-01	2.855E-01
Pb-210	<	1.0092E+00		
AM-241	#	9.9174E+00	6.539E-01	7.499E-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) 2.2810947E+01 pCi/g

WI07-1016 D2 Bag# S-157 Ditch 080807

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1018 D2 Bag# S-159 Grid D2-1 080807

Sample description
WI07-1018 D2 Bag # S-159 Grid D2-1 080807

Spectrum Filename: C:\User\Win00576.An1

Acquisition information

Start time:	08-Aug-2007 12:00:20
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:	3.9650E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.9650E+02) = 2.5221E+03
Detection limit method:	Traditional ORTEC method

WI07-1018 D2 Bag# S-159 Grid D2-1 080807

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: 0.1185

********** 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	2.93	5850.	11354.	18.923	2.67	0.854	-	D
16.70	4.18	15622.	8817.	14.694	4.54	0.855	-	D
420.92	105.40	15.	26.	0.043	61.30	0.699	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	185.67	46.60	70.	37.	0.062	84.95	0.703
AM-241	237.57	59.57	207.	1233.	2.056	7.48	0.963
Th-234	253.68	63.60	68.	40.	0.068	82.15	0.347s
Pb-214	298.54	74.81	66.	102.	0.169	30.15	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	260.32	0.809D
Pb-212	307.74	77.11	62.	150.	0.250	22.11	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	646.84	0.389D
Pb-214	348.46	87.29	46.	58.	0.097	47.15	0.917
Th-234	368.72	92.35	48.	60.	0.101	41.31	0.933D
Ac-228	380.72	95.35	39.	5.	0.009	347.27	0.936D
Ac-228	836.99	209.39	20.	29.	0.049	70.33	0.317s
Pb-212	953.94	238.62	9.	172.	0.287	16.03	1.057D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:18:51 Page 3
8905696 Spectrum name: Win00576.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	28.	30.	0.049	62.64	1.060D
Ac-228	1080.44	270.24	5.	40.	0.067	37.91	0.322s
Pb-214	1180.64	295.29	3.	80.	0.133	24.35	0.839
Ac-228	1309.00	327.37	4.	2.	0.002	382.97	0.071s
Ac-228	1353.15	338.40	5.	59.	0.098	30.15	0.725s

WI07-1018 D2 Bag# S-159 Grid D2-1 080807

Pb-214	1407.41	351.96	7.	125.	0.208	20.02	1.113
Ac-228	1850.22	462.64	4.	13.	0.022	73.06	0.632s
Bi-214	2437.45	609.40	0.	66.	0.110	24.62	0.864s
CS-137	2645.79	661.46	0.	21.	0.035	43.64	0.333s
Bi-214	3067.42	766.83	2.	4.	0.006	170.62	0.479s
Ac-228	3179.71	794.89	0.	9.	0.015	66.67	0.312s
Ac-228	3646.10	911.44	0.	49.	0.082	28.57	1.033s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	5.	10.	0.016	93.68	1.595D
Ac-228	3876.86	969.11	0.	31.	0.051	36.13	1.598D
Bi-214	4484.08	1120.84	0.	14.	0.023	53.45	0.750s
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	5846.13	1461.18	0.	87.	0.145	21.44	0.437s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7059.14	1764.24	0.	8.	0.013	70.71	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	3.0897E-04	609.31	3.069E-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	2.034E-04	-	2.034E-04	G
			768.36	1.998E-04	&	2.084E-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	3.8304E-03	1460.81	3.830E-03	(	4.403E-05	G
Ac-228	N	5.8129E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	5.949E-04	(	1.942E-05	G
			338.32	6.875E-04	(	4.458E-05	G
			964.60	5.947E-04	(	2.354E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	5.197E-04	?(	1.268E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:18:51 Page 4
8905696 Spectrum name: Win00576.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	6.172E-04	*(	1.443E-04	G
		270.23	1.250E-03	+	3.124E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.906E-04	X
		327.64	0.000E+00	%	1.629E-04	G
Pb-212	N 3.9625E-04	238.62	3.962E-04	(	1.114E-05	G K
		77.11	5.735E-04	+	8.077E-05	Energy duplication
		74.81	0.000E+00	%	9.351E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 7.6098E-04	92.35	7.536E-04	(	1.281E-04	G
		63.29	7.716E-04	$(	2.311E-04	G

Pb-214	N	4.6762E-04	351.92	4.630E-04	(	1.583E-05		G K
			295.21	4.991E-04	(	1.961E-05		G
			77.11	0.000E+00	%	1.145E-04	Energy duplication	
			241.98	4.102E-04	(	1.112E-04		G
			74.81	1.134E-03	+	2.103E-04	Energy duplication	
			87.30	8.441E-04	+	2.167E-04		X
Pb-210	N	7.5531E-04	46.50	7.553E-04	(	2.520E-04		G
AM-241		2.5396E-03	59.54	2.540E-03	(	4.291E-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 08-AUG-2007 12:18:51 Page 5
8905696 Spectrum name: Win00576.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	7.7924E-01	1.918E-01	1.940E-01
K-40	9.6606E+00	2.071E+00	2.103E+00
Ac-228	1.4661E+00	3.412E-01	3.456E-01
Pb-212	9.9937E-01	1.602E-01	1.646E-01
CS-137 #	1.4353E-01	6.264E-02	6.288E-02
Th-234	1.9192E+00	7.928E-01	7.940E-01
Pb-214	1.1794E+00	2.361E-01	2.402E-01
Pb-210	1.9049E+00	1.618E+00	1.619E+00
AM-241	6.4051E+00	4.792E-01	5.347E-01

- All peaks for activity calculation had bad shape.

WI07-1018 D2 Bag# S-159 Grid D2-1 080807

* - 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) 2.4457382E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 1017 D1 Bag #S-158 Grid D2-2 080807

8/3/07

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:08:53 Page 1
8905696 Spectrum name: Win00384.An1

Sample description
WI07-1017 D1 Bag S-158 Grid D2-2 080807

Spectrum Filename: C:\User\Win00384.An1

Acquisition information
Start time: 08-Aug-2007 11:58:43
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: 4.0520E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0520E+02) = 2.4679E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:08:53 Page 2
8905696 Spectrum name: Win00384.An1

WI07 - 1017 D1 Bag #S-158 Grid 2-2 080807

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: 0.1093

********** 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	
28.91	7.41	110.	312.	0.519	17.41	0.979	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	46.75	78.	34.	0.057	89.02	1.166s
AM-241	237.81	59.62	223.	1520.	2.534	6.19	0.994
Th-234	252.01	63.16	69.	28.	0.046	113.66	0.265s
Pb-214	298.61	74.81	97.	79.	0.131	41.98	0.971D
Pb-212	298.63	74.81	106.	0.	0.000	526.55	0.348D
Pb-212	307.80	77.11	85.	167.	0.278	22.05	0.972D
Pb-214	307.80	77.11	264.	0.	0.000	80.58	0.427D
Pb-214	348.04	87.17	50.	58.	0.097	50.53	1.235s
Th-234	368.79	92.35	62.	45.	0.074	58.26	0.985D
Ac-228	380.79	95.35	51.	0.	0.001	5645.48	0.987D
Ac-228	839.10	209.89	9.	40.	0.067	43.59	0.675s
Pb-212	954.08	238.62	33.	165.	0.275	18.44	1.099D
Pb-214	967.50	241.98	40.	43.	0.071	51.87	1.101D
Ac-228	1077.82	269.55	6.	28.	0.047	51.51	0.500s

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:08:53 Page 3
8905696 Spectrum name: Win00384.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.68	295.26	6.	68.	0.113	28.66	1.309
Ac-228	1308.18	327.12	7.	37.	0.062	44.74	0.393s
Ac-228	1353.15	338.36	15.	52.	0.087	42.00	0.781s
Pb-214	1407.47	351.94	17.	120.	0.201	23.88	1.272
Ac-228	1851.71	462.96	0.	21.	0.035	43.64	0.719s

WI07 - 1017 D1 Bag #S-158 Grid 2-2 080807

Bi-214	2437.99	609.47	0.	74.	0.123	23.25	0.578s
CS-137	2644.00	660.95	0.	16.	0.027	50.00	0.562s
Bi-214	3074.00	768.40	1.	0.	0.000	0.00	0.000s
Ac-228	3179.42	794.75	0.	17.	0.028	48.51	0.750s
Ac-228	3646.98	911.59	0.	59.	0.098	26.04	1.562
Bi-214	3737.00	934.08	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	12.	5.	0.008	222.59	1.589D
Ac-228	3877.18	969.11	12.	6.	0.010	175.66	1.591D
Bi-214	4479.00	1119.49	10.	0.	0.000	0.00	0.000s
Bi-214	4954.00	1238.18	1.	0.	0.000	0.00	0.000s
Bi-214	5516.33	1378.69	0.	5.	0.008	89.44	0.250s
K-40	5846.41	1461.17	0.	59.	0.098	26.04	0.607s
Ac-228	6354.00	1587.99	0.	1.	0.002	200.00	0.250s
Bi-214	7062.62	1765.05	0.	17.	0.028	48.51	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7868E-04	609.31	3.787E-04	(	5.117E-06	G K
			1764.49	6.431E-04	+	2.403E-04	G
			1120.29	0.000E+00	?	1.312E-04	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	5.794E-04	&	4.290E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	2.7774E-03	1460.81	2.777E-03	(	4.707E-05	G
Ac-228	N	7.6179E-04	911.07	7.053E-04	(	1.195E-05	G K
			969.11	1.320E-04	-	1.383E-04	G
			338.32	6.894E-04	(	7.824E-05	G
			964.60	0.000E+00	%	4.260E-04	G
			794.70	1.090E-03	+	4.073E-04	G
			463.00	9.095E-04	(	4.331E-05	G
			209.28	9.691E-04	&(	1.156E-04	G
			270.23	9.917E-04	&(	1.417E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:08:53 Page 4
8905696 Spectrum name: Win00384.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	3.098E-04	G
			95.35	0.000E+00	%	2.389E-04	X
			327.64	1.696E-03	+	4.534E-04	G
Pb-212	N	4.3160E-04	238.62	4.316E-04	(	2.266E-05	G K
			77.11	7.706E-04	+	1.062E-04	Energy duplication
			74.81	0.000E+00	%	1.182E-04	Energy duplication
CS-137		4.7575E-05	661.66	4.758E-05	&(	2.973E-06	G
Th-234	N	6.4859E-04	92.35	6.561E-04	(	1.715E-04	G
			63.29	6.379E-04	?(	2.833E-04	G
Pb-214	N	4.9297E-04	351.92	5.002E-04	(	2.617E-05	G K

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                    WI07 - 1017  D1 Bag #S-158 Grid 2-2  080807
                          295.21 4.789E-04  (  2.898E-05          G
                           77.11 0.000E+00 ?   1.862E-04Energy duplication
                          241.98 6.737E-04 +   2.108E-04          G
                           74.81 1.064E-03 +   2.603E-04Energy duplication
                           87.30 1.004E-03 +   2.625E-04          X

Pb-210   N   7.9647E-04     46.50 7.965E-04 ?(  3.045E-04          G

AM-241       3.7691E-03     59.54 3.769E-03  (  5.358E-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  08-AUG-2007 12:08:53 Page    5
8905696                          Spectrum name: Win00384.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       9.3456E-01    2.173E-01    2.190E-01
K-40         6.8543E+00    1.785E+00    1.796E+00
Ac-228       1.8800E+00    3.547E-01    3.590E-01
Pb-212       1.0651E+00    1.964E-01    1.989E-01
CS-137 #     1.1741E-01    5.871E-02    5.881E-02
Th-234       1.6007E+00    9.325E-01    9.332E-01
Pb-214       1.2166E+00    2.270E-01    2.298E-01
Pb-210 #     1.9656E+00    1.750E+00    1.750E+00
AM-241       9.3018E+00    5.761E-01    6.711E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07 - 1017 D1 Bag #S-158 Grid 2-2 080807

< - 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) 2.4936184E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1019 D2 Bag# S-160 Grid D2-1 080807

Sample description
WI07-1019 D2 Bag # S-160 Grid D1-3 080807

Spectrum Filename: C:\User\Win00577.An1

Acquisition information

Start time:	08-Aug-2007 12:23:34
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:	4.2670E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.2670E+02) = 2.3436E+03
Detection limit method:	Traditional ORTEC method

WI07-1019 D2 Bag# S-160 Grid D2-1 080807

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: 0.1262

********** 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	4917.	23678.	39.463	1.76	2.223	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	185.45	46.54	72.	27.	0.046	108.15	0.670
AM-241	237.60	59.58	200.	1190.	1.983	7.37	0.912
Th-234	251.97	63.17	57.	38.	0.064	71.81	0.529s
Pb-214	298.54	74.81	77.	129.	0.215	26.15	0.917D
Pb-212	298.56	74.81	131.	0.	0.000	1085.25	0.592D
Pb-212	307.74	77.11	71.	170.	0.284	20.73	0.919D
Pb-214	307.74	77.11	166.	0.	0.000	1038.67	0.439D
Pb-214	348.21	87.22	63.	61.	0.102	53.97	0.619s
Th-234	368.72	92.35	60.	44.	0.073	58.97	0.933D
Ac-228	380.72	95.35	43.	16.	0.026	129.51	0.935D
Ac-228	835.45	209.01	40.	54.	0.091	52.88	0.579s
Pb-212	953.94	238.62	30.	208.	0.346	15.77	1.057D
Pb-214	967.37	241.98	39.	43.	0.072	50.71	1.060D
Ac-228	1081.64	270.54	21.	33.	0.055	65.56	0.455s

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:33:45 Page 3
8905696 Spectrum name: Win00577.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.91	295.10	16.	78.	0.130	30.72	0.434s
Ac-228	1308.70	327.29	6.	31.	0.052	46.49	0.402s
Ac-228	1353.05	338.38	14.	54.	0.090	40.06	0.467s
Pb-214	1407.31	351.94	7.	131.	0.219	19.28	1.337s
Ac-228	1852.94	463.32	2.	23.	0.039	45.98	0.346s

WI07-1019 D2 Bag# S-160 Grid D2-1 080807

Bi-214	2437.25	609.35	4.	94.	0.157	22.72	0.628s
CS-137	2647.00	661.77	5.	0.	0.000	0.00	0.000s
Bi-214	3065.00	766.23	0.	11.	0.018	60.30	0.250s
Ac-228	3177.00	794.22	8.	3.	0.004	374.17	0.000s
Ac-228	3645.13	911.20	0.	62.	0.103	25.40	1.138s
Bi-214	3732.20	932.96	0.	11.	0.018	60.30	0.312s
Ac-228	3858.81	964.60	2.	13.	0.021	66.10	1.595D
Ac-228	3876.86	969.11	0.	31.	0.052	35.82	1.598D
Bi-214	4483.04	1120.59	0.	25.	0.042	40.00	0.750s
Bi-214	4939.00	1234.52	0.	17.	0.028	48.51	0.250s
Bi-214	5512.50	1377.82	0.	2.	0.003	141.42	0.500s
K-40	5845.50	1461.02	0.	53.	0.088	27.47	0.385s
Ac-228	6357.20	1588.87	0.	7.	0.012	75.59	0.375s
Bi-214	7059.60	1764.36	0.	14.	0.023	53.45	0.999s

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	4.6172E-04	609.31	4.371E-04	(	1.568E-05	G K
			1764.49	4.982E-04	?(	3.558E-05	G
			1120.29	6.083E-04	+	1.847E-04	G
			1238.11	1.153E-03	&	4.307E-04	G
			768.36	5.732E-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	1.069E-03	&	5.069E-04	G
K-40	N	2.3335E-03	1460.81	2.333E-03	?(	4.403E-05	G
Ac-228	N	6.6055E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	6.054E-04	(	1.942E-05	G
			338.32	6.329E-04	?(	6.815E-05	G
			964.60	7.788E-04	(	1.691E-04	G
			794.70	0.000E+00	%	3.067E-04	G
			463.00	9.030E-04	+	2.958E-04	G
			209.28	1.150E-03	+	3.009E-04	G
			270.23	1.031E-03	+	3.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:33:45 Page 4
8905696 Spectrum name: Win00577.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	3.010E-04	-	2.191E-04	X
		327.64	1.276E-03	+	3.713E-04	G
Pb-212	N 4.7774E-04	238.62	4.777E-04	(	1.913E-05	G K
		77.11	6.521E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	%	1.081E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	1.003E-05	G
Th-234	N 6.2013E-04	92.35	5.428E-04	(	1.436E-04	G
		63.29	7.303E-04	$(	2.126E-04	G
Pb-214	N 5.0060E-04	351.92	4.864E-04	*(	1.550E-05	G K

```
                    WI07-1019   D2 Bag# S-160   Grid D2-1    080807
                              295.21 4.897E-04  (  3.852E-05          G
                               77.11 0.000E+00 %   1.228E-04Energy duplication
                              241.98 5.990E-04  (  1.287E-04          G
                               74.81 1.436E-03 +   2.322E-04Energy duplication
                               87.30 8.852E-04 +   2.359E-04          X

Pb-210   N   5.5798E-04      46.50 5.580E-04  (  2.548E-04          G

AM-241       2.4504E-03      59.54 2.450E-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  08-AUG-2007 12:33:45 Page    5
8905696                                  Spectrum name: Win00577.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        1.0821E+00    2.458E-01    2.491E-01
K-40    #     5.4686E+00    1.502E+00    1.516E+00
Ac-228        1.5480E+00    3.440E-01    3.489E-01
Pb-212        1.1196E+00    1.766E-01    1.815E-01
CS-137  <     2.3508E-02
Th-234        1.4533E+00    6.752E-01    6.760E-01
Pb-214        1.1732E+00    2.261E-01    2.304E-01
Pb-210        1.3077E+00    1.414E+00    1.414E+00
AM-241        5.7426E+00    4.233E-01    4.737E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-1019 D2 Bag# S-160 Grid D2-1 080807

< - 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) 1.8895138E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 -1020 Bag #S-161 Grid D1-3 080807

Sample description
WI07-1020 D1 Bag S-161 Grid D1-3 080807

Spectrum Filename: C:\User\Win00385.An1

Acquisition information
Start time: 08-Aug-2007 12:24:47
Live time: 600
Real time: 602
Dead time: 0.32 %
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: 4.1070E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.1070E+02) =
2.4349E+03
Detection limit method: Traditional ORTEC method

WI07 -1020 Bag #S-161 Grid D1-3 080807

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: 0.1994

********** 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	
27.00	6.93	296.	32.	0.053	163.93	0.000	-	s
231.93	58.27	587.	449.	0.749	17.93	0.957	TA-182	D
243.58	61.18	391.	574.	0.956	12.84	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	186.05	46.68	138.	32.	0.052	143.77	0.257s
AM-241	237.51	59.54	853.	356.	0.593	25.53	0.958D
Th-234	252.51	63.29	54.	0.	0.000	0.00	0.000D
Pb-214	298.61	74.81	128.	0.	0.000	0.00	0.307D
Pb-212	298.63	74.81	126.	0.	0.000	66.84	1.352D
Pb-212	312.17	78.20	110.	35.	0.059	113.33	0.341s
Pb-214	307.80	77.11	104.	0.	0.000	103.46	0.364D
Pb-214	350.97	87.90	22.	3.	0.005	419.88	0.129s
Th-234	364.53	91.29	80.	24.	0.040	135.40	0.680s
Ac-228	380.79	95.35	39.	0.	0.000	0.00	0.000D
Ac-228	840.87	210.33	34.	34.	0.058	82.24	0.506s
Pb-212	955.00	238.86	25.	0.	0.000	0.00	0.000s

0

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:36:50 Page 3
8905696 Spectrum name: Win00385.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	22.	0.	0.000	0.00	0.000D
Ac-228	1081.00	270.35	3.	1.	0.001	498.89	0.000s
Pb-214	1179.00	294.84	3.	0.	0.000	0.00	0.000s
Ac-228	1305.21	326.38	7.	6.	0.009	181.50	0.769s
Ac-228	1349.28	337.39	21.	7.	0.012	220.39	0.233s

WI07 -1020 Bag #S-161 Grid D1-3 080807

Pb-214	1401.29	350.39	31.	26.	0.044	100.34	0.284s
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2429.18	607.27	8.	32.	0.054	49.65	0.257s
CS-137	2641.00	660.20	0.	19.	0.032	45.88	0.250s
Bi-214	3068.00	766.91	4.	1.	0.002	642.91	0.080s
Ac-228	3179.00	794.64	1.	0.	0.000	0.00	0.000s
Ac-228	3646.00	911.34	3.	0.	0.000	0.00	0.125s
Bi-214	3735.00	933.58	0.	8.	0.013	70.71	0.250s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3881.87	970.28	7.	17.	0.029	78.45	0.272s
Bi-214	4481.73	1120.18	0.	20.	0.033	44.72	0.375s
Bi-214	4954.00	1238.18	0.	1.	0.002	200.00	0.250s
Bi-214	5512.00	1377.61	0.	1.	0.002	200.00	0.250s
K-40	5846.52	1461.20	0.	42.	0.070	30.86	0.312s
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	Code	MDA Value microCi	Comments
Bi-214	N	1.6631E-04	609.31	1.663E-04	&(	2.381E-05	G K
			1764.49	7.565E-05	-	9.689E-05	G
			1120.29	5.247E-04	+	1.796E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	&	2.106E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.318E-04	G
			934.06	8.431E-04	+	4.775E-04	G
K-40	N	1.9771E-03	1460.81	1.977E-03	(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	3.586E-05	G K
			969.11	3.646E-04	&	1.566E-04	G
			338.32	0.000E+00	&	1.054E-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	?	4.331E-05	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:36:50 Page 4
8905696 Spectrum name: Win00385.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.358E-04	&	2.970E-04	G
		270.23	0.000E+00	%	1.194E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.104E-04	X
		327.64	2.597E-04	&	2.577E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	?	1.987E-05	G K
		77.11	1.634E-04	&	8.111E-05	X
		74.81	0.000E+00	&	1.283E-04	Energy duplication
CS-137	5.6496E-05	661.66	5.650E-05	&(	2.973E-06	G
Th-234	N 3.5250E-04	92.35	3.525E-04	&(	1.933E-04	G
		63.29	0.000E+00	?	2.507E-04	G

```
Pb-214   N   1.0947E-04    351.92 1.095E-04 &(  3.470E-05         G K
                           295.21 0.000E+00 ?   2.123E-05         G
                            77.11 0.000E+00 &   1.184E-04Energy duplication
                           241.98 0.000E+00 %   1.138E-04         G
                            74.81 0.000E+00 &   2.229E-04Energy duplication
                            87.30 0.000E+00 &   1.310E-04         X

Pb-210   N   7.3790E-04     46.50 7.379E-04  (  4.004E-04         G

AM-241       8.8193E-04     59.54 8.819E-04  (  1.037E-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
```

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:36:50 Page 5
8905696 Spectrum name: Win00385.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 #	4.0495E-01	2.010E-01	2.014E-01
K-40	4.8140E+00	1.486E+00	1.492E+00
Ac-228 B<	8.7322E-02		
Pb-212 B<	4.8371E-02		
CS-137 #	1.3756E-01	6.312E-02	6.326E-02
Th-234	8.5829E-01	1.162E+00	1.162E+00
Pb-214	2.6654E-01	2.675E-01	2.676E-01
Pb-210	1.7967E+00	2.583E+00	2.583E+00
AM-241	2.1474E+00	5.483E-01	5.540E-01

- All peaks for activity calculation had bad shape.

WI07 -1020 Bag #S-161 Grid D1-3 080807

* - 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) 1.0425417E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1052 D2 Bag# S-162 Grid D1-2 080807

Sample description
WI07-1052 D2 Bag # S-162 Grid D1-1,2 080807

Spectrum Filename: C:\User\Win00580.An1

Acquisition information
Start time: 08-Aug-2007 13:17:27
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: 3.6810E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6810E+02) = 2.7167E+03
Detection limit method: Traditional ORTEC method

WI07-1052 D2 Bag# S-162 Grid D1-2 080807

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: 0.0726

********** 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	2.92	6434.	12969.	21.614	2.48	0.854	-	D
17.07	4.25	15756.	10235.	17.059	3.99	0.855	-	D
103.23	25.99	91.	120.	0.201	35.37	1.133	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	180.38	45.27	185.	5.	0.008	892.94	0.204s
AM-241	237.35	59.52	580.	5899.	9.832	3.11	0.913
Th-234	252.86	63.39	46.	41.	0.068	65.26	1.242s
Pb-214	298.54	74.81	68.	86.	0.143	34.61	0.917D
Pb-212	298.56	74.81	67.	0.	0.000	129.33	0.670D
Pb-212	307.74	77.11	64.	145.	0.241	22.85	0.919D
Pb-214	307.74	77.11	226.	0.	0.000	92.03	0.238D
Pb-214	348.18	87.22	67.	63.	0.105	52.84	0.712
Th-234	368.72	92.35	66.	32.	0.053	80.93	0.933D
Ac-228	380.72	95.35	37.	8.	0.014	215.35	0.935D
Ac-228	836.38	209.24	9.	17.	0.028	74.40	0.515s
Pb-212	953.94	238.62	20.	199.	0.331	15.57	1.057D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:28:49 Page 3
8905696 Spectrum name: Win00580.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	33.	21.	0.034	90.96	1.060D
Ac-228	1078.66	269.80	9.	29.	0.049	51.38	0.474s
Pb-214	1180.12	295.15	6.	62.	0.103	30.43	1.314s
Ac-228	1310.35	327.71	3.	17.	0.028	63.35	0.524s
Ac-228	1352.02	338.12	7.	40.	0.066	43.34	1.041s

WI07-1052 D2 Bag# S-162 Grid D1-2 080807

Pb-214	1407.96	352.10	3.	77.	0.128	24.90	0.612s
Ac-228	1847.93	462.06	2.	8.	0.014	85.79	0.430s
Bi-214	2437.65	609.45	3.	72.	0.120	25.25	0.786s
CS-137	2646.37	661.61	2.	16.	0.026	63.54	0.524s
Bi-214	3074.75	768.66	0.	4.	0.007	100.00	0.375s
Ac-228	3175.00	793.72	0.	6.	0.010	81.65	0.250s
Ac-228	3645.20	911.22	0.	40.	0.067	31.62	1.062s
Bi-214	3736.00	933.91	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	2.	6.	0.011	98.23	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.51	1.598D
Bi-214	4482.08	1120.34	0.	17.	0.028	48.51	0.364s
Bi-214	4951.33	1237.60	0.	6.	0.010	81.65	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.61	1460.05	26.	6.	0.010	305.51	0.316s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
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	3.5938E-04	609.31	3.356E-04	(	1.364E-05	G K
			1764.49	1.779E-04	-	1.317E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	2.084E-04	-	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.749E-04	G
Ac-228	N	4.7121E-04	911.07	4.405E-04	(	1.101E-05	G K
			969.11	5.520E-04	(	1.942E-05	G
			338.32	4.649E-04	@(	5.112E-05	G
			964.60	3.908E-04	(	1.478E-04	G
			794.70	3.528E-04	&	2.352E-04	G
			463.00	3.248E-04	&	1.949E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:28:49 Page 4
8905696 Spectrum name: Win00580.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	3.527E-04	-	1.635E-04	G
		270.23	9.164E-04	+	2.884E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	6.923E-04	+	2.787E-04	G
Pb-212	N 4.5694E-04	238.62	4.569E-04	(	1.587E-05	G K
		77.11	5.540E-04	+	8.021E-05	Energy duplication
		74.81	0.000E+00	?	7.810E-05	Energy duplication
CS-137	4.2003E-05	661.66	4.200E-05	(	7.564E-06	G
Th-234	N 5.5445E-04	92.35	3.953E-04	(	1.501E-04	G
		63.29	7.811E-04	(	1.925E-04	G

Pb-214	N	2.8401E-04	351.92	2.840E-04	@(	1.159E-05		G K
			295.21	3.863E-04	+	7.625E-05		G
			77.11	0.000E+00	?	1.428E-04	Energy duplication	
			241.98	2.843E-04	(	1.202E-04		G
			74.81	9.608E-04	+	2.015E-04	Energy duplication	
			87.30	9.118E-04	+	2.414E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	4.083E-04		G
AM-241		1.2147E-02	59.54	1.215E-02	(	7.117E-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 08-AUG-2007 13:28:49 Page 5
8905696 Spectrum name: Win00580.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		9.7632E-01	2.465E-01	2.492E-01
K-40	<	1.0185E+00		
Ac-228		1.2801E+00	3.778E-01	3.808E-01
Pb-212		1.2414E+00	1.933E-01	1.988E-01
CS-137		1.1411E-01	7.251E-02	7.264E-02
Th-234		1.5063E+00	7.830E-01	7.838E-01
Pb-214		7.7155E-01	1.921E-01	1.943E-01
Pb-210	<	1.1091E+00		
AM-241		3.2999E+01	1.026E+00	1.595E+00

< - MDA value printed.
A - Activity printed, but activity < MDA.

WI07-1052 D2 Bag# S-162 Grid D1-2 080807

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) 3.8888500E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Lynn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07 - 1021 D1 Bag #S-162 Grid D0-2 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:57:40 Page 1
8905696 Spectrum name: Win00386.An1

Sample description
WI07-1021 D1 Bag S-162 Grid D0-2 080807

Spectrum Filename: C:\User\Win00386.An1

Acquisition information
Start time: 08-Aug-2007 12:42:32
Live time: 600
Real time: 602
Dead time: 0.31 %
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: 3.7420E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7420E+02) = 2.6724E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:57:40 Page 2
8905696 Spectrum name: Win00386.An1

WI07 - 1021 D1 Bag #S-162 Grid D0-2 080807

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	
28.26	7.24	514.	362.	0.604	24.60	1.674	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	11.	0.	0.000	0.00	0.000s
AM-241	229.11	57.44	51.	29.	0.049	100.00	0.252s
Th-234	258.87	64.88	54.	20.	0.033	139.50	0.245s
Pb-214	298.61	74.81	128.	15.	0.025	217.91	0.971D
Pb-212	298.63	74.81	26.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	115.	33.	0.055	98.10	0.972D
Pb-214	307.80	77.11	131.	0.	0.000	142.32	0.343D
Pb-214	349.00	87.40	14.	0.	0.000	0.00	0.000s
Th-234	368.79	92.35	44.	17.	0.028	121.44	0.984D
Ac-228	380.79	95.35	43.	28.	0.047	75.63	0.987D
Ac-228	838.45	209.73	21.	47.	0.078	50.62	0.343s
Pb-212	954.08	238.62	100.	64.	0.107	50.77	1.099D
Pb-214	967.50	241.98	80.	24.	0.040	112.86	1.101D
Ac-228	1081.00	270.35	7.	1.	0.002	552.27	0.600s

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:57:40 Page 3
8905696 Spectrum name: Win00386.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.95	295.32	20.	28.	0.047	72.48	0.300s
Ac-228	1309.67	327.49	4.	2.	0.003	294.39	0.225s
Ac-228	1357.19	339.37	21.	14.	0.023	130.93	0.357s
Pb-214	1407.14	351.85	13.	72.	0.120	33.02	0.640s
Ac-228	1851.73	462.96	3.	7.	0.012	108.80	0.208s

WI07 - 1021 D1 Bag #S-162 Grid D0-2 080807

Bi-214	2441.44	610.33	16.	13.	0.022	130.24	0.536s
CS-137	2644.33	661.03	6.	1.	0.002	721.11	0.430s
Bi-214	3073.62	768.31	1.	1.	0.001	339.93	0.375s
Ac-228	3172.21	792.95	2.	8.	0.014	97.72	0.366s
Ac-228	3645.67	911.26	2.	0.	0.001	412.31	0.500s
Bi-214	3737.50	934.21	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	3.	4.	0.007	142.51	1.589D
Ac-228	3877.18	969.11	7.	1.	0.002	633.39	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	5849.52	1461.95	0.	33.	0.055	34.82	0.333s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	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	7.5877E-05	609.31	6.653E-05	&(	3.162E-05	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	?	7.286E-05	G
			768.36	0.000E+00	%	1.457E-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	?(	1.054E-04	G
K-40	N	1.5534E-03	1460.81	1.553E-03	&(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	3.586E-05	G K
			969.11	0.000E+00	%	9.531E-05	G
			338.32	1.844E-04	&	1.170E-04	G
			964.60	2.915E-04		2.859E-04	G
			794.70	5.450E-04	&	3.345E-04	G
			463.00	3.032E-04	?	2.166E-04	G
			209.28	1.139E-03	*	2.949E-04	G
			270.23	0.000E+00	%	1.605E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	6.352E-04		2.798E-04	X
		327.64	0.000E+00	%	1.833E-04	G
Pb-212	N 1.6335E-04	238.62	1.676E-04	(	3.835E-05	G K
		77.11	1.529E-04	$(	7.247E-05	Energy duplication
		74.81	0.000E+00	?	6.060E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.271E-05	G
Th-234	N 3.3433E-04	92.35	2.480E-04	(	1.455E-04	G
		63.29	4.573E-04	&(	2.518E-04	G
Pb-214	N 3.1255E-04	351.92	2.993E-04	@(	2.338E-05	G K

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                    WI07 - 1021  D1 Bag #S-162 Grid D0-2  080807
                           295.21 1.994E-04 -   7.297E-05          G
                            77.11 0.000E+00 &   1.322E-04Energy duplication
                           241.98 3.783E-04  (  2.071E-04          G
                            74.81 0.000E+00 %   2.353E-04Energy duplication
                            87.30 0.000E+00 ?   1.004E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   1.255E-04          G

AM-241       7.2723E-05      59.54 7.272E-05 &(  2.623E-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  08-AUG-2007 12:57:40 Page    5
8905696                          Spectrum name: Win00386.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 #     2.0277E-01    1.949E-01    1.950E-01
K-40   #     4.1514E+00    1.445E+00    1.450E+00
Ac-228 B<    9.5839E-02
Pb-212       4.3653E-01    2.216E-01    2.220E-01
CS-137  <    3.3969E-02
Th-234       8.9346E-01    8.262E-01    8.265E-01
Pb-214       8.3525E-01    2.758E-01    2.769E-01
Pb-210  <    3.3531E-01
AM-241 #     1.9434E-01    1.943E-01    1.945E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07 - 1021 D1 Bag #S-162 Grid D0-2 080807

< - 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) 6.7137265E+00 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1022 D2 Bag# S-163 Grid D3-2,3 080807

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:52:01 Page 1
8905696 Spectrum name: Win00578.An1

Sample description
WI07-1022 D2 Bag # S-163 Grid D3-2,3 080807

Spectrum Filename: C:\User\Win00578.An1

Acquisition information
Start time: 08-Aug-2007 12:41:50
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: 3.4300E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4300E+02) = 2.9155E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:52:01 Page 2
8905696 Spectrum name: Win00578.An1

WI07-1022 D2 Bag# S-163 Grid D3-2,3 080807

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: 0.1251

********** 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	
14.79	3.88	5811.	25827.	43.045	1.72	2.314	CU-64	s
252.60	63.33	50.	62.	0.102	46.19	0.649	PA-234	s
2332.96	583.28	3.	71.	0.118	25.88	0.768	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	184.15	46.22	35.	52.	0.087	49.95	0.952
AM-241	237.15	59.47	87.	75.	0.126	56.37	0.316s
Th-234	252.63	63.33	111.	0.	0.000	0.00	0.907
Pb-214	298.54	74.81	104.	104.	0.173	33.97	0.917D
Pb-212	298.56	74.81	119.	0.	0.000	392.11	0.352D
Pb-212	307.74	77.11	83.	179.	0.299	20.73	0.919D
Pb-214	307.74	77.11	238.	0.	0.000	95.01	0.000D
Pb-214	348.56	87.31	62.	52.	0.087	59.34	0.816
Th-234	368.72	92.35	78.	51.	0.084	56.89	0.933D
Ac-228	380.72	95.35	30.	2.	0.003	1015.64	0.935D
Ac-228	837.80	209.60	15.	35.	0.058	53.45	0.525s
Pb-212	953.94	238.62	18.	232.	0.387	14.09	1.057D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 12:52:01 Page 3
8905696 Spectrum name: Win00578.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	34.	48.	0.080	44.79	1.060D
Ac-228	1081.04	270.39	11.	47.	0.078	42.20	0.729s
Pb-214	1180.27	295.19	3.	78.	0.130	24.52	0.883s
Ac-228	1311.04	327.88	12.	27.	0.046	59.54	0.694s
Ac-228	1352.61	338.27	14.	77.	0.128	30.73	0.917

WI07-1022 D2 Bag# S-163 Grid D3-2,3 080807

Pb-214	1407.28	351.93	15.	110.	0.184	24.24	0.890s
Ac-228	1853.42	463.44	0.	26.	0.043	39.22	0.531s
Bi-214	2438.21	609.59	7.	80.	0.133	26.40	0.522s
CS-137	2647.00	661.77	4.	0.	0.001	685.57	0.200s
Bi-214	3073.33	768.31	0.	3.	0.005	115.47	0.250s
Ac-228	3178.00	794.47	6.	0.	0.000	0.00	0.000s
Ac-228	3645.76	911.36	0.	51.	0.085	28.01	1.020s
Bi-214	3731.17	932.70	5.	1.	0.002	757.19	0.647s
Ac-228	3858.81	964.60	2.	6.	0.011	98.54	1.595D
Ac-228	3876.86	969.11	3.	25.	0.042	44.16	1.598D
Bi-214	4480.00	1119.83	0.	18.	0.030	47.14	0.250s
Bi-214	4951.33	1237.60	0.	9.	0.015	66.67	0.375s
Bi-214	5509.33	1377.03	0.	4.	0.007	100.00	0.250s
K-40	5845.00	1460.90	18.	0.	0.000	0.00	0.000s
Ac-228	6354.00	1588.07	0.	4.	0.007	100.00	0.750s
Bi-214	7058.86	1764.17	2.	4.	0.007	136.74	0.333s

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	3.9105E-04	609.31	3.720E-04	(	1.988E-05	G K
			1764.49	1.542E-04	-	1.423E-04	G
			1120.29	4.380E-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	4.328E-04	?(	1.082E-04	G
			934.06	0.000E+00	&	3.887E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.990E-04	G
Ac-228	N	5.5474E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	4.884E-04	(	5.705E-05	G
			338.32	9.024E-04	+	1.641E-04	G
			964.60	3.899E-04	-	2.797E-04	G
			794.70	0.000E+00	?	2.352E-04	G
			463.00	1.013E-03	+	3.012E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.406E-04	*(	1.270E-04	G
		270.23	1.468E-03	+	3.525E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.640E-04	X
		327.64	1.113E-03	+	3.806E-04	G
Pb-212	N 5.3377E-04	238.62	5.338E-04	(	1.488E-05	G K
		77.11	6.859E-04	+	8.957E-05	Energy duplication
		74.81	0.000E+00	%	1.032E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.003E-05	G
Th-234	N 6.3167E-04	92.35	6.317E-04	(	1.626E-04	G
		63.29	0.000E+00		2.935E-04	G

```
Pb-214   N   4.3551E-04    351.92 4.086E-04 @(  2.200E-05          G K
                           295.21 4.876E-04 @(  1.921E-05          G
                            77.11 0.000E+00 ?   1.466E-04Energy duplication
                           241.98 6.648E-04 +   1.841E-04          G
                            74.81 1.161E-03 +   2.333E-04Energy duplication
                            87.30 7.546E-04 +   2.265E-04          X

Pb-210   N   1.0615E-03     46.50 1.062E-03  (  1.813E-04          G

AM-241       1.5512E-04     59.54 1.551E-04 *(  2.816E-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		1.1401E+00	3.010E-01	3.040E-01
K-40	<	8.7177E-01		
Ac-228		1.6173E+00	4.529E-01	4.570E-01
Pb-212		1.5562E+00	2.193E-01	2.269E-01
CS-137	<	2.9244E-02		
Th-234		1.8416E+00	1.048E+00	1.049E+00
Pb-214		1.2697E+00	2.189E-01	2.240E-01
Pb-210		3.0948E+00	1.546E+00	1.548E+00
AM-241	#	4.5225E-01	2.550E-01	2.555E-01

- All peaks for activity calculation had bad shape.

WI07-1022 D2 Bag# S-163 Grid D3-2,3 080807

* - 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) 1.0971947E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1023 D2 Bag# S-164 Grid D3-2,3 080807

Sample description
WI07-1023 D2 Bag # S-164 Grid D3-2,3 080807

Spectrum Filename: C:\User\Win00579.An1

Acquisition information
Start time: 08-Aug-2007 13:02:29
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: 4.0620E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0620E+02) = 2.4618E+03
Detection limit method: Traditional ORTEC method

WI07-1023 D2 Bag# S-164 Grid D3-2,3 080807

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: 0.1442

********** 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	2.92	6579.	12499.	20.832	2.56	0.854	-	D
16.73	4.16	17807.	10406.	17.343	4.12	0.855	-	D
358.68	89.75	52.	65.	0.108	40.13	0.931	PB-214	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	46.59	52.	44.	0.073	64.28	0.694
AM-241	237.08	59.45	86.	86.	0.143	45.12	0.868
Th-234	251.66	63.09	84.	83.	0.138	45.91	0.968s
Pb-214	298.54	74.81	104.	132.	0.220	27.94	0.917D
Pb-212	298.56	74.81	137.	0.	0.000	212.87	0.283D
Pb-212	307.74	77.11	84.	195.	0.325	19.51	0.919D
Pb-214	307.74	77.11	208.	0.	0.000	445.12	0.574D
Pb-214	348.51	87.30	90.	66.	0.110	47.46	0.928D
Th-234	368.72	92.35	72.	61.	0.102	46.56	0.933D
Ac-228	380.72	95.35	47.	15.	0.025	136.84	0.935D
Ac-228	836.15	209.18	27.	43.	0.072	54.83	1.266s
Pb-212	953.94	238.62	15.	269.	0.448	12.87	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	39.	56.	0.093	41.75	1.060D
Ac-228	1078.28	269.70	15.	49.	0.082	42.61	0.606s
Pb-214	1180.33	295.21	25.	90.	0.150	32.90	0.615s
Ac-228	1311.69	328.04	13.	34.	0.057	54.37	0.444s
Ac-228	1352.97	338.36	7.	60.	0.099	30.06	1.181

WI07-1023 D2 Bag# S-164 Grid D3-2,3 080807

Pb-214	1407.33	351.94	21.	153.	0.255	21.09	1.121
Ac-228	1853.08	463.35	3.	28.	0.047	43.58	0.485s
Bi-214	2437.28	609.35	0.	109.	0.182	19.16	0.372s
CS-137	2645.41	661.37	0.	28.	0.047	37.80	0.937s
Bi-214	3075.42	768.83	0.	16.	0.027	50.00	1.062s
Ac-228	3178.55	794.60	0.	22.	0.037	42.64	0.541s
Ac-228	3646.94	911.65	0.	63.	0.105	25.20	0.687s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.17	964.44	12.	0.	0.000	0.00	1.595
Ac-228	3872.31	967.97	8.	6.	0.010	165.55	0.267s
Bi-214	4482.68	1120.50	0.	22.	0.037	42.64	0.750s
Bi-214	4954.83	1238.47	3.	1.	0.002	360.56	0.339s
Bi-214	5513.20	1377.99	0.	7.	0.012	75.59	0.375s
K-40	5845.61	1461.05	0.	41.	0.068	31.23	0.875s
Ac-228	6357.50	1588.95	0.	6.	0.010	81.65	0.250s
Bi-214	7061.00	1764.71	0.	15.	0.025	51.64	0.417s

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	5.1795E-04	609.31	5.069E-04	(	4.650E-06	G K
			1764.49	5.338E-04	?(	3.558E-05	G
			1120.29	5.353E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.286E-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	0.000E+00	%	1.943E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	7.2925E-04	911.07	6.938E-04	(	1.101E-05	G K
			969.11	1.165E-04	&	1.129E-04	G
			338.32	6.993E-04	?(	5.112E-05	G
			964.60	0.000E+00	%	3.338E-04	G
			794.70	1.294E-03	+	4.205E-04	G
			463.00	1.104E-03	+	3.270E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:12:41 Page 4
8905696 Spectrum name: Win00579.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.169E-04	@(	1.655E-04	G
		270.23	1.531E-03	+	3.694E-04	G
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	2.936E-04	-	2.243E-04	X
		327.64	1.398E-03	+	4.157E-04	G
Pb-212	N 6.1837E-04	238.62	6.184E-04	(	1.395E-05	G K
		77.11	7.474E-04	+	9.237E-05	Energy duplication
		74.81	0.000E+00	%	1.105E-04	Energy duplication
CS-137	7.5877E-05	661.66	7.588E-05	?(	2.710E-06	G
Th-234	N 7.6651E-04	92.35	7.665E-04	(	1.556E-04	G
		63.29	1.581E-03	+	3.578E-04	G

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Pb-214   N   5.6609E-04    351.92 5.673E-04  (  2.583E-05          G K
                           295.21 5.638E-04  (  4.754E-05          G
                            77.11 0.000E+00 %   1.372E-04Energy duplication
                           241.98 7.680E-04 +   1.976E-04          G
                            74.81 1.473E-03 +   2.481E-04Energy duplication
                            87.30 9.590E-04 +   2.637E-04          X

Pb-210   N   8.9821E-04     46.50 8.982E-04  (  2.186E-04          G

AM-241       1.7640E-04     59.54 1.764E-04  (  2.811E-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 08-AUG-2007 13:12:41 Page 5
8905696 Spectrum name: Win00579.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	1.2751E+00	2.443E-01	2.489E-01
K-40 #	4.4440E+00	1.388E+00	1.398E+00
Ac-228	1.7953E+00	4.524E-01	4.574E-01
Pb-212	1.5223E+00	1.959E-01	2.041E-01
CS-137 #	1.8680E-01	7.060E-02	7.096E-02
Th-234	1.8870E+00	8.786E-01	8.797E-01
Pb-214	1.3936E+00	2.723E-01	2.773E-01
Pb-210	2.2112E+00	1.421E+00	1.422E+00
AM-241	4.3427E-01	1.959E-01	1.966E-01

- All peaks for activity calculation had bad shape.

WI07-1023 D2 Bag# S-164 Grid D3-2,3 080807

* - 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) 1.5149683E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fegin
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0263 D2 Test Sample #1(20 K cts) Grid B2 071207

Sample description
WI07-0263 D2 Test Sample #1 (20 K cts) Grid B2 071207

Spectrum Filename: C:\User\Win00165.An1

Acquisition information

Start time:	12-Jul-2007 10:42:05
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:	2.8220E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.8220E+02) = 3.5436E+03
Detection limit method:	Traditional ORTEC method

WI07-0263 D2 Test Sample #1(20 K cts) Grid B2 071207

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: 0.0982

********** 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	4872.	10300.	17.167	2.75	0.854	-	D
17.95	4.44	13998.	8418.	14.029	4.53	0.855	-	D
84.71	21.36	34.	130.	0.217	24.82	1.117	TC-99M	s
104.92	26.41	42.	187.	0.312	20.15	0.801	AM-241	
128.08	32.20	53.	144.	0.239	25.64	0.984	XE-138	s
359.24	89.95	25.	28.	0.047	62.73	0.931	PB-214	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	185.15	46.47	270.	0.	0.000	0.00	0.354s
AM-241	237.65	59.59	867.	12822.	21.370	1.98	0.937
Th-234	253.17	63.47	33.	46.	0.077	53.78	0.429s
Pb-214	298.54	74.81	41.	63.	0.104	38.52	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	242.59	0.447D
Pb-212	307.74	77.11	27.	114.	0.190	22.68	0.919D
Pb-214	307.74	77.11	117.	0.	0.000	254.17	0.635D
Pb-214	348.51	87.30	35.	42.	0.070	50.03	0.928D
Th-234	368.72	92.35	50.	34.	0.057	67.26	0.933D

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 10:52:17 Page 3
EnergySolutions Spectrum name: Win00165.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	18.	8.	0.014	155.95	0.935D
Ac-228	837.48	209.52	10.	24.	0.041	69.15	0.367s
Pb-212	953.94	238.62	18.	117.	0.194	21.22	1.057D
Pb-214	967.37	241.98	20.	23.	0.038	68.79	1.060D
Ac-228	1080.00	270.13	4.	0.	0.000	0.00	0.000s

WI07-0263 D2 Test Sample #1(20 K cts) Grid B2 071207

Pb-214	1180.34	295.21	6.	40.	0.066	39.25	1.579s
Ac-228	1311.75	328.05	2.	1.	0.002	314.25	0.312s
Ac-228	1352.63	338.27	8.	26.	0.044	60.47	0.539s
Pb-214	1407.83	352.07	3.	63.	0.105	27.75	1.664s
Ac-228	1850.00	462.58	0.	20.	0.033	44.72	0.417s
Bi-214	2438.22	609.59	0.	46.	0.077	29.49	0.854s
CS-137	2648.17	662.06	0.	18.	0.030	47.14	0.594s
Bi-214	3073.33	768.31	0.	6.	0.010	81.65	0.375s
Ac-228	3177.78	794.41	1.	3.	0.005	149.07	0.452s
Ac-228	3646.19	911.47	0.	36.	0.060	33.33	0.866s
Bi-214	3735.00	933.66	0.	3.	0.005	115.47	0.750s
Ac-228	3858.81	964.60	0.	6.	0.011	78.68	1.595D
Ac-228	3876.86	969.11	2.	14.	0.024	59.65	1.598D
Bi-214	4482.00	1120.33	0.	4.	0.007	100.00	0.250s
Bi-214	4952.00	1237.77	0.	2.	0.003	141.42	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.15	1461.18	0.	32.	0.053	35.36	0.321s
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	2.1895E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	9.733E-05	-	8.206E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	3.127E-04	+	2.084E-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	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	3.8718E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	2.750E-04	-	1.200E-04	G
			338.32	3.086E-04	?(	5.212E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	3.989E-04	(	6.173E-05	G
		794.70	1.764E-04	-	1.983E-04	G
		463.00	7.795E-04	+	2.668E-04	G
		209.28	5.184E-04	*(	1.081E-04	G
		270.23	0.000E+00	?	1.054E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.630E-04	-	1.489E-04	X
		327.64	0.000E+00	%	1.222E-04	G
Pb-212 N	2.6815E-04	238.62	2.681E-04	(	1.511E-05	G K
		77.11	4.373E-04	+	6.623E-05	Energy duplication
		74.81	0.000E+00	%	8.121E-05	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	(	2.710E-06	G

Th-234	N	6.1611E-04	92.35	4.289E-04	(	1.307E-04	G
			63.29	8.827E-04	*(	1.638E-04	G
Pb-214	N	2.4724E-04	351.92	2.327E-04	@(	1.135E-05	G K
			295.21	2.474E-04	(	2.593E-05	G
			77.11	0.000E+00	%	1.039E-04	Energy duplication
			241.98	3.189E-04	(	9.449E-05	G
			74.81	6.987E-04	+	1.666E-04	Energy duplication
			87.30	6.132E-04	+	1.875E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	?	4.847E-04	G
AM-241		2.6402E-02	59.54	2.640E-02	(	8.678E-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

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay

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EnergySolutions Spectrum name: Win00165.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		7.7587E-01	2.288E-01	2.306E-01
K-40	#	4.9925E+00	1.765E+00	1.775E+00
Ac-228		1.3720E+00	4.303E-01	4.334E-01
Pb-212		9.5020E-01	2.017E-01	2.048E-01
CS-137		1.7285E-01	8.148E-02	8.175E-02
Th-234		2.1832E+00	9.401E-01	9.414E-01
Pb-214		8.7613E-01	2.432E-01	2.454E-01
Pb-210	<	1.7175E+00		

WI07-0263 D2 Test Sample #1(20 K cts) Grid B2 071207

AM-241	9.3559E+01	1.854E+00	3.928E+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) 1.0488151E+02 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0264 D2 Test Sample #2 (35K cts) GridD1-2 071207

Sample description
WI07-0164 D2 Test Sample #2 (35K cts) Grid D1-2 071207

Spectrum Filename: C:\User\Win00164.An1

Acquisition information
Start time: 12-Jul-2007 10:00:48
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: 2.2980E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.2980E+02) = 4.3516E+03
Detection limit method: Traditional ORTEC method

WI07-0264 D2 Test Sample #2 (35K cts) GridD1-2 071207

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: . 0.1750

********** 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	2.91	4984.	10302.	17.170	2.76	0.854	-	D
17.74	4.39	13108.	8139.	13.565	4.55	0.855	-	D
69.76	17.62	96.	354.	0.589	15.21	1.107	MO-99	s
84.08	21.20	58.	262.	0.438	16.41	0.800	TC-99M	s
104.81	26.39	54.	407.	0.679	12.17	0.914	AM-241	
128.18	32.23	133.	357.	0.595	16.91	1.094	XE-138	s
197.15	49.49	1354.	434.	0.723	25.84	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	577.	37.	0.062	185.30	0.893D
AM-241	237.68	59.60	1275.	19907.	33.178	1.58	0.935
Th-234	253.94	63.66	35.	37.	0.062	68.27	0.912s
Pb-214	298.54	74.81	35.	64.	0.107	36.01	0.917D
Pb-212	298.56	74.81	58.	0.	0.000	316.87	0.339D
Pb-212	307.74	77.11	36.	86.	0.143	29.36	0.919D
Pb-214	307.74	77.11	104.	0.	0.000	285.90	0.229D
Pb-214	348.13	87.21	24.	42.	0.070	50.84	0.611s

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EnergySolutions Spectrum name: Win00164.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	39.	47.	0.078	47.53	0.933D
Ac-228	380.72	95.35	36.	7.	0.011	272.43	0.936D
Ac-228	835.24	208.96	3.	36.	0.060	39.08	0.437s
Pb-212	953.94	238.62	22.	132.	0.220	20.15	1.057D
Pb-214	967.37	241.98	18.	15.	0.025	96.59	1.060D

WI07-0264 D2 Test Sample #2 (35K cts) GridD1-2 071207

Ac-228	1078.93	269.87	4.	15.	0.026	66.15	1.458s
Pb-214	1181.69	295.55	4.	40.	0.067	38.15	0.587s
Ac-228	1310.94	327.85	1.	8.	0.013	82.18	0.354s
Ac-228	1353.31	338.44	0.	40.	0.067	31.62	0.700s
Pb-214	1408.16	352.15	7.	66.	0.110	29.92	0.801s
Ac-228	1850.75	462.77	0.	11.	0.018	60.30	0.687s
Bi-214	2437.91	609.51	0.	55.	0.092	26.97	1.479
CS-137	2646.30	661.59	4.	20.	0.034	58.74	0.475s
Bi-214	3074.00	768.48	1.	0.	0.000	0.00	0.000s
Ac-228	3177.33	794.30	0.	10.	0.017	63.25	0.250s
Ac-228	3646.40	911.52	0.	23.	0.038	41.70	0.375s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	4.	0.007	105.11	1.595D
Ac-228	3876.86	969.11	3.	16.	0.027	57.07	1.598D
Bi-214	4483.00	1120.58	0.	4.	0.007	100.00	0.250s
Bi-214	4954.00	1238.27	0.	8.	0.013	70.71	0.375s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5844.17	1460.69	0.	30.	0.050	36.51	0.531s
Ac-228	6355.50	1588.45	0.	2.	0.003	141.42	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	2.5577E-04	609.31	2.558E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	9.733E-05	-	8.206E-05	G
			1238.11	5.424E-04	+	3.072E-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	1.3208E-03	1460.81	1.321E-03	?(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 10:10:59 Page 4
EnergySolutions Spectrum name: Win00164.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	3.2678E-04	911.07	2.533E-04	?(	1.101E-05	G K
			969.11	3.169E-04	(	5.572E-05	G
			338.32	4.688E-04	(	1.172E-05	G
			964.60	2.761E-04	(	1.013E-04	G
			794.70	5.880E-04	+	2.940E-04	G
			463.00	4.288E-04	?(	3.898E-05	G
			209.28	7.582E-04	+	1.978E-04	G
			270.23	4.791E-04	(	1.017E-04	G
			1588.00	2.905E-04	?(	1.452E-04	G
			95.35	0.000E+00	%	1.885E-04	X
			327.64	3.190E-04	?(	8.582E-05	G
Pb-212	N	3.1010E-04	238.62	3.028E-04	(	1.651E-05	G K
			77.11	3.281E-04	(	3.459E-05	Energy duplication
			74.81	0.000E+00	&	7.307E-05	Energy duplication

WI07-0264 D2 Test Sample #2 (35K cts) GridD1-2 071207

CS-137		5.5553E-05	661.66	5.555E-05	(	8.652E-06	G
Th-234	N	6.3560E-04	92.35	5.869E-04	(	1.165E-04	G
			63.29	7.049E-04	(	1.692E-04	G
Pb-214	N	2.4195E-04	351.92	2.444E-04	(	1.583E-05	G K
			295.21	2.516E-04	@(	2.076E-05	G
			77.11	0.000E+00	%	9.776E-05	Energy duplication
			241.98	2.048E-04	(	9.059E-05	G
			74.81	7.169E-04	+	1.627E-04	Energy duplication
			87.30	6.095E-04	+	1.741E-04	X
Pb-210	N	7.6029E-04	46.50	7.603E-04	(	7.036E-04	G
AM-241		4.0991E-02	59.54	4.099E-02	(	1.050E-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 12-JUL-2007 10:10:59 Page 5
EnergySolutions Spectrum name: Win00164.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	#	1.1130E+00	3.002E-01	3.030E-01
K-40	#	5.7478E+00	2.099E+00	2.110E+00
Ac-228		1.4220E+00	4.046E-01	4.081E-01
Pb-212		1.3494E+00	2.403E-01	2.455E-01
CS-137		2.4174E-01	1.420E-01	1.423E-01
Th-234		2.7659E+00	1.150E+00	1.152E+00
Pb-214		1.0529E+00	3.150E-01	3.175E-01

WI07-0264 D2 Test Sample #2 (35K cts) GridD1-2 071207

Pb-210	C	3.3085E+00	6.131E+00	6.131E+00
AM-241		1.7838E+02	2.822E+00	7.181E+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) 1.9537924E+02 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

Sample description
WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

Spectrum Filename: C:\User\Win00166.An1

Acquisition information

Start time:	12-Jul-2007 11:01:26
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:	3.0410E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0410E+02) = 3.2884E+03
Detection limit method:	Traditional ORTEC method

WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

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: 0.0653

********** 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	
14.78	3.88	4608.	19963.	33.272	1.96	2.383	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	185.13	46.46	59.	74.	0.124	45.78	0.898
AM-241	237.65	59.59	127.	570.	0.951	11.62	0.861
Th-234	252.91	63.40	43.	54.	0.089	51.49	1.044
Pb-214	298.54	74.81	66.	83.	0.138	35.48	0.917D
Pb-212	298.56	74.81	92.	0.	0.000	549.91	0.371D
Pb-212	307.74	77.11	61.	155.	0.259	21.44	0.919D
Pb-214	307.74	77.11	164.	0.	0.000	494.13	0.265D
Pb-214	348.74	87.36	42.	64.	0.108	45.28	0.690s
Th-234	371.75	93.11	45.	71.	0.118	44.25	1.762s
Ac-228	380.72	95.35	13.	0.	0.000	0.00	0.218D
Ac-228	836.97	209.39	23.	38.	0.064	58.38	1.326s
Pb-212	953.94	238.62	28.	175.	0.291	17.35	1.057D
Pb-214	967.37	241.98	33.	33.	0.055	59.91	1.060D
Ac-228	1080.09	270.15	12.	20.	0.034	70.55	0.471s

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EnergySolutions Spectrum name: Win00166.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.42	295.23	2.	45.	0.074	32.43	1.053s
Ac-228	1310.26	327.68	3.	17.	0.029	61.68	0.488s
Ac-228	1353.98	338.61	6.	63.	0.106	29.12	1.100s
Pb-214	1407.01	351.86	3.	93.	0.154	22.34	1.043s
Ac-228	1852.00	463.08	9.	3.	0.005	378.85	0.000s

WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

Bi-214	2437.48	609.40	0.	60.	0.100	25.82	0.758s
CS-137	2644.92	661.24	4.	24.	0.041	51.79	0.525s
Bi-214	3073.25	768.29	0.	11.	0.018	60.30	0.437s
Ac-228	3180.80	795.17	0.	5.	0.008	89.44	0.292s
Ac-228	3646.00	911.42	6.	0.	0.000	0.00	0.000s
Bi-214	3735.62	933.82	1.	1.	0.001	339.93	0.375s
Ac-228	3858.81	964.60	2.	0.	0.000	0.00	0.318D
Ac-228	3874.02	968.40	2.	24.	0.039	48.33	0.402s
Bi-214	4483.57	1120.72	0.	21.	0.035	43.64	0.833s
Bi-214	4953.22	1238.07	0.	13.	0.022	55.47	0.312s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.40	1460.99	0.	46.	0.077	29.49	0.385s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7055.00	1763.21	0.	11.	0.018	60.30	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	2.7903E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	3.914E-04	&	1.856E-04	G
			1120.29	5.110E-04	+	1.703E-04	G
			1238.11	8.813E-04	+	3.812E-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	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	0.0000E+00	911.07	0.000E+00	?	4.405E-05	G K
			969.11	4.563E-04	?	1.501E-04	G
			338.32	7.422E-04	*	1.437E-04	G
			964.60	0.000E+00	?	1.421E-04	G
			794.70	2.940E-04	?	2.176E-04	G
			463.00	0.000E+00	%	2.114E-04	G
			209.28	8.111E-04	@	2.445E-04	G
			270.23	6.353E-04	$	2.660E-04	G

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 11:11:36 Page 4
EnergySolutions Spectrum name: Win00166.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	&	1.083E-04	X
		327.64	6.991E-04	?	2.787E-04	G
Pb-212	N 4.0182E-04	238.62	4.018E-04	(	1.825E-05	G K
		77.11	5.942E-04	+	8.151E-05	Energy duplication
		74.81	0.000E+00	%	9.116E-05	Energy duplication
CS-137	6.6392E-05	661.66	6.639E-05	?(	8.652E-06	G
Th-234	N 9.3975E-04	92.35	8.817E-04	&(	1.252E-04	G
		63.29	1.022E-03	$(	1.871E-04	G
Pb-214	N 3.4321E-04	351.92	3.432E-04	*(	1.159E-05	G K

WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

			295.21	2.798E-04	-	6.395E-05	G
			77.11	0.000E+00	%	1.222E-04	Energy duplication
			241.98	4.588E-04	+	1.659E-04	G
			74.81	9.231E-04	+	1.983E-04	Energy duplication
			87.30	9.360E-04	+	2.197E-04	X
Pb-210	N	1.5174E-03	46.50	1.517E-03	(	2.316E-04	G
AM-241		1.1744E-03	59.54	1.174E-03	(	3.382E-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

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EnergySolutions Spectrum name: Win00166.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		9.1755E-01	2.369E-01	2.394E-01
K-40	#	6.6599E+00	1.964E+00	1.980E+00
Ac-228	B<	1.4486E-01		
Pb-212		1.3213E+00	2.292E-01	2.345E-01
CS-137	#	2.1832E-01	1.131E-01	1.134E-01
Th-234		3.0903E+00	1.049E+00	1.051E+00
Pb-214		1.1286E+00	2.521E-01	2.556E-01
Pb-210		4.9899E+00	2.284E+00	2.287E+00
AM-241		3.8619E+00	4.488E-01	4.710E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-0265 D2 Test Sample #3 (12 K cts) Grid D4-3 071207

< - 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) 2.2187748E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0266 D2 Test Sample #4 (12K cts) Grid E1-2 071207

Sample description
WI07-0266 D2 Test Sample #4 (12 K cts) Grid E1-2 071207

Spectrum Filename: C:\User\Win00167.An1

Acquisition information

Start time:	12-Jul-2007 12:51:04
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:	2.7380E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.7380E+02) = 3.6523E+03
Detection limit method:	Traditional ORTEC method

WI07-0266 D2 Test Sample #4 (12K cts) Grid E1-2 071207

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	
11.81	2.93	5467.	10538.	17.563	2.78	0.854	-	D
16.85	4.19	15101.	8665.	14.441	4.55	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	185.21	46.48	51.	55.	0.092	57.55	0.628s
AM-241	238.04	59.69	40.	185.	0.308	19.69	1.152s
Th-234	252.25	63.24	35.	53.	0.088	49.15	0.686s
Pb-214	298.54	74.81	76.	84.	0.139	36.77	0.917D
Pb-212	298.56	74.81	108.	0.	0.000	150.48	0.478D
Pb-212	307.74	77.11	49.	130.	0.217	23.16	0.919D
Pb-214	307.74	77.11	194.	0.	0.000	95.59	0.260D
Pb-214	348.30	87.25	33.	64.	0.107	40.92	0.358s
Th-234	368.72	92.35	44.	45.	0.075	51.15	0.933D
Ac-228	380.72	95.35	39.	7.	0.012	249.83	0.935D
Ac-228	835.26	208.96	14.	15.	0.025	100.66	0.233s
Pb-212	953.94	238.62	27.	159.	0.266	18.30	1.057D
Pb-214	967.37	241.98	23.	23.	0.038	73.54	1.060D

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 13:01:16 Page 3
EnergySolutions Spectrum name: Win00167.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.34	269.72	11.	3.	0.006	318.75	0.185s
Pb-214	1181.64	295.54	10.	36.	0.061	50.15	0.323s
Ac-228	1310.79	327.81	0.	31.	0.052	35.92	0.542s
Ac-228	1352.02	338.12	7.	45.	0.074	39.77	0.307s
Pb-214	1407.31	351.94	3.	84.	0.140	23.33	1.230s

WI07-0266 D2 Test Sample #4 (12K cts) Grid E1-2 071207

Ac-228	1852.24	463.14	0.	23.	0.038	41.70	0.281s
Bi-214	2437.06	609.30	4.	41.	0.069	37.54	0.293s
CS-137	2645.94	661.50	0.	17.	0.028	48.51	0.583s
Bi-214	3072.43	768.08	0.	12.	0.020	57.74	0.500s
Ac-228	3178.00	794.47	0.	2.	0.003	141.42	0.250s
Ac-228	3646.61	911.57	0.	38.	0.063	32.44	0.698s
Bi-214	3736.00	933.91	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	3.	3.	0.005	199.99	1.595D
Ac-228	3876.86	969.11	4.	28.	0.047	42.93	1.598D
Bi-214	4481.00	1120.08	0.	5.	0.008	89.44	0.250s
Bi-214	4954.50	1238.39	0.	2.	0.003	141.42	0.500s
Bi-214	5511.00	1377.44	0.	4.	0.007	100.00	0.750s
K-40	5842.52	1460.28	6.	8.	0.014	111.71	0.547s
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	1.9144E-04	609.31	1.914E-04	(	1.541E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	1.217E-04	-	9.007E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	6.253E-04	+	2.827E-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	+	3.277E-04	G
K-40	N	3.5956E-04	1460.81	3.596E-04	?(	1.740E-04	G
Ac-228	N	4.7710E-04	911.07	4.185E-04	(	1.101E-05	G K
			969.11	5.430E-04	(	6.570E-05	G
			338.32	5.235E-04	(	5.112E-05	G
			964.60	1.852E-04	-	2.469E-04	G
			794.70	1.176E-04	-	1.506E-04	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	3.174E-04	-	1.721E-04	G

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 13:01:16 Page 4
EnergySolutions Spectrum name: Win00167.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.817E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.946E-04	X
		327.64	1.262E-03	+	3.417E-04	G
Pb-212	N 3.6631E-04	238.62	3.663E-04	(	1.795E-05	G K
		77.11	4.988E-04	+	7.437E-05	Energy duplication
		74.81	0.000E+00	?	9.849E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 7.4699E-04	92.35	5.625E-04	(	1.233E-04	G
		63.29	1.010E-03	(	1.692E-04	G

WI07-0266 D2 Test Sample #4 (12K cts) Grid E1-2 071207

Pb-214	N	3.1145E-04	351.92	3.111E-04	@(	1.111E-05		G K
			295.21	2.286E-04	-	6.395E-05		G
			77.11	0.000E+00	?	1.327E-04	Energy duplication	
			241.98	3.131E-04	(	1.017E-04		G
			74.81	9.334E-04	+	2.053E-04	Energy duplication	
			87.30	9.335E-04	+	2.095E-04		X
Pb-210	N	1.1228E-03	46.50	1.123E-03	(	2.166E-04		G
AM-241		3.8094E-04	59.54	3.809E-04	*(	1.948E-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

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		6.9921E-01	2.625E-01	2.638E-01
K-40	#	1.3132E+00	1.467E+00	1.468E+00
Ac-228		1.7425E+00	3.886E-01	3.941E-01
Pb-212		1.3379E+00	2.448E-01	2.499E-01
CS-137	#	1.6825E-01	8.162E-02	8.187E-02
Th-234		2.7282E+00	9.677E-01	9.697E-01
Pb-214		1.1375E+00	2.654E-01	2.688E-01
Pb-210		4.1007E+00	2.360E+00	2.362E+00
AM-241	#	1.3913E+00	2.739E-01	2.787E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0266 D2 Test Sample #4 (12K cts) Grid E1-2 071207

& - 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) 1.4618776E+01 pCi/g

The library has energies which are not separable.

Analyzed by: H. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0267 D2 Soil from underWorkOver Tank 071207

Sample description
WI07-0267 D2 From Under WorkOver Tank 071207

Spectrum Filename: C:\User\Win00168.An1

Acquisition information

Start time:	12-Jul-2007 13:59:50
Live time:	600
Real time:	615
Dead time:	2.39 %
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:	3.4790E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.4790E+02) = 2.8744E+03
Detection limit method:	Traditional ORTEC method

WI07-0267 D2 Soil from underWorkOver Tank 071207

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: 0.0897

********** 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	
14.55	3.82	3912.	13518.	22.530	2.53	2.209	CU-64	s
31.93	8.17	1716.	-108.	-0.180	130.55	0.422	ZN-65	s
55.48	14.05	350.	146.	0.244	43.61	0.984	PU-239	s
69.77	17.63	540.	2367.	3.945	5.69	1.016	MO-99	s
84.12	21.21	414.	1861.	3.102	6.31	1.127	TC-99M	s
104.87	26.40	374.	2897.	4.828	4.54	0.884	AM-241	
128.55	32.32	827.	2134.	3.557	7.08	1.059	XE-138	s
145.62	36.59	1085.	583.	0.972	22.71	0.978	CE-144	s
172.82	43.39	4577.	382.	0.637	51.11	0.890	EU-155	D
197.77	49.63	19246.	4131.	6.885	10.00	0.895	EU-155	D
394.74	98.85	54.	181.	0.302	21.73	1.011	PA-234	M
410.69	102.84	54.	178.	0.297	22.30	0.819	GD-153	

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	9175.	0.	0.000	0.00	0.893D
AM-241	237.57	59.57	18914.	223236.	372.061	0.49	0.888
Th-234	254.47	63.79	64.	24.	0.040	120.34	1.123s
Pb-214	298.54	74.81	74.	47.	0.079	59.07	0.917D
Pb-212	298.56	74.81	71.	0.	0.000	1200.00	0.239D
Pb-212	307.74	77.11	65.	124.	0.207	25.63	0.919D
Pb-214	307.74	77.11	132.	0.	0.000	477.53	0.176D
Pb-214	348.84	87.38	56.	45.	0.075	70.32	0.503s

WI07-0267 D2 Soil from underWorkOver Tank 071207

Th-234	368.72	92.35	59.	19.	0.032	120.33	0.933D
Ac-228	380.72	95.35	31.	3.	0.004	604.04	0.935D
Ac-228	835.83	209.10	14.	18.	0.030	89.35	0.417s
Pb-212	953.94	238.62	15.	84.	0.141	25.23	1.057D
Pb-214	967.37	241.98	10.	23.	0.038	58.33	1.060D
Ac-228	1081.86	270.60	5.	16.	0.027	69.15	0.937
Pb-214	1180.36	295.22	6.	32.	0.054	42.67	1.032
Ac-228	1310.00	327.62	9.	4.	0.006	284.84	0.000s
Ac-228	1353.33	338.45	3.	29.	0.049	43.38	0.602s
Pb-214	1406.39	351.71	4.	60.	0.100	29.49	0.674s
Ac-228	1850.50	462.70	2.	0.	0.000	0.00	0.292s
Bi-214	2437.57	609.43	0.	49.	0.082	28.57	1.400s
CS-137	2648.00	662.02	0.	28.	0.047	37.80	0.531s
Bi-214	3075.73	768.91	0.	13.	0.022	55.47	0.500s
Ac-228	3177.67	794.38	0.	6.	0.010	81.65	0.375s
Ac-228	3645.88	911.39	0.	20.	0.033	44.72	1.000s
Bi-214	3738.60	934.56	0.	5.	0.008	89.44	0.375s
Ac-228	3857.33	964.23	0.	7.	0.012	75.59	0.250s
Ac-228	3876.86	969.11	6.	0.	0.000	0.00	1.598
Bi-214	4477.50	1119.20	0.	11.	0.018	60.30	0.312s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	4.	0.007	100.00	0.250s
K-40	5845.92	1461.13	0.	40.	0.067	31.62	0.656s
Ac-228	6354.00	1588.07	0.	2.	0.003	141.42	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.

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 14:10:15 Page 4
EnergySolutions Spectrum name: Win00168.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	MDA Value microCi	Comments
Bi-214	N	2.3766E-04	609.31	2.279E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	2.677E-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	4.328E-04	+	3.649E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	3.0459E-04	911.07	2.203E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	7.693E-05	G
			338.32	3.418E-04	(	3.437E-05	G
			964.60	4.321E-04	?(	6.173E-05	G
			794.70	3.528E-04	?(	5.880E-05	G
			463.00	0.000E+00	?	9.984E-05	G
			209.28	3.809E-04	(	1.230E-04	G
			270.23	5.103E-04	(	1.123E-04	G
			1588.00	2.905E-04	?(	1.452E-04	G
			95.35	0.000E+00	%	1.669E-04	X
			327.64	0.000E+00	%	2.290E-04	G

Pb-212	N	1.9409E-04	238.62	1.941E-04	(	1.360E-05	G K
			77.11	4.758E-04	+	7.637E-05	Energy duplication
			74.81	0.000E+00	%	8.049E-05	Energy duplication
CS-137		7.5877E-05	661.66	7.588E-05	?(	2.710E-06	G
Th-234	N	3.2970E-04	92.35	2.424E-04	(	1.414E-04	G
			63.29	4.540E-04	&(	2.256E-04	G
Pb-214	N	2.1629E-04	351.92	2.228E-04	(	1.227E-05	G K
			295.21	2.036E-04	(	2.414E-05	G
			77.11	0.000E+00	%	1.099E-04	Energy duplication
			241.98	3.124E-04	+	1.195E-04	G
			74.81	5.273E-04	+	1.793E-04	Energy duplication
			87.30	6.530E-04	+	2.136E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	2.776E-03	G

ORTEC g v - i (63) wan32 G53W2.06 12-JUL-2007 14:10:15 Page 5
EnergySolutions Spectrum name: Win00168.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
AM-241	4.5967E-01	59.54	4.597E-01	(	4.015E-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 #	6.8312E-01	1.952E-01	1.968E-01
K-40 #	5.0621E+00	1.601E+00	1.612E+00

WI07-0267 D2 Soil from underWorkOver Tank 071207

Ac-228	8.7551E-01	2.769E-01	2.789E-01
Pb-212	5.5789E-01	1.408E-01	1.423E-01
CS-137 #	2.1810E-01	8.243E-02	8.285E-02
Th-234	9.4767E-01	8.064E-01	8.067E-01
Pb-214	6.2169E-01	1.612E-01	1.629E-01
Pb-210 <	7.9780E+00		
AM-241	1.3213E+03	6.506E+00	4.934E+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 12-JUL-2007 14:10:15 Page 6
EnergySolutions Spectrum name: Win00168.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) 1.3302502E+03 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0281 D2 Test Comparison (14K cts) 071307

Sample description
WI07 -0281 D2 Test Comparison (14K) counts 071307

Spectrum Filename: C:\User\Win00175.An1

Acquisition information
Start time: 13-Jul-2007 11:11:01
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: 2.1700E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.1700E+02) = 4.6083E+03
Detection limit method: Traditional ORTEC method

WI07-0281 D2 Test Comparison (14K cts) 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: 0.0926

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.75	3.87	4377.	22708.	37.847	1.77	2.256	CU-64	s
105.28	26.50	22.	109.	0.182	24.02	0.987	AM-241	
127.92	32.16	66.	66.	0.110	55.05	0.761	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	182.04	45.69	159.	45.	0.076	105.72	0.668s
AM-241	237.67	59.59	368.	5726.	9.543	2.94	0.872
Th-234	252.12	63.21	30.	32.	0.053	69.03	0.677
Pb-214	298.54	74.81	48.	51.	0.086	47.18	0.917D
Pb-212	298.56	74.81	53.	0.	0.000	352.77	0.223D
Pb-212	307.74	77.11	37.	92.	0.153	28.01	0.919D
Pb-214	307.74	77.11	105.	0.	0.000	729.92	0.220D
Pb-214	348.08	87.19	14.	40.	0.067	45.28	0.821
Th-234	368.72	92.35	51.	32.	0.054	71.11	0.933D
Ac-228	380.72	95.35	29.	6.	0.010	258.70	0.935D
Ac-228	836.24	209.21	16.	21.	0.035	85.01	0.319s
Pb-212	953.94	238.62	15.	125.	0.208	19.91	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	27.	19.	0.032	87.90	1.060D
Ac-228	1079.90	270.11	4.	30.	0.051	44.59	0.408s
Pb-214	1179.30	294.95	6.	34.	0.058	43.03	0.565s
Ac-228	1311.42	327.97	0.	22.	0.037	42.64	0.625s
Ac-228	1354.11	338.64	4.	44.	0.074	35.86	0.567s

WI07-0281 D2 Test Comparison (14K cts) 071307

Pb-214	1407.46	351.98	5.	61.	0.101	29.53	0.675s
Ac-228	1850.86	462.80	4.	7.	0.012	114.81	0.333s
Bi-214	2437.60	609.43	3.	45.	0.074	34.43	0.818s
CS-137	2646.29	661.59	0.	31.	0.052	35.92	0.625s
Bi-214	3069.00	767.23	0.	4.	0.007	100.00	0.250s
Ac-228	3183.57	795.86	4.	2.	0.004	296.65	0.220s
Ac-228	3645.51	911.30	0.	37.	0.062	32.88	0.783s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	9.	0.014	86.37	1.595D
Ac-228	3876.86	969.11	8.	15.	0.025	74.78	1.598D
Bi-214	4478.57	1119.47	0.	11.	0.018	60.30	0.375s
Bi-214	4953.00	1238.02	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5846.55	1461.28	0.	29.	0.048	37.14	0.559s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7058.89	1764.18	1.	1.	0.002	281.40	0.229s

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	2.2140E-04	609.31	2.077E-04	(	1.456E-05	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	2.084E-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	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	4.4915E-04	911.07	4.075E-04	(	1.101E-05	G K
			969.11	2.895E-04	-	1.418E-04	G
			338.32	5.176E-04	@(	3.883E-05	G
			964.60	5.251E-04	(	1.721E-04	G
			794.70	0.000E+00	&	2.514E-04	G
			463.00	2.858E-04	-	2.033E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.443E-04	?(	1.307E-04	G
		270.23	9.529E-04	+	2.737E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.711E-04	X
		327.64	8.959E-04	+	2.913E-04	G
Pb-212	N 3.0593E-04	238.62	2.873E-04	(	1.378E-05	G K
		77.11	3.520E-04	(	3.488E-05	Energy duplication
		74.81	0.000E+00	%	7.000E-05	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	?(	2.710E-06	G
Th-234	N 4.8971E-04	92.35	4.055E-04	(	1.318E-04	G
		63.29	6.096E-04	$(	1.574E-04	G

Pb-214	N	2.2720E-04	351.92	2.247E-04	(	1.409E-05	G K	
			295.21	2.161E-04	(	2.593E-05	G	
			77.11	0.000E+00	%	9.859E-05	Energy duplication	
			241.98	2.681E-04	(	1.080E-04	G	
			74.81	5.729E-04	+	1.627E-04	Energy duplication	
			87.30	5.804E-04	+	1.582E-04	X	
Pb-210	N	9.2543E-04	46.50	9.254E-04	&(	3.740E-04	G	
AM-241		1.1791E-02	59.54	1.179E-02	(	5.690E-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 13-JUL-2007 11:21:12 Page 5
EnergySolutions Spectrum name: Win00175.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	1.0203E+00	3.512E-01	3.533E-01
K-40 #	5.8839E+00	2.185E+00	2.196E+00
Ac-228	2.0698E+00	6.757E-01	6.801E-01
Pb-212	1.4098E+00	2.423E-01	2.480E-01
CS-137 #	3.8713E-01	1.391E-01	1.398E-01
Th-234	2.2567E+00	1.118E+00	1.119E+00
Pb-214	1.0470E+00	3.092E-01	3.116E-01
Pb-210 #	4.2646E+00	4.509E+00	4.510E+00
AM-241	5.4335E+01	1.596E+00	2.568E+00

- All peaks for activity calculation had bad shape.

WI07-0281 D2 Test Comparison (14K cts) 071307

* - 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) 7.2673981E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Lum
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0281QC D1 QC Test Comparison (14K cts) 071307

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:42:14 Page 1
EnergySolutions Spectrum name: Win00176.An1

Sample description
WI07-0281QC Test Comparison Sample (14K cts) 071307

Spectrum Filename: C:\User\Win00176.An1

Acquisition information
Start time: 13-Jul-2007 11:32:03
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: 2.1700E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.1700E+02) = 4.6083E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:42:14 Page 2
EnergySolutions Spectrum name: Win00176.An1

WI07-0281QC D1 QC Test Comparison (14K cts) 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: 0.0691

********** 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	71.	399.	0.665	12.98	1.391	CU-64	s
70.65	17.84	72.	182.	0.303	23.82	0.973	MO-99	s
106.09	26.70	35.	109.	0.182	28.13	1.112	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	185.21	46.47	108.	33.	0.054	109.79	0.893
AM-241	237.70	59.59	300.	4301.	7.168	3.39	1.190s
Th-234	253.50	63.54	24.	43.	0.072	53.23	0.680s
Pb-214	298.61	74.81	39.	50.	0.084	45.05	0.971D
Pb-212	298.63	74.81	58.	0.	0.000	622.05	0.000D
Pb-212	307.80	77.11	59.	72.	0.120	38.15	0.972D
Pb-214	307.80	77.11	106.	0.	0.000	266.06	0.217D
Pb-214	347.63	87.06	22.	29.	0.048	67.22	0.779
Th-234	368.79	92.35	27.	31.	0.051	59.79	0.985D
Ac-228	380.79	95.35	27.	5.	0.009	286.54	0.987D
Ac-228	838.75	209.80	16.	15.	0.025	105.83	0.636s
Pb-212	954.08	238.62	13.	95.	0.159	23.11	1.099D

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:42:14 Page 3
EnergySolutions Spectrum name: Win00176.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	21.	13.	0.021	117.23	1.101D
Ac-228	1079.60	270.00	2.	12.	0.021	64.50	0.589s
Pb-214	1180.24	295.15	6.	34.	0.057	43.61	0.894
Ac-228	1308.57	327.22	2.	1.	0.002	416.33	0.328s
Ac-228	1352.85	338.28	0.	26.	0.043	39.22	1.416s

WI07-0281QC D1 QC Test Comparison (14K cts) 071307

Pb-214	1407.31	351.89	3.	47.	0.078	33.50	1.475s
Ac-228	1845.00	461.28	0.	14.	0.023	53.45	0.250s
Bi-214	2438.58	609.61	0.	35.	0.058	33.81	0.896s
CS-137	2646.67	661.62	0.	12.	0.020	57.74	1.125
Bi-214	3072.50	768.03	0.	12.	0.020	57.74	0.500s
Ac-228	3176.78	794.09	1.	1.	0.002	346.41	0.218s
Ac-228	3645.84	911.30	0.	25.	0.042	40.00	0.937s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	0.	4.	0.006	103.53	1.589D
Ac-228	3877.18	969.11	4.	13.	0.021	73.56	1.591D
Bi-214	4482.00	1120.24	0.	1.	0.002	200.00	0.250s
Bi-214	4951.78	1237.63	1.	1.	0.002	346.41	0.217s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5846.09	1461.09	0.	25.	0.042	40.00	0.750s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7057.33	1763.72	0.	6.	0.010	81.65	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	1.9128E-04	609.31	1.791E-04	?(	5.117E-06	G K
			1764.49	2.270E-04	?(	3.783E-05	G
			1120.29	0.000E+00	%	5.247E-05	G
			1238.11	0.000E+00	%	1.866E-04	G
			768.36	6.827E-04	+	3.086E-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	1.1769E-03	1460.81	1.177E-03	?(	4.707E-05	G
Ac-228	N	3.0576E-04	911.07	2.989E-04	?(	1.195E-05	G K
			969.11	2.647E-04	(	7.392E-05	G
			338.32	3.425E-04	(	1.317E-05	G
			964.60	2.496E-04	(	6.688E-05	G
			794.70	0.000E+00	%	1.642E-04	G
			463.00	6.063E-04	&	2.519E-04	G

ORTEC g v - i (63) wan32 G53W2.06 13-JUL-2007 11:42:14 Page 4
EnergySolutions Spectrum name: Win00176.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	3.634E-04	?(	1.497E-04	G
		270.23	4.427E-04	?(	8.156E-05	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	1.917E-04	X
		327.64	0.000E+00	%	1.375E-04	G
Pb-212	N 2.4910E-04	238.62	2.491E-04	(	1.464E-05	G K
		77.11	3.340E-04	+	7.721E-05	Energy duplication
		74.81	0.000E+00	%	8.871E-05	Energy duplication
CS-137	3.5682E-05	661.66	3.568E-05	?(	2.973E-06	G
Th-234	N 6.7533E-04	92.35	4.533E-04	(	1.158E-04	G
		63.29	9.914E-04	*(	1.717E-04	G

WI07-0281QC D1 QC Test Comparison (14K cts) 071307

Pb-214	N	2.0939E-04	351.92	1.940E-04	(	1.301E-05		G K
			295.21	2.430E-04	(	2.763E-05		G
			77.11	0.000E+00	%	1.197E-04	Energy duplication	
			241.98	1.997E-04	(	1.109E-04		G
			74.81	6.782E-04	+	1.871E-04	Energy duplication	
			87.30	5.007E-04	+	1.832E-04		X
Pb-210	N	7.6523E-04	46.50	7.652E-04	(	3.567E-04		G
AM-241		1.0662E-02	59.54	1.066E-02	(	6.200E-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 13-JUL-2007 11:42:14 Page 5
EnergySolutions Spectrum name: Win00176.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	#	8.8148E-01	2.980E-01	2.991E-01
K-40	#	5.4233E+00	2.169E+00	2.175E+00
Ac-228		1.4090E+00	4.370E-01	4.390E-01
Pb-212		1.1479E+00	2.652E-01	2.674E-01
CS-137	#	1.6443E-01	9.493E-02	9.507E-02
Th-234		3.1121E+00	1.246E+00	1.248E+00
Pb-214		9.6494E-01	3.233E-01	3.245E-01
Pb-210		3.5264E+00	3.872E+00	3.872E+00
AM-241		4.9136E+01	1.666E+00	2.466E+00

- All peaks for activity calculation had bad shape.

WI07-0281QC D1 QC Test Comparison (14K cts) 071307

* - 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) 6.5765427E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lem
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:21:50 Page 1
EnergySolutions Spectrum name: Win00237.An1

Sample description
WI07- 0368 D2 Grid B4 - 3 071707

Spectrum Filename: C:\User\Win00237.An1

Acquisition information
Start time: 17-Jul-2007 12:11:39
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: 3.3710E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3710E+02) = 2.9665E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:21:50 Page 2
EnergySolutions Spectrum name: Win00237.An1

WI07-0368 D2 Grid B4 - 3 071707

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	
11.86	2.92	5335.	9587.	15.979	2.97	0.854	-	D
16.89	4.17	13803.	9371.	15.618	4.10	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	184.94	46.41	34.	58.	0.097	47.32	1.033s
AM-241	237.68	59.60	61.	637.	1.061	9.22	1.076s
Th-234	252.68	63.35	18.	23.	0.038	76.30	0.533s
Pb-214	298.54	74.81	44.	66.	0.110	37.49	0.917D
Pb-212	298.56	74.81	57.	0.	0.000	276.13	0.840D
Pb-212	307.74	77.11	31.	85.	0.141	28.57	0.919D
Pb-214	307.74	77.11	84.	0.	0.000	2905.17	1.007D
Pb-214	348.78	87.37	32.	32.	0.054	66.84	0.689s
Th-234	370.65	92.83	37.	32.	0.054	70.56	0.473s
Ac-228	380.72	95.35	17.	0.	0.000	0.00	0.201D
Ac-228	836.42	209.25	8.	19.	0.031	68.51	0.268s
Pb-212	953.94	238.62	12.	123.	0.206	19.62	1.057D
Pb-214	967.37	241.98	23.	2.	0.003	830.24	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:21:50 Page 3
EnergySolutions Spectrum name: Win00237.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.97	270.12	11.	25.	0.041	66.92	0.345s
Pb-214	1179.94	295.11	5.	36.	0.059	41.67	1.590s
Ac-228	1312.63	328.28	2.	13.	0.022	65.09	0.390s
Ac-228	1352.77	338.31	8.	28.	0.047	54.08	0.733s
Pb-214	1407.30	351.94	0.	59.	0.098	26.04	0.791s

WI07-0368 D2 Grid B4 - 3 071707

Ac-228	1851.33	462.91	0.	16.	0.027	50.00	0.562s
Bi-214	2437.20	609.33	0.	41.	0.068	31.23	0.700s
CS-137	2646.69	661.69	0.	16.	0.027	50.00	0.625s
Bi-214	3073.33	768.31	0.	9.	0.015	66.67	0.375s
Ac-228	3179.33	794.80	2.	1.	0.002	416.33	0.197s
Ac-228	3645.00	911.17	15.	0.	0.000	0.00	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	0.375D
Ac-228	3876.63	969.05	0.	19.	0.032	45.88	0.541s
Bi-214	4482.93	1120.56	0.	15.	0.025	51.64	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	5843.73	1460.58	0.	23.	0.038	41.70	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	1.9067E-04	609.31	1.907E-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	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	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.0126E-03	1460.81	1.013E-03	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	7.242E-05	G K
			969.11	3.689E-04	?	1.298E-04	G
			338.32	3.281E-04	@	1.055E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	6.236E-04	?	2.408E-04	G
			209.28	3.950E-04	?	1.664E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:21:50 Page 4
EnergySolutions Spectrum name: Win00237.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.706E-04	$	2.812E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.234E-04	X
		327.64	5.362E-04	&	2.443E-04	G
Pb-212	N 2.9556E-04	238.62	2.837E-04	(	1.226E-05	G K
		77.11	3.250E-04	(	3.217E-05	Energy duplication
		74.81	0.000E+00	%	7.247E-05	Energy duplication
CS-137	4.3358E-05	661.66	4.336E-05	?(	2.710E-06	G
Th-234	N 4.1776E-04	92.35	4.034E-04	(	1.133E-04	G
		63.29	4.382E-04	(	1.242E-04	G

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Pb-214	N	2.2019E-04	351.92	2.185E-04	(	3.704E-06		G K
			295.21	2.234E-04	*(	2.383E-05		G
			77.11	0.000E+00	%	8.841E-05	Energy duplication	
			241.98	0.000E+00	%	1.049E-04		G
			74.81	7.385E-04	+	1.712E-04	Energy duplication	
			87.30	4.692E-04	+	1.716E-04		X
Pb-210	N	1.1840E-03	46.50	1.184E-03	(	1.789E-04		G
AM-241		1.3110E-03	59.54	1.311E-03	(	2.386E-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

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		5.6561E-01	1.767E-01	1.779E-01
K-40	#	3.0040E+00	1.253E+00	1.258E+00
Ac-228	B<	2.1483E-01		
Pb-212		8.7677E-01	1.519E-01	1.554E-01
CS-137	#	1.2862E-01	6.431E-02	6.450E-02
Th-234		1.2393E+00	6.440E-01	6.446E-01
Pb-214		6.5319E-01	1.605E-01	1.623E-01
Pb-210	#	3.5123E+00	1.662E+00	1.664E+00
AM-241	#	3.8890E+00	3.586E-01	3.864E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0368 D2 Grid B4 - 3 071707

& - 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) 1.3868752E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 07:51:40 Page 1
EnergySolutions Spectrum name: Win00240.An1

Sample description
WI07- 0388 D2 Pre RSA South 071807

Spectrum Filename: C:\User\Win00240.An1

Acquisition information
Start time: 18-Jul-2007 07:41:28
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: 2.3490E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.3490E+02) =
4.2571E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 07:51:40 Page 2
EnergySolutions Spectrum name: Win00240.An1

WI07-0388 D2 Pre RSA South 071807

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: 0.1585

********** 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	2.90	2423.	10039.	16.731	2.43	0.854	-	D
18.21	4.51	10816.	7537.	12.561	4.53	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	186.15	46.72	21.	71.	0.118	36.24	1.334s
AM-241	236.88	59.40	20.	24.	0.041	69.87	0.278s
Th-234	251.66	63.09	32.	34.	0.057	72.36	0.507s
Pb-214	298.54	74.81	38.	58.	0.097	39.64	0.917D
Pb-212	298.56	74.81	61.	0.	0.000	450.78	0.420D
Pb-212	307.74	77.11	34.	80.	0.133	30.48	0.919D
Pb-214	307.74	77.11	76.	0.	0.000	2670.83	0.228D
Pb-214	348.14	87.21	14.	32.	0.054	50.09	0.641s
Th-234	371.14	92.96	22.	38.	0.062	57.50	0.287s
Ac-228	380.72	95.35	23.	0.	0.000	0.00	0.935
Ac-228	839.29	209.97	16.	20.	0.033	88.69	0.517s
Pb-212	953.94	238.62	5.	107.	0.178	20.30	1.057D
Pb-214	967.37	241.98	19.	18.	0.030	81.68	1.060D

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 07:51:40 Page 3
EnergySolutions Spectrum name: Win00240.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.73	269.81	5.	18.	0.031	63.51	0.583s
Pb-214	1179.63	295.03	12.	50.	0.083	43.16	0.452s
Ac-228	1300.94	325.35	4.	25.	0.041	54.84	0.281s
Ac-228	1352.86	338.33	0.	17.	0.028	48.51	0.300s
Pb-214	1406.88	351.83	0.	58.	0.097	26.26	0.552s

Ac-228	1852.12	463.11	3.	2.	0.003	389.87	0.585s
Bi-214	2437.55	609.42	0.	42.	0.070	30.86	1.083
CS-137	2647.00	661.77	0.	9.	0.015	66.67	0.500s
Bi-214	3076.24	769.04	3.	3.	0.004	254.95	0.268s
Ac-228	3180.83	795.17	0.	6.	0.010	81.65	0.625s
Ac-228	3645.67	911.34	0.	12.	0.020	57.74	0.417s
Bi-214	3737.67	934.33	1.	0.	0.001	240.37	0.197s
Ac-228	3857.33	964.23	1.	0.	0.001	240.37	0.197s
Ac-228	3877.69	969.32	6.	0.	0.000	0.00	1.598
Bi-214	4480.50	1119.95	0.	3.	0.005	115.47	0.500s
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	5844.44	1460.76	0.	17.	0.028	48.51	0.625s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7061.00	1764.71	0.	6.	0.010	81.65	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	1.9994E-04	609.31	1.953E-04	?(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	7.300E-05	-	7.300E-05	G
			1238.11	0.000E+00	?	6.779E-05	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	0.000E+00	%	1.943E-04	G
K-40	N	7.4847E-04	1460.81	7.485E-04	?(	4.403E-05	G
Ac-228	N	1.7288E-04	911.07	1.322E-04	?(	1.101E-05	G K
			969.11	0.000E+00		7.767E-05	G
			338.32	1.992E-04	?(	1.172E-05	G
			964.60	0.000E+00	%	1.235E-04	G
			794.70	3.528E-04	?(	5.880E-05	G
			463.00	0.000E+00	%	1.443E-04	G
			209.28	4.232E-04	&	1.904E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.728E-04	+	2.281E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00		1.406E-04	X
		327.64	1.011E-03	&	3.312E-04	G
Pb-212	N 2.6264E-04	238.62	2.452E-04	(	8.708E-06	G K
		77.11	3.057E-04	(	3.360E-05	Energy duplication
		74.81	0.000E+00	%	7.485E-05	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	2.710E-06	G
Th-234	N 5.4209E-04	92.35	4.679E-04	&(	9.017E-05	G
		63.29	6.477E-04	?(	1.622E-04	G

Pb-214	N	2.2117E-04	351.92	2.148E-04	(	3.704E-06		G K
			295.21	3.101E-04	+	7.296E-05		G
			77.11	0.000E+00	%	8.426E-05	Energy duplication	
			241.98	2.527E-04	(	9.180E-05		G
			74.81	6.510E-04	+	1.603E-04	Energy duplication	
			87.30	4.716E-04	+	1.466E-04		X
Pb-210	N	1.4494E-03	46.50	1.449E-03	*(	1.429E-04		G
AM-241		5.0449E-05	59.54	5.045E-05	?(	1.393E-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

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 #	8.5119E-01	2.627E-01	2.646E-01
K-40 #	3.1863E+00	1.546E+00	1.550E+00
Ac-228	7.3596E-01	2.727E-01	2.741E-01
Pb-212	1.1181E+00	2.047E-01	2.090E-01
CS-137 #	1.0383E-01	6.922E-02	6.933E-02
Th-234	2.3077E+00	1.067E+00	1.068E+00
Pb-214	9.4155E-01	2.473E-01	2.498E-01
Pb-210 #	6.1702E+00	2.236E+00	2.241E+00
AM-241 #	2.1477E-01	1.501E-01	1.503E-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) 1.5629669E+01 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 18-JUL-2007 08:05:35 Page 1
EnergySolutions Spectrum name: Win00241.An1

Sample description
WI07- 0389 D2 Pre RSA South 071807

Spectrum Filename: C:\User\Win00241.An1

Acquisition information
Start time: 18-Jul-2007 07:55:24
Live time: 600
Real time: 601
Dead time: 0.23 %
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: 2.4480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4480E+02) = 4.0850E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:05:35 Page 2
EnergySolutions Spectrum name: Win00241.An1

WI07-0389 D2 Pre RSA South 071807

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: 0.1727

********** 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	
14.67	3.85	4476.	22206.	37.010	1.80	2.285	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	185.29	46.50	35.	35.	0.058	79.28	1.743s
AM-241	241.08	60.45	12.	24.	0.041	65.35	0.452s
Th-234	251.50	63.05	15.	32.	0.053	56.15	0.508s
Pb-214	298.54	74.81	25.	27.	0.045	65.40	0.917D
Pb-212	298.56	74.81	30.	0.	0.000	454.36	0.256D
Pb-212	307.74	77.11	19.	50.	0.083	37.98	0.919D
Pb-214	307.74	77.11	52.	0.	0.000	425.24	0.204D
Pb-214	347.09	86.94	15.	7.	0.012	175.81	0.399s
Th-234	368.72	92.35	22.	25.	0.041	67.01	0.933D
Ac-228	380.72	95.35	13.	5.	0.008	248.84	0.935D
Ac-228	836.52	209.28	8.	16.	0.026	89.47	0.407s
Pb-212	953.94	238.62	11.	54.	0.091	31.96	1.057D
Pb-214	967.37	241.98	19.	12.	0.020	116.07	1.060D
Ac-228	1078.54	269.77	4.	8.	0.013	111.80	0.284s

0

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:05:35 Page 3
EnergySolutions Spectrum name: Win00241.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.99	295.37	3.	33.	0.054	42.02	1.252s
Ac-228	1310.60	327.77	0.	10.	0.017	63.25	0.312s
Ac-228	1352.30	338.19	3.	9.	0.016	93.68	0.268s
Pb-214	1406.88	351.83	2.	32.	0.052	40.28	1.118
Ac-228	1852.50	463.20	0.	8.	0.013	70.71	0.312s

Bi-214	2437.40	609.38	0.	30.	0.050	36.51	0.437s
CS-137	2645.83	661.47	0.	9.	0.015	66.67	0.312s
Bi-214	3074.33	768.56	1.	0.	0.001	240.37	0.197s
Ac-228	3179.33	794.80	1.	0.	0.001	240.37	0.197s
Ac-228	3644.87	911.14	0.	17.	0.028	48.51	0.375s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	2.	0.003	200.52	1.595D
Ac-228	3876.86	969.11	1.	7.	0.011	92.64	1.598D
Bi-214	4480.33	1119.91	1.	0.	0.001	240.37	0.197s
Bi-214	4954.00	1238.27	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5847.00	1461.40	0.	11.	0.018	60.30	0.312s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3951E-04	609.31	1.395E-04	?(	4.650E-06	G K
			1764.49	2.491E-04	+	1.521E-04	G
			1120.29	0.000E+00	%	4.867E-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	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	4.8431E-04	1460.81	4.843E-04	?(	4.403E-05	G
Ac-228	N	1.9458E-04	911.07	1.872E-04	?(	1.101E-05	G K
			969.11	1.284E-04	(	4.346E-05	G
			338.32	1.094E-04	-	6.357E-05	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	3.118E-04	?(	3.898E-05	G
			209.28	3.280E-04	(	9.846E-05	G
			270.23	2.499E-04	?(	1.054E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.256E-04	X
		327.64	4.072E-04	+	2.036E-04	G
Pb-212	N 1.2504E-04	238.62	1.250E-04	(	1.179E-05	G K
		77.11	1.896E-04	+	4.693E-05	Energy duplication
		74.81	0.000E+00	%	5.379E-05	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	2.710E-06	G
Th-234	N 4.3214E-04	92.35	3.097E-04	(	8.957E-05	G
		63.29	6.065E-04	(	1.149E-04	G
Pb-214	N 1.2352E-04	351.92	1.167E-04	?(	1.034E-05	G K

```
                        WI07-0389  D2   Pre RSA  South    071807
                              295.21 2.046E-04 +   5.638E-05          G
                               77.11 0.000E+00 %   7.061E-05Energy duplication
                              241.98 1.682E-04  (  9.206E-05          G
                               74.81 2.998E-04 +   1.195E-04Energy duplication
                               87.30 1.064E-04 ?(  8.618E-05          X

Pb-210   N   7.1448E-04      46.50 7.145E-04 *(  1.813E-04          G

AM-241       5.0106E-05      59.54 5.011E-05 &(  1.103E-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  18-JUL-2007 08:05:35 Page    5
EnergySolutions                    Spectrum name: Win00241.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 #     5.6991E-01     2.081E-01    2.092E-01
K-40   #     1.9784E+00     1.193E+00    1.195E+00
Ac-228       7.9486E-01     3.035E-01    3.049E-01
Pb-212       5.1077E-01     1.632E-01    1.644E-01
CS-137 #     9.9628E-02     6.642E-02    6.653E-02
Th-234       1.7653E+00     7.717E-01    7.727E-01
Pb-214       5.0456E-01     2.032E-01    2.041E-01
Pb-210 #     2.9186E+00     2.314E+00    2.315E+00
AM-241 #     2.0468E-01     1.338E-01    1.340E-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) 9.3467054E+00 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fim
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:31:17 Page 1
EnergySolutions Spectrum name: Win00242.An1

Sample description
WI07- 0390 D2 Pre RSA South 071807

Spectrum Filename: C:\User\Win00242.An1

Acquisition information
Start time: 18-Jul-2007 08:21:07
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: 2.6930E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6930E+02) = 3.7133E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:31:17 Page 2
EnergySolutions Spectrum name: Win00242.An1

WI07-0390 D2 Pre RSA South 071807

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: 0.1453

********** 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	2.92	7798.	11844.	19.740	2.80	0.854	-	D
15.66	3.92	16880.	10467.	17.444	4.02	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	186.38	46.77	13.	25.	0.041	62.92	0.370s
AM-241	237.55	59.56	8.	16.	0.027	71.97	0.780
Th-234	252.03	63.18	21.	33.	0.055	65.56	0.333s
Pb-214	298.54	74.81	27.	24.	0.040	73.69	0.918D
Pb-212	298.56	74.81	29.	0.	0.000	573.58	0.282D
Pb-212	307.74	77.11	25.	48.	0.080	41.29	0.920D
Pb-214	307.74	77.11	84.	0.	0.000	250.44	0.000D
Pb-214	349.18	87.47	9.	17.	0.028	73.94	0.444s
Th-234	368.72	92.35	29.	23.	0.039	76.65	0.933D
Ac-228	380.72	95.35	18.	2.	0.003	613.58	0.935D
Ac-228	840.00	210.15	13.	8.	0.013	175.30	0.000s
Pb-212	953.94	238.62	8.	65.	0.108	27.97	1.057D
Pb-214	967.37	241.98	10.	9.	0.015	118.29	1.060D

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:31:17 Page 3
EnergySolutions Spectrum name: Win00242.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.13	2.	0.	0.000	0.00	0.000s
Pb-214	1180.12	295.16	4.	33.	0.055	44.12	0.328s
Ac-228	1309.00	327.37	0.	0.	0.000	0.00	0.000s
Ac-228	1351.72	338.05	0.	19.	0.032	45.88	1.041
Pb-214	1407.68	352.03	3.	40.	0.067	35.10	1.584s

WI07-0390 D2 Pre RSA South 071807

Ac-228	1852.60	463.23	0.	5.	0.008	89.44	0.312s
Bi-214	2436.55	609.17	0.	32.	0.053	35.36	0.927s
CS-137	2648.00	662.02	1.	0.	0.000	0.00	0.000s
Bi-214	3070.83	767.68	1.	1.	0.001	366.67	0.223s
Ac-228	3178.00	794.47	0.	3.	0.005	115.47	0.250s
Ac-228	3645.13	911.20	0.	15.	0.025	51.64	0.812s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	3.	2.	0.003	305.15	1.595D
Ac-228	3876.86	969.11	2.	8.	0.013	87.12	1.598D
Bi-214	4476.00	1118.83	0.	8.	0.013	70.71	0.250s
Bi-214	4953.00	1238.02	0.	2.	0.003	141.42	0.250s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5845.50	1461.02	0.	16.	0.027	50.00	0.812s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.5793E-04	609.31	1.488E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	1.947E-04	&(	2.433E-05	G
			1238.11	1.356E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.335E-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	7.0444E-04	1460.81	7.044E-04	?(	4.403E-05	G
Ac-228	N	1.7365E-04	911.07	1.652E-04	?(	1.101E-05	G K
			969.11	1.489E-04	(	4.725E-05	G
			338.32	2.227E-04	?(	1.172E-05	G
			964.60	0.000E+00	%	2.290E-04	G
			794.70	1.764E-04	?(	5.880E-05	G
			463.00	1.949E-04	?(	3.898E-05	G
			209.28	1.693E-04	&(	1.190E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:31:17 Page 4
EnergySolutions Spectrum name: Win00242.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	8.003E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.318E-04	X
		327.64	0.000E+00	?	4.072E-05	G
Pb-212	N 1.5824E-04	238.62	1.483E-04	(	1.067E-05	G K
		77.11	1.828E-04	(	2.889E-05	Energy duplication
		74.81	0.000E+00	&	5.281E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 4.3106E-04	92.35	2.922E-04	(	1.008E-04	G
		63.29	6.287E-04	?(	1.334E-04	G

Pb-214	N	1.6948E-04	351.92	1.494E-04	*(	1.060E-05		G K
			295.21	2.067E-04	(	2.113E-05		G
			77.11	0.000E+00	%	8.841E-05	Energy	duplication
			241.98	1.257E-04	(	6.885E-05		G
			74.81	2.675E-04	+	1.184E-04	Energy	duplication
			87.30	2.467E-04	(	6.925E-05		X
Pb-210	N	5.0354E-04	46.50	5.035E-04	(	1.161E-04		G
AM-241		3.3976E-05	59.54	3.398E-05	?(	9.071E-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

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

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	#	5.8644E-01	2.073E-01	2.085E-01
K-40	#	2.6158E+00	1.308E+00	1.312E+00
Ac-228		6.4483E-01	2.728E-01	2.739E-01
Pb-212		5.8759E-01	1.465E-01	1.482E-01
CS-137	<	2.0125E-02		
Th-234		1.6007E+00	8.072E-01	8.080E-01
Pb-214		6.2934E-01	2.209E-01	2.222E-01
Pb-210		1.8698E+00	1.177E+00	1.177E+00
AM-241	#	1.2616E-01	9.079E-02	9.091E-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 1999.3 keV) 8.6606665E+00 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Ferin
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Sample description
WI07- 0391 D2 Pre RSA South 071807

Spectrum Filename: C:\User\Win00243.An1

Acquisition information
Start time: 18-Jul-2007 08:33:27
Live time: 600
Real time: 601
Dead time: 0.23 %
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: 1.8920E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 1.8920E+02) = 5.2854E+03
Detection limit method: Traditional ORTEC method

WI07-0391 D2 Pre RSA South 071807

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: 0.2514

********** 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	2.92	7031.	11089.	18.482	2.86	0.854	-	D
15.98	3.99	15273.	9999.	16.665	4.03	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	185.49	46.55	6.	55.	0.092	31.73	0.728s
AM-241	236.33	59.26	15.	7.	0.012	190.69	0.223s
Th-234	251.30	63.00	20.	22.	0.037	94.77	0.880s
Pb-214	298.54	74.81	20.	16.	0.027	91.57	0.917D
Pb-212	298.56	74.81	15.	0.	0.000	291.55	0.225D
Pb-212	307.74	77.11	12.	47.	0.078	35.97	0.919D
Pb-214	307.74	77.11	40.	0.	0.000	566.92	0.266D
Pb-214	339.75	85.11	7.	21.	0.035	63.41	0.319s
Th-234	368.72	92.35	15.	14.	0.023	95.33	0.933D
Ac-228	380.72	95.35	14.	3.	0.005	398.54	0.936D
Ac-228	836.46	209.26	3.	13.	0.022	69.66	0.611s
Pb-212	953.94	238.62	13.	26.	0.043	55.75	1.057D
Pb-214	967.37	241.98	13.	10.	0.017	117.80	1.060D

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:43:38 Page 3
EnergySolutions Spectrum name: Win00243.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.18	269.68	3.	1.	0.002	360.56	0.161s
Pb-214	1176.59	294.27	3.	11.	0.019	81.08	0.242s
Ac-228	1310.00	327.62	0.	1.	0.002	200.00	0.250s
Ac-228	1344.99	336.36	3.	17.	0.028	65.11	0.247s
Pb-214	1406.86	351.83	2.	15.	0.025	62.80	0.698s

WI07-0391 D2 Pre RSA South 071807

Ac-228	1852.67	463.25	1.	0.	0.001	240.37	0.197s
Bi-214	2437.09	609.31	0.	22.	0.037	42.64	0.292s
CS-137	2646.33	661.60	0.	8.	0.013	70.71	0.250s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3643.00	910.67	0.	9.	0.015	66.67	0.500s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	2.	0.003	145.60	1.595D
Ac-228	3876.86	969.11	1.	1.	0.002	211.03	1.598D
Bi-214	4483.00	1120.58	1.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5511.50	1377.57	0.	2.	0.003	141.42	0.500s
K-40	5846.00	1461.15	0.	9.	0.015	66.67	0.500s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.00	1764.96	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	Peak Code	MDA Value microCi	Comments
Bi-214	N	1.0344E-04	609.31	1.023E-04	?(	4.650E-06	G K
			1764.49	1.068E-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	?	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	?	9.716E-05	G
K-40	N	3.9625E-04	1460.81	3.962E-04	?(	4.403E-05	G
Ac-228	N	1.4034E-04	911.07	9.912E-05	?(	1.101E-05	G K
			969.11	0.000E+00	%	4.974E-05	G
			338.32	1.973E-04	&(	3.593E-05	G
			964.60	1.211E-04	(	6.619E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	2.751E-04	?(	6.348E-05	G

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 08:43:38 Page 4
EnergySolutions Spectrum name: Win00243.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	&	1.054E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.224E-04	X
		327.64	0.000E+00	%	8.145E-05	G
Pb-212	N 5.9514E-05	238.62	5.951E-05	(	1.297E-05	G K
		77.11	1.795E-04	+	4.354E-05	Energy duplication
		74.81	0.000E+00	%	3.886E-05	Energy duplication
CS-137	2.1679E-05	661.66	2.168E-05	?(	2.710E-06	G
Th-234	N 2.7501E-04	92.35	1.738E-04	(	7.502E-05	G
		63.29	4.191E-04	*(	1.304E-04	G

```
Pb-214   N   7.9731E-05    351.92 5.494E-05 ?(  9.781E-06          G K
                           295.21 7.100E-05 &(  1.793E-05          G
                            77.11 0.000E+00 %   6.183E-05Energy duplication
                           241.98 1.405E-04  (  7.731E-05          G
                            74.81 1.819E-04  (  7.585E-05Energy duplication
                            87.30 3.047E-04 &   1.161E-04          X

Pb-210   N   1.1296E-03     46.50 1.130E-03  (  7.968E-05          G

AM-241       1.5100E-05     59.54 1.510E-05 ?(  1.223E-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
```



```
   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 #	5.4672E-01	2.331E-01	2.340E-01
K-40 #	2.0943E+00	1.396E+00	1.398E+00
Ac-228	7.4174E-01	3.456E-01	3.467E-01
Pb-212	3.1455E-01	1.754E-01	1.757E-01
CS-137 #	1.1458E-01	8.102E-02	8.114E-02
Th-234	1.4535E+00	9.769E-01	9.775E-01
Pb-214	4.2141E-01	1.907E-01	1.914E-01
Pb-210 #	5.9702E+00	1.894E+00	1.899E+00
AM-241 #C	7.9812E-02	1.522E-01	1.522E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0391 D2 Pre RSA South 071807

& - 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) 1.1736895E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0314 D2 Grid C1 - 1 6 inches 071407

Sample description
WI07 - 0314 Grid C! - 1 @ 6" 071407

Spectrum Filename: C:\User\Win00192.An1

Acquisition information

Start time:	14-Jul-2007 13:58:22
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:	3.4410E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.4410E+02) = 2.9061E+03
Detection limit method:	Traditional ORTEC method

WI07-0314 D2 Grid C1 - 1 6 inches 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: 0.0930

********** 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	
14.67	3.85	4974.	22595.	37.658	1.82	2.177	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	183.83	46.14	99.	72.	0.120	60.09	0.447s
AM-241	237.41	59.53	220.	1026.	1.711	8.75	0.913
Th-234	256.58	64.32	69.	35.	0.058	91.99	0.653s
Pb-214	298.54	74.81	86.	125.	0.209	27.47	0.917D
Pb-212	298.56	74.81	131.	0.	0.000	1624.81	0.434D
Pb-212	307.74	77.11	56.	226.	0.376	16.29	0.919D
Pb-214	307.74	77.11	203.	0.	0.000	470.79	0.330D
Pb-214	348.04	87.18	51.	53.	0.088	53.45	0.650s
Th-234	368.72	92.35	73.	40.	0.066	68.95	0.933D
Ac-228	380.72	95.35	39.	8.	0.013	229.09	0.935D
Ac-228	834.26	208.71	32.	33.	0.055	74.31	0.583s
Pb-212	953.94	238.62	13.	254.	0.423	13.16	1.057D
Pb-214	967.37	241.98	29.	39.	0.064	51.22	1.060D
Ac-228	1079.62	270.04	11.	49.	0.082	40.88	0.524s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 14:08:32 Page 3
EnergySolutions Spectrum name: Win00192.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.14	295.16	3.	58.	0.097	28.85	0.826s
Ac-228	1311.00	327.87	10.	22.	0.037	68.63	0.444s
Ac-228	1352.67	338.28	14.	60.	0.100	34.43	1.208
Pb-214	1407.08	351.88	8.	110.	0.183	22.54	0.797s
Ac-228	1851.86	463.05	3.	24.	0.040	48.98	0.820s

WI07-0314 D2 Grid C1 - 1 6 inches 071407

Bi-214	2438.04	609.54	3.	86.	0.143	23.19	1.282
CS-137	2647.11	661.79	0.	28.	0.047	37.80	0.687s
Bi-214	3069.52	767.36	2.	8.	0.014	97.72	0.352s
Ac-228	3179.50	794.84	0.	6.	0.010	81.65	0.500s
Ac-228	3645.42	911.27	3.	39.	0.065	37.15	0.327s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3859.57	964.79	0.	7.	0.012	75.59	0.437s
Ac-228	3877.76	969.33	7.	0.	0.000	0.00	1.598
Bi-214	4483.16	1120.61	0.	19.	0.032	45.88	0.300s
Bi-214	4956.21	1238.82	0.	14.	0.023	53.45	0.375s
Bi-214	5506.00	1376.19	0.	4.	0.007	100.00	0.250s
K-40	5845.75	1461.08	0.	57.	0.095	26.49	0.583s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7058.60	1764.11	3.	1.	0.001	498.89	0.350s

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	4.1777E-04	609.31	3.992E-04	(	1.426E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	4.623E-04	?(	2.433E-05	G
			1238.11	9.491E-04	+	3.942E-04	G
			768.36	4.429E-04	&(	1.455E-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	?	9.716E-05	G
K-40	N	2.5096E-03	1460.81	2.510E-03	(	4.403E-05	G
Ac-228	N	4.1910E-04	911.07	4.277E-04	(	3.376E-05	G K
			969.11	0.000E+00		8.301E-05	G
			338.32	7.032E-04	+	1.486E-04	G
			964.60	4.321E-04	?(	6.173E-05	G
			794.70	3.528E-04	?(	5.880E-05	G
			463.00	9.420E-04	+	3.066E-04	G
			209.28	6.983E-04	&	2.521E-04	G
			270.23	1.531E-03	+	3.582E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 14:08:32 Page 4
EnergySolutions Spectrum name: Win00192.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.966E-04	X
			327.64	8.959E-04	+	3.468E-04	G
Pb-212	N	5.8366E-04	238.62	5.837E-04	(	1.281E-05	G K
			77.11	8.642E-04	+	9.285E-05	Energy duplication
			74.81	0.000E+00	%	1.081E-04	Energy duplication
CS-137		7.5877E-05	661.66	7.588E-05	(	2.710E-06	G
Th-234	N	5.6273E-04	92.35	4.941E-04	(	1.575E-04	G
			63.29	6.604E-04	&(	2.341E-04	G
Pb-214	N	3.9159E-04	351.92	4.062E-04	(	1.709E-05	G K

WI07-0314 D2 Grid C1 - 1 6 inches 071407

			295.21	3.633E-04	(	1.879E-05	G
			77.11	0.000E+00	%	1.356E-04	Energy duplication
			241.98	5.330E-04	+	1.683E-04	G
			74.81	1.400E-03	+	2.349E-04	Energy duplication
			87.30	7.642E-04	+	2.167E-04	X
Pb-210	N	1.4698E-03	46.50	1.470E-03	*(	2.976E-04	G
AM-241		2.1137E-03	59.54	2.114E-03	(	4.428E-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
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	1.2141E+00	2.815E-01	2.852E-01
K-40	7.2932E+00	1.932E+00	1.951E+00
Ac-228	1.2180E+00	4.525E-01	4.548E-01
Pb-212	1.6962E+00	2.233E-01	2.322E-01
CS-137	2.2051E-01	8.334E-02	8.377E-02
Th-234	1.6354E+00	9.400E-01	9.408E-01
Pb-214	1.1380E+00	2.083E-01	2.126E-01
Pb-210 #	4.2714E+00	2.567E+00	2.569E+00
AM-241	6.1427E+00	5.377E-01	5.838E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

WI07-0314 D2 Grid C1 - 1 6 inches 071407

< - 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) 2.4829390E+01 pCi/g

The library has energies which are not separable.

Analyzed by: S.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0315 D2 Grid C1 - 2 @ 6 inches 071407

Sample description
WI07 - 0314 Grid C! - 2 @ 6" 071407

Spectrum Filename: C:\User\Win00193.An1

Acquisition information
Start time: 14-Jul-2007 14:15:19
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: 3.1790E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1790E+02) = 3.1456E+03
Detection limit method: Traditional ORTEC method

WI07-0315 D2 Grid C1 - 2 @ 6 inches 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: 0.1011

********** 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	6008.	10472.	17.453	2.86	0.854	-	D
16.77	4.17	15156.	9568.	15.947	4.17	0.855	-	D
70.01	17.69	65.	99.	0.165	37.78	0.814	MO-99	s
104.93	26.41	32.	140.	0.233	21.95	0.876	AM-241	
128.35	32.27	77.	234.	0.390	18.93	0.787	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	185.69	46.60	179.	31.	0.052	135.14	0.288s
AM-241	237.65	59.59	582.	8866.	14.778	2.36	0.901
Th-234	252.09	63.20	56.	55.	0.092	58.67	0.642s
Pb-214	298.54	74.81	54.	96.	0.159	29.88	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	405.07	0.797D
Pb-212	307.74	77.11	66.	121.	0.202	26.28	0.919D
Pb-214	307.74	77.11	141.	0.	0.000	239.95	0.544D
Pb-214	347.50	87.05	47.	56.	0.094	51.68	0.613s
Th-234	368.72	92.35	59.	27.	0.045	88.30	0.933D
Ac-228	380.72	95.35	28.	3.	0.005	472.43	0.935D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	835.85	209.11	12.	23.	0.038	66.79	0.270s
Pb-212	953.94	238.62	17.	174.	0.289	16.62	1.057D
Pb-214	967.37	241.98	28.	23.	0.039	75.52	1.060D
Ac-228	1078.50	269.76	18.	18.	0.030	105.41	0.267s
Pb-214	1180.27	295.19	9.	48.	0.079	37.24	0.315s

WI07-0315 D2 Grid C1 - 2 @ 6 inches 071407

Ac-228	1310.88	327.84	7.	25.	0.042	60.13	0.423s
Ac-228	1352.14	338.15	5.	49.	0.082	33.28	0.907
Pb-214	1407.54	352.00	10.	76.	0.126	28.42	0.396s
Ac-228	1848.50	462.21	0.	7.	0.012	75.59	0.375s
Bi-214	2438.00	609.53	0.	57.	0.095	26.49	0.536s
CS-137	2646.33	661.60	0.	22.	0.037	42.64	0.500s
Bi-214	3072.00	767.98	0.	0.	0.001	223.61	0.100s
Ac-228	3177.33	794.30	0.	7.	0.012	75.59	0.250s
Ac-228	3645.59	911.32	0.	37.	0.062	32.88	0.812s
Bi-214	3738.00	934.41	0.	4.	0.007	100.00	0.250s
Ac-228	3858.38	964.49	9.	0.	0.000	0.00	1.595
Ac-228	3876.62	969.05	0.	32.	0.053	35.36	1.562
Bi-214	4480.77	1120.02	0.	15.	0.025	51.64	0.292s
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	5846.15	1461.18	0.	61.	0.102	25.61	1.306s
Ac-228	6355.00	1588.32	0.	2.	0.003	141.42	0.250s
Bi-214	7062.00	1764.96	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0660E-04	609.31	2.651E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	3.650E-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	%	2.164E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.6857E-03	1460.81	2.686E-03	?(	4.403E-05	G
Ac-228	N	4.6214E-04	911.07	4.075E-04	?(	1.101E-05	G K
			969.11	6.214E-04	+	1.654E-04	G
			338.32	5.743E-04	(	4.338E-05	G
			964.60	0.000E+00	%	2.951E-04	G

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EnergySolutions Spectrum name: Win00193.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	4.116E-04	?(	5.880E-05	G
		463.00	2.728E-04	&	1.666E-04	G
		209.28	4.867E-04	?(	1.148E-04	G
		270.23	5.624E-04	?(	2.037E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	1.018E-03	+	3.468E-04	G
Pb-212	N 4.1755E-04	238.62	3.991E-04	(	1.473E-05	G K
		77.11	4.633E-04	(	4.593E-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

WI07-0315 D2 Grid C1 - 2 @ 6 inches 071407

Th-234	N	6.3204E-04	92.35	3.400E-04	(	1.416E-04	G
			63.29	1.048E-03	*(	2.114E-04	G
Pb-214	N	2.9059E-04	351.92	2.796E-04	(	1.810E-05	G K
			295.21	2.986E-04	(	3.038E-05	G
			77.11	0.000E+00	%	1.135E-04	Energy duplication
			241.98	3.245E-04	(	1.097E-04	G
			74.81	1.068E-03	+	1.990E-04	Energy duplication
			87.30	8.175E-04	+	2.157E-04	X
Pb-210	N	6.3963E-04	46.50	6.396E-04	?(	3.962E-04	G
AM-241		1.8257E-02	59.54	1.826E-02	(	7.132E-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

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

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EnergySolutions Spectrum name: Win00193.An1

P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

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	9.6447E-01	2.555E-01	2.580E-01
K-40 #	8.4482E+00	2.163E+00	2.186E+00
Ac-228	1.4537E+00	4.455E-01	4.488E-01
Pb-212	1.3135E+00	2.042E-01	2.101E-01
CS-137 #	1.8754E-01	7.997E-02	8.029E-02
Th-234	1.9882E+00	1.054E+00	1.055E+00
Pb-214	9.1409E-01	2.598E-01	2.620E-01
Pb-210 #	2.0121E+00	2.719E+00	2.719E+00
AM-241	5.7431E+01	1.353E+00	2.520E+00

WI07-0315 D2 Grid C1 - 2 @ 6 inches 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) 7.4712845E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0316 D2 Grid C1 - 3 @ 6 inches 071407

Sample description
WI07 - 0315 Grid C! - 3 @ 6" 071407

Spectrum Filename: C:\User\Win00194.An1

Acquisition information
Start time: 14-Jul-2007 14:28:49
Live time: 600
Real time: 603
Dead time: 0.52 %
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: 3.0180E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0180E+02) = 3.3135E+03
Detection limit method: Traditional ORTEC method

WI07-0316 D2 Grid C1 - 3 @ 6 inches 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: 0.0912

********** 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	5382.	23511.	39.185	1.81	2.300	CU-64	s
69.97	17.68	792.	240.	0.399	45.84	0.613	MO-99	s
84.23	21.24	529.	140.	0.234	60.71	0.822	TC-99M	
105.06	26.45	312.	232.	0.387	28.75	0.586	AM-241	s
127.63	32.09	411.	195.	0.326	42.23	0.832	XE-138	s
197.90	49.59	1680.	407.	0.678	30.16	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	754.	57.	0.096	137.81	0.893D
AM-241	237.55	59.56	1897.	19334.	32.224	1.72	0.891
Th-234	252.46	63.29	88.	18.	0.029	176.59	0.354s
Pb-214	298.54	74.81	103.	77.	0.128	43.86	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	982.06	0.670D
Pb-212	307.74	77.11	106.	130.	0.217	28.40	0.919D
Pb-214	307.74	77.11	228.	0.	0.000	129.46	0.422D
Pb-214	347.98	87.17	66.	43.	0.072	70.54	0.989
Th-234	368.72	92.35	69.	32.	0.054	81.04	0.933D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	57.	13.	0.022	171.58	0.936D
Ac-228	837.26	209.46	12.	48.	0.080	43.30	0.782s
Pb-212	953.94	238.62	15.	182.	0.304	16.00	1.057D
Pb-214	967.37	241.98	29.	43.	0.071	46.98	1.060D
Ac-228	1081.26	270.45	14.	25.	0.041	71.65	0.338s

WI07-0316 D2 Grid C1 - 3 @ 6 inches 071407

Pb-214	1180.23	295.18	3.	70.	0.117	25.66	1.018s
Ac-228	1301.00	325.37	7.	20.	0.034	69.01	0.305s
Ac-228	1351.84	338.07	3.	43.	0.072	34.49	0.993s
Pb-214	1407.91	352.09	8.	110.	0.183	22.27	0.893
Ac-228	1838.33	459.66	0.	23.	0.038	41.70	0.375s
Bi-214	2437.93	609.52	0.	65.	0.108	24.81	0.407s
CS-137	2647.24	661.82	0.	18.	0.030	47.14	0.750s
Bi-214	3073.62	768.38	3.	1.	0.002	360.56	0.375s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.75	911.36	0.	36.	0.060	33.33	0.536s
Bi-214	3734.00	933.41	0.	8.	0.013	70.71	0.250s
Ac-228	3858.81	964.60	6.	15.	0.025	70.50	1.595D
Ac-228	3876.86	969.11	12.	4.	0.007	252.98	1.598D
Bi-214	4480.29	1119.90	0.	11.	0.018	60.30	0.562s
Bi-214	4952.00	1237.77	2.	0.	0.001	368.18	0.000s
Bi-214	5513.00	1377.94	0.	5.	0.008	89.44	0.250s
K-40	5845.70	1461.07	0.	50.	0.083	28.28	0.625s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	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	2.9376E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	0.000E+00	%	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	?(	4.403E-05	G
Ac-228	N	4.2780E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	1.225E-04	G
			338.32	5.039E-04	*(	3.516E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	9.224E-04	+	4.353E-04	G
		794.70	0.000E+00	?	5.880E-05	G
		463.00	8.965E-04	&	2.846E-04	G
		209.28	1.016E-03	+	2.426E-04	G
		270.23	7.759E-04	+	2.920E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.529E-04	-	2.377E-04	X
		327.64	8.280E-04	&	3.203E-04	G
Pb-212	N 4.4159E-04	238.62	4.187E-04	(	1.384E-05	G K
		77.11	4.984E-04	(	5.764E-05	Energy duplication
		74.81	0.000E+00	%	9.805E-05	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G

WI07-0316 D2 Grid C1 - 3 @ 6 inches 071407

Th-234	N	3.7327E-04	92.35	4.013E-04	(	1.528E-04	G
			63.29	3.334E-04	$(	2.632E-04	G
Pb-214	N	4.1835E-04	351.92	4.074E-04	(	1.678E-05	G K
			295.21	4.395E-04	(	1.837E-05	G
			77.11	0.000E+00	?	1.436E-04	Energy duplication
			241.98	5.920E-04	+	1.730E-04	G
			74.81	8.544E-04	+	2.169E-04	Energy duplication
			87.30	6.240E-04	+	2.216E-04	X
Pb-210	N	1.1720E-03	46.50	1.172E-03	(	8.029E-04	G
AM-241		3.9812E-02	59.54	3.981E-02	(	1.279E-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 14-JUL-2007 14:39:02 Page 5
EnergySolutions Spectrum name: Win00194.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		9.7338E-01	2.415E-01	2.442E-01
K-40	#	7.2942E+00	2.063E+00	2.081E+00
Ac-228		1.4175E+00	3.400E-01	3.441E-01
Pb-212		1.4632E+00	2.341E-01	2.405E-01
CS-137	#	1.6162E-01	7.619E-02	7.644E-02
Th-234		1.2368E+00	1.002E+00	1.003E+00
Pb-214		1.3862E+00	2.355E-01	2.411E-01
Pb-210	C	3.8835E+00	5.352E+00	5.353E+00

WI07-0316 D2 Grid C1 - 3 @ 6 inches 071407

AM-241	1.3192E+02	2.265E+00	5.383E+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) 1.4973178E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0317 D2 Grid D1 - 1 @ 6 inches 071407

Sample description
WI07 - 0317 Grid D1 - 1 @ 6" 071407

Spectrum Filename: C:\User\Win00195.An1

Acquisition information
Start time: 14-Jul-2007 14:55:42
Live time: 600
Real time: 607
Dead time: 1.22 %
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: 3.1780E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1780E+02) = 3.1466E+03
Detection limit method: Traditional ORTEC method

WI07-0317 D2 Grid D1 - 1 @ 6 inches 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: 0.1774

********** 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	4395.	16872.	28.120	2.20	2.302	CU-64	s
55.15	13.97	275.	124.	0.207	48.47	0.700	PU-239	
69.94	17.67	360.	1384.	2.307	7.60	0.916	MO-99	s
84.70	21.36	279.	1082.	1.804	8.75	1.198	TC-99M	s
104.92	26.41	215.	1480.	2.466	6.49	0.802	AM-241	
128.04	32.19	750.	3362.	5.603	4.84	0.963	XE-138	s
145.58	36.57	680.	1006.	1.677	11.95	0.892	CE-144	s
197.39	49.53	7504.	2308.	3.847	14.32	1.152	EU-155	s
410.97	102.91	45.	68.	0.113	45.93	0.789	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	185.97	46.67	3646.	0.	0.000	0.00	0.893
AM-241	237.58	59.57	8202.	98952.	164.921	0.74	0.892
Th-234	253.57	63.57	40.	39.	0.066	66.60	0.317s
Pb-214	298.54	74.81	52.	60.	0.101	42.42	0.917D
Pb-212	298.56	74.81	65.	0.	0.000	464.76	0.453D
Pb-212	307.74	77.11	47.	124.	0.207	23.76	0.919D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	307.74	77.11	170.	0.	0.000	115.75	0.751D
Pb-214	347.52	87.05	33.	32.	0.053	69.35	1.338s
Th-234	368.72	92.35	41.	35.	0.059	60.90	0.933D
Ac-228	380.72	95.35	24.	3.	0.005	484.74	0.935D
Ac-228	842.59	210.79	21.	19.	0.032	106.83	0.263s

WI07-0317 D2 Grid D1 - 1 @ 6 inches 071407

Pb-212	953.94	238.62	10.	169.	0.282	16.22	1.057D
Pb-214	967.37	241.98	27.	17.	0.028	100.46	1.060D
Ac-228	1080.29	270.20	13.	11.	0.018	131.32	0.549s
Pb-214	1178.78	294.82	6.	35.	0.059	42.76	0.309s
Ac-228	1311.56	328.01	6.	12.	0.021	84.79	1.700s
Ac-228	1351.69	338.04	11.	25.	0.042	63.38	0.439s
Pb-214	1407.49	351.98	7.	69.	0.115	29.06	0.754s
Ac-228	1856.00	464.08	5.	3.	0.005	269.43	1.968s
Bi-214	2437.00	609.28	0.	54.	0.090	27.22	0.573s
CS-137	2648.00	662.02	0.	10.	0.017	63.25	0.292s
Bi-214	3069.00	767.23	0.	6.	0.010	81.65	0.250s
Ac-228	3182.00	795.47	0.	9.	0.015	66.67	0.500s
Ac-228	3646.25	911.48	0.	32.	0.053	35.36	0.521s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	4.	8.	0.014	93.80	1.595D
Ac-228	3876.86	969.11	5.	20.	0.033	55.45	1.598D
Bi-214	4481.00	1120.08	6.	2.	0.004	384.36	0.000s
Bi-214	4952.00	1237.77	0.	4.	0.007	100.00	0.250s
Bi-214	5513.25	1378.01	0.	4.	0.007	100.00	0.375s
K-40	5846.42	1461.25	0.	66.	0.110	24.62	2.199
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7056.00	1763.46	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.5862E-04	609.31	2.511E-04	(	4.650E-06	G K
			1764.49	7.117E-05	&	9.115E-05	G
			1120.29	0.000E+00	%	1.161E-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	4.328E-04	+	3.649E-04	G
			934.06	0.000E+00	%	1.943E-04	G

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	2.9058E-03	1460.81	2.906E-03	(	4.403E-05	G
Ac-228	N	3.8207E-04	911.07	3.524E-04	(	1.101E-05	G K
			969.11	3.848E-04	(	7.299E-05	G
			338.32	2.969E-04	(	6.031E-05	G
			964.60	5.196E-04	(	1.990E-04	G
			794.70	5.292E-04	&(	5.880E-05	G
			463.00	0.000E+00	&	1.766E-04	G
			209.28	4.020E-04	&(	1.481E-04	G
			270.23	3.437E-04	?(	1.757E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.515E-04	X
			327.64	5.090E-04	(	1.570E-04	G
Pb-212	N	3.8919E-04	238.62	3.892E-04	(	1.131E-05	G K
			77.11	4.756E-04	+	7.274E-05	Energy duplication

```
                WI07-0317  D2  Grid  D1 - 1   @ 6 inches   071407
                           74.81 0.000E+00 %   7.716E-05Energy duplication

CS-137        2.7099E-05   661.66 2.710E-05 ?(  2.710E-06          G

Th-234    N   5.6901E-04    92.35 4.424E-04  (  1.188E-04          G
                            63.29 7.493E-04  (  1.795E-04          G

Pb-214    N   2.4254E-04   351.92 2.556E-04 @(  1.583E-05          G K
                           295.21 2.213E-04  (  2.445E-05          G
                            77.11 0.000E+00 ?   1.245E-04Energy duplication
                           241.98 2.323E-04  (  1.091E-04          G
                            74.81 6.732E-04 +   1.727E-04Energy duplication
                            87.30 4.595E-04 +   1.729E-04          X

Pb-210    N   0.0000E+00    46.50 0.000E+00     1.753E-03          G

AM-241        2.0376E-01    59.54 2.038E-01  (  2.648E-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 *****

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	8.1378E-01	2.215E-01	2.236E-01
K-40	9.1436E+00	2.251E+00	2.277E+00
Ac-228	1.2022E+00	3.601E-01	3.629E-01
Pb-212	1.2246E+00	1.986E-01	2.039E-01
CS-137 #	8.5270E-02	5.393E-02	5.403E-02

WI07-0317 D2 Grid D1 - 1 @ 6 inches 071407

Th-234		1.7905E+00	8.079E-01	8.090E-01
Pb-214		7.6319E-01	2.218E-01	2.236E-01
Pb-210	<	5.5175E+00		
AM-241		6.4115E+02	4.728E+00	2.420E+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) 6.5617017E+02 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Funn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0318 D2 Grid D1 - 2 @ 6 inches 071407

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 15:18:59 Page 1
EnergySolutions Spectrum name: Win00196.An1

Sample description
WI07 - 0318 Grid D1 - 2 @ 6" 071407

Spectrum Filename: C:\User\Win00196.An1

Acquisition information
Start time: 14-Jul-2007 15:08:48
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: 3.5940E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5940E+02) = 2.7824E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 15:18:59 Page 2
EnergySolutions Spectrum name: Win00196.An1

WI07-0318 D2 Grid D1 - 2 @ 6 inches 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: 0.1280

********** 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	
14.82	3.89	4914.	25680.	42.800	1.66	2.345	CU-64	s
104.89	26.40	40.	110.	0.183	28.75	0.578	AM-241	s
127.94	32.17	104.	260.	0.434	20.25	0.945	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	181.22	45.49	184.	11.	0.018	381.53	0.366s
AM-241	237.54	59.56	744.	8293.	13.821	2.57	0.900
Th-234	253.30	63.50	37.	25.	0.042	89.74	1.041s
Pb-214	298.54	74.81	58.	59.	0.098	44.91	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	1208.30	0.252D
Pb-212	307.74	77.11	71.	123.	0.205	26.45	0.919D
Pb-214	307.74	77.11	196.	0.	0.000	113.39	0.216D
Pb-214	347.93	87.15	37.	54.	0.091	46.30	0.819
Th-234	368.72	92.35	50.	45.	0.076	52.92	0.933D
Ac-228	380.72	95.35	26.	4.	0.006	399.23	0.935D
Ac-228	835.05	208.91	17.	29.	0.048	63.77	0.357s
Pb-212	953.94	238.62	17.	155.	0.259	17.70	1.057D

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 15:18:59 Page 3
EnergySolutions Spectrum name: Win00196.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	32.	35.	0.059	56.09	1.060D
Ac-228	1078.53	269.76	4.	17.	0.028	63.35	0.283s
Pb-214	1180.28	295.20	13.	71.	0.118	33.37	0.936s
Ac-228	1311.54	328.00	7.	30.	0.050	52.28	0.889s
Ac-228	1353.08	338.39	5.	44.	0.074	34.91	1.029

WI07-0318 D2 Grid D1 - 2 @ 6 inches 071407

Pb-214	1408.23	352.17	12.	71.	0.118	30.73	1.097
Ac-228	1850.26	462.65	3.	21.	0.035	53.47	0.739s
Bi-214	2437.07	609.30	0.	67.	0.112	24.43	1.000s
CS-137	2646.00	661.52	0.	13.	0.022	55.47	0.312s
Bi-214	3072.00	767.98	1.	1.	0.002	316.23	0.100s
Ac-228	3178.00	794.47	0.	12.	0.020	57.74	0.500s
Ac-228	3646.22	911.47	0.	59.	0.098	26.04	0.790s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	2.	0.003	338.58	1.595D
Ac-228	3876.86	969.11	2.	24.	0.040	43.73	1.598D
Bi-214	4482.00	1120.33	5.	5.	0.008	177.28	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	4.	0.007	100.00	0.750s
K-40	5845.11	1460.92	0.	83.	0.138	21.95	1.916
Ac-228	6348.00	1586.57	0.	4.	0.007	100.00	0.250s
Bi-214	7058.00	1763.96	4.	0.	0.001	685.57	0.227s

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	3.1158E-04	609.31	3.116E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	1.136E-04	-	1.217E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	1.335E-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
K-40	N	3.6543E-03	1460.81	3.654E-03	?(	4.403E-05	G
Ac-228	N	6.2771E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	4.629E-04	-	1.487E-04	G
			338.32	5.196E-04	(	4.214E-05	G
			964.60	0.000E+00	%	2.285E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	8.250E-04	?(	1.143E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 15:18:59 Page 4
EnergySolutions Spectrum name: Win00196.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	6.066E-04	(	1.356E-04	G
		270.23	5.311E-04	(	1.054E-04	G
		1588.00	5.810E-04	&(	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	1.222E-03	+	3.713E-04	G
Pb-212	N 3.5729E-04	238.62	3.573E-04	(	1.457E-05	G K
		77.11	4.709E-04	+	7.730E-05	Energy duplication
		74.81	0.000E+00	%	8.103E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 5.3215E-04	92.35	5.669E-04	(	1.306E-04	G
		63.29	4.826E-04	(	1.729E-04	G

```
Pb-214   N   2.6296E-04    351.92 2.630E-04  (  2.009E-05        G K
                           295.21 4.448E-04 +   8.439E-05        G
                            77.11 0.000E+00 ?   1.333E-04Energy duplication
                           241.98 4.896E-04 +   1.671E-04        G
                            74.81 6.550E-04 +   1.758E-04Energy duplication
                            87.30 7.884E-04 +   2.032E-04        X

Pb-210   N   0.0000E+00     46.50 0.000E+00 &   4.135E-04        G

AM-241       1.7076E-02     59.54 1.708E-02  (  8.048E-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 14-JUL-2007 15:18:59 Page 5
EnergySolutions Spectrum name: Win00196.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	8.6694E-01	2.118E-01	2.143E-01
K-40 #	1.0168E+01	2.232E+00	2.264E+00
Ac-228	1.7466E+00	4.036E-01	4.089E-01
Pb-212	9.9414E-01	1.760E-01	1.799E-01
CS-137 #	9.8021E-02	5.437E-02	5.450E-02
Th-234	1.4807E+00	7.713E-01	7.721E-01
Pb-214	7.3167E-01	2.248E-01	2.265E-01
Pb-210 <	1.1505E+00		
AM-241	4.7513E+01	1.223E+00	2.142E+00

- All peaks for activity calculation had bad shape.

WI07-0318 D2 Grid D1 - 2 @ 6 inches 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) 6.3598545E+01 pCi/g

The library has energies which, are not separable.

Analyzed by: LC Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0319 D2 Grid D1 - 3 @ 6 inches 071407

Sample description
WI07 - 0319 Grid D1 - 3 @ 6" 071407

Spectrum Filename: C:\User\Win00197.An1

Acquisition information
Start time: 14-Jul-2007 15:29:44
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: 3.8960E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8960E+02) = 2.5667E+03
Detection limit method: Traditional ORTEC method

WI07-0319 D2 Grid D1 - 3 @ 6 inches 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: 0.0926

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.58	3.83	5223.	21592.	35.987	1.91	2.150	CU-64	s
105.50	26.56	183.	186.	0.310	32.58	0.806	AM-241	
128.02	32.19	243.	806.	1.344	10.22	1.108	XE-138	s
145.43	36.54	255.	276.	0.460	26.09	0.709	CE-144	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	181.58	45.57	626.	26.	0.043	312.67	0.863
AM-241	237.46	59.54	2760.	25008.	41.680	1.54	0.901
Th-234	252.68	63.35	58.	28.	0.047	101.52	0.400s
Pb-214	298.54	74.81	72.	66.	0.110	43.69	0.917D
Pb-212	298.56	74.81	73.	0.	0.000	353.41	0.262D
Pb-212	307.74	77.11	47.	116.	0.193	24.96	0.919D
Pb-214	307.74	77.11	114.	0.	0.000	864.83	0.227D
Pb-214	348.91	87.40	46.	44.	0.072	62.97	0.857s
Th-234	368.72	92.35	59.	35.	0.058	71.48	0.933D
Ac-228	380.72	95.35	29.	4.	0.006	431.44	0.935D
Ac-228	837.44	209.51	11.	45.	0.074	42.03	0.316s

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 15:39:57 Page 3
EnergySolutions Spectrum name: Win00197.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	17.	155.	0.258	17.74	1.057D
Pb-214	967.37	241.98	18.	26.	0.044	59.28	1.060D
Ac-228	1082.42	270.74	10.	21.	0.035	71.27	0.279s
Pb-214	1180.76	295.31	6.	58.	0.096	31.80	0.847
Ac-228	1308.76	327.31	8.	20.	0.033	70.24	0.458s

WI07-0319 D2 Grid D1 - 3 @ 6 inches 071407

Ac-228	1352.66	338.28	8.	60.	0.101	32.71	0.958
Pb-214	1407.39	351.96	12.	68.	0.114	32.52	0.931
Ac-228	1852.00	463.08	4.	2.	0.002	401.85	0.000s
Bi-214	2437.59	609.43	4.	58.	0.096	30.81	0.498s
CS-137	2648.45	662.13	2.	11.	0.019	70.10	0.988s
Bi-214	3074.67	768.64	1.	0.	0.001	240.37	0.197s
Ac-228	3180.75	795.15	0.	12.	0.020	57.74	0.375s
Ac-228	3645.73	911.35	0.	47.	0.078	29.17	1.250
Bi-214	3737.33	934.24	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	1.	1.	0.001	429.92	1.595D
Ac-228	3876.86	969.11	0.	23.	0.038	42.02	1.598D
Bi-214	4482.33	1120.41	0.	10.	0.017	63.25	0.250s
Bi-214	4950.00	1237.27	0.	10.	0.017	63.25	0.250s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5845.59	1461.04	0.	95.	0.158	20.52	1.936
Ac-228	6349.00	1586.82	0.	2.	0.003	141.42	0.250s
Bi-214	7060.00	1764.46	0.	6.	0.010	81.65	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.5076E-04	609.31	2.690E-04	?(	1.595E-05	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	6.779E-04	+	3.390E-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	5.830E-04	+	3.887E-04	G
K-40	N	4.1826E-03	1460.81	4.183E-03	(	4.403E-05	G
Ac-228	N	5.0105E-04	911.07	5.176E-04	?(	1.101E-05	G K
			969.11	4.398E-04	(	1.942E-05	G
			338.32	7.071E-04	+	1.427E-04	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	7.056E-04	+	3.189E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	0.000E+00	%	1.443E-04	G
		209.28	9.451E-04	+	2.348E-04	G
		270.23	6.561E-04	?(	1.562E-04	G
		1588.00	2.905E-04	&	3.720E-04	G
		95.35	0.000E+00	%	1.664E-04	X
		327.64	8.145E-04	+	3.258E-04	G
Pb-212	N 3.5565E-04	238.62	3.556E-04	(	1.455E-05	G K
		77.11	4.444E-04	+	7.106E-05	Energy duplication
		74.81	0.000E+00	%	8.157E-05	Energy duplication
CS-137	3.0712E-05	661.66	3.071E-05	?(	6.485E-06	G
Th-234	N 4.7402E-04	92.35	4.323E-04	(	1.423E-04	G

```
                    WI07-0319  D2  Grid  D1 - 3   @ 6 inches   071407
                               63.29 5.334E-04 ?(  2.149E-04         G

Pb-214   N   2.9918E-04       351.92 2.537E-04  (  1.971E-05         G K
                              295.21 3.612E-04  (  2.565E-05         G
                               77.11 0.000E+00 %   1.026E-04Energy duplication
                              241.98 3.659E-04  (  8.909E-05         G
                               74.81 7.398E-04 +   1.911E-04Energy duplication
                               87.30 6.312E-04 +   2.010E-04         X

Pb-210   N   0.0000E+00        46.50 0.000E+00 &   7.469E-04         G

AM-241       5.1495E-02        59.54 5.149E-02  (  1.540E-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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 15:39:57 Page    5
EnergySolutions                    Spectrum name: Win00197.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 #     6.4363E-01    1.983E-01    1.998E-01
K-40         1.0736E+01    2.203E+00    2.239E+00
Ac-228       1.2861E+00    3.752E-01    3.783E-01
Pb-212       9.1285E-01    1.620E-01    1.656E-01
CS-137 #     7.8830E-02    5.526E-02    5.534E-02
Th-234       1.2167E+00    7.553E-01    7.558E-01
Pb-214       7.6790E-01    1.913E-01    1.934E-01
Pb-210  <    1.9170E+00
AM-241       1.3217E+02    2.032E+00    5.298E+00
```

WI07-0319 D2 Grid D1 - 3 @ 6 inches 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) 1.4781551E+02 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0320 D2 Grid D1 - 4 @ 6 inches 071407

Sample description
WI07 - 0320 Grid D1 - 4 @ 6" 071407

Spectrum Filename: C:\User\Win00198.An1

Acquisition information
Start time: 14-Jul-2007 15:54:41
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: 3.5650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5650E+02) = 2.8050E+03
Detection limit method: Traditional ORTEC method

WI07-0320 D2 Grid D1 - 4 @ 6 inches 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: 0.1210

********** 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	2.91	3995.	12061.	20.101	2.35	0.854	-	D
16.54	4.12	15202.	10832.	18.053	3.75	0.855	-	D
84.24	21.24	88.	112.	0.187	37.78	0.822	TC-99M	s
105.25	26.49	51.	216.	0.359	18.24	0.923	AM-241	
128.25	32.24	94.	276.	0.459	19.22	0.858	XE-138	s
197.48	49.55	1625.	415.	0.692	35.94	1.151	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	185.40	46.53	803.	0.	0.000	0.00	0.893
AM-241	237.52	59.56	1802.	17239.	28.732	1.83	0.897
Th-234	252.17	63.22	48.	28.	0.047	86.90	0.802
Pb-214	298.54	74.81	73.	90.	0.151	33.95	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	310.32	0.601D
Pb-212	307.74	77.11	66.	150.	0.250	22.44	0.919D
Pb-214	307.74	77.11	250.	0.	0.000	101.39	0.000D
Pb-214	348.19	87.22	45.	64.	0.107	48.81	0.782s
Th-234	368.72	92.35	51.	44.	0.073	54.89	0.933D

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EnergySolutions Spectrum name: Win00198.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	40.	4.	0.006	514.76	0.936D
Ac-228	836.32	209.23	23.	32.	0.053	72.78	0.600s
Pb-212	953.94	238.62	28.	178.	0.297	17.12	1.057D
Pb-214	967.37	241.98	22.	39.	0.065	46.70	1.060D
Ac-228	1079.97	270.12	18.	4.	0.006	395.43	0.284s

WI07-0320 D2 Grid D1 - 4 @ 6 inches 071407

Pb-214	1178.63	294.78	6.	57.	0.095	31.58	1.069
Ac-228	1310.00	327.62	3.	0.	0.000	0.00	0.000s
Ac-228	1351.63	338.02	15.	63.	0.104	37.33	0.882s
Pb-214	1407.47	351.98	3.	75.	0.126	24.49	1.104s
Ac-228	1840.54	460.21	3.	24.	0.040	50.00	0.225s
Bi-214	2437.84	609.49	0.	71.	0.118	23.74	0.583s
Cs-137	2645.10	661.29	0.	21.	0.035	43.64	0.333s
Bi-214	3075.20	768.78	0.	12.	0.020	57.74	0.292s
Ac-228	3178.91	794.69	0.	11.	0.018	60.30	0.500s
Ac-228	3644.78	911.11	0.	32.	0.053	35.36	1.249
Bi-214	3737.75	934.35	0.	4.	0.007	100.00	0.375s
Ac-228	3858.67	964.56	0.	9.	0.015	66.67	0.500s
Ac-228	3876.86	969.11	19.	0.	0.000	0.00	1.598
Bi-214	4479.50	1119.70	0.	14.	0.023	53.45	0.375s
Bi-214	4954.00	1238.27	0.	7.	0.012	75.59	0.333s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5846.14	1461.18	0.	66.	0.110	24.62	1.395s
Ac-228	6355.00	1588.32	0.	7.	0.012	75.59	0.375s
Bi-214	7059.50	1764.33	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.3553E-04	609.31	3.302E-04	(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	4.746E-04	+	2.898E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.9058E-03	1460.81	2.906E-03	(	4.403E-05	G
Ac-228	N	3.5241E-04	911.07	3.524E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.296E-04	G
			338.32	7.344E-04	+	1.524E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	5.556E-04	+	2.946E-04	G
		794.70	6.468E-04	+	3.067E-04	G
		463.00	9.355E-04	&	3.066E-04	G
		209.28	6.701E-04	+	2.328E-04	G
		270.23	0.000E+00	%	2.234E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	1.906E-04	X
		327.64	0.000E+00	?	1.222E-04	G
Pb-212	N 4.1018E-04	238.62	4.102E-04	(	1.824E-05	G K
		77.11	5.731E-04	+	8.151E-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	5.4275E-04	92.35	5.493E-04	(	1.324E-04	G
			63.29	5.334E-04	?(	1.964E-04	G
Pb-214	N	3.0558E-04	351.92	2.790E-04	*(	1.060E-05	G K
			295.21	3.571E-04	(	2.506E-05	G
			77.11	0.000E+00	?	1.501E-04	Energy duplication
			241.98	5.394E-04	+	1.598E-04	G
			74.81	1.009E-03	+	2.072E-04	Energy duplication
			87.30	9.287E-04	+	2.216E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00		8.283E-04	G
AM-241		3.5498E-02	59.54	3.550E-02	(	1.246E-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 14-JUL-2007 16:04:52 Page 5
EnergySolutions Spectrum name: Win00198.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	9.4119E-01	2.234E-01	2.262E-01
K-40	8.1510E+00	2.007E+00	2.030E+00
Ac-228	9.8854E-01	3.495E-01	3.515E-01
Pb-212	1.1506E+00	1.970E-01	2.017E-01
CS-137 #	1.5963E-01	6.967E-02	6.993E-02
Th-234	1.5224E+00	7.824E-01	7.832E-01
Pb-214	8.5718E-01	1.713E-01	1.743E-01
Pb-210 <	2.3233E+00		

WI07-0320 D2 Grid D1 - 4 @ 6 inches 071407

AM-241	9.9573E+01	1.817E+00	4.110E+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) 1.1334368E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0321 D2 Grid D1 - 5 @ 6 inches 071407

Sample description
WI07 - 0321 Grid D1 - 5 @ 6" 071407

Spectrum Filename: C:\User\Win00199.An1

Acquisition information
Start time: 14-Jul-2007 16:24:10
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: 3.4700E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4700E+02) = 2.8818E+03
Detection limit method: Traditional ORTEC method

WI07-0321 D2 Grid D1 - 5 @ 6 inches 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: 0.1576

********** 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	2.91	5369.	13304.	22.173	2.33	0.854	-	D
17.97	4.46	16221.	9601.	16.002	4.27	0.855	-	D
104.71	26.36	40.	167.	0.279	20.69	0.519	AM-241	s
127.79	32.13	87.	483.	0.805	11.94	1.085	XE-138	s
145.27	36.50	86.	180.	0.299	25.79	0.967	CE-144	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	184.64	46.34	265.	30.	0.049	171.72	0.456s
AM-241	237.54	59.56	1169.	12500.	20.833	2.13	0.913
Th-234	254.21	63.73	33.	37.	0.062	64.78	0.296s
Pb-214	298.54	74.81	43.	55.	0.091	43.55	0.917D
Pb-212	298.56	74.81	76.	0.	0.000	2564.93	0.332D
Pb-212	307.74	77.11	38.	92.	0.153	28.24	0.919D
Pb-214	307.74	77.11	89.	0.	0.000	541.11	0.203D
Pb-214	350.00	87.67	30.	3.	0.005	529.15	0.000s
Th-234	368.72	92.35	49.	28.	0.046	81.29	0.933D
Ac-228	380.72	95.35	35.	2.	0.003	1059.09	0.935D

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EnergySolutions Spectrum name: Win00199.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	836.69	209.32	0.	36.	0.060	33.33	0.312s
Pb-212	953.94	238.62	12.	101.	0.168	22.11	1.057D
Pb-214	967.37	241.98	30.	11.	0.018	158.39	1.060D
Ac-228	1079.00	269.88	7.	28.	0.047	55.10	0.673s
Pb-214	1180.09	295.15	12.	37.	0.062	49.84	0.348s

WI07-0321 D2 Grid D1 - 5 @ 6 inches 071407

Ac-228	1308.38	327.21	5.	0.	0.001	646.36	0.192s
Ac-228	1352.96	338.36	4.	39.	0.066	38.20	0.613s
Pb-214	1407.44	351.97	0.	52.	0.087	27.74	0.890
Ac-228	1851.18	462.88	0.	13.	0.022	55.47	0.312s
Bi-214	2437.35	609.37	0.	48.	0.080	28.87	0.760s
CS-137	2646.20	661.57	2.	7.	0.012	98.12	0.477s
Bi-214	3073.00	768.23	0.	4.	0.007	100.00	0.375s
Ac-228	3168.50	792.09	0.	7.	0.012	75.59	0.500s
Ac-228	3646.31	911.50	0.	26.	0.043	39.22	1.000s
Bi-214	3732.00	932.91	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	2.	4.	0.006	152.67	1.595D
Ac-228	3876.86	969.11	0.	15.	0.025	51.82	1.598D
Bi-214	4482.15	1120.36	0.	20.	0.033	44.72	0.375s
Bi-214	4952.67	1237.93	1.	0.	0.001	240.37	0.197s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5846.34	1461.23	0.	71.	0.118	23.74	0.970s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	2.2177E-04	609.31	2.232E-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	0.000E+00	%	1.356E-04	G
			768.36	2.084E-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	3.887E-04	&	3.277E-04	G
K-40	N	3.1260E-03	1460.81	3.126E-03	?(	4.403E-05	G
Ac-228	N	3.3358E-04	911.07	2.863E-04	(	1.101E-05	G K
			969.11	2.892E-04	(	1.942E-05	G
			338.32	4.610E-04	@(	3.813E-05	G
			964.60	2.321E-04	(	1.651E-04	G

ORTEC g v - i (63) wan32 G53W2.06 14-JUL-2007 16:34:22 Page 4
EnergySolutions Spectrum name: Win00199.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	4.116E-04	&(	5.880E-05	G
		463.00	5.067E-04	?(	3.898E-05	G
		209.28	7.617E-04	+	1.904E-04	G
		270.23	8.748E-04	+	2.775E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.756E-04	X
		327.64	0.000E+00	%	1.507E-04	G
Pb-212	N 2.3233E-04	238.62	2.323E-04	(	1.242E-05	G K
		77.11	3.504E-04	+	6.350E-05	Energy duplication
		74.81	0.000E+00	%	8.307E-05	Energy duplication
CS-137	1.9421E-05	661.66	1.942E-05	?(	6.718E-06	G

```
                WI07-0321  D2  Grid  D1 - 5   @ 6 inches   071407
Th-234    N   4.9613E-04      92.35 3.450E-04  (  1.303E-04          G
                              63.29 7.112E-04 $(  1.638E-04          G

Pb-214    N   2.0593E-04     351.92 1.926E-04  (  3.704E-06          G K
                             295.21 2.318E-04 ?(  3.398E-05          G
                              77.11 0.000E+00 %   9.090E-05Energy duplication
                             241.98 1.475E-04 -   1.323E-04          G
                              74.81 6.094E-04 +   1.619E-04Energy duplication
                              87.30 0.000E+00 %   1.254E-04          X

Pb-210    N   6.0561E-04      46.50 6.056E-04 ?(  4.806E-04          G

AM-241        2.5739E-02      59.54 2.574E-02  (  1.006E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  14-JUL-2007 16:34:22 Page    5
EnergySolutions                    Spectrum name: Win00199.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	6.3911E-01	1.845E-01	1.860E-01
K-40 #	9.0086E+00	2.138E+00	2.165E+00
Ac-228	9.6133E-01	3.114E-01	3.135E-01
Pb-212	6.6955E-01	1.480E-01	1.501E-01
CS-137 #	5.5968E-02	5.491E-02	5.496E-02
Th-234	1.4298E+00	7.431E-01	7.438E-01
Pb-214	5.9347E-01	1.646E-01	1.661E-01
Pb-210 #C	1.7453E+00	2.997E+00	2.997E+00
AM-241	7.4176E+01	1.582E+00	3.169E+00

WI07-0321 D2 Grid D1 - 5 @ 6 inches 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) 8.9279465E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0342 D2 Grid E3 -5 071607

Sample description
WI07-0342 D2 Grid E3 - 5 071607

Spectrum Filename: C:\User\Win00215.An1

Acquisition information
Start time: 16-Jul-2007 12:58:43
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: 2.2660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.2660E+02) =
4.4131E+03
Detection limit method: Traditional ORTEC method

WI07-0342 D2 Grid E3 -5 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: 0.1525

********** 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	
11.67	2.92	6010.	11469.	19.115	2.67	0.854	-	D
16.87	4.22	16341.	8471.	14.119	4.79	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	185.81	46.63	40.	75.	0.125	35.94	0.976
AM-241	237.59	59.57	159.	1967.	3.278	5.19	0.916
Th-234	251.97	63.17	37.	41.	0.069	61.03	0.490s
Pb-214	298.54	74.81	41.	81.	0.135	31.43	0.917D
Pb-212	298.56	74.81	83.	0.	0.000	2584.57	0.244D
Pb-212	307.74	77.11	43.	105.	0.176	26.22	0.919D
Pb-214	307.74	77.11	93.	0.	0.000	782.66	0.350D
Pb-214	348.61	87.32	28.	44.	0.073	51.43	0.311s
Th-234	368.72	92.35	39.	64.	0.106	37.32	0.933D
Ac-228	380.72	95.35	24.	2.	0.003	748.81	0.936D
Ac-228	835.58	209.04	5.	28.	0.047	46.76	0.619s
Pb-212	953.94	238.62	15.	151.	0.251	17.88	1.057D
Pb-214	967.37	241.98	32.	22.	0.037	84.70	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.89	270.60	6.	26.	0.043	56.22	1.192
Pb-214	1181.42	295.48	5.	41.	0.068	38.17	1.458s
Ac-228	1312.30	328.19	2.	12.	0.020	68.49	0.309s
Ac-228	1353.94	338.60	9.	50.	0.083	37.09	0.940s
Pb-214	1407.59	352.01	4.	48.	0.080	34.82	0.707s

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Ac-228	1852.00	463.08	0.	23.	0.038	41.70	0.375s
Bi-214	2437.21	609.34	0.	47.	0.078	29.17	0.833s
CS-137	2648.32	662.10	0.	31.	0.052	35.92	1.000s
Bi-214	3072.00	767.98	0.	3.	0.005	115.47	0.750s
Ac-228	3181.00	795.22	0.	17.	0.028	48.51	0.312s
Ac-228	3645.58	911.31	0.	36.	0.060	33.33	1.260
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	2.	0.003	314.17	1.595D
Ac-228	3876.86	969.11	1.	19.	0.032	46.74	1.598D
Bi-214	4480.00	1119.83	0.	1.	0.002	200.00	0.250s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5510.50	1377.32	0.	2.	0.003	141.42	0.500s
K-40	5845.23	1460.95	0.	31.	0.052	35.92	0.750s
Ac-228	6353.50	1587.95	0.	2.	0.003	141.42	0.500s
Bi-214	7057.17	1763.75	2.	2.	0.003	311.13	0.646s

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	2.1839E-04	609.31	2.186E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	0.000E+00	%	4.867E-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	?	9.716E-05	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	3.9632E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	3.770E-04	(	3.287E-05	G
			338.32	5.860E-04	+	1.333E-04	G
			964.60	0.000E+00	%	2.082E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	5.995E-04	+	1.828E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 13:08:53 Page 4
EnergySolutions Spectrum name: Win00215.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.019E-04	+	2.660E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.489E-04	X
		327.64	4.955E-04	?(	1.010E-04	G
Pb-212	N 3.6258E-04	238.62	3.462E-04	(	1.394E-05	G K
		77.11	4.032E-04	(	3.733E-05	Energy duplication
		74.81	0.000E+00	%	8.675E-05	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	?(	2.710E-06	G
Th-234	N 7.9177E-04	92.35	7.970E-04	(	1.168E-04	G
		63.29	7.843E-04	@(	1.733E-04	G

```
                                WI07-0342  D2  Grid  E3 -5   071607
Pb-214    N   2.1522E-04     351.92 1.772E-04  (  1.270E-05          G K
                            295.21 2.547E-04  (  2.383E-05          G
                             77.11 0.000E+00 %   9.301E-05Energy duplication
                            241.98 3.029E-04  (  1.179E-04          G
                             74.81 9.061E-04 +   1.800E-04Energy duplication
                             87.30 6.385E-04 +   1.815E-04          X

Pb-210    N   1.5310E-03      46.50 1.531E-03  (  1.931E-04          G

AM-241        4.0503E-03      59.54 4.050E-03  (  3.776E-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                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  16-JUL-2007 13:08:53 Page    5
EnergySolutions                    Spectrum name: Win00215.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 #      9.6378E-01    2.812E-01    2.835E-01
K-40   #      6.0232E+00    2.164E+00    2.175E+00
Ac-228        1.7490E+00    5.210E-01    5.251E-01
Pb-212        1.6001E+00    2.539E-01    2.609E-01
CS-137 #      3.7073E-01    1.332E-01    1.339E-01
Th-234        3.4941E+00    1.250E+00    1.252E+00
Pb-214        9.4978E-01    3.141E-01    3.161E-01
Pb-210        6.7566E+00    2.428E+00    2.434E+00
AM-241        1.7874E+01    9.272E-01    1.139E+00

  # - All peaks for activity calculation had bad shape.
  * - Activity omitted from total
```

WI07-0342 D2 Grid E3 -5 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) 3.9781597E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0343 D2 Grid E4 -2 071607

Sample description
WI07-0343 D2 Grid E4- 2 071607

Spectrum Filename: C:\User\Win00216.An1

Acquisition information
Start time: 16-Jul-2007 13:16:30
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: 3.0450E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0450E+02) = 3.2841E+03
Detection limit method: Traditional ORTEC method

WI07-0343 D2 Grid E4 -2 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: 0.0807

********** 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	2.90	3424.	12610.	21.017	2.21	0.854	-	D
17.87	4.44	17158.	10303.	17.172	4.10	0.855	-	D
2333.09	583.32	0.	74.	0.123	23.25	0.639	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	185.31	46.51	301.	80.	0.133	80.54	0.966
AM-241	237.47	59.54	258.	670.	1.117	12.32	0.969
Th-234	252.20	63.23	165.	78.	0.129	67.34	1.301s
Pb-214	298.54	74.81	110.	114.	0.190	32.10	0.917D
Pb-212	298.56	74.81	149.	0.	0.000	2703.71	0.000D
Pb-212	307.74	77.11	105.	146.	0.244	25.76	0.919D
Pb-214	307.74	77.11	229.	0.	0.000	505.18	0.305D
Pb-214	347.72	87.10	69.	57.	0.094	58.66	0.581s
Th-234	368.72	92.35	75.	47.	0.079	59.27	0.933D
Ac-228	380.72	95.35	67.	6.	0.009	424.84	0.935D
Ac-228	836.60	209.30	28.	40.	0.066	63.69	0.423s
Pb-212	953.94	238.62	19.	205.	0.341	15.21	1.057D

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EnergySolutions Spectrum name: Win00216.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	34.	17.	0.028	108.54	1.060D
Ac-228	1077.37	269.47	9.	27.	0.045	58.79	0.490s
Pb-214	1181.14	295.41	6.	34.	0.056	41.83	0.877
Ac-228	1309.43	327.48	8.	17.	0.028	75.33	0.472s
Ac-228	1353.79	338.56	8.	63.	0.105	32.22	0.817s

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Pb-214	1407.42	351.97	3.	83.	0.138	23.66	0.451s
Ac-228	1852.98	463.33	5.	12.	0.019	95.79	0.337s
Bi-214	2437.11	609.31	0.	54.	0.090	27.22	1.375
CS-137	2647.08	661.79	0.	25.	0.042	40.00	0.437s
Bi-214	3066.00	766.48	0.	7.	0.012	75.59	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.94	911.40	0.	35.	0.058	33.81	0.573s
Bi-214	3736.50	934.03	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	0.	10.	0.017	62.29	1.595D
Ac-228	3876.86	969.11	2.	31.	0.051	38.72	1.598D
Bi-214	4482.18	1120.37	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	5845.49	1461.02	0.	43.	0.072	30.50	0.781s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.5699E-04	609.31	2.511E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	2.677E-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	2.915E-04	?(	9.716E-05	G
K-40	N	1.8932E-03	1460.81	1.893E-03	?(	4.403E-05	G
Ac-228	N	3.9495E-04	911.07	3.855E-04	?(	1.101E-05	G K
			969.11	5.960E-04	+	1.678E-04	G
			338.32	7.383E-04	+	1.456E-04	G
			964.60	6.364E-04	+	3.129E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	4.547E-04	?(	1.483E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 13:26:42 Page 4
EnergySolutions Spectrum name: Win00216.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.358E-04	+	2.576E-04	G
		270.23	8.435E-04	&	2.812E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.426E-04	X
		327.64	6.923E-04	+	3.090E-04	G
Pb-212	N 4.7078E-04	238.62	4.708E-04	(	1.536E-05	G K
		77.11	5.605E-04	+	8.771E-05	Energy duplication
		74.81	0.000E+00	%	1.152E-04	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 5.9046E-04	92.35	5.905E-04	(	1.588E-04	G
		63.29	1.480E-03	+	4.296E-04	G

```
Pb-214   N   3.0679E-04    351.92 3.068E-04  (  1.135E-05          G K
                           295.21 2.099E-04 -   5.855E-05          G
                            77.11 0.000E+00 %   1.438E-04Energy duplication
                           241.98 2.349E-04 -   1.467E-04          G
                            74.81 1.271E-03 +   2.419E-04Energy duplication
                            87.30 8.223E-04 +   2.377E-04          X

Pb-210   N   1.6297E-03     46.50 1.630E-03  (  5.113E-04          G

AM-241       1.3796E-03     59.54 1.380E-03  (  4.782E-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 16-JUL-2007 13:26:42 Page 5
EnergySolutions Spectrum name: Win00216.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	8.4399E-01	2.297E-01	2.319E-01
K-40 #	6.2174E+00	1.896E+00	1.911E+00
Ac-228	1.2970E+00	4.385E-01	4.412E-01
Pb-212	1.5461E+00	2.352E-01	2.423E-01
CS-137 #	2.2249E-01	8.899E-02	8.940E-02
Th-234	1.9391E+00	1.149E+00	1.150E+00
Pb-214	1.0075E+00	2.384E-01	2.414E-01
Pb-210	5.3521E+00	4.310E+00	4.312E+00
AM-241	4.5308E+00	5.580E-01	5.826E-01

- All peaks for activity calculation had bad shape.

WI07-0343 D2 Grid E4 -2 071607

* - 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) 2.2956442E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0329 D2 Bag# S-022 (Grid C3 - 1,2) 071607

Sample description
WI07-0329 D2 Bag# S-022 Grid C3-1,2 071607

Spectrum Filename: C:\User\Win00206.An1

Acquisition information
Start time: 16-Jul-2007 09:00:54
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: 3.5760E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5760E+02) = 2.7964E+03
Detection limit method: Traditional ORTEC method

WI07-0329 D2 Bag# S-022 (Grid C3 - 1,2) 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: 0.1450

********** 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	6825.	24182.	40.303	1.88	2.138	CU-64 s
104.84	26.39	37.	107.	0.178	28.50	0.845	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	184.65	46.34	215.	71.	0.118	71.50	0.414s
AM-241	237.60	59.58	485.	7221.	12.034	2.60	0.856
Th-234	249.18	62.47	33.	11.	0.018	175.81	0.353s
Pb-214	298.54	74.81	48.	87.	0.144	31.15	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	1102.86	0.288D
Pb-212	307.74	77.11	55.	128.	0.214	24.07	0.919D
Pb-214	307.74	77.11	156.	0.	0.000	443.89	0.306D
Pb-214	347.99	87.17	33.	60.	0.100	41.30	0.894
Th-234	368.72	92.35	55.	40.	0.067	61.05	0.933D
Ac-228	380.72	95.35	42.	3.	0.005	576.08	0.935D
Ac-228	835.07	208.91	13.	33.	0.054	55.29	1.197
Pb-212	953.94	238.62	18.	204.	0.339	15.20	1.057D
Pb-214	967.37	241.98	32.	47.	0.078	45.03	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:11:05 Page 3
EnergySolutions Spectrum name: Win00206.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.67	270.05	8.	26.	0.043	59.77	0.588s
Pb-214	1180.05	295.14	4.	83.	0.138	24.46	0.471s
Ac-228	1312.29	328.19	4.	36.	0.060	40.90	0.329s
Ac-228	1351.66	338.03	5.	41.	0.069	36.50	1.281
Pb-214	1407.32	351.94	6.	94.	0.156	22.85	1.116

WI07-0329 D2 Bag# S-022 (Grid C3 - 1,2) 071607

Ac-228	1851.37	462.92	4.	10.	0.016	95.90	0.277s
Bi-214	2437.32	609.36	0.	69.	0.115	24.08	1.031
CS-137	2647.19	661.81	3.	16.	0.027	62.57	0.478s
Bi-214	3071.44	767.84	0.	9.	0.015	66.67	0.375s
Ac-228	3173.00	793.22	0.	13.	0.022	55.47	0.250s
Ac-228	3644.98	911.16	0.	43.	0.072	30.50	0.541s
Bi-214	3735.00	933.66	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	0.	8.	0.013	75.12	1.595D
Ac-228	3876.86	969.11	2.	33.	0.055	36.55	1.598D
Bi-214	4481.33	1120.16	0.	18.	0.030	47.14	1.062s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	2.	0.003	141.42	0.250s
K-40	5844.38	1460.74	0.	47.	0.078	29.17	0.364s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7063.00	1765.21	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	3.1898E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	1.779E-04	-	1.317E-04	G
			1120.29	4.380E-04	+	1.587E-04	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	2.164E-04	-	2.771E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	5.3362E-04	911.07	4.736E-04	?(	1.101E-05	G K
			969.11	6.445E-04	(	4.787E-05	G
			338.32	4.844E-04	(	4.214E-05	G
			964.60	4.741E-04	(	8.912E-05	G
			794.70	7.644E-04	&	3.306E-04	G
			463.00	3.703E-04	-	2.267E-04	G
			209.28	6.912E-04	(	1.204E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:11:05 Page 4
EnergySolutions Spectrum name: Win00206.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.967E-04	+	2.737E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	1.473E-03	+	3.852E-04	G
Pb-212	N 4.7429E-04	238.62	4.677E-04	(	1.491E-05	G K
		77.11	4.905E-04	(	4.206E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	4.4262E-05	661.66	4.426E-05	?(	7.758E-06	G
Th-234	N 5.0044E-04	92.35	5.004E-04	(	1.371E-04	G
		63.29	2.096E-04	&	1.885E-04	G

```
Pb-214    N   3.4630E-04    351.92 3.463E-04  (  1.533E-05          G K
                            295.21 5.199E-04 +   8.582E-05          G
                             77.11 0.000E+00 %   1.192E-04Energy duplication
                            241.98 6.475E-04 +   1.808E-04          G
                             74.81 9.674E-04 +   1.887E-04Energy duplication
                             87.30 8.707E-04 +   2.053E-04          X

Pb-210    N   1.4494E-03     46.50 1.449E-03  (  4.336E-04          G

AM-241        1.4868E-02     59.54 1.487E-02  (  6.519E-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		8.9199E-01	2.148E-01	2.174E-01
K-40	#	5.7866E+00	1.688E+00	1.702E+00
Ac-228		1.4922E+00	3.310E-01	3.357E-01
Pb-212		1.3263E+00	1.888E-01	1.952E-01
CS-137	#	1.2377E-01	7.745E-02	7.759E-02
Th-234		1.3995E+00	8.543E-01	8.549E-01
Pb-214		9.6839E-01	2.212E-01	2.242E-01
Pb-210		4.0531E+00	2.898E+00	2.900E+00
AM-241		4.1578E+01	1.083E+00	1.882E+00

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

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& - 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) 5.7620033E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0334 D2 Grid E1 -4 071607

Sample description
WI07-0334 D2 Grid E1 - 4 071607

Spectrum Filename: C:\User\Win00207.An1

Acquisition information
Start time: 16-Jul-2007 09:14:19
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: 3.2560E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2560E+02) = 3.0713E+03
Detection limit method: Traditional ORTEC method

WI07-0334 D2 Grid E1 -4 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: 0.0555

********** 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	4155.	21202.	35.337	1.83	2.228	CU-64	s
743.59	186.05	22.	58.	0.096	40.60	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	185.13	46.46	78.	37.	0.061	85.47	0.389s
AM-241	237.51	59.55	180.	1786.	2.977	5.50	0.827
Th-234	253.24	63.49	52.	47.	0.078	61.91	0.834s
Pb-214	298.54	74.81	54.	99.	0.165	29.14	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	296.65	0.332D
Pb-212	307.74	77.11	47.	152.	0.253	20.68	0.919D
Pb-214	307.74	77.11	164.	0.	0.000	191.35	0.289D
Pb-214	348.39	87.27	30.	59.	0.098	42.40	0.815s
Th-234	368.72	92.35	40.	36.	0.060	59.51	0.933D
Ac-228	380.72	95.35	44.	13.	0.022	152.68	0.935D
Ac-228	836.00	209.15	16.	35.	0.058	54.46	0.624s
Pb-212	953.94	238.62	29.	184.	0.307	16.86	1.057D
Pb-214	967.37	241.98	37.	42.	0.071	50.79	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:24:30 Page 3
EnergySolutions Spectrum name: Win00207.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.40	270.23	10.	22.	0.037	68.63	0.805s
Pb-214	1180.34	295.21	7.	47.	0.078	35.69	0.554s
Ac-228	1312.35	328.21	5.	21.	0.035	55.80	0.420s
Ac-228	1351.45	337.98	8.	48.	0.081	37.13	1.269
Pb-214	1407.08	351.88	2.	81.	0.134	23.32	1.012

WI07-0334 D2 Grid E1 -4 071607

Ac-228	1851.38	462.92	0.	32.	0.053	35.36	0.583s
Bi-214	2437.17	609.33	0.	47.	0.078	29.17	0.425s
CS-137	2646.51	661.64	0.	37.	0.062	32.88	1.093
Bi-214	3069.50	767.35	0.	14.	0.023	53.45	0.375s
Ac-228	3180.00	794.97	0.	5.	0.008	89.44	0.250s
Ac-228	3644.09	910.94	0.	46.	0.077	29.49	0.301s
Bi-214	3737.00	934.16	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	0.	15.	0.025	51.42	1.595D
Ac-228	3876.86	969.11	2.	26.	0.044	41.51	1.598D
Bi-214	4482.00	1120.33	0.	8.	0.013	70.71	0.312s
Bi-214	4947.67	1236.68	3.	1.	0.002	583.10	0.210s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.91	1460.87	0.	68.	0.113	24.25	0.640s
Ac-228	6351.00	1587.32	0.	4.	0.007	100.00	0.250s
Bi-214	7055.50	1763.33	0.	7.	0.012	75.59	0.999s

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	2.2299E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	2.491E-04	&(	3.558E-05	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	0.000E+00	&	2.286E-04	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	2.915E-04	?(	9.716E-05	G
K-40	N	2.9939E-03	1460.81	2.994E-03	(	4.403E-05	G
Ac-228	N	5.4637E-04	911.07	5.066E-04	(	1.101E-05	G K
			969.11	5.101E-04	(	4.709E-05	G
			338.32	5.684E-04	(	5.453E-05	G
			964.60	9.338E-04	+	3.718E-04	G
			794.70	2.940E-04	-	2.176E-04	G
			463.00	1.247E-03	+	3.319E-04	G
			209.28	7.335E-04	(	1.320E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.873E-04	(	1.562E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	2.534E-04	-	2.155E-04	X
		327.64	8.552E-04	&	3.147E-04	G
Pb-212	N 4.2369E-04	238.62	4.237E-04	(	1.858E-05	G K
		77.11	5.811E-04	+	7.831E-05	Energy duplication
		74.81	0.000E+00	%	9.716E-05	Energy duplication
CS-137	1.0027E-04	661.66	1.003E-04	(	2.710E-06	G
Th-234	N 6.3453E-04	92.35	4.513E-04	(	1.178E-04	G
		63.29	8.954E-04	*(	2.040E-04	G

WI07-0334 D2 Grid E1 -4 071607

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Pb-214   N   2.9729E-04    351.92 2.988E-04  (  1.006E-05          G K
                           295.21 2.944E-04 ?(  2.678E-05          G
                            77.11 0.000E+00 ?   1.222E-04Energy duplication
                           241.98 5.855E-04 +   1.808E-04          G
                            74.81 1.103E-03 +   2.009E-04Energy duplication
                            87.30 8.513E-04 +   2.010E-04          X

Pb-210   N   7.4851E-04     46.50 7.485E-04  (  2.659E-04          G

AM-241       3.6776E-03     59.54 3.678E-03  (  4.011E-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
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	6.8485E-01	1.998E-01	2.014E-01
K-40	9.1950E+00	2.230E+00	2.257E+00
Ac-228	1.6780E+00	4.115E-01	4.163E-01
Pb-212	1.3013E+00	2.194E-01	2.248E-01
CS-137	3.0794E-01	1.013E-01	1.019E-01
Th-234	1.9488E+00	8.367E-01	8.380E-01
Pb-214	9.1304E-01	1.946E-01	1.976E-01
Pb-210	2.2989E+00	1.965E+00	1.966E+00
AM-241	1.1295E+01	6.217E-01	7.492E-01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.

WI07-0334 D2 Grid E1 -4 071607

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) 2.9622679E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0335 D2 Grid E1 -3 071607

Sample description
WI07-0335 D2 Grid E1 - 3 071607

Spectrum Filename: C:\User\Win00208.An1

Acquisition information
Start time: 16-Jul-2007 09:30:34
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: 2.1730E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.1730E+02) = 4.6019E+03
Detection limit method: Traditional ORTEC method

WI07-0335 D2 Grid E1 -3 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: 0.0836

********** 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	5001.	22117.	36.862	1.86	2.260	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	183.87	46.15	166.	62.	0.104	79.54	0.568s
AM-241	237.57	59.57	309.	3473.	5.789	3.93	0.872
Th-234	253.08	63.45	74.	43.	0.072	83.30	0.333s
Pb-214	298.54	74.81	55.	96.	0.160	29.83	0.917D
Pb-212	298.56	74.81	90.	0.	0.000	251.28	0.262D
Pb-212	307.74	77.11	59.	152.	0.253	21.62	0.919D
Pb-214	307.74	77.11	227.	0.	0.000	104.71	0.290D
Pb-214	348.24	87.23	58.	40.	0.066	78.56	0.304s
Th-234	368.72	92.35	68.	44.	0.074	60.28	0.933D
Ac-228	380.72	95.35	48.	2.	0.004	808.51	0.935D
Ac-228	836.52	209.28	14.	28.	0.047	61.72	0.588s
Pb-212	953.94	238.62	18.	185.	0.308	16.09	1.057D
Pb-214	967.37	241.98	20.	34.	0.057	50.36	1.060D
Ac-228	1080.07	270.15	6.	23.	0.038	55.68	0.455s

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:40:44 Page 3
EnergySolutions Spectrum name: Win00208.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1178.91	294.85	4.	51.	0.085	32.63	0.626s
Ac-228	1310.00	327.62	3.	1.	0.001	498.89	0.000s
Ac-228	1352.87	338.33	5.	55.	0.092	30.96	1.302
Pb-214	1406.75	351.80	6.	72.	0.121	26.62	1.279
Ac-228	1852.00	463.08	11.	4.	0.007	297.72	0.000s

WI07-0335 D2 Grid E1 -3 071607

Bi-214	2437.06	609.30	4.	51.	0.086	32.23	0.741s
CS-137	2646.32	661.59	0.	33.	0.055	34.82	0.264s
Bi-214	3072.42	768.08	0.	13.	0.022	55.47	0.292s
Ac-228	3179.25	794.78	0.	12.	0.020	57.74	0.375s
Ac-228	3645.27	911.24	0.	41.	0.068	31.23	0.537s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	2.	7.	0.012	89.67	1.595D
Ac-228	3876.86	969.11	3.	18.	0.030	53.61	1.598D
Bi-214	4480.62	1119.98	1.	1.	0.001	339.93	0.375s
Bi-214	4954.83	1238.47	1.	1.	0.001	339.93	0.339s
Bi-214	5511.50	1377.57	0.	2.	0.003	141.42	0.500s
K-40	5846.00	1461.15	0.	35.	0.058	33.81	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.46	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	2.3690E-04	609.31	2.387E-04	(	1.513E-05	G K
			1764.49	1.779E-04	-	1.317E-04	G
			1120.29	0.000E+00	%	6.233E-05	G
			1238.11	0.000E+00	%	1.737E-04	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	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	4.3270E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	3.534E-04	(	5.668E-05	G
			338.32	6.446E-04	+	1.344E-04	G
			964.60	4.504E-04	(	1.489E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	0.000E+00	%	2.339E-04	G
			209.28	5.925E-04	*(	1.230E-04	G
			270.23	7.186E-04	+	2.541E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:40:44 Page 4
EnergySolutions Spectrum name: Win00208.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	0.000E+00	%	1.373E-04	G
Pb-212	N 4.2486E-04	238.62	4.249E-04	(	1.503E-05	G K
		77.11	5.820E-04	+	8.058E-05	Energy duplication
		74.81	0.000E+00	%	9.020E-05	Energy duplication
CS-137	8.9426E-05	661.66	8.943E-05	?(	2.710E-06	G
Th-234	N 6.6643E-04	92.35	5.547E-04	(	1.514E-04	G
		63.29	8.255E-04	$(	2.410E-04	G
Pb-214	N 2.8622E-04	351.92	2.685E-04	(	1.533E-05	G K

```
                          WI07-0335  D2  Grid  E1 -3   071607
                            295.21 3.205E-04 *(  2.076E-05          G
                             77.11 0.000E+00 ?   1.433E-04Energy duplication
                            241.98 4.719E-04 +   1.508E-04          G
                             74.81 1.073E-03 +   1.996E-04Energy duplication
                             87.30 5.732E-04 +   2.095E-04          X

Pb-210   N   1.2725E-03      46.50 1.272E-03 ?(  3.819E-04          G

AM-241       7.1517E-03      59.54 7.152E-03  (  5.222E-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 09:40:44 Page    5
 EnergySolutions                  Spectrum name: Win00208.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	1.0902E+00	3.514E-01	3.538E-01
K-40 #	7.0914E+00	2.397E+00	2.412E+00
Ac-228	1.9913E+00	6.220E-01	6.264E-01
Pb-212	1.9552E+00	3.145E-01	3.230E-01
CS-137 #	4.1153E-01	1.433E-01	1.441E-01
Th-234	3.0669E+00	1.577E+00	1.578E+00
Pb-214	1.3172E+00	2.773E-01	2.817E-01
Pb-210 #	5.8558E+00	4.658E+00	4.660E+00
AM-241	3.2912E+01	1.293E+00	1.777E+00

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0335 D2 Grid E1 -3 071607

< - 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) 5.5691238E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0336 D2 Grid E1 -1 071607

Sample description
WI07-0336 D2 Grid E1 - 1 071607

Spectrum Filename: C:\User\Win00209.An1

Acquisition information

Start time:	16-Jul-2007 09:44:53
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:	2.4000E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.4000E+02) = 4.1667E+03
Detection limit method:	Traditional ORTEC method

WI07-0336 D2 Grid E1 -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: 0.0806

********** 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	2.90	3048.	13011.	21.685	2.12	0.854	-	D
18.03	4.47	13044.	8721.	14.534	4.28	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	185.00	46.43	87.	40.	0.067	87.98	0.650s
AM-241	237.49	59.55	139.	1827.	3.045	5.32	0.829
Th-234	253.32	63.51	33.	20.	0.033	105.96	0.426s
Pb-214	298.54	74.81	50.	77.	0.129	34.35	0.917D
Pb-212	298.56	74.81	81.	0.	0.000	644.20	0.000D
Pb-212	307.74	77.11	40.	135.	0.225	21.73	0.919D
Pb-214	307.74	77.11	180.	0.	0.000	108.80	0.418D
Pb-214	347.98	87.17	28.	41.	0.068	56.54	1.232s
Th-234	368.72	92.35	58.	38.	0.063	65.25	0.933D
Ac-228	380.72	95.35	30.	7.	0.012	227.79	0.935D
Ac-228	836.58	209.29	17.	23.	0.038	77.70	0.428s
Pb-212	953.94	238.62	16.	173.	0.289	16.50	1.057D
Pb-214	967.37	241.98	10.	32.	0.053	45.83	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:55:04 Page 3
EnergySolutions Spectrum name: Win00209.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.52	270.26	3.	23.	0.038	51.44	0.402s
Pb-214	1181.17	295.42	18.	52.	0.086	44.32	0.475s
Ac-228	1310.00	327.62	8.	0.	0.001	877.50	0.000s
Ac-228	1352.55	338.25	6.	33.	0.055	43.28	0.907
Pb-214	1406.15	351.65	0.	71.	0.118	23.74	0.875

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Ac-228	1850.27	462.65	0.	22.	0.037	42.64	1.999s
Bi-214	2437.13	609.32	0.	52.	0.087	27.74	0.395s
CS-137	2646.24	661.57	0.	17.	0.028	48.51	0.666s
Bi-214	3073.50	768.35	0.	9.	0.015	66.67	1.499
Ac-228	3178.00	794.47	0.	5.	0.008	89.44	0.250s
Ac-228	3644.95	911.16	0.	37.	0.062	32.88	0.831s
Bi-214	3738.00	934.41	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	1.	8.	0.013	85.18	1.595D
Ac-228	3876.86	969.11	3.	23.	0.039	45.88	1.598D
Bi-214	4483.44	1120.69	0.	15.	0.025	51.64	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	5843.19	1460.44	0.	27.	0.045	38.49	0.542s
Ac-228	6355.83	1588.53	1.	1.	0.001	339.93	0.339s
Bi-214	7058.78	1764.15	0.	9.	0.015	66.67	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	2.6178E-04	609.31	2.418E-04	(	4.650E-06	G K
			1764.49	3.203E-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	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	3.887E-04	+	3.277E-04	G
K-40	N	1.1887E-03	1460.81	1.189E-03	?(	4.403E-05	G
Ac-228	N	4.2515E-04	911.07	4.075E-04	(	1.101E-05	G K
			969.11	4.532E-04	(	5.555E-05	G
			338.32	3.867E-04	?(	4.688E-05	G
			964.60	4.679E-04	(	1.394E-04	G
			794.70	2.940E-04	-	2.176E-04	G
			463.00	8.575E-04	+	2.788E-04	G
			209.28	4.796E-04	(	1.356E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 09:55:04 Page 4
EnergySolutions Spectrum name: Win00209.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.186E-04	+	2.415E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	1.756E-04	X
		327.64	0.000E+00	%	1.845E-04	G
Pb-212	N 3.9854E-04	238.62	3.985E-04	(	1.403E-05	G K
		77.11	5.166E-04	+	7.356E-05	Energy duplication
		74.81	0.000E+00	%	8.574E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	(	2.710E-06	G
Th-234	N 4.3333E-04	92.35	4.745E-04	(	1.407E-04	G
		63.29	3.747E-04	?(	1.654E-04	G

WI07-0336 D2 Grid E1 -1 071607

Pb-214	N	2.8327E-04	351.92	2.630E-04	(	3.704E-06		G K
			295.21	3.226E-04	?(	4.032E-05		G
			77.11	0.000E+00	?	1.278E-04	Energy duplication	
			241.98	4.368E-04	+	1.338E-04		G
			74.81	8.637E-04	+	1.835E-04	Energy duplication	
			87.30	5.950E-04	+	1.779E-04		X
Pb-210	N	8.2336E-04	46.50	8.234E-04	?(	2.792E-04		G
AM-241		3.7624E-03	59.54	3.762E-03	(	3.536E-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 09:55:04 Page 5
EnergySolutions Spectrum name: Win00209.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		1.0907E+00	3.025E-01	3.053E-01
K-40	#	4.9531E+00	1.906E+00	1.915E+00
Ac-228		1.7714E+00	4.800E-01	4.845E-01
Pb-212		1.6606E+00	2.739E-01	2.809E-01
CS-137		1.9195E-01	9.311E-02	9.340E-02
Th-234		1.8056E+00	1.123E+00	1.124E+00
Pb-214		1.1803E+00	2.801E-01	2.836E-01
Pb-210	#	3.4307E+00	3.018E+00	3.019E+00
AM-241		1.5677E+01	8.335E-01	1.016E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0336 D2 Grid E1 -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) 3.1760971E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0337 D2 Grid E1 -5 071607

Sample description
WI07-0337 D2 Grid E1 - 5 071607

Spectrum Filename: C:\User\Win00210.An1

Acquisition information
Start time: 16-Jul-2007 10:01:06
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: 3.4870E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4870E+02) = 2.8678E+03
Detection limit method: Traditional ORTEC method

WI07-0337 D2 Grid E1 -5 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: 0.0793

********** 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	4815.	21232.	35.387	1.90	2.093	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	184.96	46.42	51.	62.	0.103	49.48	0.900
AM-241	237.53	59.56	54.	261.	0.435	15.94	0.715
Th-234	253.43	63.53	70.	70.	0.117	55.21	0.807s
Pb-214	298.54	74.81	62.	119.	0.198	26.20	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	441.70	0.486D
Pb-212	307.74	77.11	60.	161.	0.269	20.77	0.919D
Pb-214	307.74	77.11	177.	0.	0.000	493.09	0.408D
Pb-214	348.10	87.20	54.	64.	0.107	48.48	0.620s
Th-234	368.72	92.35	67.	47.	0.079	57.00	0.933D
Ac-228	380.72	95.35	44.	5.	0.008	398.89	0.935D
Ac-228	836.92	209.38	21.	25.	0.042	77.97	0.820
Pb-212	953.94	238.62	27.	220.	0.367	15.02	1.057D
Pb-214	967.37	241.98	39.	37.	0.062	57.49	1.060D
Ac-228	1080.00	270.13	24.	0.	0.000	0.00	0.000s

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EnergySolutions Spectrum name: Win00210.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.09	295.15	8.	80.	0.134	26.97	0.461s
Ac-228	1309.37	327.46	6.	28.	0.046	53.15	0.778s
Ac-228	1352.34	338.20	9.	46.	0.076	38.38	0.823s
Pb-214	1407.00	351.86	8.	100.	0.167	22.74	0.579s
Ac-228	1848.76	462.27	0.	23.	0.038	41.70	0.500s

Bi-214	2436.57	609.18	0.	75.	0.125	23.09	0.494s
CS-137	2646.69	661.69	0.	26.	0.043	39.22	0.854s
Bi-214	3067.33	766.81	0.	11.	0.018	60.30	0.250s
Ac-228	3178.00	794.47	6.	1.	0.002	800.00	0.000s
Ac-228	3645.58	911.31	0.	60.	0.100	25.82	1.011s
Bi-214	3735.00	933.66	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	3.	2.	0.003	342.93	1.595D
Ac-228	3876.86	969.11	1.	22.	0.037	45.46	1.598D
Bi-214	4480.88	1120.05	0.	17.	0.028	48.51	0.500s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	0.	3.	0.005	115.47	0.375s
K-40	5844.27	1460.71	0.	56.	0.093	26.73	0.708s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7055.00	1763.21	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5406E-04	609.31	3.488E-04	(	4.650E-06	G K
			1764.49	3.203E-04	&(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	5.732E-04	&	2.719E-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	2.4656E-03	1460.81	2.466E-03	(	4.403E-05	G
Ac-228	N	6.1454E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	4.258E-04	-	1.429E-04	G
			338.32	5.352E-04	(	5.683E-05	G
			964.60	0.000E+00	%	2.229E-04	G
			794.70	0.000E+00	%	2.514E-04	G
			463.00	8.965E-04	&	2.846E-04	G
			209.28	5.290E-04	(	1.481E-04	G
			270.23	0.000E+00	?	2.326E-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	%	2.006E-04	X
		327.64	1.127E-03	+	3.568E-04	G
Pb-212	N 5.0636E-04	238.62	5.064E-04	(	1.797E-05	G K
		77.11	6.176E-04	+	8.242E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	7.0457E-05	661.66	7.046E-05	(	2.710E-06	G
Th-234	N 8.9602E-04	92.35	5.887E-04	(	1.506E-04	G
		63.29	1.334E-03	(	2.351E-04	G
Pb-214	N 3.7037E-04	351.92	3.704E-04	(	1.678E-05	G K

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			295.21	5.032E-04	+	8.630E-05		G
			77.11	0.000E+00	%	1.269E-04	Energy duplication	
			241.98	5.152E-04	+	1.775E-04		G
			74.81	1.328E-03	+	2.180E-04	Energy duplication	
			87.30	9.335E-04	+	2.303E-04		X
Pb-210	N	1.2589E-03	46.50	1.259E-03	(	2.173E-04		G
AM-241		5.3709E-04	59.54	5.371E-04	(	2.249E-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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EnergySolutions Spectrum name: Win00210.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	1.0154E+00	2.345E-01	2.376E-01
K-40	7.0707E+00	1.890E+00	1.908E+00
Ac-228	1.7624E+00	4.550E-01	4.598E-01
Pb-212	1.4521E+00	2.181E-01	2.247E-01
CS-137	2.0206E-01	7.925E-02	7.963E-02
Th-234	2.5696E+00	1.019E+00	1.021E+00
Pb-214	1.0621E+00	2.416E-01	2.448E-01
Pb-210	3.6101E+00	1.786E+00	1.788E+00
AM-241	1.5403E+00	2.456E-01	2.521E-01

< - 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 1999.3 keV) 2.0284803E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0338 D2 Grid E1 -2 071607

Sample description
WI07-0338 D2 Grid E1 - 2 071607

Spectrum Filename: C:\User\Win00211.An1

Acquisition information
Start time: 16-Jul-2007 10:15:54
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: 3.3510E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3510E+02) = 2.9842E+03
Detection limit method: Traditional ORTEC method

WI07-0338 D2 Grid E1 -2 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: 0.0670

********** 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	
11.55	2.89	4895.	11394.	18.991	2.55	0.854	-	D
15.76	3.94	15672.	10051.	16.752	4.05	0.855	-	D
371.34	93.03	48.	81.	0.136	32.68	0.933	TH-234	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	31.	78.	0.130	36.09	0.636s
AM-241	237.68	59.60	50.	84.	0.141	35.48	0.844
Th-234	252.59	63.32	63.	39.	0.065	80.92	0.776
Pb-214	298.54	74.81	55.	110.	0.183	27.09	0.917D
Pb-212	298.56	74.81	104.	0.	0.000	418.94	0.501D
Pb-212	307.74	77.11	52.	174.	0.291	19.10	0.919D
Pb-214	307.74	77.11	185.	0.	0.000	342.00	0.238D
Pb-214	348.33	87.25	38.	48.	0.079	51.37	0.367s
Th-234	368.72	92.35	113.	2.	0.004	1368.31	0.933D
Ac-228	380.72	95.35	30.	20.	0.033	90.73	0.935D
Ac-228	837.02	209.40	19.	22.	0.037	72.69	0.892
Pb-212	953.94	238.62	14.	224.	0.373	14.21	1.057D

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EnergySolutions Spectrum name: Win00211.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	39.	24.	0.041	82.64	1.060D
Ac-228	1077.66	269.55	12.	38.	0.063	52.10	0.412s
Pb-214	1180.99	295.37	7.	51.	0.086	34.90	0.536s
Ac-228	1310.98	327.86	13.	28.	0.046	66.82	0.563s
Ac-228	1352.79	338.31	10.	50.	0.083	39.74	1.026

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Pb-214	1407.79	352.06	6.	73.	0.122	26.59	1.044
Ac-228	1851.76	463.02	0.	25.	0.042	40.00	0.833s
Bi-214	2437.19	609.33	2.	64.	0.108	26.54	1.642s
CS-137	2646.66	661.68	0.	37.	0.062	32.88	0.771s
Bi-214	3074.64	768.64	2.	6.	0.011	98.51	0.349s
Ac-228	3181.00	795.22	2.	2.	0.003	311.13	0.000s
Ac-228	3645.10	911.20	0.	59.	0.098	26.04	0.869s
Bi-214	3733.67	933.33	0.	14.	0.023	53.45	0.375s
Ac-228	3858.81	964.60	3.	11.	0.018	79.16	1.595D
Ac-228	3876.86	969.11	2.	25.	0.042	43.06	1.598D
Bi-214	4482.00	1120.33	1.	0.	0.000	0.00	0.000s
Bi-214	4948.56	1236.91	3.	1.	0.002	412.31	0.204s
Bi-214	5505.00	1375.94	0.	6.	0.010	81.65	0.250s
K-40	5844.19	1460.69	0.	36.	0.060	33.33	0.348s
Ac-228	6355.00	1588.32	1.	0.	0.000	260.34	0.000s
Bi-214	7060.00	1764.46	2.	1.	0.002	447.21	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0376E-04	609.31	3.000E-04	(	1.298E-05	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	0.000E+00	?	4.867E-05	G
			1238.11	0.000E+00	&	2.286E-04	G
			768.36	3.387E-04	?(	1.200E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	&	4.328E-04	G
			934.06	1.360E-03	+	5.650E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	6.3203E-04	911.07	6.498E-04	?(	1.101E-05	G K
			969.11	4.856E-04	-	1.527E-04	G
			338.32	5.801E-04	(	5.988E-05	G
			964.60	6.514E-04	(	1.959E-04	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	9.744E-04	+	2.958E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.726E-04	-	2.025E-04	G
		270.23	1.187E-03	&	3.284E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	3.804E-04	-	2.025E-04	X
		327.64	1.127E-03	+	3.897E-04	G
Pb-212	N 5.1384E-04	238.62	5.138E-04	(	1.354E-05	G K
		77.11	6.677E-04	+	8.333E-05	Energy duplication
		74.81	0.000E+00	%	9.671E-05	Energy duplication
CS-137	1.0027E-04	661.66	1.003E-04	?(	2.710E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.956E-04	G
		63.29	7.430E-04		2.818E-04	G

```
Pb-214   N   2.9432E-04    351.92 2.716E-04  (  1.446E-05        G K
                           295.21 3.216E-04  (  2.622E-05        G
                            77.11 0.000E+00 %   1.297E-04Energy duplication
                           241.98 3.373E-04  (  1.286E-04        G
                            74.81 1.223E-03 +   2.084E-04Energy duplication
                            87.30 6.917E-04 +   1.977E-04        X

Pb-210   N   1.5889E-03     46.50 1.589E-03 *(  1.717E-04        G

AM-241       1.7400E-04     59.54 1.740E-04  (  2.154E-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
```

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EnergySolutions Spectrum name: Win00211.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	9.0647E-01	2.406E-01	2.430E-01
K-40 #	4.7299E+00	1.577E+00	1.587E+00
Ac-228	1.8861E+00	4.911E-01	4.962E-01
Pb-212	1.5334E+00	2.179E-01	2.254E-01
CS-137 #	2.9921E-01	9.838E-02	9.904E-02
Th-234 <	5.8359E-01		
Pb-214	8.7831E-01	2.335E-01	2.359E-01
Pb-210 #	4.7415E+00	1.711E+00	1.715E+00
AM-241	5.1924E-01	1.842E-01	1.852E-01

- All peaks for activity calculation had bad shape.

WI07-0338 D2 Grid E1 -2 071607

* - 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) 1.5494142E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0339 D2 Grid E2 -2 071607

Sample description
WI07-0339 D2 Grid E2 - 2 071607

Spectrum Filename: C:\User\Win00212.An1

Acquisition information
Start time: 16-Jul-2007 10:53:45
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: 3.8290E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8290E+02) =
2.6116E+03
Detection limit method: Traditional ORTEC method

WI07-0339 D2 Grid E2 -2 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: 0.0605

********** 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	4365.	24614.	41.023	1.67	2.257	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	184.33	46.26	111.	88.	0.147	53.20	1.305s
AM-241	237.51	59.55	102.	720.	1.200	9.33	0.927
Th-234	252.48	63.30	48.	75.	0.125	42.25	1.177s
Pb-214	298.54	74.81	82.	95.	0.158	34.08	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	494.41	0.625D
Pb-212	307.74	77.11	86.	125.	0.209	27.51	0.919D
Pb-214	307.74	77.11	246.	0.	0.000	82.34	0.000D
Pb-214	347.87	87.14	39.	63.	0.105	43.35	1.312s
Th-234	371.45	93.03	34.	105.	0.175	29.22	0.582s
Ac-228	380.72	95.35	28.	0.	0.000	0.00	0.935
Ac-228	836.28	209.22	13.	35.	0.058	55.47	0.708s
Pb-212	953.94	238.62	15.	167.	0.278	16.82	1.057D
Pb-214	967.37	241.98	28.	17.	0.029	99.17	1.060D
Ac-228	1080.14	270.17	17.	22.	0.037	87.08	0.257s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.29	295.45	7.	50.	0.083	36.88	0.502s
Ac-228	1312.07	328.13	3.	35.	0.059	38.02	1.140
Ac-228	1352.68	338.29	9.	42.	0.071	39.46	0.623s
Pb-214	1407.33	351.94	6.	64.	0.107	29.32	1.142s
Ac-228	1852.50	463.20	0.	22.	0.037	42.64	0.375s

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Bi-214	2437.15	609.32	0.	47.	0.078	29.17	0.762s
CS-137	2649.61	662.42	2.	7.	0.012	103.02	0.595s
Bi-214	3069.00	767.23	0.	5.	0.008	89.44	0.250s
Ac-228	3172.90	793.19	2.	3.	0.006	167.33	0.232s
Ac-228	3645.41	911.27	0.	54.	0.090	27.22	1.054s
Bi-214	3737.33	934.24	0.	3.	0.005	115.47	0.375s
Ac-228	3858.81	964.60	0.	11.	0.019	59.94	1.595D
Ac-228	3876.86	969.11	2.	22.	0.037	45.37	1.598D
Bi-214	4481.20	1120.13	0.	6.	0.010	81.65	0.375s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.23	1460.70	0.	35.	0.058	33.81	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.25	1764.27	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	2.1578E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	1.460E-04	-	9.733E-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	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	6.0118E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	4.337E-04	-	1.446E-04	G
			338.32	4.961E-04	(	5.500E-05	G
			964.60	6.872E-04	(	6.173E-05	G
			794.70	1.960E-04	&	2.176E-04	G
			463.00	8.575E-04	+	2.788E-04	G
			209.28	7.335E-04	(	1.204E-04	G
			270.23	6.977E-04	?(	1.967E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 11:03:56 Page 4
EnergySolutions Spectrum name: Win00212.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.541E-04	X
		327.64	1.439E-03	+	3.760E-04	G
Pb-212	N 3.8373E-04	238.62	3.837E-04	(	1.382E-05	G K
		77.11	4.795E-04	+	8.058E-05	Energy duplication
		74.81	0.000E+00	%	9.805E-05	Energy duplication
CS-137	1.8969E-05	661.66	1.897E-05	&(	6.942E-06	G
Th-234	N 1.3591E-03	92.35	1.310E-03	&(	1.093E-04	G
		63.29	1.429E-03	*(	1.964E-04	G
Pb-214	N 2.5940E-04	351.92	2.370E-04	(	1.481E-05	G K

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			295.21	3.111E-04	(	2.733E-05	G
			77.11	0.000E+00	?	1.489E-04	Energy duplication
			241.98	2.379E-04	(	1.102E-04	G
			74.81	1.055E-03	+	2.156E-04	Energy duplication
			87.30	9.142E-04	+	2.146E-04	X
Pb-210	N	1.7998E-03	46.50	1.800E-03	@(	3.143E-04	G
AM-241		1.4826E-03	59.54	1.483E-03	(	3.046E-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 - Positi
S - Single-Escape
D - Double-Escape
K - Key Line
Not in Average

ORTEC g v i (63) wan32 G53W2 06 16 JUL 2007 11:03:56 Page
EnergySolutions Spectrum name: Win00212.Am

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	5.6353E-01	1.644E-01	1.658E-01
K-40 #	4.0245E+00	1.361E+00	1.369E+00
[illegible]	1.5701E+00	4.040E-01	4.083E-01
Pb-212	1.0022E+00	1.685E-01	1.727E-01
CS-137 #	4.9541E-02	5.103E-02	5.107E-02
Th-234 #	3.5494E+00	9.116E-01	9.153E-01
Pb-214	6.7747E-01	1.986E-01	2.002E-01
Pb-210 #	4.7005E+00	2.501E+00	2.503E+00
AM-241	3.8720E+00	3.612E-01	3.886E-01

\# - All peaks for activity calculation had bad shape
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

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< - 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) 2.0009125E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0340 D2 Grid E1 -5 071607

Sample description
WI07-0340 D2 Grid E2 - 5 071607

Spectrum Filename: C:\User\Win00213.An1

Acquisition information
Start time: 16-Jul-2007 11:20:20
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: 2.8720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8720E+02) = 3.4819E+03
Detection limit method: Traditional ORTEC method

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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: 0.0710

********** 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	2.91	7822.	13600.	22.667	2.51	0.854	-	D
16.85	4.20	21593.	10467.	17.445	4.43	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	185.03	46.44	304.	88.	0.147	71.87	0.604s
AM-241	237.48	59.55	360.	477.	0.795	18.92	0.934
Th-234	252.55	63.31	174.	45.	0.075	105.83	0.361s
Pb-214	298.54	74.81	150.	89.	0.148	44.39	0.917D
Pb-212	298.56	74.81	132.	0.	0.000	656.05	0.373D
Pb-212	307.74	77.11	154.	137.	0.228	30.84	0.919D
Pb-214	307.74	77.11	201.	0.	0.000	967.15	0.417D
Pb-214	347.69	87.09	93.	84.	0.139	47.50	0.915
Th-234	368.72	92.35	84.	56.	0.094	53.13	0.933D
Ac-228	380.72	95.35	81.	12.	0.020	219.03	0.936D
Ac-228	836.14	209.18	15.	38.	0.063	50.07	0.828
Pb-212	953.94	238.62	23.	183.	0.306	16.52	1.057D
Pb-214	967.37	241.98	30.	23.	0.038	81.09	1.060D

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 11:30:32 Page 3
EnergySolutions Spectrum name: Win00213.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1074.98	268.88	11.	27.	0.044	62.80	0.257s
Pb-214	1181.40	295.48	8.	55.	0.092	34.74	1.366s
Ac-228	1311.33	327.95	4.	12.	0.019	86.38	0.840s
Ac-228	1351.82	338.07	3.	56.	0.093	29.76	0.373s
Pb-214	1407.08	351.88	4.	86.	0.142	23.54	0.757s

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Ac-228	1852.01	463.08	3.	22.	0.037	50.75	0.465s
Bi-214	2437.10	609.31	2.	60.	0.099	27.77	0.719s
CS-137	2646.06	661.53	0.	31.	0.052	35.92	0.375s
Bi-214	3066.00	766.48	0.	13.	0.022	55.47	0.250s
Ac-228	3175.00	793.72	0.	11.	0.018	60.30	0.250s
Ac-228	3645.02	911.17	0.	50.	0.083	28.28	1.079s
Bi-214	3735.50	933.78	0.	6.	0.010	81.65	1.000s
Ac-228	3858.81	964.60	0.	17.	0.028	49.32	1.595D
Ac-228	3876.86	969.11	0.	31.	0.052	35.84	1.598D
Bi-214	4482.07	1120.34	0.	17.	0.028	48.51	0.375s
Bi-214	4952.50	1237.89	0.	2.	0.003	141.42	0.500s
Bi-214	5512.50	1377.82	0.	3.	0.005	115.47	0.500s
K-40	5845.24	1460.96	0.	39.	0.065	32.03	0.325s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7057.50	1763.83	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	2.8060E-04	609.31	2.767E-04	(	1.298E-05	G K
			1764.49	1.423E-04	-	1.200E-04	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	6.774E-04	&	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	6.1877E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	6.047E-04	(	1.942E-05	G
			338.32	6.543E-04	(	3.593E-05	G
			964.60	1.038E-03	+	3.921E-04	G
			794.70	6.468E-04	&(	5.880E-05	G
			463.00	8.705E-04	+	2.958E-04	G
			209.28	8.041E-04	(	1.270E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 11:30:32 Page 4
EnergySolutions Spectrum name: Win00213.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.331E-04	&(	1.652E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.725E-04	X
		327.64	4.751E-04	-	2.516E-04	G
Pb-212	N 4.2148E-04	238.62	4.215E-04	(	1.682E-05	G K
		77.11	5.234E-04	+	9.423E-05	Energy duplication
		74.81	0.000E+00	%	1.085E-04	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	(	2.710E-06	G
Th-234	N 7.6636E-04	92.35	7.025E-04	(	1.678E-04	G
		63.29	8.573E-04	?(	3.650E-04	G

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```
Pb-214    N   3.2507E-04    351.92 3.167E-04  (  1.182E-05          G K
                            295.21 3.466E-04  (  2.786E-05          G
                             77.11 0.000E+00 %   1.348E-04Energy duplication
                            241.98 3.116E-04  (  1.151E-04          G
                             74.81 9.930E-04 +   2.499E-04Energy duplication
                             87.30 1.214E-03 +   2.804E-04          X

Pb-210    N   1.7964E-03     46.50 1.796E-03  (  5.137E-04          G

AM-241        9.8221E-04     59.54 9.822E-04  (  5.629E-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 11:30:32 Page 5
EnergySolutions Spectrum name: Win00213.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	9.7704E-01	2.713E-01	2.738E-01
K-40 #	5.9787E+00	1.915E+00	1.928E+00
Ac-228	2.1545E+00	4.103E-01	4.182E-01
Pb-212	1.4676E+00	2.425E-01	2.487E-01
CS-137	2.9250E-01	1.051E-01	1.057E-01
Th-234	2.6684E+00	1.418E+00	1.419E+00
Pb-214	1.1319E+00	2.664E-01	2.698E-01
Pb-210	6.2549E+00	4.495E+00	4.498E+00
AM-241	3.4199E+00	6.472E-01	6.594E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0340 D2 Grid E1 -5 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) 2.4345400E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0341 D2 Grid E3 -2 071607

Sample description
WI07-0341 D2 Grid E3 - 2 071607

Spectrum Filename: C:\User\Win00214.An1

Acquisition information
Start time: 16-Jul-2007 11:40:38
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: 2.9640E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9640E+02) = 3.3738E+03
Detection limit method: Traditional ORTEC method

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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: 0.1212

********** 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	7469.	11020.	18.366	2.92	0.854	-	D
15.64	3.91	15692.	9857.	16.429	4.12	0.855	-	D
198.55	49.83	112.	36.	0.061	88.44	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	88.	36.	0.061	79.97	0.893D
AM-241	237.56	59.57	203.	1595.	2.658	6.24	0.822
Th-234	252.02	63.18	44.	40.	0.067	64.16	0.955
Pb-214	298.54	74.81	54.	92.	0.154	30.61	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	689.20	0.378D
Pb-212	307.74	77.11	72.	128.	0.214	25.70	0.919D
Pb-214	307.74	77.11	162.	0.	0.000	292.42	0.216D
Pb-214	348.07	87.19	31.	50.	0.083	47.17	1.108
Th-234	368.72	92.35	64.	43.	0.072	60.18	0.933D
Ac-228	380.72	95.35	36.	7.	0.011	270.65	0.935D
Ac-228	837.04	209.41	6.	49.	0.081	35.60	0.643s
Pb-212	953.94	238.62	35.	190.	0.316	17.03	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	29.	29.	0.048	64.17	1.060D
Ac-228	1072.00	268.13	20.	8.	0.013	221.91	0.229s
Pb-214	1180.12	295.16	23.	52.	0.087	49.13	0.988
Ac-228	1305.78	326.56	4.	10.	0.017	88.11	0.477s
Ac-228	1351.26	337.93	10.	55.	0.092	36.06	1.061

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Pb-214	1407.12	351.89	8.	84.	0.139	25.09	0.999
Ac-228	1852.95	463.32	0.	22.	0.037	42.64	0.542s
Bi-214	2437.47	609.40	0.	55.	0.092	26.97	1.250
CS-137	2647.08	661.79	0.	24.	0.040	40.82	0.375s
Bi-214	3066.00	766.48	0.	9.	0.015	66.67	0.250s
Ac-228	3179.79	794.91	0.	17.	0.028	48.51	0.375s
Ac-228	3646.18	911.46	0.	42.	0.070	30.86	0.700s
Bi-214	3740.00	934.91	0.	6.	0.010	81.65	0.375s
Ac-228	3858.81	964.60	4.	7.	0.012	111.15	1.595D
Ac-228	3876.86	969.11	4.	24.	0.040	47.55	1.598D
Bi-214	4482.00	1120.33	5.	1.	0.002	507.44	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5509.78	1377.14	1.	1.	0.002	346.41	0.217s
K-40	5845.32	1460.98	0.	34.	0.057	34.30	0.301s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7060.43	1764.57	0.	10.	0.017	63.25	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.5577E-04	609.31	2.558E-04	(	4.650E-06	G K
			1764.49	3.558E-04	+	1.779E-04	G
			1120.29	0.000E+00	%	9.733E-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	0.000E+00	%	2.771E-04	G
			934.06	5.830E-04	&	3.887E-04	G
K-40	N	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	4.9039E-04	911.07	4.625E-04	(	1.101E-05	G K
			969.11	4.631E-04	(	6.648E-05	G
			338.32	6.446E-04	(	5.860E-05	G
			964.60	4.305E-04	(	2.087E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	8.575E-04	+	2.788E-04	G

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EnergySolutions Spectrum name: Win00214.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.030E-03	+	2.328E-04	G
		270.23	0.000E+00	&	2.457E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.885E-04	X
		327.64	4.208E-04	&(	1.325E-04	G
Pb-212	N 4.5153E-04	238.62	4.356E-04	(	2.054E-05	G K
		77.11	4.911E-04	(	4.780E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 6.3252E-04	92.35	5.415E-04	(	1.471E-04	G
		63.29	7.620E-04	$(	1.885E-04	G

```
Pb-214   N   3.2506E-04    351.92 3.093E-04  (  1.632E-05          G K
                           295.21 3.257E-04  (  4.573E-05          G
                            77.11 0.000E+00 %   1.215E-04Energy duplication
                           241.98 4.018E-04  (  1.123E-04          G
                            74.81 1.030E-03 +   1.964E-04Energy duplication
                            87.30 7.231E-04 +   1.921E-04          X

Pb-210   N   7.4252E-04     46.50 7.425E-04  (  2.806E-04          G

AM-241       3.2836E-03     59.54 3.284E-03  (  4.257E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  16-JUL-2007 11:50:50 Page    5
 EnergySolutions                  Spectrum name: Win00214.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	8.6294E-01	2.327E-01	2.350E-01
K-40 #	5.0504E+00	1.732E+00	1.743E+00
Ac-228	1.6545E+00	5.106E-01	5.143E-01
Pb-212	1.5234E+00	2.348E-01	2.417E-01
CS-137 #	2.1942E-01	8.958E-02	8.997E-02
Th-234	2.1340E+00	9.386E-01	9.399E-01
Pb-214	1.0967E+00	2.752E-01	2.782E-01
Pb-210	2.5051E+00	2.003E+00	2.004E+00
AM-241	1.1078E+01	6.913E-01	8.038E-01

- All peaks for activity calculation had bad shape.

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* - 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) 2.6124887E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0353 D2 Grid E2 -3 071607

Sample description
WI07- 0353 D2 Grid E2-3 071607

Spectrum Filename: C:\User\Win00220.An1

Acquisition information
Start time: 16-Jul-2007 14:56:18
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: 2.8480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8480E+02) = 3.5112E+03
Detection limit method: Traditional ORTEC method

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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: 0.1537

********** 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	4317.	23549.	39.248	1.72	2.278	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	185.23	46.49	93.	47.	0.078	78.96	0.958
AM-241	237.58	59.57	186.	1474.	2.457	6.39	0.925
Th-234	252.46	63.29	62.	43.	0.071	78.66	0.875
Pb-214	298.54	74.81	65.	77.	0.129	37.18	0.917D
Pb-212	298.56	74.81	83.	0.	0.000	523.07	0.760D
Pb-212	307.74	77.11	52.	142.	0.237	22.11	0.919D
Pb-214	307.74	77.11	149.	0.	0.000	285.31	0.225D
Pb-214	347.46	87.04	61.	51.	0.084	65.53	0.775s
Th-234	368.72	92.35	51.	55.	0.091	45.97	0.933D
Ac-228	380.72	95.35	19.	9.	0.015	155.98	0.935D
Ac-228	835.12	208.93	14.	23.	0.038	70.11	0.741s
Pb-212	953.94	238.62	15.	208.	0.347	14.80	1.057D
Pb-214	967.37	241.98	30.	16.	0.026	112.09	1.060D
Ac-228	1079.03	269.89	3.	32.	0.053	41.46	0.568s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.93	295.11	8.	38.	0.064	41.80	0.966
Ac-228	1312.24	328.18	4.	17.	0.028	63.35	0.812s
Ac-228	1352.90	338.34	7.	63.	0.104	31.41	1.155
Pb-214	1407.07	351.88	10.	62.	0.104	32.33	1.269
Ac-228	1852.96	463.32	0.	30.	0.050	36.51	0.364s

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Bi-214	2438.20	609.58	0.	55.	0.092	26.97	0.850s
CS-137	2646.63	661.67	0.	32.	0.053	35.36	0.750s
Bi-214	3073.00	768.23	0.	2.	0.003	141.42	0.250s
Ac-228	3177.89	794.44	0.	12.	0.020	57.74	0.562s
Ac-228	3646.53	911.55	0.	36.	0.060	33.33	0.386s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	13.	0.021	65.22	1.595D
Ac-228	3876.86	969.11	4.	24.	0.041	45.86	1.598D
Bi-214	4482.00	1120.33	0.	5.	0.008	89.44	0.750s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.00	1377.94	0.	2.	0.003	141.42	0.250s
K-40	5845.89	1461.12	0.	54.	0.090	27.22	0.609s
Ac-228	6353.50	1587.95	0.	2.	0.003	141.42	0.500s
Bi-214	7062.00	1764.96	2.	1.	0.002	416.33	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	2.5256E-04	609.31	2.558E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	1.217E-04	-	9.007E-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	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.3775E-03	1460.81	2.377E-03	(	4.403E-05	G
Ac-228	N	4.3152E-04	911.07	3.965E-04	(	1.101E-05	G K
			969.11	4.754E-04	(	6.211E-05	G
			338.32	7.344E-04	+	1.447E-04	G
			964.60	7.864E-04	+	3.704E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	1.169E-03	+	3.220E-04	G
			209.28	4.867E-04	?(	1.230E-04	G
			270.23	9.998E-04	+	2.775E-04	G

ORTEC g v - i (63) wan32 G53W2.06 16-JUL-2007 15:06:28 Page 4
EnergySolutions Spectrum name: Win00220.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	1.697E-04	-	1.541E-04	X
		327.64	6.923E-04	+	2.851E-04	G
Pb-212	N 4.9728E-04	238.62	4.787E-04	(	1.366E-05	G K
		77.11	5.432E-04	(	4.104E-05	Energy duplication
		74.81	0.000E+00	%	8.675E-05	Energy duplication
CS-137	8.6716E-05	661.66	8.672E-05	(	2.710E-06	G
Th-234	N 7.3542E-04	92.35	6.810E-04	(	1.329E-04	G
		63.29	8.128E-04	?(	2.224E-04	G
Pb-214	N 2.3254E-04	351.92	2.315E-04	(	1.810E-05	G K

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			295.21	2.412E-04	(	2.760E-05		G
			77.11	0.000E+00	%	1.167E-04	Energy	duplication
			241.98	2.156E-04	(	1.150E-04		G
			74.81	8.630E-04	+	1.937E-04	Energy	duplication
			87.30	7.352E-04	+	2.246E-04		X
Pb-210	N	9.5605E-04	46.50	9.560E-04	?(	2.891E-04		G
AM-241		3.0352E-03	59.54	3.035E-03	(	4.076E-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 16-JUL-2007 15:06:28 Page 5
EnergySolutions Spectrum name: Win00220.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	8.8681E-01	2.392E-01	2.415E-01
K-40	8.3480E+00	2.272E+00	2.293E+00
Ac-228	1.5152E+00	4.554E-01	4.589E-01
Pb-212	1.7461E+00	2.323E-01	2.413E-01
CS-137	3.0448E-01	1.077E-01	1.083E-01
Th-234	2.5822E+00	1.176E+00	1.178E+00
Pb-214	8.1649E-01	2.640E-01	2.658E-01
Pb-210 #	3.3569E+00	2.651E+00	2.652E+00
AM-241	1.0657E+01	6.810E-01	7.870E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

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< - 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) 3.0213310E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0354 D2 Grid E2 -4 071607

Sample description
WI07- 0354 D2 Grid E2-4 071607

Spectrum Filename: C:\User\Win00221.An1

Acquisition information
Start time: 16-Jul-2007 15:10:29
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: 2.4400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4400E+02) = 4.0984E+03
Detection limit method: Traditional ORTEC method

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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	
12.00	3.29	7502.	12422.	20.704	2.67	0.854	-	D
17.31	4.62	12113.	9926.	16.543	3.72	0.855	-	D
69.95	17.67	75.	253.	0.422	17.95	1.026	MO-99	s
83.98	21.18	48.	202.	0.338	19.76	1.220	TC-99M	s
104.91	26.41	48.	324.	0.539	14.12	0.971	AM-241	s
128.10	32.21	110.	206.	0.343	25.37	0.654	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	363.	9.	0.015	672.75	0.000s
AM-241	237.60	59.58	1397.	18897.	31.496	1.67	0.880
Th-234	253.61	63.58	30.	45.	0.074	54.06	0.958
Pb-214	298.54	74.81	48.	63.	0.104	40.37	0.917D
Pb-212	298.56	74.81	58.	0.	0.000	727.25	0.131D
Pb-212	307.74	77.11	40.	107.	0.179	25.45	0.919D
Pb-214	307.74	77.11	109.	0.	0.000	743.41	0.295D
Pb-214	347.99	87.17	25.	47.	0.078	45.37	0.545s
Th-234	368.72	92.35	47.	42.	0.070	55.26	0.933D

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EnergySolutions Spectrum name: Win00221.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.72	95.35	24.	3.	0.005	433.74	0.936D
Ac-228	837.66	209.56	18.	30.	0.051	68.54	0.242s
Pb-212	953.94	238.62	25.	128.	0.213	20.88	1.057D
Pb-214	967.37	241.98	24.	7.	0.012	206.27	1.060D
Ac-228	1082.58	270.78	5.	26.	0.043	52.40	0.528s

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Pb-214	1180.83	295.33	4.	32.	0.054	42.75	0.845s
Ac-228	1311.75	328.05	3.	23.	0.038	52.58	0.294s
Ac-228	1353.92	338.60	4.	45.	0.075	35.34	0.876
Pb-214	1406.96	351.85	8.	54.	0.089	33.38	1.248
Ac-228	1852.00	463.08	8.	0.	0.001	877.50	0.000s
Bi-214	2437.32	609.36	0.	28.	0.047	37.80	0.633s
CS-137	2646.24	661.58	0.	25.	0.042	40.00	0.400s
Bi-214	3072.33	768.06	0.	3.	0.005	115.47	0.375s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3645.79	911.37	0.	40.	0.067	31.62	1.062s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	5.	4.	0.006	203.28	1.595D
Ac-228	3876.86	969.11	2.	13.	0.022	63.00	1.598D
Bi-214	4479.80	1119.78	0.	10.	0.017	63.25	0.500s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5845.13	1460.93	0.	39.	0.065	32.03	0.666s
Ac-228	6352.50	1587.70	0.	2.	0.003	141.42	0.500s
Bi-214	7060.00	1764.46	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3278E-04	609.31	1.302E-04	(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	2.433E-04	+	1.217E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	1.563E-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	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	4.8451E-04	911.07	4.405E-04	?(	1.101E-05	G K
			969.11	2.537E-04	-	1.165E-04	G
			338.32	5.293E-04	(	3.883E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	0.000E+00	%	2.946E-04	G
		794.70	0.000E+00	%	1.176E-04	G
		463.00	0.000E+00	%	1.766E-04	G
		209.28	6.454E-04	?(	1.362E-04	G
		270.23	8.019E-04	&	2.621E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.515E-04	X
		327.64	9.299E-04	+	3.147E-04	G
Pb-212	N 2.9383E-04	238.62	2.938E-04	(	1.749E-05	G K
		77.11	4.110E-04	+	6.758E-05	Energy duplication
		74.81	0.000E+00	%	7.307E-05	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G

Th-234	N	6.6021E-04	92.35	5.262E-04	(	1.271E-04	G
			63.29	8.509E-04	$(	1.582E-04	G
Pb-214	N	2.0000E-04	351.92	1.981E-04	(	1.632E-05	G K
			295.21	2.036E-04	*(	2.000E-05	G
			77.11	0.000E+00	%	1.004E-04	Energy duplication
			241.98	0.000E+00	%	1.160E-04	G
			74.81	6.981E-04	+	1.720E-04	Energy duplication
			87.30	6.820E-04	+	1.815E-04	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	5.671E-04	G
AM-241		3.8912E-02	59.54	3.891E-02	(	1.099E-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

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EnergySolutions Spectrum name: Win00221.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		5.4417E-01	2.057E-01	2.067E-01
K-40	#	7.0372E+00	2.254E+00	2.269E+00
Ac-228		1.9857E+00	5.517E-01	5.567E-01
Pb-212		1.2042E+00	2.514E-01	2.554E-01
CS-137	#	2.7765E-01	1.111E-01	1.116E-01
Th-234		2.7058E+00	1.046E+00	1.048E+00
Pb-214		8.1967E-01	2.223E-01	2.244E-01
Pb-210	<	2.3242E+00		

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AM-241	1.5948E+02	2.666E+00	6.477E+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) 1.7405074E+02 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Sample description
WI07- 0355 D2 Grid E3 -1 071607

Spectrum Filename: C:\User\Win00222.An1

Acquisition information
Start time: 16-Jul-2007 15:31:57
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: 2.6650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6650E+02) = 3.7523E+03
Detection limit method: Traditional ORTEC method

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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: 0.1104

********** 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	4676.	10134.	16.890	2.75	0.854	-	D
15.74	3.93	14059.	9648.	16.080	4.03	0.855	-	D
104.74	26.37	45.	185.	0.308	20.29	0.905	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	186.50	46.81	308.	60.	0.099	99.54	0.357s
AM-241	237.60	59.58	921.	12058.	20.097	2.08	0.885
Th-234	252.24	63.24	58.	44.	0.073	70.68	0.809s
Pb-214	298.54	74.81	54.	95.	0.159	29.85	0.917D
Pb-212	298.56	74.81	82.	0.	0.000	240.52	0.816D
Pb-212	307.74	77.11	61.	128.	0.213	24.76	0.919D
Pb-214	307.74	77.11	183.	0.	0.000	245.69	0.244D
Pb-214	347.63	87.08	46.	58.	0.096	49.38	1.097
Th-234	368.72	92.35	41.	41.	0.068	54.57	0.933D
Ac-228	380.72	95.35	24.	12.	0.021	124.99	0.935D
Ac-228	837.16	209.44	25.	25.	0.041	92.53	0.490s
Pb-212	953.94	238.62	13.	218.	0.363	14.32	1.057D

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EnergySolutions Spectrum name: Win00222.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	27.	31.	0.052	58.81	1.060D
Ac-228	1080.15	270.17	9.	28.	0.047	52.72	0.645s
Pb-214	1181.30	295.45	3.	48.	0.080	32.66	1.451s
Ac-228	1312.80	328.32	7.	28.	0.047	53.40	0.573s
Ac-228	1353.31	338.44	2.	49.	0.081	30.56	0.493s

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Pb-214	1407.54	351.99	11.	78.	0.129	28.34	0.875
Ac-228	1846.64	461.74	0.	21.	0.035	43.64	0.562s
Bi-214	2438.02	609.54	0.	41.	0.068	31.23	1.250
CS-137	2647.03	661.77	0.	36.	0.060	33.33	1.100
Bi-214	3075.00	768.73	1.	0.	0.000	0.00	0.000s
Ac-228	3178.88	794.69	0.	11.	0.018	60.30	0.750s
Ac-228	3645.32	911.25	0.	42.	0.070	30.86	1.416
Bi-214	3738.00	934.41	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	3.	2.	0.004	256.26	1.595D
Ac-228	3876.86	969.11	2.	23.	0.038	45.11	1.598D
Bi-214	4482.47	1120.44	0.	15.	0.025	51.64	0.667s
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	5845.74	1461.08	0.	43.	0.072	30.50	1.104s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7060.00	1764.46	0.	5.	0.008	89.44	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8776E-04	609.31	1.907E-04	(	4.650E-06	G K
			1764.49	1.779E-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	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	1.943E-04	?(	9.716E-05	G
K-40	N	1.8932E-03	1460.81	1.893E-03	?(	4.403E-05	G
Ac-228	N	4.9443E-04	911.07	4.625E-04	?(	1.101E-05	G K
			969.11	4.447E-04	(	4.868E-05	G
			338.32	5.723E-04	(	3.095E-05	G
			964.60	0.000E+00	%	2.376E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	8.185E-04	&	2.728E-04	G

0

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EnergySolutions Spectrum name: Win00222.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	5.219E-04	(	1.616E-04	G
		270.23	8.852E-04	+	2.848E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.380E-04	~	1.734E-04	X
		327.64	1.154E-03	&	3.617E-04	G
Pb-212	N 4.9753E-04	238.62	5.011E-04	(	1.283E-05	G K
		77.11	4.887E-04	(	4.424E-05	Energy duplication
		74.81	0.000E+00	%	8.625E-05	Energy duplication
CS-137	9.7556E-05	661.66	9.756E-05	(	2.710E-06	G
Th-234	N 6.4150E-04	92.35	5.078E-04	(	1.198E-04	G
		63.29	8.319E-04	@(	2.155E-04	G

Pb-214	N	2.9174E-04	351.92	2.877E-04	(	1.958E-05		G K
			295.21	2.996E-04	(	1.921E-05		G
			77.11	0.000E+00	%	1.290E-04	Energy	duplication
			241.98	4.327E-04	+	1.560E-04		G
			74.81	1.064E-03	+	1.983E-04	Energy	duplication
			87.30	8.344E-04	+	2.157E-04		X
Pb-210	N	1.2180E-03	46.50	1.218E-03	?(	5.172E-04		G
AM-241		2.4829E-02	59.54	2.483E-02	(	8.941E-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

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	7.0455E-01	2.201E-01	2.216E-01
K-40 #	7.1039E+00	2.167E+00	2.183E+00
Ac-228	1.8553E+00	4.711E-01	4.762E-01
Pb-212	1.8669E+00	2.669E-01	2.760E-01
CS-137	3.6606E-01	1.220E-01	1.228E-01
Th-234	2.4071E+00	1.075E+00	1.076E+00
Pb-214	1.0947E+00	2.367E-01	2.402E-01
Pb-210 #	4.5704E+00	4.549E+00	4.551E+00
AM-241	9.3167E+01	1.939E+00	3.956E+00

- All peaks for activity calculation had bad shape.

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* - 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) 1.1313628E+02 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

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EnergySolutions Spectrum name: Win00225.An1

Sample description
WI07- 0356 D2 Grid E3-3 071707

Spectrum Filename: C:\User\Win00225.An1

Acquisition information
Start time: 17-Jul-2007 07:18:24
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: 2.4170E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4170E+02) = 4.1374E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 07:28:35 Page 2
EnergySolutions Spectrum name: Win00225.An1

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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: 0.0981

********** 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	
14.67	3.85	5196.	23422.	39.037	1.80	2.269	CU-64	s
104.66	26.35	28.	86.	0.144	31.26	0.804	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	186.64	46.84	178.	54.	0.090	87.22	0.736
AM-241	237.57	59.57	329.	4914.	8.191	3.20	0.879
Th-234	252.49	63.30	49.	34.	0.057	82.63	0.616s
Pb-214	298.54	74.81	58.	107.	0.179	27.80	0.917D
Pb-212	298.56	74.81	101.	0.	0.000	322.80	0.480D
Pb-212	307.74	77.11	51.	160.	0.267	20.23	0.919D
Pb-214	307.74	77.11	179.	0.	0.000	223.61	0.273D
Pb-214	347.99	87.17	47.	58.	0.097	50.14	0.748
Th-234	368.72	92.35	35.	44.	0.073	48.70	0.933D
Ac-228	380.72	95.35	39.	9.	0.015	212.42	0.935D
Ac-228	836.49	209.27	20.	27.	0.045	72.95	0.653s
Pb-212	953.94	238.62	7.	213.	0.354	14.16	1.057D
Pb-214	967.37	241.98	27.	21.	0.035	83.27	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.01	269.89	16.	27.	0.045	71.05	0.435s
Pb-214	1179.76	295.06	12.	37.	0.062	49.84	0.668s
Ac-228	1309.88	327.59	11.	17.	0.028	93.04	0.410s
Ac-228	1352.92	338.35	4.	43.	0.072	34.49	0.394s
Pb-214	1407.87	352.08	12.	51.	0.085	39.02	0.695s

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Ac-228	1852.72	463.26	0.	18.	0.030	47.14	1.000
Bi-214	2437.48	609.40	0.	44.	0.073	30.15	0.381s
CS-137	2645.97	661.51	4.	23.	0.039	55.74	0.356s
Bi-214	3071.78	767.92	2.	2.	0.003	244.95	0.218s
Ac-228	3178.00	794.47	0.	12.	0.020	57.74	0.625s
Ac-228	3646.28	911.49	0.	43.	0.072	30.50	0.450s
Bi-214	3738.78	934.60	0.	9.	0.015	66.67	0.500s
Ac-228	3858.81	964.60	1.	5.	0.009	102.07	1.595D
Ac-228	3876.86	969.11	0.	26.	0.043	39.55	1.598D
Bi-214	4480.00	1119.83	0.	17.	0.028	48.51	0.375s
Bi-214	4951.67	1237.68	0.	8.	0.013	70.71	0.375s
Bi-214	5512.50	1377.82	0.	10.	0.017	63.25	0.500s
K-40	5845.90	1461.12	0.	41.	0.068	31.23	0.381s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.89	1764.68	0.	13.	0.022	55.47	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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	2.0462E-04	609.31	2.046E-04	(	4.650E-06	G K
			1764.49	4.626E-04	+	2.001E-04	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	0.000E+00	%	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.082E-03	+	5.410E-04	G
			934.06	8.745E-04	+	4.637E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	5.1517E-04	911.07	4.736E-04	(	1.101E-05	G K
			969.11	4.965E-04	(	1.942E-05	G
			338.32	5.039E-04	(	3.952E-05	G
			964.60	3.169E-04	-	2.469E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	7.016E-04	?(	3.898E-05	G
			209.28	5.713E-04	(	1.448E-04	G

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EnergySolutions Spectrum name: Win00225.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.488E-04	+	3.058E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.986E-04	X
		327.64	6.787E-04	?(	2.153E-04	G
Pb-212	N	4.8878E-04	238.62	4.888E-04	(	9.824E-06	G K
			77.11	6.144E-04	+	8.076E-05	Energy duplication
			74.81	0.000E+00	%	9.535E-05	Energy duplication
CS-137		6.2779E-05	661.66	6.278E-05	?(	8.980E-06	G
Th-234	N	5.8881E-04	92.35	5.474E-04	(	1.110E-04	G
			63.29	6.477E-04	$(	1.984E-04	G

```
                          WI07-0356  D2  Grid  E3 -3   071707
Pb-214    N   2.1339E-04    351.92 1.889E-04  (  2.009E-05          G K
                           295.21 2.318E-04  (  3.398E-05          G
                            77.11 0.000E+00 %   1.274E-04Energy duplication
                           241.98 2.879E-04  (  1.091E-04          G
                            74.81 1.198E-03 +   2.084E-04Energy duplication
                            87.30 8.465E-04 +   2.177E-04          X

Pb-210    N   1.1057E-03     46.50 1.106E-03 ?(  3.953E-04          G

AM-241        1.0119E-02     59.54 1.012E-02  (  5.383E-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
   M - No MDA Calculation                  A - Not in Average
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  17-JUL-2007 07:28:35 Page    5
 EnergySolutions                    Spectrum name: Win00225.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        8.4658E-01    2.553E-01    2.572E-01
 K-40    #     7.4685E+00    2.333E+00    2.350E+00
 Ac-228        2.1314E+00    5.009E-01    5.073E-01
 Pb-212        2.0223E+00    2.863E-01    2.962E-01
 CS-137  #     2.5974E-01    1.448E-01    1.451E-01
 Th-234        2.4361E+00    1.168E+00    1.170E+00
 Pb-214        8.8288E-01    3.078E-01    3.096E-01
 Pb-210  #     4.5749E+00    3.990E+00    3.992E+00
 AM-241        4.1867E+01    1.339E+00    2.048E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

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& - 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) 6.2489574E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Leon
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 07:45:12 Page 1
EnergySolutions Spectrum name: Win00226.An1

Sample description
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Spectrum Filename: C:\User\Win00226.An1

Acquisition information
Start time: 17-Jul-2007 07:35:00
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: 2.7470E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7470E+02) = 3.6403E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 07:45:12 Page 2
EnergySolutions Spectrum name: Win00226.An1

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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: 0.0974

********** 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	
14.79	3.88	5109.	26797.	44.662	1.62	2.392	CU-64	s
104.73	26.36	28.	118.	0.198	26.00	1.181	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	184.58	46.32	218.	45.	0.075	114.86	0.700
AM-241	237.62	59.58	570.	7446.	12.409	2.64	0.871
Th-234	252.57	63.32	45.	65.	0.108	45.90	1.261s
Pb-214	298.54	74.81	54.	101.	0.168	28.78	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	916.52	0.406D
Pb-212	307.74	77.11	43.	170.	0.284	18.76	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	898.61	0.489D
Pb-214	347.81	87.12	58.	50.	0.083	62.92	1.097s
Th-234	368.72	92.35	43.	35.	0.058	62.95	0.933D
Ac-228	380.72	95.35	25.	6.	0.010	249.61	0.935D
Ac-228	837.34	209.48	28.	30.	0.049	82.55	0.479s
Pb-212	953.94	238.62	21.	186.	0.309	16.23	1.057D
Pb-214	967.37	241.98	29.	43.	0.072	46.79	1.060D

ORTEC g v - 1 (63) wan32 G53W2.06 17-JUL-2007 07:45:12 Page 3
EnergySolutions Spectrum name: Win00226.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.41	269.98	4.	43.	0.072	36.39	0.507s
Pb-214	1180.24	295.19	6.	60.	0.099	30.08	1.310
Ac-228	1302.25	325.68	8.	14.	0.023	100.57	0.227s
Ac-228	1352.89	338.34	18.	48.	0.081	46.52	0.605s
Pb-214	1407.47	351.98	3.	74.	0.124	24.87	1.493s

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Ac-228	1841.33	460.41	0.	16.	0.027	50.00	0.250s
Bi-214	2437.72	609.46	0.	47.	0.078	29.17	1.218
CS-137	2648.56	662.16	7.	6.	0.010	149.07	0.230s
Bi-214	3073.50	768.35	0.	8.	0.013	70.71	0.375s
Ac-228	3177.33	794.30	0.	9.	0.015	66.67	0.250s
Ac-228	3646.98	911.66	0.	42.	0.070	30.86	0.916s
Bi-214	3738.33	934.49	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	5.	2.	0.004	288.40	1.595D
Ac-228	3876.86	969.11	2.	24.	0.040	43.36	1.598D
Bi-214	4482.80	1120.53	0.	7.	0.012	75.59	0.312s
Bi-214	4949.37	1237.11	4.	3.	0.005	258.20	0.276s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5845.79	1461.09	0.	33.	0.055	34.82	0.271s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7062.43	1765.07	0.	16.	0.027	50.00	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	2.0671E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	5.693E-04	+	2.199E-04	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	0.000E+00	&	2.898E-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	3.887E-04	+	3.277E-04	G
K-40	N	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	5.0904E-04	911.07	4.625E-04	(	1.101E-05	G K
			969.11	4.715E-04	(	4.698E-05	G
			338.32	5.684E-04	(	7.544E-05	G
			964.60	0.000E+00	%	2.639E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	6.236E-04	&(	3.898E-05	G
			209.28	6.242E-04	(	1.707E-04	G

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ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 07:45:12 Page 4
EnergySolutions Spectrum name: Win00226.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.349E-03	+	3.189E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	5.498E-04	&(	1.895E-04	G
Pb-212	N 4.2658E-04	238.62	4.266E-04	(	1.595E-05	G K
		77.11	6.524E-04	+	8.096E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	1.6259E-05	661.66	1.626E-05	?(	1.158E-05	G
Th-234	N 4.3610E-04	92.35	4.361E-04	(	1.222E-04	G
		63.29	1.238E-03	+	2.923E-04	G

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Pb-214	N	2.7469E-04	351.92	2.747E-04	*(	1.086E-05		G K
			295.21	3.727E-04	+	7.517E-05		G
			77.11	0.000E+00	%	1.207E-04	Energy duplication	
			241.98	5.941E-04	+	1.730E-04		G
			74.81	1.122E-03	+	2.022E-04	Energy duplication	
			87.30	7.207E-04	+	2.206E-04		X
Pb-210	N	9.1522E-04	46.50	9.152E-04	?(	4.367E-04		G
AM-241		1.5331E-02	59.54	1.533E-02	(	7.053E-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:
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

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	7.5248E-01	2.195E-01	2.213E-01
K-40 #	5.2891E+00	1.841E+00	1.852E+00
Ac-228	1.8531E+00	4.498E-01	4.551E-01
Pb-212	1.5529E+00	2.520E-01	2.587E-01
CS-137 #C	5.9189E-02	8.823E-02	8.826E-02
Th-234	1.5875E+00	9.994E-01	1.000E+00
Pb-214	9.9997E-01	2.486E-01	2.515E-01
Pb-210 #	3.3317E+00	3.827E+00	3.828E+00
AM-241	5.5811E+01	1.471E+00	2.536E+00

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

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& - 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) 7.1237061E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0358 D2 Grid E4 -1 071707

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 08:10:28 Page 1
EnergySolutions Spectrum name: Win00227.An1

Sample description
WI07- 0258 D2 Grid E4 - 1 071707

Spectrum Filename: C:\User\Win00227.An1

Acquisition information
Start time: 17-Jul-2007 08:00:18
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: 3.0180E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0180E+02) = 3.3135E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 08:10:28 Page 2
EnergySolutions Spectrum name: Win00227.An1

WI07-0358 D2 Grid E4 -1 071707

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: 0.1172

********** 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	4536.	17578.	29.297	2.15	2.249	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	187.30	47.00	147.	20.	0.034	199.52	0.253s
AM-241	237.67	59.59	272.	3322.	5.536	3.94	0.966
Th-234	253.78	63.62	61.	16.	0.027	176.79	0.290s
Pb-214	298.54	74.81	81.	99.	0.164	32.78	0.917D
Pb-212	298.56	74.81	115.	0.	0.000	309.84	0.716D
Pb-212	307.74	77.11	69.	142.	0.237	23.51	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	488.19	0.394D
Pb-214	348.92	87.40	54.	43.	0.072	68.80	0.857s
Th-234	368.72	92.35	46.	58.	0.097	41.89	0.933D
Ac-228	380.72	95.35	32.	2.	0.004	671.69	0.936D
Ac-228	833.81	208.60	14.	45.	0.075	44.42	0.364s
Pb-212	953.94	238.62	26.	168.	0.279	17.70	1.057D
Pb-214	967.37	241.98	17.	25.	0.042	61.42	1.060D
Ac-228	1079.06	269.90	6.	35.	0.058	45.08	1.611s

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 08:10:28 Page 3
EnergySolutions Spectrum name: Win00227.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.96	295.11	12.	52.	0.087	40.70	0.763s
Ac-228	1312.39	328.21	6.	22.	0.036	60.35	0.317s
Ac-228	1352.68	338.29	5.	57.	0.094	30.81	1.031s
Pb-214	1407.09	351.88	7.	91.	0.152	24.33	0.641s
Ac-228	1851.40	462.93	3.	22.	0.037	53.01	0.607s

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Bi-214	2437.68	609.45	0.	65.	0.108	24.81	1.000s
CS-137	2647.30	661.84	0.	14.	0.023	53.45	0.375s
Bi-214	3072.33	768.06	0.	7.	0.012	75.59	0.292s
Ac-228	3173.00	793.22	4.	0.	0.001	685.57	0.190s
Ac-228	3645.89	911.39	0.	55.	0.092	26.97	1.260
Bi-214	3731.00	932.66	0.	10.	0.017	63.25	0.750s
Ac-228	3858.81	964.60	0.	8.	0.013	74.00	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.75	1.598D
Bi-214	4483.22	1120.63	0.	9.	0.015	66.67	0.625s
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	5845.39	1460.99	0.	28.	0.047	37.80	0.520s
Ac-228	6354.50	1588.20	0.	3.	0.005	115.47	0.500s
Bi-214	7060.36	1764.55	0.	12.	0.020	57.74	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0841E-04	609.31	3.023E-04	@(	4.650E-06	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	2.190E-04	-	1.161E-04	G
			1238.11	0.000E+00	%	1.356E-04	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	9.716E-04	&	4.858E-04	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	5.8925E-04	911.07	6.057E-04	?(	1.101E-05	G K
			969.11	5.450E-04	(	1.942E-05	G
			338.32	6.641E-04	@(	4.458E-05	G
			964.60	4.789E-04	(	8.372E-05	G
			794.70	0.000E+00	&	2.176E-04	G
			463.00	8.575E-04	+	2.958E-04	G
			209.28	9.487E-04	&	2.407E-04	G
			270.23	1.083E-03	+	2.990E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	8.756E-04	&	3.258E-04	G
Pb-212	N 3.8538E-04	238.62	3.854E-04	(	1.786E-05	G K
		77.11	5.447E-04	+	8.058E-05	Energy duplication
		74.81	0.000E+00	%	1.015E-04	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G
Th-234	N 7.2856E-04	92.35	7.286E-04	(	1.256E-04	G
		63.29	3.112E-04	-	2.461E-04	G
Pb-214	N 3.3467E-04	351.92	3.370E-04	(	1.583E-05	G K

```
                          WI07-0358  D2  Grid  E4 -1     071707
                              295.21 3.257E-04  (  3.398E-05          G
                               77.11 0.000E+00 %   1.207E-04Energy duplication
                              241.98 3.458E-04  (  8.781E-05          G
                               74.81 1.101E-03 +   2.174E-04Energy duplication
                               87.30 6.288E-04 +   2.095E-04          X

Pb-210   N   4.1508E-04      46.50 4.151E-04 &(  3.600E-04          G

AM-241       6.8394E-03      59.54 6.839E-03  (  4.911E-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 #     1.0219E+00     2.535E-01    2.564E-01
K-40   #     4.0848E+00     1.544E+00    1.551E+00
Ac-228       1.9525E+00     4.521E-01    4.580E-01
Pb-212       1.2769E+00     2.260E-01    2.311E-01
CS-137 #     1.2571E-01     6.719E-02    6.737E-02
Th-234       2.4140E+00     1.011E+00    1.013E+00
Pb-214       1.1089E+00     2.697E-01    2.729E-01
Pb-210 #C    1.3753E+00     2.744E+00    2.744E+00
AM-241       2.2662E+01     8.922E-01    1.225E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0358 D2 Grid E4 -1 071707

< - 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) 3.6022186E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Sample description
WI07- 0359 D2 Grid E4 - 3 071707

Spectrum Filename: C:\User\Win00228.An1

Acquisition information
Start time: 17-Jul-2007 09:06:35
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: 2.7940E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7940E+02) = 3.5791E+03
Detection limit method: Traditional ORTEC method

WI07-0359 DZ Grid E4 -3 071707

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: 0.1373

********** 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	
11.67	2.91	7244.	11721.	19.535	2.76	0.854	-	D
15.94	3.97	16248.	10471.	17.452	3.96	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	186.67	46.85	56.	67.	0.112	47.54	0.407s
AM-241	237.57	59.57	147.	991.	1.652	8.14	0.912
Th-234	253.95	63.66	60.	42.	0.070	75.59	0.335s
Pb-214	298.54	74.81	60.	93.	0.156	31.24	0.917D
Pb-212	298.56	74.81	94.	0.	0.000	311.90	0.477D
Pb-212	307.74	77.11	56.	164.	0.274	20.19	0.919D
Pb-214	307.74	77.11	262.	0.	0.000	71.03	0.000D
Pb-214	348.25	87.23	36.	46.	0.077	53.96	0.928
Th-234	368.72	92.35	54.	41.	0.068	59.55	0.933D
Ac-228	380.72	95.35	27.	15.	0.025	109.02	0.935D
Ac-228	835.82	209.10	23.	19.	0.032	106.62	0.312s
Pb-212	953.94	238.62	9.	237.	0.396	13.45	1.057D
Pb-214	967.37	241.98	32.	34.	0.056	58.48	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 09:16:47 Page 3
EnergySolutions Spectrum name: Win00228.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.80	270.08	6.	30.	0.049	50.47	0.413s
Pb-214	1180.01	295.13	10.	41.	0.068	41.10	0.768s
Ac-228	1308.69	327.29	3.	20.	0.034	53.97	0.708s
Ac-228	1354.10	338.64	9.	48.	0.080	38.19	1.280
Pb-214	1407.82	352.07	5.	70.	0.117	26.35	0.743s

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Ac-228	1852.00	463.08	10.	4.	0.007	291.55	0.000s
Bi-214	2437.89	609.50	0.	61.	0.102	25.61	0.966s
CS-137	2646.89	661.74	0.	22.	0.037	42.64	0.416s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3172.75	793.15	0.	11.	0.018	60.30	0.375s
Ac-228	3646.80	911.62	0.	49.	0.082	28.57	1.000s
Bi-214	3735.50	933.78	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	2.	9.	0.015	81.10	1.595D
Ac-228	3876.86	969.11	1.	17.	0.029	49.66	1.598D
Bi-214	4477.75	1119.26	4.	1.	0.002	642.91	0.215s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.16	1460.94	0.	39.	0.065	32.03	0.375s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7063.91	1765.44	0.	19.	0.032	45.88	0.333s

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	2.8368E-04	609.31	2.837E-04	?(	4.650E-06	G K
			1764.49	6.761E-04	+	2.379E-04	G
			1120.29	0.000E+00	&	9.007E-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	1.943E-04	-	2.489E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	5.5621E-04	911.07	5.396E-04	?(	1.101E-05	G K
			969.11	3.374E-04	-	1.266E-04	G
			338.32	5.625E-04	(	5.593E-05	G
			964.60	5.506E-04	(	1.605E-04	G
			794.70	6.468E-04	&(	5.880E-05	G
			463.00	0.000E+00	%	2.267E-04	G
			209.28	4.091E-04	-	2.048E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 09:16:47 Page 4
EnergySolutions Spectrum name: Win00228.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.269E-04	+	2.812E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.931E-04	-	1.864E-04	X
		327.64	8.280E-04	+	2.973E-04	G
Pb-212	N 5.6961E-04	238.62	5.454E-04	(	1.078E-05	G K
		77.11	6.295E-04	(	4.231E-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 6.3061E-04	92.35	5.115E-04	(	1.361E-04	G
		63.29	8.001E-04	?(	2.184E-04	G

WI07-0359 D2 Grid E4 -3 071707

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Pb-214   N   2.5925E-04    351.92 2.605E-04  (  1.332E-05          G K
                           295.21 2.568E-04  (  3.132E-05          G
                            77.11 0.000E+00 ?   1.535E-04Energy duplication
                           241.98 4.684E-04 +   1.659E-04          G
                            74.81 1.042E-03 +   2.009E-04Energy duplication
                            87.30 6.675E-04 +   1.932E-04          X

Pb-210   N   1.3677E-03     46.50 1.368E-03  (  2.265E-04          G

AM-241       2.0413E-03     59.54 2.041E-03  (  3.631E-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
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 17-JUL-2007 09:16:47 Page 5
EnergySolutions Spectrum name: Win00228.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 #	1.0153E+00	2.600E-01	2.628E-01
K-40 #	6.1456E+00	1.968E+00	1.982E+00
Ac-228	1.9907E+00	5.562E-01	5.612E-01
Pb-212	2.0387E+00	2.473E-01	2.588E-01
CS-137 #	2.1338E-01	9.098E-02	9.135E-02
Th-234	2.2570E+00	1.086E+00	1.087E+00
Pb-214	9.2788E-01	2.265E-01	2.292E-01
Pb-210	4.8952E+00	2.327E+00	2.330E+00
AM-241	7.3060E+00	5.945E-01	6.531E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0359 D2 Grid E4 -3 071707

& - 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) 2.6789810E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fum
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0361 D2 Grid D4 -1 071707

Sample description
WI07- 0361 D2 Grid D4 - 2 071707

Spectrum Filename: C:\User\Win00230.An1

Acquisition information
Start time: 17-Jul-2007 09:39:58
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: 2.7920E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7920E+02) = 3.5817E+03
Detection limit method: Traditional ORTEC method

WI07-0361 D2 Grid D4 -1 071707

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: 0.1387

********** 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	2.92	6207.	11576.	19.293	2.68	0.854	-	D
16.80	4.19	16205.	9675.	16.125	4.24	0.855	-	D
358.68	89.72	30.	38.	0.063	52.53	0.931	PB-214	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	185.39	46.53	93.	60.	0.099	64.54	0.641s
AM-241	237.68	59.60	142.	1818.	3.029	5.30	0.864
Th-234	252.04	63.19	46.	48.	0.080	56.83	0.680
Pb-214	298.54	74.81	50.	94.	0.156	29.80	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	714.14	0.285D
Pb-212	307.74	77.11	58.	142.	0.237	22.58	0.919D
Pb-214	307.74	77.11	183.	0.	0.000	138.28	0.361D
Pb-214	348.51	87.30	45.	28.	0.047	76.21	0.928D
Th-234	368.72	92.35	52.	45.	0.075	54.21	0.933D
Ac-228	380.72	95.35	35.	12.	0.020	149.71	0.935D
Ac-228	841.24	210.46	21.	44.	0.073	53.49	0.256s
Pb-212	953.94	238.62	14.	166.	0.276	16.78	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	24.	22.	0.037	75.41	1.060D
Ac-228	1080.99	270.38	10.	42.	0.070	43.99	1.180s
Pb-214	1179.21	294.93	7.	50.	0.083	36.88	0.625s
Ac-228	1311.92	328.10	4.	12.	0.021	77.30	0.322s
Ac-228	1353.90	338.59	0.	49.	0.082	28.57	1.833s

WI07-0361 D2 Grid D4 -1 071707

Pb-214	1406.64	351.77	8.	56.	0.094	32.20	0.429s
Ac-228	1851.74	463.01	6.	14.	0.023	79.89	0.311s
Bi-214	2437.12	609.31	0.	52.	0.087	27.74	1.250s
CS-137	2646.74	661.70	0.	34.	0.057	34.30	0.365s
Bi-214	3069.00	767.23	0.	8.	0.013	70.71	0.250s
Ac-228	3174.50	793.59	0.	5.	0.008	89.44	0.500s
Ac-228	3645.27	911.24	0.	45.	0.075	29.81	0.750s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	4.	10.	0.017	82.97	1.595D
Ac-228	3876.86	969.11	0.	37.	0.062	32.91	1.598D
Bi-214	4481.00	1120.08	6.	2.	0.004	340.20	0.000s
Bi-214	4950.75	1237.45	0.	9.	0.015	66.67	0.375s
Bi-214	5508.00	1376.69	0.	3.	0.005	115.47	0.250s
K-40	5845.21	1460.95	0.	23.	0.038	41.70	0.417s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7054.89	1763.18	2.	2.	0.002	305.51	0.229s

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	2.4857E-04	609.31	2.418E-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	6.101E-04	+	3.235E-04	G
			768.36	4.169E-04	&	2.361E-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	1.0126E-03	1460.81	1.013E-03	?(	4.403E-05	G
Ac-228	N	5.2916E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	7.172E-04	+	1.769E-04	G
			338.32	5.743E-04	(	1.172E-05	G
			964.60	6.282E-04	(	2.043E-04	G
			794.70	2.940E-04	&	2.176E-04	G
			463.00	5.262E-04	?(	1.502E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 09:50:09 Page 4
EnergySolutions Spectrum name: Win00230.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.310E-04	&	2.521E-04	G
		270.23	1.312E-03	+	3.346E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.329E-04	-	1.966E-04	X
		327.64	5.023E-04	(	1.325E-04	G
Pb-212	N 3.8035E-04	238.62	3.804E-04	(	1.320E-05	G K
		77.11	5.445E-04	+	7.850E-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 7.0731E-04	92.35	5.618E-04	(	1.336E-04	G
		63.29	9.144E-04	$(	1.925E-04	G

Pb-214	N	2.2555E-04	351.92	2.093E-04	?(	1.632E-05		G K
			295.21	3.111E-04	+	7.009E-05		G
			77.11	0.000E+00	?	1.289E-04	Energy duplication	
			241.98	3.065E-04	(	1.026E-04		G
			74.81	1.044E-03	+	1.951E-04	Energy duplication	
			87.30	4.129E-04	+	1.827E-04		X
Pb-210	N	1.2180E-03	46.50	1.218E-03	(	2.893E-04		G
AM-241		3.7425E-03	59.54	3.742E-03	(	3.581E-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

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 #	8.9029E-01	2.469E-01	2.492E-01
K-40 #	3.6269E+00	1.513E+00	1.519E+00
Ac-228	1.8953E+00	5.415E-01	5.461E-01
Pb-212	1.3623E+00	2.285E-01	2.342E-01
CS-137 #	3.3000E-01	1.132E-01	1.139E-01
Th-234	2.5333E+00	9.948E-01	9.965E-01
Pb-214	8.0785E-01	2.601E-01	2.619E-01
Pb-210	4.3625E+00	2.816E+00	2.818E+00
AM-241	1.3404E+01	7.099E-01	8.661E-01

- All peaks for activity calculation had bad shape.

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* - 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) 2.9212809E+01 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 17-JUL-2007 09:32:22 Page 1
EnergySolutions Spectrum name: Win00229.An1

Sample description
WI07- 0360 D2 Grid D4 - 1 071707

Spectrum Filename: C:\User\Win00229.An1

Acquisition information
Start time: 17-Jul-2007 09:22:11
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: 2.4330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4330E+02) =
4.1102E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 09:32:22 Page 2
EnergySolutions Spectrum name: Win00229.An1

WI07-0360 D2 Grid D4 -1 071707

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	
14.75	3.87	5046.	24029.	40.048	1.75	2.289	CU-64	s
83.98	21.18	55.	77.	0.128	42.64	0.532	TC-99M	s
104.88	26.40	33.	162.	0.271	20.29	0.836	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	189.00	47.43	381.	9.	0.014	804.79	0.000s
AM-241	237.61	59.58	817.	10250.	17.083	2.28	0.870
Th-234	253.29	63.50	45.	43.	0.071	67.75	0.795
Pb-214	298.54	74.81	52.	79.	0.132	34.18	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	429.47	0.486D
Pb-212	307.74	77.11	41.	132.	0.219	22.26	0.919D
Pb-214	307.74	77.11	136.	0.	0.000	260.04	0.000D
Pb-214	347.46	87.04	39.	49.	0.082	53.61	0.650s
Th-234	368.72	92.35	56.	34.	0.057	70.54	0.933D
Ac-228	380.72	95.35	20.	5.	0.009	256.48	0.935D
Ac-228	837.67	209.56	15.	3.	0.006	367.70	0.199s
Pb-212	953.94	238.62	11.	165.	0.275	16.58	1.057D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 09:32:22 Page 3
EnergySolutions Spectrum name: Win00229.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	28.	18.	0.030	94.24	1.060D
Ac-228	1083.07	270.90	13.	20.	0.034	84.10	0.400s
Pb-214	1179.37	294.97	8.	36.	0.061	43.41	1.045s
Ac-228	1312.12	328.15	0.	25.	0.042	40.00	0.448s
Ac-228	1352.89	338.34	7.	45.	0.076	38.01	0.647s

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Pb-214	1407.19	351.91	4.	73.	0.122	25.94	0.644s
Ac-228	1850.32	462.66	0.	19.	0.032	45.88	0.333s
Bi-214	2438.27	609.60	0.	50.	0.083	28.28	0.900s
CS-137	2646.58	661.66	0.	19.	0.032	45.88	1.749s
Bi-214	3074.00	768.48	0.	1.	0.002	200.00	0.250s
Ac-228	3180.00	794.97	0.	10.	0.017	63.25	0.500s
Ac-228	3645.96	911.41	0.	25.	0.042	40.00	0.625s
Bi-214	3735.00	933.66	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	2.	6.	0.010	109.05	1.595D
Ac-228	3876.86	969.11	2.	27.	0.045	41.17	1.598D
Bi-214	4483.00	1120.58	1.	0.	0.000	0.00	0.000s
Bi-214	4948.00	1236.77	0.	6.	0.010	81.65	0.250s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.04	1460.90	0.	28.	0.047	37.80	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7058.11	1763.99	4.	2.	0.004	296.65	0.143s

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	2.3005E-04	609.31	2.325E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.521E-04	G
			1120.29	0.000E+00	?	4.867E-05	G
			1238.11	4.068E-04	&	2.712E-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	1.943E-04	?(	9.716E-05	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	2.8883E-04	911.07	2.753E-04	?(	1.101E-05	G K
			969.11	5.249E-04	+	1.579E-04	G
			338.32	5.313E-04	+	1.255E-04	G
			964.60	3.608E-04	(	1.627E-04	G
			794.70	5.880E-04	+	2.940E-04	G
			463.00	7.406E-04	+	2.606E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	1.380E-04	G
		270.23	6.353E-04	&	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.462E-04	X
		327.64	1.018E-03	+	3.090E-04	G
Pb-212	N 3.7927E-04	238.62	3.793E-04	(	1.201E-05	G K
		77.11	5.037E-04	+	7.315E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	?(	2.710E-06	G
Th-234	N 5.8625E-04	92.35	4.271E-04	(	1.382E-04	G
		63.29	8.128E-04	$(	1.912E-04	G

```
Pb-214   N   2.5640E-04    351.92 2.716E-04 @(  1.205E-05        G K
                           295.21 2.286E-04 @(  2.760E-05        G
                            77.11 0.000E+00 %   1.116E-04Energy duplication
                           241.98 2.520E-04  (  1.102E-04        G
                            74.81 8.831E-04 +   1.863E-04Energy duplication
                            87.30 7.110E-04 +   1.999E-04        X

Pb-210   N   0.0000E+00     46.50 0.000E+00 &   5.804E-04        G

AM-241       2.1106E-02     59.54 2.111E-02  (  8.427E-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	9.4552E-01	2.674E-01	2.698E-01
K-40 #	5.0669E+00	1.915E+00	1.925E+00
Ac-228	1.1871E+00	4.749E-01	4.769E-01
Pb-212	1.5589E+00	2.584E-01	2.649E-01
CS-137 #	2.1162E-01	9.710E-02	9.744E-02
Th-234	2.4096E+00	1.178E+00	1.180E+00
Pb-214	1.0538E+00	2.733E-01	2.762E-01
Pb-210 <	2.3856E+00		
AM-241	8.6750E+01	1.978E+00	3.771E+00

\# - All peaks for activity calculation had bad shape.

WI07-0360 D2 Grid D4 -1 071707

* - 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) 9.9183037E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Sample description
WI07- 0362 D2 Grid D4 - 3 071707

Spectrum Filename: C:\User\Win00231.An1

Acquisition information
Start time: 17-Jul-2007 09:56:54
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: 2.7660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7660E+02) = 3.6153E+03
Detection limit method: Traditional ORTEC method

WI07-0362 D2 Grid D4 -3 071707

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: 0.1459

********** 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	
12.05	3.29	7772.	13994.	23.323	2.46	0.854	-	D
17.50	4.65	13581.	10313.	17.188	3.75	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	185.28	46.50	33.	62.	0.104	41.98	0.573s
AM-241	237.48	59.55	76.	234.	0.389	19.66	0.921
Th-234	252.21	63.23	58.	37.	0.061	82.92	0.553s
Pb-214	298.54	74.81	43.	103.	0.171	26.83	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	2792.85	0.557D
Pb-212	307.74	77.11	38.	116.	0.194	23.82	0.919D
Pb-214	307.74	77.11	111.	0.	0.000	3104.66	0.410D
Pb-214	349.32	87.50	65.	30.	0.050	106.98	0.536s
Th-234	368.72	92.35	48.	50.	0.084	48.18	0.933D
Ac-228	380.72	95.35	24.	18.	0.030	90.20	0.935D
Ac-228	837.35	209.48	30.	20.	0.033	111.80	0.750s
Pb-212	953.94	238.62	17.	190.	0.317	15.71	1.057D
Pb-214	967.37	241.98	30.	21.	0.035	84.81	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.21	270.68	6.	23.	0.039	57.53	0.583s
Pb-214	1180.74	295.31	17.	66.	0.111	37.23	0.694s
Ac-228	1312.00	328.12	3.	27.	0.046	44.57	0.901s
Ac-228	1352.63	338.27	9.	40.	0.066	42.42	0.994
Pb-214	1407.21	351.91	4.	92.	0.154	22.83	1.062s

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Ac-228	1851.57	462.97	4.	10.	0.017	93.81	0.658s
Bi-214	2437.85	609.50	0.	47.	0.078	29.17	0.962s
CS-137	2646.30	661.59	0.	23.	0.038	41.70	0.437s
Bi-214	3075.00	768.73	1.	0.	0.000	0.00	0.000s
Ac-228	3177.00	794.22	0.	0.	0.001	223.61	0.100s
Ac-228	3645.98	911.41	0.	44.	0.073	30.15	0.387s
Bi-214	3737.67	934.33	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	4.	5.	0.008	149.02	1.595D
Ac-228	3876.86	969.11	3.	35.	0.058	36.81	1.598D
Bi-214	4486.00	1121.32	0.	9.	0.015	66.67	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	5844.10	1460.67	0.	29.	0.048	37.14	1.624
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7056.33	1763.54	2.	1.	0.001	478.42	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	2.1867E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	2.190E-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	%	1.943E-04	G
K-40	N	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	5.4071E-04	911.07	4.846E-04	?(	1.101E-05	G K
			969.11	6.768E-04	(	5.937E-05	G
			338.32	4.649E-04	?(	5.683E-05	G
			964.60	3.003E-04	-	2.946E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	3.898E-04	-	2.267E-04	G
			209.28	4.232E-04	(	1.748E-04	G

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EnergySolutions Spectrum name: Win00231.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.290E-04	(	1.220E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	3.469E-04	-	1.864E-04	X
		327.64	1.113E-03	+	3.365E-04	G
Pb-212	N 4.3973E-04	238.62	4.375E-04	(	1.448E-05	G K
		77.11	4.451E-04	(	3.522E-05	Energy duplication
		74.81	0.000E+00	%	9.351E-05	Energy duplication
CS-137	6.2327E-05	661.66	6.233E-05	?(	2.710E-06	G
Th-234	N 6.5564E-04	92.35	6.255E-04	(	1.285E-04	G
		63.29	6.985E-04	(	2.155E-04	G

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Pb-214    N   3.7186E-04    351.92 3.414E-04 @(  1.227E-05          G K
                            295.21 4.155E-04 @(  3.943E-05          G
                             77.11 0.000E+00 %   1.010E-04Energy duplication
                            241.98 2.931E-04 -   1.467E-04          G
                             74.81 1.145E-03 +   1.964E-04Energy duplication
                             87.30 4.353E-04  (  1.729E-04          X

Pb-210    N   1.2725E-03     46.50 1.272E-03 @(  1.755E-04          G

AM-241        4.8081E-04     59.54 4.808E-04  (  2.652E-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 17-JUL-2007 10:07:04 Page 5
EnergySolutions Spectrum name: Win00231.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	7.9058E-01	2.306E-01	2.325E-01
K-40 #	4.6161E+00	1.714E+00	1.723E+00
Ac-228	1.9548E+00	5.512E-01	5.560E-01
Pb-212	1.5898E+00	2.268E-01	2.345E-01
CS-137 #	2.2533E-01	9.397E-02	9.437E-02
Th-234	2.3704E+00	1.137E+00	1.138E+00
Pb-214	1.3444E+00	3.069E-01	3.110E-01
Pb-210 #	4.6004E+00	1.931E+00	1.934E+00
AM-241	1.7383E+00	3.417E-01	3.477E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

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& - 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) 1.9230034E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

Sample description
WI07- 0363 D2 Grid C4 - 1 071707

Spectrum Filename: C:\User\Win00232.An1

Acquisition information
Start time: 17-Jul-2007 10:54:49
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: 3.3260E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3260E+02) = 3.0066E+03
Detection limit method: Traditional ORTEC method

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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	
12.13	3.31	6445.	10424.	17.374	2.93	0.854	-	D
17.39	4.63	11121.	8549.	14.248	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	186.04	46.69	43.	49.	0.081	56.03	0.372s
AM-241	237.43	59.54	81.	374.	0.623	14.13	1.038s
Th-234	253.04	63.44	44.	52.	0.087	51.12	0.413s
Pb-214	298.54	74.81	102.	61.	0.102	53.28	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	464.00	0.228D
Pb-212	307.74	77.11	89.	165.	0.274	22.53	0.919D
Pb-214	307.74	77.11	230.	0.	0.000	251.66	0.347D
Pb-214	347.86	87.14	43.	60.	0.099	44.37	1.116s
Th-234	368.72	92.35	50.	57.	0.095	44.13	0.933D
Ac-228	380.72	95.35	33.	1.	0.002	1789.39	0.936D
Ac-228	837.83	209.60	18.	38.	0.064	56.25	0.384s
Pb-212	953.94	238.62	30.	199.	0.332	16.17	1.057D
Pb-214	967.37	241.98	31.	23.	0.038	81.66	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:04:59 Page 3
EnergySolutions Spectrum name: Win00232.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.64	270.04	12.	28.	0.046	61.39	0.340s
Pb-214	1181.17	295.42	3.	56.	0.094	29.15	1.042s
Ac-228	1309.76	327.56	7.	23.	0.039	61.94	0.378s
Ac-228	1352.60	338.26	5.	49.	0.082	32.66	1.603s
Pb-214	1407.17	351.90	7.	89.	0.148	25.00	0.371s

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Ac-228	1852.41	463.18	0.	22.	0.037	42.64	1.083
Bi-214	2437.21	609.34	4.	65.	0.109	28.08	1.368s
CS-137	2645.35	661.35	3.	28.	0.046	46.03	0.391s
Bi-214	3073.39	768.32	2.	9.	0.015	86.07	0.236s
Ac-228	3178.62	794.62	0.	8.	0.013	70.71	0.312s
Ac-228	3645.82	911.37	0.	60.	0.100	25.82	1.520s
Bi-214	3734.40	933.51	2.	6.	0.010	115.47	0.292s
Ac-228	3858.81	964.60	3.	17.	0.029	55.13	1.595D
Ac-228	3876.86	969.11	1.	40.	0.067	32.47	1.598D
Bi-214	4481.82	1120.28	0.	17.	0.028	48.51	0.375s
Bi-214	4950.00	1237.27	0.	5.	0.008	89.44	0.250s
Bi-214	5512.67	1377.86	1.	0.	0.001	240.37	0.197s
K-40	5845.20	1460.95	0.	49.	0.082	28.57	1.612
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7059.55	1764.35	3.	1.	0.001	618.24	0.315s

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	3.3102E-04	609.31	3.031E-04	@(	1.541E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	4.690E-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	5.830E-04	+	4.403E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	(	4.403E-05	G
Ac-228	N	7.1893E-04	911.07	6.608E-04	*(	1.101E-05	G K
			969.11	7.755E-04	(	3.959E-05	G
			338.32	5.782E-04	(	4.214E-05	G
			964.60	1.067E-03	+	4.225E-04	G
			794.70	4.704E-04	-	2.664E-04	G
			463.00	8.575E-04	?(	3.898E-05	G
			209.28	8.146E-04	(	1.362E-04	G

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:04:59 Page 4
EnergySolutions Spectrum name: Win00232.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.592E-04	*(	1.726E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	9.502E-04	(	1.705E-04	G
Pb-212	N 4.5735E-04	238.62	4.574E-04	(	1.898E-05	G K
		77.11	6.299E-04	+	8.822E-05	Energy duplication
		74.81	0.000E+00	%	9.819E-05	Energy duplication
CS-137	7.5425E-05	661.66	7.543E-05	(	8.308E-06	G
Th-234	N 8.2512E-04	92.35	7.089E-04	(	1.314E-04	G
		63.29	9.906E-04	(	1.885E-04	G

Pb-214	N	3.3362E-04	351.92	3.284E-04	(	1.616E-05		G K
			295.21	3.518E-04	@(	1.837E-05		G
			77.11	0.000E+00	%	1.441E-04	Energy duplication	
			241.98	3.129E-04	(	1.167E-04		G
			74.81	6.819E-04	+	2.072E-04	Energy duplication	
			87.30	8.658E-04	+	2.157E-04		X
Pb-210	N	9.9347E-04	46.50	9.935E-04	(	2.005E-04		G
AM-241		7.7012E-04	59.54	7.701E-04	*(	2.726E-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

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 #	9.9526E-01	2.794E-01	2.819E-01
K-40	6.4864E+00	1.853E+00	1.869E+00
Ac-228	2.1616E+00	3.829E-01	3.914E-01
Pb-212	1.3751E+00	2.224E-01	2.283E-01
CS-137 #	2.2677E-01	1.044E-01	1.047E-01
Th-234	2.4808E+00	8.377E-01	8.397E-01
Pb-214	1.0031E+00	2.508E-01	2.536E-01
Pb-210 #	2.9870E+00	1.674E+00	1.675E+00
AM-241 #	2.3154E+00	3.271E-01	3.382E-01

\# - All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0363 D2 Grid C4 -1 071707

& - 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) 2.0031357E+01 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 17-JUL-2007 11:21:22 Page 1
EnergySolutions Spectrum name: Win00233.An1

Sample description
WI07- 0364 D2 Grid C4 - 2 071707

Spectrum Filename: C:\User\Win00233.An1

Acquisition information
Start time: 17-Jul-2007 11:11:11
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: 2.9910E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9910E+02) = 3.3434E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:21:22 Page 2
EnergySolutions Spectrum name: Win00233.An1

WI07-0364 D2 Grid C4 -2 071707

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: 0.1092

********** 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	
11.77	2.91	5429.	9477.	15.795	3.01	0.854	-	D
16.84	4.18	14224.	8422.	14.036	4.56	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	185.51	46.56	33.	61.	0.102	40.75	1.048
AM-241	237.57	59.57	144.	796.	1.327	9.31	0.952
Th-234	253.66	63.59	48.	49.	0.082	56.70	1.034
Pb-214	298.54	74.81	63.	91.	0.152	32.30	0.917D
Pb-212	298.56	74.81	92.	0.	0.000	685.57	0.374D
Pb-212	307.74	77.11	56.	116.	0.194	26.00	0.919D
Pb-214	307.74	77.11	194.	0.	0.000	100.56	0.000D
Pb-214	348.19	87.22	26.	61.	0.102	37.76	1.521s
Th-234	368.72	92.35	65.	39.	0.065	66.86	0.933D
Ac-228	380.72	95.35	42.	7.	0.011	279.46	0.935D
Ac-228	835.34	208.98	19.	29.	0.049	65.24	0.456s
Pb-212	953.94	238.62	31.	177.	0.295	17.43	1.057D
Pb-214	967.37	241.98	14.	26.	0.043	57.26	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:21:22 Page 3
EnergySolutions Spectrum name: Win00233.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.09	269.65	7.	40.	0.067	42.28	0.483s
Pb-214	1181.20	295.43	3.	58.	0.096	29.45	0.960
Ac-228	1309.94	327.60	5.	16.	0.027	72.35	0.305s
Ac-228	1353.44	338.47	3.	62.	0.104	27.49	1.545s
Pb-214	1408.10	352.14	10.	72.	0.120	29.83	1.235s

WI07-0364 D2 Grid C4 -2 071707

Ac-228	1851.12	462.86	4.	30.	0.050	46.26	0.507s
Bi-214	2437.17	609.33	0.	41.	0.068	31.23	1.081
CS-137	2645.96	661.51	0.	27.	0.045	38.49	0.583s
Bi-214	3070.33	767.56	0.	5.	0.008	89.44	0.250s
Ac-228	3179.31	794.79	0.	23.	0.038	41.70	0.375s
Ac-228	3645.20	911.22	0.	41.	0.068	31.23	0.875s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	1.	0.002	262.74	1.595D
Ac-228	3876.86	969.11	1.	21.	0.035	45.45	1.598D
Bi-214	4476.00	1118.83	0.	14.	0.023	53.45	0.250s
Bi-214	4954.67	1238.43	1.	0.	0.001	240.37	0.197s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5845.98	1461.14	0.	45.	0.075	29.81	0.625s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7057.00	1763.71	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1005E-04	609.31	1.907E-04	(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	3.407E-04	&	1.415E-04	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	2.164E-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	4.6465E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	4.091E-04	(	3.790E-05	G
			338.32	7.286E-04	+	1.396E-04	G
			964.60	0.000E+00	%	1.581E-04	G
			794.70	1.352E-03	+	4.293E-04	G
			463.00	1.176E-03	+	3.415E-04	G
			209.28	6.207E-04	@(	1.403E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.250E-03	&	3.189E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.006E-04	X
		327.64	6.516E-04	(	1.507E-04	G
Pb-212	N 4.1809E-04	238.62	4.074E-04	(	1.920E-05	G K
		77.11	4.446E-04	(	4.243E-05	Energy duplication
		74.81	0.000E+00	%	9.116E-05	Energy duplication
CS-137	7.3167E-05	661.66	7.317E-05	(	2.710E-06	G
Th-234	N 6.7023E-04	92.35	4.853E-04	(	1.487E-04	G
		63.29	9.335E-04	$(	1.964E-04	G

```
                        WI07-0364  D2  Grid  C4 -2     071707
Pb-214   N   3.0553E-04    351.92 2.667E-04 @(  1.852E-05          G K
                           295.21 3.612E-04  (  1.961E-05          G
                            77.11 0.000E+00 ?   1.326E-04Energy duplication
                           241.98 3.558E-04  (  8.110E-05          G
                            74.81 1.018E-03 +   2.015E-04Energy duplication
                            87.30 8.900E-04 +   1.988E-04          X

Pb-210   N   1.2452E-03     46.50 1.245E-03  (  1.764E-04          G

AM-241       1.6391E-03     59.54 1.639E-03  (  3.599E-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  17-JUL-2007 11:21:22 Page    5
EnergySolutions                    Spectrum name: Win00233.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        7.0227E-01     2.194E-01    2.209E-01
K-40    #     6.6240E+00     1.975E+00    1.990E+00
Ac-228        1.5535E+00     4.348E-01    4.387E-01
Pb-212        1.3978E+00     2.188E-01    2.250E-01
CS-137        2.4462E-01     9.416E-02    9.462E-02
Th-234        2.2408E+00     9.823E-01    9.836E-01
Pb-214        1.0215E+00     2.416E-01    2.447E-01
Pb-210        4.1633E+00     1.697E+00    1.699E+00
AM-241        5.4800E+00     5.100E-01    5.489E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0364 D2 Grid C4 -2 071707

& - 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) 2.3427874E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0365 D2 Grid C4 -3 071707

Sample description
WI07- 0365 D2 Grid C4 - 3 071707

Spectrum Filename: C:\User\Win00234.An1

Acquisition information
Start time: 17-Jul-2007 11:25:39
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: 2.8790E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8790E+02) = 3.4734E+03
Detection limit method: Traditional ORTEC method

WI07-0365 D2 Grid C4 -3 071707

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: 0.1576

********** 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	2.91	5758.	9574.	15.957	3.03	0.854	-	D
17.90	4.43	15847.	7580.	12.634	5.23	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	184.32	46.26	174.	53.	0.088	90.49	0.467s
AM-241	237.92	59.66	187.	288.	0.480	22.67	1.051
Th-234	252.55	63.31	106.	42.	0.070	90.35	0.346s
Pb-214	298.54	74.81	92.	100.	0.167	33.58	0.917D
Pb-212	298.56	74.81	110.	0.	0.000	501.11	0.683D
Pb-212	307.74	77.11	82.	119.	0.199	28.17	0.919D
Pb-214	307.74	77.11	132.	0.	0.000	3385.10	0.296D
Pb-214	348.14	87.21	91.	36.	0.060	102.34	0.888
Th-234	368.72	92.35	67.	41.	0.068	65.05	0.933D
Ac-228	380.72	95.35	50.	1.	0.002	1471.25	0.935D
Ac-228	836.52	209.27	14.	22.	0.037	72.73	0.507s
Pb-212	953.94	238.62	30.	135.	0.226	20.59	1.057D
Pb-214	967.37	241.98	26.	20.	0.033	85.30	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:35:50 Page 3
EnergySolutions Spectrum name: Win00234.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.88	270.10	10.	34.	0.056	51.04	0.370s
Pb-214	1180.29	295.20	5.	47.	0.079	33.51	1.062s
Ac-228	1305.00	326.37	0.	25.	0.042	40.00	0.250s
Ac-228	1352.22	338.17	3.	44.	0.074	33.19	0.550s
Pb-214	1406.34	351.70	8.	89.	0.149	25.17	1.421s

WI07-0365 D2 Grid C4 -3 071707

Ac-228	1850.42	462.69	3.	18.	0.030	62.47	0.912s
Bi-214	2437.58	609.43	0.	52.	0.087	27.74	0.821s
CS-137	2647.50	661.89	0.	44.	0.073	30.15	0.700s
Bi-214	3071.33	767.81	0.	8.	0.013	70.71	0.250s
Ac-228	3179.71	794.89	0.	12.	0.020	57.74	0.500s
Ac-228	3645.71	911.35	0.	51.	0.085	28.01	0.791s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	3.	0.005	166.79	1.595D
Ac-228	3876.86	969.11	0.	31.	0.051	36.73	1.598D
Bi-214	4482.00	1120.33	4.	3.	0.005	234.13	0.000s
Bi-214	4953.00	1238.02	0.	1.	0.002	200.00	0.250s
Bi-214	5509.00	1376.94	0.	6.	0.010	81.65	0.250s
K-40	5844.88	1460.87	0.	26.	0.043	39.22	0.645s
Ac-228	6353.62	1587.98	1.	1.	0.001	339.93	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	MDA Value microCi	Comments
Bi-214	N	2.4182E-04	609.31	2.418E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	0.000E+00	%	1.040E-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	6.492E-04	+	4.328E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.1447E-03	1460.81	1.145E-03	?(	4.403E-05	G
Ac-228	N	5.7421E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	5.931E-04	(	3.067E-05	G
			338.32	5.196E-04	@(	3.355E-05	G
			964.60	1.696E-04	-	2.082E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	6.951E-04	(	1.195E-04	G
			209.28	4.655E-04	?(	1.230E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:35:50 Page 4
EnergySolutions Spectrum name: Win00234.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.047E-03	+	3.058E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	0.000E+00	%	2.044E-04	X
		327.64	1.018E-03	&	3.090E-04	G
Pb-212	N 3.1135E-04	238.62	3.114E-04	(	1.884E-05	G K
		77.11	4.570E-04	+	7.869E-05	Energy duplication
		74.81	0.000E+00	%	9.936E-05	Energy duplication
CS-137	1.1924E-04	661.66	1.192E-04	(	2.710E-06	G
Th-234	N 6.2846E-04	92.35	5.079E-04	(	1.511E-04	G
		63.29	8.001E-04	?(	2.871E-04	G

```
                        WI07-0365  D2  Grid  C4 -3     071707
Pb-214   N   3.1402E-04    351.92 3.309E-04 @(  1.647E-05          G K
                           295.21 2.965E-04  (  2.252E-05          G
                            77.11 0.000E+00 %   1.099E-04Energy duplication
                           241.98 2.753E-04  (  1.070E-04          G
                            74.81 1.119E-03 +   2.243E-04Energy duplication
                            87.30 5.224E-04 +   2.386E-04          X

Pb-210   N   1.0819E-03     46.50 1.082E-03  (  3.912E-04          G

AM-241       5.9338E-04     59.54 5.934E-04  (  4.085E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  17-JUL-2007 11:35:50 Page    5
EnergySolutions                    Spectrum name: Win00234.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        8.3996E-01     2.330E-01    2.351E-01
K-40    #     3.9761E+00     1.560E+00    1.567E+00
Ac-228        1.9945E+00     4.173E-01    4.240E-01
Pb-212        1.0815E+00     2.227E-01    2.263E-01
CS-137        4.1415E-01     1.249E-01    1.259E-01
Th-234        2.1829E+00     1.215E+00    1.216E+00
Pb-214        1.0907E+00     2.745E-01    2.776E-01
Pb-210 #      3.7580E+00     3.401E+00    3.402E+00
AM-241        2.0610E+00     4.672E-01    4.734E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0365 D2 Grid C4 -3 071707

& - 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) 1.7398872E+01 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 17-JUL-2007 11:55:31 Page 1
EnergySolutions Spectrum name: Win00235.An1

Sample description
WI07- 0366 D2 Grid B4 - 1 071707

Spectrum Filename: C:\User\Win00235.An1

Acquisition information
Start time: 17-Jul-2007 11:45:20
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: 2.6880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6880E+02) = 3.7202E+03
Detection limit method: Traditional ORTEC method

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:55:31 Page 2
EnergySolutions Spectrum name: Win00235.An1

WI07-0366 D2 Grid B4 - 1 071707

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: 0.1229

********** 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	7040.	10923.	18.204	2.90	0.854	-	D
15.83	3.96	15162.	9712.	16.186	4.12	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	185.27	46.50	70.	54.	0.090	60.18	0.440s
AM-241	237.61	59.58	142.	2036.	3.394	4.99	0.859
Th-234	253.04	63.44	24.	27.	0.045	73.70	1.121s
Pb-214	298.54	74.81	29.	44.	0.074	45.67	0.917D
Pb-212	298.56	74.81	38.	0.	0.000	485.71	0.000D
Pb-212	307.74	77.11	34.	95.	0.158	27.01	0.919D
Pb-214	307.74	77.11	99.	0.	0.000	485.70	0.401D
Pb-214	347.22	86.98	19.	42.	0.071	48.31	0.731
Th-234	368.72	92.35	24.	21.	0.035	80.40	0.933D
Ac-228	380.72	95.35	20.	8.	0.014	167.68	0.935D
Ac-228	836.62	209.30	8.	21.	0.035	63.89	0.900
Pb-212	953.94	238.62	26.	94.	0.157	25.65	1.057D
Pb-214	967.37	241.98	17.	7.	0.011	187.24	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:55:31 Page 3
EnergySolutions Spectrum name: Win00235.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1074.58	268.78	7.	26.	0.043	58.33	0.305s
Pb-214	1179.90	295.10	5.	39.	0.064	39.47	1.016
Ac-228	1296.26	324.18	4.	15.	0.026	74.30	0.212s
Ac-228	1351.45	337.98	6.	31.	0.052	47.85	0.861s
Pb-214	1407.29	351.93	8.	42.	0.069	41.48	0.431s

WI07-0366 D2 Grid B4 - 1 071707

Ac-228	1851.00	462.83	0.	6.	0.010	81.65	0.250s
Bi-214	2437.21	609.34	26.	0.	0.000	0.00	0.170s
CS-137	2646.11	661.54	0.	19.	0.032	45.88	0.771s
Bi-214	3073.67	768.39	0.	3.	0.005	115.47	0.375s
Ac-228	3179.67	794.88	0.	9.	0.015	66.67	0.375s
Ac-228	3646.15	911.46	0.	29.	0.048	37.14	0.333s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	7.	0.012	91.84	1.595D
Ac-228	3876.86	969.11	0.	16.	0.027	49.83	1.598D
Bi-214	4483.00	1120.58	0.	9.	0.015	66.67	0.312s
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	5842.18	1460.19	6.	2.	0.004	355.18	0.294s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7056.83	1763.67	1.	1.	0.001	366.67	0.223s

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	0.0000E+00	609.31	0.000E+00	%	3.802E-05	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	2.190E-04	?	1.161E-04	G
			1238.11	0.000E+00	?	6.779E-05	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	0.0000E+00	1460.81	0.000E+00	%	1.995E-04	G
Ac-228	N	3.5579E-04	911.07	3.194E-04	(	1.101E-05	G K
			969.11	3.127E-04	(	1.942E-05	G
			338.32	3.633E-04	(	4.688E-05	G
			964.60	4.424E-04	(	1.530E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	2.339E-04	-	1.559E-04	G
			209.28	4.443E-04	(	9.588E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 11:55:31 Page 4
EnergySolutions Spectrum name: Win00235.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.123E-04	&	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.588E-04	-	1.541E-04	X
		327.64	6.244E-04	&	2.722E-04	G
Pb-212	N 2.1641E-04	238.62	2.164E-04	(	1.771E-05	G K
		77.11	3.623E-04	+	6.344E-05	Energy duplication
		74.81	0.000E+00	%	5.943E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	?(	2.710E-06	G
Th-234	N 3.6399E-04	92.35	2.584E-04	(	9.343E-05	G
		63.29	5.144E-04	(	1.419E-04	G

```
                        WI07-0366  D2  Grid  B4 - 1    071707
Pb-214    N   1.8384E-04    351.92 1.537E-04  (  1.723E-05          G K
                           295.21 2.422E-04  (  2.383E-05          G
                            77.11 0.000E+00 %   9.553E-05Energy duplication
                           241.98 9.474E-05 -   1.030E-04          G
                            74.81 4.932E-04 +   1.405E-04Energy duplication
                            87.30 6.143E-04 +   1.677E-04          X

Pb-210    N   1.1023E-03     46.50 1.102E-03 ?(  2.520E-04          G

AM-241        4.1931E-03     59.54 4.193E-03  (  3.571E-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  17-JUL-2007 11:55:31 Page    5
EnergySolutions                    Spectrum name: Win00235.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 B<     1.4145E-01
K-40    <     7.4217E-01
Ac-228        1.3236E+00    3.354E-01    3.390E-01
Pb-212        8.0511E-01    2.065E-01    2.087E-01
CS-137 #      1.9155E-01    8.789E-02    8.819E-02
Th-234        1.3541E+00    7.385E-01    7.391E-01
Pb-214        6.8392E-01    1.958E-01    1.975E-01
Pb-210 #      4.1010E+00    2.468E+00    2.470E+00
AM-241        1.5599E+01    7.781E-01    9.690E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0366 D2 Grid B4 - 1 071707

& - 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) 2.4058620E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fern
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:08:51 Page 1
EnergySolutions Spectrum name: Win00236.An1

Sample description
WI07- 0367 D2 Grid B4 - 2 071707

Spectrum Filename: C:\User\Win00236.An1

Acquisition information
Start time: 17-Jul-2007 11:58:38
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: 3.1830E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1830E+02) = 3.1417E+03
Detection limit method: Traditional ORTEC method

D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:08:51 Page 2
EnergySolutions Spectrum name: Win00236.An1

WI07-0367 D2 Grid B4 - 2 071707

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: 0.1441

********** 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	
12.16	3.44	10544.	14054.	23.424	2.67	0.854	-	D
17.74	4.83	12365.	11184.	18.639	3.39	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	185.93	46.66	35.	55.	0.092	44.97	0.993
AM-241	237.70	59.60	61.	348.	0.581	13.47	0.948
Th-234	251.75	63.11	46.	29.	0.049	86.47	0.852
Pb-214	298.54	74.81	59.	67.	0.112	40.30	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	168.13	0.387D
Pb-212	307.74	77.11	41.	117.	0.194	24.23	0.919D
Pb-214	307.74	77.11	117.	0.	0.000	2487.97	0.218D
Pb-214	348.19	87.22	32.	26.	0.043	80.08	0.824
Th-234	368.72	92.35	56.	28.	0.047	84.57	0.933D
Ac-228	380.72	95.35	23.	3.	0.005	490.58	0.935D
Ac-228	835.44	209.01	18.	35.	0.058	59.11	0.874
Pb-212	953.94	238.62	15.	139.	0.231	18.79	1.057D
Pb-214	967.37	241.98	17.	24.	0.041	62.37	1.060D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:08:51 Page 3
EnergySolutions Spectrum name: Win00236.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.39	270.23	12.	23.	0.039	67.61	1.234
Pb-214	1180.88	295.35	4.	57.	0.096	30.10	1.135
Ac-228	1312.63	328.27	0.	27.	0.045	38.49	0.483s
Ac-228	1352.91	338.34	0.	44.	0.073	30.15	1.268s
Pb-214	1407.13	351.89	3.	51.	0.086	30.46	0.688s

WI07-0367 D2 Grid B4 - 2 071707

Ac-228	1851.44	462.94	6.	15.	0.025	76.59	0.571s
Bi-214	2437.82	609.49	0.	55.	0.092	26.97	0.625s
CS-137	2647.95	662.00	0.	38.	0.063	32.44	0.365s
Bi-214	3066.00	766.48	0.	12.	0.020	57.74	0.375s
Ac-228	3178.33	794.55	0.	11.	0.018	60.30	0.375s
Ac-228	3646.44	911.53	0.	50.	0.083	28.28	0.604s
Bi-214	3737.50	934.28	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	4.	9.	0.015	94.83	1.595D
Ac-228	3876.86	969.11	0.	23.	0.039	41.52	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5514.00	1378.19	0.	5.	0.008	89.44	0.750s
K-40	5847.03	1461.40	0.	30.	0.050	36.51	0.364s
Ac-228	6353.00	1587.82	0.	2.	0.003	141.42	0.250s
Bi-214	7059.62	1764.37	0.	13.	0.022	55.47	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.5809E-04	609.31	2.558E-04	(	4.650E-06	G K
			1764.49	4.626E-04	+	2.001E-04	G
			1120.29	0.000E+00	?	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	5.410E-04	+	4.005E-04	G
			934.06	2.915E-04	?(	9.716E-05	G
K-40	N	1.3208E-03	1460.81	1.321E-03	?(	4.403E-05	G
Ac-228	N	5.3869E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	4.505E-04	(	1.942E-05	G
			338.32	5.157E-04	*(	1.172E-05	G
			964.60	5.406E-04	(	2.133E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	5.847E-04	?(	1.559E-04	G
			209.28	7.406E-04	+	2.287E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 17-JUL-2007 12:08:51 Page 4
EnergySolutions Spectrum name: Win00236.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.290E-04	?(	1.673E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.489E-04	X
		327.64	1.100E-03	&	3.203E-04	G
Pb-212	N 3.1837E-04	238.62	3.184E-04	(	1.398E-05	G K
		77.11	4.462E-04	+	6.999E-05	Energy duplication
		74.81	0.000E+00	&	8.103E-05	Energy duplication
CS-137	1.0298E-04	661.66	1.030E-04	(	2.710E-06	G
Th-234	N 4.3435E-04	92.35	3.491E-04	(	1.384E-04	G
		63.29	5.557E-04	?(	1.922E-04	G

```
                          WI07-0367  D2  Grid  B4 - 2    071707
Pb-214    N   1.9012E-04    351.92 1.901E-04  (  1.060E-05          G K
                           295.21 3.592E-04 +   7.239E-05          G
                            77.11 0.000E+00 %   1.039E-04Energy duplication
                           241.98 3.367E-04 +   1.323E-04          G
                            74.81 7.525E-04 +   1.828E-04Energy duplication
                            87.30 3.700E-04 +   1.624E-04          X

Pb-210    N   1.1262E-03     46.50 1.126E-03  (  1.809E-04          G

AM-241        7.1727E-04     59.54 7.173E-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
```



```
   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        8.1084E-01     2.187E-01    2.208E-01
K-40    #     4.1496E+00     1.515E+00    1.523E+00
Ac-228        1.6924E+00     3.936E-01    3.987E-01
Pb-212        1.0002E+00     1.880E-01    1.917E-01
CS-137        3.2352E-01     1.050E-01    1.057E-01
Th-234        1.3646E+00     8.253E-01    8.259E-01
Pb-214        5.9731E-01     1.819E-01    1.833E-01
Pb-210        3.5381E+00     1.591E+00    1.593E+00
AM-241        2.2534E+00     3.036E-01    3.148E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0367 D2 Grid B4 - 2 071707

& - 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) 1.5730003E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

LN2 Dewar Fill Sheet

Winnie Project

Detector #	Date/Time Started	Technician	Time Filled
1	6/5/07@1300	LCF	1420
1	6/5/07@1645	LCF	1735
2	6/6/07@0730	LCF	0810
2	6/7/07@1435	CSH	1600
2	6/8/07@0700	LCF	0820
2	6/9/07@0800	CSH	0915
1	6/10/07@0815	CSH	0922
1	6/11/07@1725	LCF	1842
2	6/12/07@0615	CSH	0733
1	6/12/07@1405	CSH	1622
2	6/13/07@1500	LCF	1633
2	6/14/07@0800	LCF	0916
1	6/14/07@0945	LCF	1018
1	6/16/07@0815	CSH	0925
2	6/16/07@0945	CSH	1000
2	6/18/07@1247	LCF	1310
1	6/18/07@1340	LCF	1420
1	6/20/07@1450	LCF	1535
2	6/20/07@1615	LCF	1655
2	6/21/07@1150	LCF	1225
2	6/24/07@0915	LCF	0955
1	6/24/07@1000	CSH	1011
1	6/27/07@1245	LCF	1415
2	6/27/07@1600	LCF	1639
2	6/30/07@1233	GP	1255
1	6/30/07@1355	GP	1444
1	7/2/07@0855	LCF	1010
1	7/5/07@0810	LCF	0858
2	7/7/07@1130	LCF	1215

LN2 Dewar Fill Sheet

Winnie Project

Detector #	Date/Time Started	Technician	Time Filled
1	7/9/07@0830	LCF	0915
2	7/10/07@1620	LCF	1655
1	7/10/07@1635	LCF	1700
1	7/11/07@1107	LCF	1145 *
2	7/11/07@1155	LCF	1316 *
1	7/11/07@1325	LCF	1410 *
2	7/11/07@1450	LCF	1510 *
2	7/12/07@1326	LCF	1405
1	7/12/07@1530	LCF	1600
1	7/15/07@0840	LCF	0935
2	7/16/07@0747	LCF	0840
2	7/18/07@1600	LCF	1615
1	7/20/07@0720	LCF	0820
2	7/22/07@1045	LCF	1130
1	7/24/07@1515	LCF	1630
2	7/25/07@0730	LCF	0830
2	7/28/07@1300	LCF	1328
1	7/30/07@1800	GP	1910
2	7/30/07@1930	GP	2030
1	7/31/07@0930	LCF	1010
2	8/1/07@0845	LCF	1022
1	8/3/07@1130	LCF	1320
2	8/3/07@1440	LCF	1520
2	8/5/07@0915	LCF	1115
1	8/6/07@1325	GP	1438
2	8/8/07@1100	GP	1145
2	8/9/07@1635	LCF	1730

* Air conditioning off while being replaced

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 09:07:42 Page 1
EnergySolutions Spectrum name: Win00244.An1

Sample description
WI07- 0392 D2 Pre RSA South 071807

Spectrum Filename: C:\User\Win00244.An1

Acquisition information
Start time: 18-Jul-2007 08:57:31
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: 2.4260E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.4260E+02) = 4.1220E+03
Detection limit method: Traditional ORTEC method

D

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 09:07:42 Page 2
EnergySolutions Spectrum name: Win00244.An1

WI07-0392 D2 Pre RSA South 071807

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: 0.1558

********** 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	2.91	5307.	13377.	22.295	2.32	0.854	-	D
18.66	4.61	14378.	8791.	14.651	4.41	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	186.27	46.75	9.	46.	0.076	38.38	0.434s
AM-241	235.00	58.93	11.	7.	0.012	176.51	0.250s
Th-234	252.89	63.40	10.	10.	0.016	125.88	0.355s
Pb-214	298.54	74.81	11.	21.	0.036	61.39	0.918D
Pb-212	298.56	74.81	18.	0.	0.000	340.87	0.406D
Pb-212	307.74	77.11	26.	11.	0.018	147.36	0.920D
Pb-214	307.74	77.11	28.	0.	0.000	551.09	0.000D
Pb-214	348.84	87.38	14.	27.	0.045	67.14	0.362s
Th-234	368.72	92.35	19.	11.	0.018	133.63	0.933D
Ac-228	380.72	95.35	7.	3.	0.005	277.13	0.935D
Ac-228	837.79	209.59	6.	20.	0.034	63.79	0.265s
Pb-212	953.94	238.62	7.	24.	0.039	52.60	1.057D
Pb-214	967.37	241.98	11.	10.	0.017	112.46	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 09:07:42 Page 3
EnergySolutions Spectrum name: Win00244.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.00	269.88	2.	0.	0.000	0.00	0.000s
Pb-214	1180.58	295.27	11.	2.	0.003	575.91	0.336s
Ac-228	1309.00	327.37	1.	0.	0.000	0.00	0.000s
Ac-228	1341.19	335.41	3.	9.	0.015	97.64	0.484s
Pb-214	1406.25	351.67	0.	23.	0.038	41.70	0.312s

WI07-0392 D2 Pre RSA South 071807

Ac-228	1851.67	463.00	1.	0.	0.001	240.37	0.197s
Bi-214	2437.00	609.28	0.	13.	0.022	55.47	0.292s
CS-137	2646.35	661.60	0.	17.	0.028	48.51	0.541s
Bi-214	3074.00	768.48	0.	2.	0.003	141.42	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.71	911.35	0.	9.	0.015	66.67	0.292s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	2.	0.003	238.03	1.595D
Ac-228	3876.86	969.11	0.	6.	0.010	87.71	1.598D
Bi-214	4481.00	1120.08	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	5842.00	1460.15	0.	8.	0.013	70.71	0.250s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	7.4636E-05	609.31	6.046E-05	?(	4.650E-06	G K
			1764.49	1.068E-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	1.042E-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	3.5222E-04	1460.81	3.522E-04	?(	4.403E-05	G
Ac-228	N	1.0436E-04	911.07	9.912E-05	?(	1.101E-05	G K
			969.11	1.110E-04	(	2.727E-05	G
			338.32	1.074E-04	&(	3.437E-05	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	4.302E-04	+	1.635E-04	G

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 09:07:42 Page 4
EnergySolutions Spectrum name: Win00244.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	8.003E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	9.631E-05	X
		327.64	0.000E+00	?	8.145E-05	G
Pb-212	N 5.0469E-05	238.62	5.417E-05	(	1.008E-05	G K
		77.11	4.131E-05	(	2.970E-05	Energy duplication
		74.81	0.000E+00	&	4.169E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 1.5183E-04	92.35	1.313E-04	(	8.435E-05	G
		63.29	1.810E-04	?(	9.735E-05	G

```
                        WI07-0392  D2   Pre RSA  South    071807
Pb-214   N   9.4203E-05    351.92 8.519E-05 ?(  3.704E-06          G K
                            295.21 0.000E+00 %   3.523E-05          G
                             77.11 0.000E+00 %   5.250E-05Energy duplication
                            241.98 1.390E-04  (  7.198E-05          G
                             74.81 2.385E-04 +   9.533E-05Energy duplication
                             87.30 3.894E-04 +   1.389E-04          X

Pb-210   N   9.3223E-04     46.50 9.322E-04  (  9.899E-05          G

AM-241       1.4414E-05     59.54 1.441E-05 &(  1.074E-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  18-JUL-2007 09:07:42 Page    5
EnergySolutions                     Spectrum name: Win00244.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 #      3.0765E-01    1.707E-01    1.710E-01
K-40   #      1.4519E+00    1.027E+00    1.028E+00
Ac-228        4.3016E-01    2.111E-01    2.117E-01
Pb-212        2.0803E-01    1.094E-01    1.097E-01
CS-137 #      1.8989E-01    9.211E-02    9.240E-02
Th-234        6.2584E-01    5.744E-01    5.746E-01
Pb-214        3.8830E-01    1.619E-01    1.626E-01
Pb-210        3.8427E+00    1.475E+00    1.477E+00
AM-241 #C     5.9415E-02    1.049E-01    1.049E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0392 D2 Pre RSA South 071807

& - 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) 7.5038195E+00 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  19-JUL-2007 14:10:53 Page    1
EnergySolutions                  Spectrum name: Win00248.An1

Sample description
     WI07- 0400  D2   Chesapeak Comparison (600)      071907


Spectrum Filename: C:\User\Win00248.An1

Acquisition information
       Start time:                 19-Jul-2007 14:00:40
       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:                3.5410E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5410E+02) =
                                   2.8241E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 14:10:53 Page    2
EnergySolutions                  Spectrum name: Win00248.An1
```

WI07-0400 D2 Chesapeak (comparison) 600 071907

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: 0.1005

********** 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	2.91	5479.	13485.	22.475	2.32	0.854	-	D
18.22	4.51	14238.	9309.	15.515	4.18	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	183.80	46.13	61.	15.	0.024	171.29	0.371s
AM-241	237.62	59.58	283.	2852.	4.753	4.48	0.865
Th-234	252.74	63.36	41.	24.	0.040	104.20	0.767
Pb-214	298.54	74.81	51.	59.	0.099	42.90	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	515.68	0.000D
Pb-212	307.74	77.11	70.	98.	0.164	31.32	0.919D
Pb-214	307.74	77.11	126.	0.	0.000	278.63	0.222D
Pb-214	348.18	87.22	37.	43.	0.071	62.81	1.006
Th-234	371.29	92.99	34.	44.	0.073	54.92	1.117s
Ac-228	380.72	95.35	22.	0.	0.000	0.00	0.935
Ac-228	836.19	209.19	14.	24.	0.040	74.18	0.323s
Pb-212	953.94	238.62	23.	116.	0.193	22.01	1.057D
Pb-214	967.37	241.98	33.	15.	0.025	118.74	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 14:10:53 Page 3
EnergySolutions Spectrum name: Win00248.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.63	269.54	8.	16.	0.027	84.16	0.532s
Pb-214	1180.23	295.18	6.	59.	0.098	31.44	0.871s
Ac-228	1312.35	328.21	11.	12.	0.021	116.31	0.687s
Ac-228	1353.56	338.51	5.	28.	0.047	46.76	0.393s
Pb-214	1407.86	352.08	5.	63.	0.105	28.48	1.352

WI07-0400 D2 Chesapeak (comparison) 600 071907

Ac-228	1847.43	461.94	0.	13.	0.022	55.47	0.500s
Bi-214	2436.21	609.09	0.	43.	0.072	30.50	0.750s
CS-137	2646.75	661.70	3.	16.	0.026	70.05	0.461s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3173.89	793.44	2.	2.	0.002	305.51	0.229s
Ac-228	3645.16	911.21	0.	32.	0.053	35.36	0.337s
Bi-214	3735.50	933.78	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	0.	5.	0.008	90.13	1.595D
Ac-228	3876.86	969.11	1.	6.	0.010	93.40	1.598D
Bi-214	4482.46	1120.44	0.	14.	0.023	53.45	0.500s
Bi-214	4954.00	1238.27	0.	1.	0.002	200.00	0.250s
Bi-214	5509.00	1376.94	0.	4.	0.007	100.00	0.250s
K-40	5845.29	1460.97	0.	35.	0.058	33.81	0.729s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.50	1764.58	0.	6.	0.010	81.65	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.0774E-04	609.31	2.000E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	3.407E-04	+	1.415E-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	4.328E-04	+	3.649E-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	3.8369E-04	911.07	3.524E-04	(	1.101E-05	G K
			969.11	1.173E-04	-	8.301E-05	G
			338.32	3.321E-04	(	4.214E-05	G
			964.60	3.039E-04	(	6.173E-05	G
			794.70	0.000E+00	&	1.764E-04	G
			463.00	5.067E-04	&(	3.898E-05	G
			209.28	5.043E-04	@(	1.237E-04	G

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 14:10:53 Page 4
EnergySolutions
Spectrum name: Win00248.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			270.23	4.999E-04	&(	1.416E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.378E-04	X
			327.64	5.023E-04	*(	2.096E-04	G
Pb-212	N	2.6603E-04	238.62	2.660E-04	(	1.686E-05	G K
			77.11	3.768E-04	+	7.211E-05	Energy duplication
			74.81	0.000E+00	%	9.490E-05	Energy duplication
CS-137		4.2455E-05	661.66	4.245E-05	?(	8.482E-06	G
Th-234	N	5.0981E-04	92.35	5.490E-04	&(	1.093E-04	G
			63.29	4.540E-04	$(	1.827E-04	G

WI07-0402 D2 Chesapeak (comparison) 800 071907

Sample description
WI07- 0402 D2 Chesapeak Comparison (800) 071907

Spectrum Filename: C:\User\Win00250.An1

Acquisition information
Start time: 19-Jul-2007 14:31:01
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: 2.6330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.6330E+02) = 3.7979E+03
Detection limit method: Traditional ORTEC method

0

WI07-0402 D2 Chesapeak (comparison) 800 071907

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: 0.1971

********** 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	
14.55	3.82	4821.	25247.	42.078	1.67	2.179	CU-64	s
69.23	17.49	45.	83.	0.138	38.17	0.834	MO-99	s
84.32	21.26	40.	72.	0.121	39.55	0.757	TC-99M	
104.71	26.36	19.	132.	0.220	22.02	0.721	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	185.25	46.49	213.	55.	0.092	92.71	0.436s
AM-241	237.63	59.58	672.	9293.	15.488	2.39	0.858
Th-234	251.88	63.15	9.	17.	0.028	73.94	0.357s
Pb-214	298.54	74.81	16.	44.	0.073	39.41	0.917D
Pb-212	298.56	74.81	33.	0.	0.000	159.54	0.255D
Pb-212	307.74	77.11	24.	67.	0.112	31.92	0.919D
Pb-214	307.74	77.11	72.	0.	0.000	303.38	0.309D
Pb-214	349.05	87.43	15.	22.	0.037	71.58	0.397s
Th-234	368.72	92.35	30.	23.	0.039	77.55	0.933D
Ac-228	380.72	95.35	16.	12.	0.020	113.47	0.935D
Ac-228	835.07	208.91	8.	14.	0.023	88.06	0.542s

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 14:41:12 Page 3
EnergySolutions Spectrum name: Win00250.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	9.	70.	0.117	26.59	1.057D
Pb-214	967.37	241.98	15.	15.	0.025	88.64	1.060D
Ac-228	1072.80	268.33	7.	4.	0.006	269.68	0.307s
Pb-214	1178.91	294.85	7.	38.	0.064	42.78	0.399s
Ac-228	1307.50	326.99	2.	1.	0.002	447.21	0.407s

Ac-228	1352.60	338.26	0.	17.	0.028	48.51	0.375s
Pb-214	1406.96	351.85	2.	36.	0.059	36.96	0.633s
Ac-228	1844.80	461.28	5.	5.	0.008	210.93	0.310s
Bi-214	2437.94	609.52	0.	31.	0.052	35.92	0.719s
CS-137	2646.46	661.63	0.	13.	0.022	55.47	0.750s
Bi-214	3072.33	768.06	1.	0.	0.001	240.37	0.197s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.62	911.33	0.	18.	0.030	47.14	0.301s
Bi-214	3737.33	934.24	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	0.	10.	0.017	62.01	1.595D
Ac-228	3876.86	969.11	0.	10.	0.017	62.10	1.598D
Bi-214	4476.00	1118.83	0.	5.	0.008	89.44	0.250s
Bi-214	4954.20	1238.32	0.	5.	0.008	89.44	0.375s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5843.80	1460.60	0.	25.	0.042	40.00	0.417s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.3863E-04	609.31	1.442E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	1.217E-04	&(	2.433E-05	G
			1238.11	3.390E-04	+	2.509E-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	3.887E-04	+	3.277E-04	G
K-40	N	1.1007E-03	1460.81	1.101E-03	?(	4.403E-05	G
Ac-228	N	2.0755E-04	911.07	1.982E-04	?(	1.101E-05	G K
			969.11	2.014E-04	(	1.942E-05	G
			338.32	1.992E-04	?(	1.172E-05	G
			964.60	6.421E-04	+	3.141E-04	G
			794.70	0.000E+00	?	5.880E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	0.000E+00	&	1.949E-04	G
		209.28	2.962E-04	(	9.588E-05	G
		270.23	0.000E+00	&	1.630E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.259E-04	(	1.199E-04	X
		327.64	0.000E+00	&	1.222E-04	G
Pb-212	N 1.6178E-04	238.62	1.618E-04	(	1.075E-05	G K
		77.11	2.571E-04	+	5.360E-05	Energy duplication
		74.81	0.000E+00	?	5.596E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 3.0537E-04	92.35	2.924E-04	(	1.024E-04	G

```
                                63.29 3.239E-04  (  9.091E-05          G

Pb-214    N   1.4499E-04      351.92 1.321E-04 ?(  1.006E-05          G K
                              295.21 2.401E-04 +   6.264E-05          G
                               77.11 0.000E+00 %   8.192E-05Energy duplication
                              241.98 2.090E-04  (  8.267E-05          G
                               74.81 4.907E-04 +   1.275E-04Energy duplication
                               87.30 3.241E-04 +   1.323E-04          X

Pb-210    N   1.1296E-03       46.50 1.130E-03  (  4.313E-04          G

AM-241        1.9136E-02       59.54 1.914E-02  (  7.653E-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  19-JUL-2007 14:41:12 Page    5
 EnergySolutions                      Spectrum name: Win00250.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 #     5.2651E-01    1.891E-01    1.902E-01
K-40   #     4.1804E+00    1.672E+00    1.679E+00
Ac-228       7.8825E-01    2.688E-01    2.704E-01
Pb-212       6.1442E-01    1.634E-01    1.650E-01
CS-137 #     1.3380E-01    7.422E-02    7.439E-02
Th-234       1.1598E+00    6.214E-01    6.219E-01
Pb-214       5.5066E-01    2.035E-01    2.046E-01
Pb-210       4.2900E+00    3.977E+00    3.978E+00
AM-241       7.2676E+01    1.736E+00    3.202E+00
```

WI07-0402 D2 Chesapeak (comparison) 800 071907

- 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) 8.4919769E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0399 D2 Chesapeak (comparison) 500 071907

Sample description
WI07- 0399 D2 Chesapeak Comparison (500) 071907

Spectrum Filename: C:\User\Win00247.An1

Acquisition information
Start time: 19-Jul-2007 13:36:20
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: 3.7040E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7040E+02) = 2.6998E+03
Detection limit method: Traditional ORTEC method

WI07-0399 D2 Chesapeak (comparison) 500 071907

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: 0.0675

********** 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	4193.	11601.	19.335	2.44	0.854	-	D
16.82	4.19	17705.	9090.	15.151	4.64	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	186.24	46.74	80.	60.	0.100	59.20	0.930s
AM-241	237.60	59.58	139.	1597.	2.662	5.78	0.854
Th-234	253.07	63.44	30.	43.	0.072	59.38	1.058s
Pb-214	298.54	74.81	39.	54.	0.090	42.64	0.917D
Pb-212	298.56	74.81	63.	0.	0.000	2345.21	0.241D
Pb-212	307.74	77.11	30.	111.	0.185	23.61	0.919D
Pb-214	307.74	77.11	99.	0.	0.000	381.01	0.398D
Pb-214	348.55	87.31	28.	50.	0.083	47.32	1.172s
Th-234	368.72	92.35	38.	29.	0.049	70.22	0.933D
Ac-228	380.72	95.35	21.	3.	0.006	391.58	0.935D
Ac-228	837.00	209.40	20.	0.	0.000	0.00	0.000s
Pb-212	953.94	238.62	14.	109.	0.182	21.52	1.057D
Pb-214	967.37	241.98	22.	13.	0.021	118.48	1.060D

0

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 13:46:30 Page 3
EnergySolutions Spectrum name: Win00247.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1084.08	271.15	10.	28.	0.047	60.33	0.253s
Pb-214	1179.79	295.07	4.	53.	0.088	32.64	1.022
Ac-228	1304.67	326.28	6.	2.	0.003	412.31	0.210s
Ac-228	1352.70	338.29	5.	23.	0.038	55.34	0.378s
Pb-214	1407.38	351.96	5.	62.	0.104	28.32	0.680s

Ac-228	1852.50	463.20	0.	6.	0.010	81.65	0.292s
Bi-214	2438.20	609.58	0.	45.	0.075	29.81	1.083s
CS-137	2646.97	661.76	0.	29.	0.048	37.14	0.312s
Bi-214	3073.50	768.35	0.	2.	0.003	141.42	0.500s
Ac-228	3179.00	794.72	0.	11.	0.018	60.30	1.000s
Ac-228	3645.54	911.30	0.	33.	0.055	34.82	0.292s
Bi-214	3736.50	934.03	0.	4.	0.007	100.00	1.000s
Ac-228	3858.81	964.60	2.	3.	0.005	172.57	1.595D
Ac-228	3876.86	969.11	2.	12.	0.019	70.48	1.598D
Bi-214	4483.50	1120.70	0.	3.	0.005	115.47	0.500s
Bi-214	4951.00	1237.52	0.	8.	0.013	70.71	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.90	1460.87	0.	20.	0.033	44.72	0.312s
Ac-228	6354.67	1588.24	0.	4.	0.007	100.00	0.375s
Bi-214	7059.73	1764.39	3.	2.	0.003	308.22	0.294s

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	2.0927E-04	609.31	2.093E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	7.300E-05	-	7.300E-05	G
			1238.11	5.424E-04	+	3.072E-04	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	3.887E-04	+	3.277E-04	G
K-40	N	8.8056E-04	1460.81	8.806E-04	?(	4.403E-05	G
Ac-228	N	3.3606E-04	911.07	3.634E-04	?(	1.101E-05	G K
			969.11	2.237E-04	-	1.129E-04	G
			338.32	2.695E-04	*(	4.338E-05	G
			964.60	1.885E-04	-	2.285E-04	G
			794.70	6.468E-04	+	3.067E-04	G
			463.00	2.339E-04	-	1.559E-04	G
			209.28	0.000E+00	%	1.459E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.748E-04	&	2.884E-04	G
		1588.00	5.810E-04	+	4.898E-04	G
		95.35	0.000E+00	%	1.434E-04	X
		327.64	0.000E+00	&	1.845E-04	G
Pb-212	N	2.5074E-04	238.62	2.507E-04	(	1.353E-05	G K
			77.11	4.243E-04	+	6.623E-05	Energy duplication
			74.81	0.000E+00	%	7.602E-05	Energy duplication
CS-137		7.8587E-05	661.66	7.859E-05	(	2.710E-06	G
Th-234	N	5.5173E-04	92.35	3.639E-04	(	1.150E-04	G
			63.29	8.192E-04	*(	1.574E-04	G

```
Pb-214    N   2.3086E-04    351.92 2.309E-04  (  1.332E-05          G K
                            295.21 3.310E-04 +   7.009E-05          G
                             77.11 0.000E+00 %   9.576E-05Energy duplication
                            241.98 1.766E-04 -   1.228E-04          G
                             74.81 6.016E-04 +   1.579E-04Energy duplication
                             87.30 7.231E-04 +   1.886E-04          X

Pb-210    N   1.2214E-03     46.50 1.221E-03 *(  2.689E-04          G

AM-241        3.2888E-03     59.54 3.289E-03  (  3.536E-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 #     5.6498E-01     1.684E-01    1.698E-01
K-40   #     2.3773E+00     1.063E+00    1.067E+00
Ac-228       9.0728E-01     2.966E-01    2.985E-01
Pb-212       6.7696E-01     1.457E-01    1.479E-01
CS-137       2.1217E-01     7.880E-02    7.921E-02
Th-234       1.4896E+00     6.849E-01    6.858E-01
Pb-214       6.2328E-01     1.765E-01    1.780E-01
Pb-210 #     3.2976E+00     1.952E+00    1.954E+00
AM-241       8.8790E+00     5.131E-01    6.093E-01

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
```

WI07-0399 D2 Chesapeak (comparison) 500 071907

& - 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) 1.9028143E+01 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  19-JUL-2007 14:24:44 Page    1
EnergySolutions                  Spectrum name: Win00249.An1

Sample description
     WI07- 0401  D2   Chesapeak Comparison (700)      071907


Spectrum Filename: C:\User\Win00249.An1

Acquisition information
       Start time:                 19-Jul-2007 14:14:33
       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:                3.0770E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.0770E+02) =
                                   3.2499E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 14:24:44 Page    2
EnergySolutions                  Spectrum name: Win00249.An1
```

WI07-0401 D2 Chesapeak (comparison) 700 071907

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: 0.0965

********** 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	4388.	13321.	22.202	2.23	0.854	-	D
16.65	4.14	17274.	11815.	19.692	3.64	0.855	-	D
105.51	26.56	12.	84.	0.141	26.80	1.064	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	185.34	46.51	178.	47.	0.079	104.35	0.530s
AM-241	237.69	59.60	357.	4967.	8.278	3.19	0.855
Th-234	253.19	63.47	25.	32.	0.053	68.32	0.899s
Pb-214	298.54	74.81	28.	29.	0.048	63.87	0.917D
Pb-212	298.56	74.81	29.	0.	0.000	529.67	0.381D
Pb-212	307.74	77.11	26.	56.	0.094	36.89	0.919D
Pb-214	307.74	77.11	94.	0.	0.000	165.78	0.342D
Pb-214	347.32	87.00	21.	41.	0.068	53.62	0.456s
Th-234	370.00	92.67	15.	34.	0.056	53.48	0.314s
Ac-228	381.49	95.54	18.	0.	0.000	0.00	0.935
Ac-228	837.00	209.40	6.	2.	0.003	374.17	0.000s
Pb-212	953.94	238.62	11.	61.	0.101	30.21	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	10.	17.	0.028	72.65	1.060D
Ac-228	1077.13	269.41	3.	19.	0.031	60.10	0.234s
Pb-214	1180.89	295.35	0.	36.	0.060	33.33	1.100
Ac-228	1311.87	328.09	2.	8.	0.013	97.87	0.431s
Ac-228	1354.00	338.61	0.	21.	0.035	43.64	0.791s

Pb-214	1407.71	352.04	4.	40.	0.067	37.58	1.070s
Ac-228	1850.00	462.58	0.	0.	0.000	0.00	0.000s
Bi-214	2437.22	609.34	0.	39.	0.065	32.03	0.583s
CS-137	2644.38	661.11	0.	13.	0.022	55.47	0.292s
Bi-214	3074.67	768.64	1.	0.	0.001	240.37	0.197s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3644.55	911.06	0.	15.	0.025	51.64	0.375s
Bi-214	3737.67	934.33	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	0.	5.	0.008	102.17	1.595D
Ac-228	3876.86	969.11	0.	16.	0.026	50.40	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4952.50	1237.89	0.	4.	0.007	100.00	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.00	1461.15	0.	12.	0.020	57.74	0.333s
Ac-228	6353.00	1587.82	0.	2.	0.003	141.42	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.8137E-04	609.31	1.814E-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	2.712E-04	+	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	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	5.2833E-04	1460.81	5.283E-04	?(	4.403E-05	G
Ac-228	N	2.3610E-04	911.07	1.652E-04	?(	1.101E-05	G K
			969.11	3.058E-04	(	1.942E-05	G
			338.32	2.461E-04	(	1.172E-05	G
			964.60	2.817E-04	(	9.625E-05	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	0.000E+00	?	3.898E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	0.000E+00	%	9.588E-05	G
		270.23	5.884E-04	&	2.234E-04	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.256E-04	X
		327.64	3.190E-04	?(	1.075E-04	G
Pb-212	N 1.3904E-04	238.62	1.390E-04	(	1.223E-05	G K
		77.11	2.152E-04	+	5.094E-05	Energy duplication
		74.81	0.000E+00	%	5.281E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 4.9949E-04	92.35	4.221E-04	(	7.524E-05	G
		63.29	6.096E-04	(	1.446E-04	G

```
Pb-214   N   1.8197E-04    351.92 1.494E-04 *(  1.205E-05         G K
                           295.21 2.255E-04  (  6.264E-06         G
                            77.11 0.000E+00 ?   9.333E-05Energy duplication
                           241.98 2.322E-04  (  6.977E-05         G
                            74.81 3.219E-04 +   1.247E-04Energy duplication
                            87.30 5.901E-04 +   1.690E-04         X

Pb-210   N   9.6625E-04     46.50 9.663E-04  (  3.951E-04         G

AM-241       1.0227E-02     59.54 1.023E-02  (  5.609E-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        5.8943E-01    1.888E-01     1.901E-01
 K-40    #     1.7170E+00    9.913E-01     9.934E-01
 Ac-228        7.6729E-01    2.776E-01     2.791E-01
 Pb-212        4.5187E-01    1.365E-01     1.375E-01
 CS-137  #     1.1449E-01    6.351E-02     6.366E-02
 Th-234  #     1.6233E+00    7.042E-01     7.053E-01
 Pb-214        5.9138E-01    1.741E-01     1.755E-01
 Pb-210  #     3.1402E+00    3.277E+00     3.278E+00
 AM-241        3.3237E+01    1.060E+00     1.624E+00

   # - All peaks for activity calculation had bad shape.
```

WI07-0401 D2 Chesapeak (comparison) 700 071907

* - 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) 4.2232155E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fern
EnergySolutions

Reviewed by: K.C. Fern
Supervisor

Laboratory: EnergySolutions

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 12:17:35 Page    1
EnergySolutions                  Spectrum name: Win00288.An1

Sample description
     WI07-0449  D2  Walkway between trailers.  072207


Spectrum Filename: C:\User\Win00288.An1

Acquisition information
       Start time:                 22-Jul-2007 12:07:25
       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:                2.8360E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  2.8360E+02) =
                                   3.5261E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 12:17:35 Page    2
EnergySolutions                  Spectrum name: Win00288.An1
```

WI07-0449 D2 Walkway between trailers 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: 0.0865

********** 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	
11.84	2.92	6262.	14007.	23.345	2.33	0.854	-	D
17.75	4.40	17019.	10670.	17.783	3.96	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	185.31	46.51	32.	54.	0.089	48.35	0.856
AM-241	237.44	59.54	60.	146.	0.243	27.60	1.025s
Th-234	252.57	63.32	34.	40.	0.067	59.58	0.351s
Pb-214	298.54	74.81	35.	73.	0.122	32.66	0.917D
Pb-212	298.56	74.81	91.	0.	0.000	943.20	0.000D
Pb-212	307.74	77.11	38.	143.	0.239	20.61	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	921.95	0.248D
Pb-214	348.40	87.27	44.	48.	0.080	55.90	0.403s
Th-234	368.72	92.35	54.	26.	0.044	87.77	0.933D
Ac-228	380.72	95.35	44.	5.	0.008	403.80	0.935D
Ac-228	837.00	209.40	20.	6.	0.010	272.07	0.000s
Pb-212	953.94	238.62	16.	148.	0.247	18.09	1.057D
Pb-214	967.37	241.98	19.	36.	0.060	48.02	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 12:17:35 Page 3
EnergySolutions Spectrum name: Win00288.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.50	270.51	6.	36.	0.059	44.17	0.473s
Pb-214	1180.00	295.13	24.	0.	0.000	0.00	0.000s
Ac-228	1309.00	327.37	5.	0.	0.000	0.00	0.000s
Ac-228	1352.96	338.36	7.	38.	0.063	40.59	0.908
Pb-214	1407.17	351.90	11.	58.	0.097	33.84	0.483s

WI07-0449 D2 Walkway between trailers 072207

Ac-228	1853.31	463.41	3.	16.	0.027	64.32	0.280s
Bi-214	2438.09	609.56	0.	46.	0.077	29.49	0.583s
CS-137	2648.69	662.19	0.	13.	0.022	55.47	0.562s
Bi-214	3074.78	768.67	0.	9.	0.015	66.67	0.562s
Ac-228	3177.12	794.25	0.	12.	0.020	57.74	0.750s
Ac-228	3645.55	911.31	0.	40.	0.067	31.62	0.906s
Bi-214	3730.00	932.41	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	1.	2.	0.003	191.76	1.595D
Ac-228	3876.86	969.11	2.	15.	0.026	56.11	1.598D
Bi-214	4480.36	1119.92	0.	14.	0.023	53.45	0.375s
Bi-214	4950.50	1237.39	0.	4.	0.007	100.00	1.000s
Bi-214	5512.00	1377.69	0.	4.	0.007	100.00	0.750s
K-40	5845.73	1461.08	0.	40.	0.067	31.62	0.417s
Ac-228	6351.00	1587.32	0.	4.	0.007	100.00	0.250s
Bi-214	7062.25	1765.02	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.2708E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	3.407E-04	+	1.415E-04	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	4.328E-04	+	3.649E-04	G
			934.06	3.887E-04	&	3.277E-04	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	4.6895E-04	911.07	4.405E-04	(	1.101E-05	G K
			969.11	2.987E-04	-	1.233E-04	G
			338.32	4.414E-04	(	5.112E-05	G
			964.60	1.277E-04	-	1.852E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	6.301E-04	?(	1.143E-04	G
			209.28	0.000E+00	%	1.635E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.114E-03	+	3.024E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	2.006E-04	X
		327.64	0.000E+00	?	1.507E-04	G
Pb-212	N 3.4049E-04	238.62	3.405E-04	(	1.408E-05	G K
		77.11	5.492E-04	+	7.478E-05	Energy duplication
		74.81	0.000E+00	%	9.068E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 5.0748E-04	92.35	3.287E-04	(	1.356E-04	G
		63.29	7.620E-04	$(	1.669E-04	G

```
Pb-214    N   2.1605E-04     351.92 2.160E-04 ?(  1.906E-05          G K
                             295.21 0.000E+00 %   4.841E-05          G
                              77.11 0.000E+00 %   1.147E-04Energy duplication
                             241.98 4.958E-04 +   1.521E-04          G
                              74.81 8.167E-04 +   1.697E-04Energy duplication
                              87.30 6.965E-04 +   2.042E-04          X

Pb-210    N   1.0921E-03      46.50 1.092E-03  (  1.751E-04          G

AM-241        3.0063E-04      59.54 3.006E-04 *(  2.361E-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 12:17:35 Page 5
EnergySolutions Spectrum name: Win00288.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	8.0072E-01	2.361E-01	2.380E-01
K-40 #	6.2098E+00	1.964E+00	1.977E+00
Ac-228	1.6536E+00	5.229E-01	5.266E-01
Pb-212	1.2006E+00	2.172E-01	2.218E-01
CS-137 #	1.2422E-01	6.890E-02	6.907E-02
Th-234	1.7894E+00	9.492E-01	9.501E-01
Pb-214	7.6181E-01	2.578E-01	2.594E-01
Pb-210	3.8510E+00	1.862E+00	1.864E+00
AM-241 #	1.0601E+00	2.926E-01	2.952E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total

WI07-0449 D2 Walkway between trailers 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) 1.7451216E+01 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 26-JUL-2007 11:08:27 Page 1
4714781 Spectrum name: Win00348.An1

Sample description
WI07-0575 D2 Well-head 32 " 07-26-07

Spectrum Filename: C:\User\Win00348.An1

Acquisition information
Start time: 26-Jul-2007 10:58:17
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: 2.9860E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9860E+02) = 3.3490E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 11:08:27 Page 2
4714781 Spectrum name: Win00348.An1

WI07-0575 D2 Well-head 32 in. 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: 0.0966

********** 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	
14.62	3.84	4716.	25405.	42.342	1.66	2.164	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	186.50	46.80	30.	44.	0.073	54.14	0.489s
AM-241	236.00	59.18	12.	0.	0.001	842.61	0.077s
Th-234	253.31	63.50	70.	76.	0.127	51.25	0.963s
Pb-214	298.54	74.81	80.	112.	0.187	29.38	0.917D
Pb-212	298.56	74.81	108.	0.	0.000	199.15	0.643D
Pb-212	307.74	77.11	63.	205.	0.341	17.78	0.919D
Pb-214	307.74	77.11	187.	0.	0.000	553.43	0.259D
Pb-214	348.09	87.19	62.	64.	0.107	49.41	0.609s
Th-234	368.72	92.35	38.	72.	0.121	33.52	0.933D
Ac-228	380.72	95.35	37.	2.	0.004	740.02	0.936D
Ac-228	839.53	210.03	23.	37.	0.062	59.71	0.686s
Pb-212	953.94	238.62	20.	258.	0.430	13.38	1.057D
Pb-214	967.37	241.98	35.	40.	0.067	51.72	1.060D
Ac-228	1079.37	269.97	16.	44.	0.074	47.52	0.909

ORTEC g v - i (63) Wan32 G53W2.06 26-JUL-2007 11:08:27 Page 3
4714781 Spectrum name: Win00348.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.57	295.27	12.	65.	0.108	32.71	1.289
Ac-228	1310.27	327.68	7.	3.	0.006	228.04	0.279s
Ac-228	1352.63	338.27	9.	67.	0.112	30.30	0.978
Pb-214	1406.68	351.78	14.	101.	0.168	25.36	1.093s
Ac-228	1851.33	462.91	0.	37.	0.062	32.88	0.900s

Bi-214	2437.00	609.28	3.	81.	0.135	23.99	1.293s
CS-137	2649.00	662.27	0.	10.	0.017	63.25	0.250s
Bi-214	3074.00	768.48	0.	5.	0.008	89.44	0.500s
Ac-228	3173.00	793.22	4.	2.	0.003	336.65	0.080s
Ac-228	3645.92	911.40	0.	53.	0.088	27.47	0.412s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	2.	0.004	262.30	1.595D
Ac-228	3876.86	969.11	3.	41.	0.068	33.82	1.598D
Bi-214	4482.53	1120.46	0.	19.	0.032	45.88	0.750s
Bi-214	4953.33	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5509.78	1377.14	1.	1.	0.002	346.41	0.217s
K-40	5845.14	1460.93	0.	43.	0.072	30.50	1.124s
Ac-228	6357.00	1588.82	0.	8.	0.013	70.71	0.375s
Bi-214	7058.00	1763.96	4.	2.	0.003	336.65	0.252s

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	3.9716E-04	609.31	3.759E-04	@(	1.426E-05	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	4.623E-04	?(	2.433E-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	0.000E+00	%	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	6.9399E-04	911.07	5.837E-04	(	1.101E-05	G K
			969.11	7.900E-04	(	6.066E-05	G
			338.32	7.852E-04	(	5.593E-05	G
			964.60	0.000E+00	%	2.310E-04	G
			794.70	0.000E+00	&	2.352E-04	G
			463.00	1.442E-03	+	3.554E-04	G
			209.28	7.900E-04	&(	1.534E-04	G
			270.23	1.380E-03	+	3.582E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.162E-03	+	6.581E-04	G
		95.35	0.000E+00	%	1.800E-04	X
		327.64	0.000E+00	%	2.036E-04	G
Pb-212	N 5.9286E-04	238.62	5.929E-04	(	1.574E-05	G K
		77.11	7.837E-04	+	9.057E-05	Energy duplication
		74.81	0.000E+00	?	9.863E-05	Energy duplication
CS-137	2.7099E-05	661.66	2.710E-05	?(	2.710E-06	G
Th-234	N 9.0431E-04	92.35	9.043E-04	(	1.145E-04	G
		63.29	1.448E-03	+	3.352E-04	G
Pb-214	N 3.8534E-04	351.92	3.741E-04	(	2.154E-05	G K

```
                        WI07-0575   D2  Well-head 32 in.   072607
                              295.21 4.072E-04  (  3.398E-05          G
                               77.11 0.000E+00 %   1.301E-04Energy duplication
                              241.98 5.596E-04 +   1.764E-04          G
                               74.81 1.253E-03 +   2.243E-04Energy duplication
                               87.30 9.287E-04 +   2.377E-04          X

Pb-210   N   8.9140E-04      46.50 8.914E-04 *(  1.695E-04          G

AM-241       0.0000E+00      59.54 0.000E+00 %   1.117E-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 11:08:27 Page    5
 4714781                          Spectrum name: Win00348.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 #     1.3301E+00    3.191E-01     3.230E-01
 K-40   #     6.3402E+00    1.934E+00     1.948E+00
 Ac-228       2.3241E+00    4.641E-01     4.722E-01
 Pb-212       1.9855E+00    2.657E-01     2.760E-01
 CS-137 #     9.0753E-02    5.740E-02     5.750E-02
 Th-234       3.0285E+00    1.015E+00     1.017E+00
 Pb-214       1.2905E+00    2.671E-01     2.714E-01
 Pb-210 #     2.9853E+00    1.616E+00     1.618E+00
 AM-241  <    3.7407E-02

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0575 D2 Well-head 32 in. 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) 1.9374937E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:58:30 Page 1
4714781 Spectrum name: Win00365.An1

Sample description
WI07-0600 D2 Box #132 # 0006 07-27-07

Spectrum Filename: C:\User\Win00365.An1

Acquisition information
Start time: 27-Jul-2007 12:47:25
Live time: 600
Real time: 655
Dead time: 8.46 %
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: 2.9720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9720E+02) = 3.3647E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:58:30 Page 2
4714781 Spectrum name: Win00365.An1

WI07-0600 D2 B-12 #132 - #0006 #1 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: 0.0774

********** 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	
13.90	3.66	4054.	6404.	10.674	4.63	1.660	-	s
30.59	7.83	4768.	864.	1.440	23.61	0.858	CU-64	D
42.88	10.90	4094.	874.	1.457	21.79	0.861	PB-214	D
55.35	14.01	2195.	530.	0.884	26.46	0.864	PU-239	D
69.75	17.62	2320.	8898.	14.831	3.00	1.216	MO-99	s
84.04	21.19	1774.	7682.	12.804	3.13	1.277	TC-99M	s
104.87	26.40	1539.	13090.	21.817	2.12	0.983	AM-241	s
127.88	32.18	3031.	3389.	5.649	5.74	0.880	XE-138	D
132.95	33.44	4835.	1355.	2.258	15.50	0.881	CS-137	D
145.76	36.65	3493.	748.	1.246	23.52	0.884	CE-144	D
197.77	49.62	83188.	22332.	37.221	5.01	1.501	EU-155	s
321.16	80.44	135.	66.	0.110	55.59	0.922	J-131	D
394.71	98.85	280.	536.	0.893	17.57	1.063	PA-234	M
411.13	102.95	235.	556.	0.926	15.23	1.008	GD-153	
474.97	118.91	130.	648.	1.081	10.82	1.012	NP-239	
490.08	122.77	34.	38.	0.064	53.40	0.959	EU-154	D
500.52	125.38	39.	114.	0.189	24.41	0.961	PA-234	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:58:30 Page 3
4714781 Spectrum name: Win00365.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.72	46.61	47637.	0.	0.000	0.00	0.893
AM-241	237.61	59.58	75306.	921635.	1536.058	0.24	0.989
Th-234	251.65	63.09	248.	22.	0.036	241.40	0.243s

WI07-0600 D2 B-12 #132 - #0006 #1 072707

Pb-214	298.54	74.81	198.	103.	0.171	43.49	0.917D
Pb-212	298.56	74.81	170.	0.	0.000	620.04	0.000D
Pb-212	307.74	77.11	198.	232.	0.387	21.59	0.919D
Pb-214	307.74	77.11	295.	0.	0.000	831.84	0.373D
Pb-214	346.95	86.91	144.	86.	0.144	58.51	1.285s
Th-234	368.72	92.35	141.	53.	0.089	68.76	0.933D
Ac-228	380.72	95.35	90.	4.	0.006	713.08	0.935D
Ac-228	835.77	209.09	16.	51.	0.085	41.07	0.826s
Pb-212	953.94	238.62	24.	191.	0.318	16.24	1.057D
Pb-214	967.37	241.98	39.	25.	0.042	81.04	1.060D
Ac-228	1080.61	270.28	9.	36.	0.060	47.14	0.561s
Pb-214	1180.89	295.35	7.	57.	0.095	33.01	1.757s
Ac-228	1312.81	328.32	11.	17.	0.029	83.59	0.343s
Ac-228	1352.90	338.34	14.	42.	0.070	44.84	0.682s
Pb-214	1406.87	351.83	11.	96.	0.160	25.29	1.538s
Ac-228	1852.06	463.09	6.	12.	0.020	91.29	0.328s
Bi-214	2437.08	609.30	0.	73.	0.122	23.41	1.078
CS-137	2647.12	661.79	0.	28.	0.047	37.80	0.650s
Bi-214	3075.11	768.75	0.	9.	0.015	66.67	0.312s
Ac-228	3176.00	793.97	0.	13.	0.022	55.47	0.250s
Ac-228	3645.73	911.35	0.	44.	0.073	30.15	0.687s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	9.	0.015	66.09	1.595D
Ac-228	3876.86	969.11	0.	32.	0.054	35.15	1.598D
Bi-214	4480.33	1119.91	7.	1.	0.002	804.16	0.192s
Bi-214	4947.00	1236.52	0.	14.	0.023	53.45	0.250s
Bi-214	5509.50	1377.07	0.	7.	0.012	75.59	0.999s
K-40	5845.50	1461.02	0.	39.	0.065	32.03	0.974s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7057.00	1763.71	0.	10.	0.017	63.25	0.250s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:58:30 Page 4
4714781 Spectrum name: Win00365.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	3.4364E-04	609.31	3.395E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.103E-04	G
			1238.11	9.491E-04	&	3.942E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	+	4.625E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	5.3582E-04	911.07	4.846E-04	(	1.101E-05	G K
			969.11	6.286E-04	(	1.942E-05	G
			338.32	4.922E-04	(	6.815E-05	G
			964.60	5.654E-04	(	6.173E-05	G
			794.70	7.644E-04	+	3.306E-04	G
			463.00	4.677E-04	?(	1.559E-04	G
			209.28	1.079E-03	+	2.557E-04	G

```
                    WI07-0600   D2 B-12 #132 - #0006  #1   072707
                              270.23 1.125E-03 +   3.124E-04         G
                             1588.00 0.000E+00 %   2.905E-04         G
                               95.35 0.000E+00 %   2.739E-04         X
                              327.64 6.991E-04 &(  2.110E-04         G

Pb-212   N   4.3796E-04      238.62 4.380E-04  (  1.725E-05         G K
                               77.11 8.888E-04 +   1.142E-04Energy duplication
                               74.81 0.000E+00 %   1.227E-04Energy duplication

CS-137       7.5877E-05      661.66 7.588E-05  (  2.710E-06         G

Th-234   N   6.6405E-04       92.35 6.640E-04  (  2.157E-04         G
                               63.29 0.000E+00 %   4.523E-04         G

Pb-214   N   3.5492E-04      351.92 3.556E-04  (  1.932E-05         G K
                              295.21 3.571E-04  (  2.678E-05         G
                               77.11 0.000E+00 %   1.626E-04Energy duplication
                              241.98 3.462E-04  (  1.292E-04         G
                               74.81 1.147E-03 +   2.795E-04Energy duplication
                               87.30 1.255E-03 +   3.192E-04         X

Pb-210   N   0.0000E+00        46.50 0.000E+00     6.311E-03         G
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:58:30 Page    5
 4714781                          Spectrum name: Win00365.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       1.8978E+00      59.54 1.898E+00  (  8.002E-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
```

WI07-0600 D2 B-12 #132 - #0006 #1 072707

		pCi/g	pCi/g	pCi/g
Bi-214		1.1563E+00	2.707E-01	2.741E-01
K-40	#	5.7775E+00	1.850E+00	1.863E+00
Ac-228		1.8029E+00	4.640E-01	4.689E-01
Pb-212		1.4736E+00	2.393E-01	2.456E-01
CS-137		2.5531E-01	9.650E-02	9.699E-02
Th-234		2.2343E+00	1.536E+00	1.537E+00
Pb-214		1.1942E+00	3.020E-01	3.053E-01
Pb-210	<	2.1236E+01		
AM-241		6.3855E+03	1.556E+01	2.369E+02

- 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 27-JUL-2007 12:58:30 Page 6
4714781 Spectrum name: Win00365.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) 6.3994048E+03 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fern
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:34:41 Page 1
4714781 Spectrum name: Win00370.An1

Sample description
WI07-0615 D2 B-12 #132 - #0006 #2 07-28-07

Spectrum Filename: C:\User\Win00370.An1

Acquisition information
Start time: 28-Jul-2007 09:24:29
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: 3.0210E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0210E+02) = 3.3102E+03
Detection limit method: Traditional ORTEC method

D

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:34:41 Page 2
4714781 Spectrum name: Win00370.An1

WI07-0615 D2 B-12 #132 - #0006 #2 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: 0.1653

********** 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	4599.	22200.	37.000	1.82	2.207	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	184.74	46.36	165.	41.	0.068	110.00	0.515s
AM-241	237.69	59.60	392.	5726.	9.543	2.96	0.858
Th-234	251.94	63.16	24.	29.	0.048	74.60	0.749s
Pb-214	298.54	74.81	30.	54.	0.090	39.30	0.917D
Pb-212	298.56	74.81	72.	0.	0.000	655.74	0.408D
Pb-212	307.74	77.11	46.	71.	0.118	35.99	0.919D
Pb-214	307.74	77.11	86.	0.	0.000	2927.46	0.000D
Pb-214	347.76	87.11	24.	38.	0.064	55.86	1.243s
Th-234	368.72	92.35	37.	17.	0.028	114.95	0.933D
Ac-228	380.72	95.35	20.	8.	0.013	184.35	0.935D
Ac-228	837.62	209.55	15.	26.	0.044	73.94	0.477s
Pb-212	953.94	238.62	6.	100.	0.167	21.10	1.057D
Pb-214	967.37	241.98	16.	8.	0.013	162.90	1.060D
Ac-228	1078.38	269.73	5.	2.	0.004	302.37	0.337s

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:34:41 Page 3
4714781 Spectrum name: Win00370.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.40	295.48	8.	49.	0.082	37.68	0.452s
Ac-228	1309.54	327.50	6.	14.	0.023	88.06	0.382s
Ac-228	1352.50	338.24	2.	24.	0.041	47.07	0.423s
Pb-214	1407.02	351.87	4.	36.	0.060	38.49	0.916
Ac-228	1852.40	463.18	3.	2.	0.003	308.22	0.188s

WI07-0615 D2 B-12 #132 - #0006 #2 072807

Bi-214	2438.56	609.67	0.	18.	0.030	47.14	0.448s
CS-137	2646.55	661.65	7.	4.	0.007	217.03	0.315s
Bi-214	3073.00	768.23	1.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3643.00	910.67	6.	4.	0.007	200.00	0.237s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	7.	0.012	73.91	1.595D
Ac-228	3876.86	969.11	0.	8.	0.014	70.15	1.598D
Bi-214	4477.50	1119.20	0.	6.	0.010	81.65	0.500s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5843.00	1460.40	11.	1.	0.002	1021.00	0.000s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.50	1764.58	0.	4.	0.007	100.00	0.999s

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	1.0789E-04	609.31	8.371E-05	?(	4.650E-06	G K
			1764.49	1.423E-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	?	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	0.0000E+00	1460.81	0.000E+00	%	2.388E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.506E-05	G K
			969.11	1.578E-04		8.860E-05	G
			338.32	2.871E-04	*	9.218E-05	G
			964.60	4.520E-04		2.691E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	1.443E-04	G
			209.28	5.572E-04		2.025E-04	G
			270.23	0.000E+00	%	1.336E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.455E-04		1.541E-04	X
		327.64	5.701E-04	?	2.787E-04	G
Pb-212	N 2.4253E-04	238.62	2.308E-04	(	9.147E-06	G K
		77.11	2.716E-04	(	3.870E-05	Energy duplication
		74.81	0.000E+00	&	8.103E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.414E-05	G
Th-234	N 3.4984E-04	92.35	2.075E-04	(	1.143E-04	G
		63.29	5.525E-04	*(	1.419E-04	G
Pb-214	N 1.2903E-04	351.92	1.333E-04	(	1.249E-05	G K

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                    WI07-0615   D2  B-12 #132 - #0006  #2   072807
                            295.21 3.090E-04 +   7.009E-05         G
                             77.11 0.000E+00 %   8.916E-05Energy duplication
                            241.98 1.076E-04  (  8.595E-05         G
                             74.81 6.057E-04 +   1.503E-04Energy duplication
                             87.30 5.538E-04 +   1.690E-04         X

Pb-210   N   8.3697E-04     46.50 8.370E-04  (  3.812E-04         G

AM-241       1.1791E-02     59.54 1.179E-02  (  5.869E-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
   M - No MDA Calculation                A - Not in Average
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:34:41 Page    5
 4714781                          Spectrum name: Win00370.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 #     3.5713E-01    1.636E-01     1.642E-01
 K-40    <    7.9055E-01
 Ac-228 B<    1.8227E-01
 Pb-212       8.0281E-01    1.675E-01     1.702E-01
 CS-137  <    4.6797E-02
 Th-234       1.1580E+00    7.934E-01     7.939E-01
 Pb-214       4.2711E-01    1.644E-01     1.652E-01
 Pb-210       2.7705E+00    3.048E+00     3.048E+00
 AM-241       3.9029E+01    1.154E+00     1.849E+00

   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0615 D2 B-12 #132 - #0006 #2 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) 4.4544453E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:38:43 Page 1
4714781 Spectrum name: Win00329.An1

Sample description
WI07-0794 D1 A/F WZ 7/31Deconning Well-head080107

Spectrum Filename: C:\User\Win00329.An1

Acquisition information
Start time: 01-Aug-2007 14:28:34
Live time: 600
Real time: 601
Dead time: 0.25 %
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: 7.7310E+06
Activity scaling factor: 1.0000E+00/(1.0000E+00* 7.7310E+06) =
1.2935E-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).

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:38:43 Page 2
4714781 Spectrum name: Win00329.An1
Page 1

WI07-0801 D2 Wellhead (NW) i-side concrete 080107

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: 0.1377

********** 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	
14.74	3.87	5334.	22006.	36.677	1.89	2.240	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	186.25	46.74	130.	26.	0.043	147.10	0.334s
AM-241	237.64	59.59	257.	3174.	5.291	4.00	0.936
Th-234	250.87	62.89	68.	26.	0.044	120.54	0.328s
Pb-214	298.54	74.81	67.	117.	0.195	27.03	0.917D
Pb-212	298.56	74.81	115.	0.	0.000	512.08	0.776D
Pb-212	307.74	77.11	57.	180.	0.299	19.10	0.919D
Pb-214	307.74	77.11	172.	0.	0.000	205.26	0.600D
Pb-214	348.96	87.41	44.	40.	0.068	60.33	0.720
Th-234	368.72	92.35	50.	53.	0.088	46.94	0.933D
Ac-228	380.72	95.35	43.	12.	0.020	163.03	0.935D
Ac-228	837.12	209.43	20.	40.	0.067	52.44	0.274s
Pb-212	953.94	238.62	23.	228.	0.381	14.49	1.057D
Pb-214	967.37	241.98	30.	35.	0.058	55.79	1.060D
Ac-228	1082.05	270.64	7.	30.	0.050	48.69	0.382s

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:04:05 Page 3
4714781 Spectrum name: Win00460.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.91	295.60	8.	39.	0.065	42.39	0.583s
Ac-228	1313.21	328.42	4.	19.	0.032	58.61	0.687s
Ac-228	1353.21	338.42	3.	57.	0.095	29.15	0.872
Pb-214	1406.89	351.83	3.	73.	0.121	25.47	1.039
Ac-228	1851.64	462.99	7.	23.	0.039	61.94	0.904s

WI07-0801 D2 Wellhead (NW) i-side concrete 080107

Bi-214	2438.40	609.63	0.	47.	0.078	29.17	0.344s
CS-137	2642.50	660.64	0.	12.	0.020	57.74	0.500s
Bi-214	3075.20	768.78	0.	7.	0.012	75.59	0.312s
Ac-228	3170.81	792.67	4.	3.	0.005	258.20	0.220s
Ac-228	3644.72	911.10	0.	47.	0.078	29.17	0.739s
Bi-214	3739.00	934.66	0.	4.	0.007	100.00	0.750s
Ac-228	3858.81	964.60	2.	17.	0.029	52.06	1.595D
Ac-228	3876.86	969.11	2.	25.	0.042	42.83	1.598D
Bi-214	4479.44	1119.69	5.	3.	0.005	269.43	0.309s
Bi-214	4954.00	1238.27	0.	6.	0.010	81.65	0.500s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.71	1461.07	0.	38.	0.063	32.44	0.760s
Ac-228	6351.00	1587.32	0.	10.	0.017	63.25	0.250s
Bi-214	7059.60	1764.36	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	2.0823E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	1.779E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.103E-04	G
			1238.11	4.068E-04	+	2.712E-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	3.887E-04	+	3.277E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	(	4.403E-05	G
Ac-228	N	5.3940E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	4.874E-04	(	4.876E-05	G
			338.32	6.680E-04	(	3.516E-05	G
			964.60	1.076E-03	+	4.126E-04	G
			794.70	0.000E+00	&	2.514E-04	G
			463.00	9.095E-04	+	3.220E-04	G
			209.28	8.464E-04	+	2.426E-04	G
			270.23	9.373E-04	+	2.848E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:04:05 Page 4
4714781 Spectrum name: Win00460.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.452E-03	+	7.262E-04	G
		95.35	2.338E-04	-	2.119E-04	X
		327.64	7.737E-04	&	2.973E-04	G
Pb-212	N 5.2481E-04	238.62	5.248E-04	(	1.665E-05	G K
		77.11	6.878E-04	+	8.528E-05	Energy duplication
		74.81	0.000E+00	%	1.015E-04	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	&(	2.710E-06	G
Th-234	N 5.9354E-04	92.35	6.581E-04	(	1.315E-04	G
		63.29	5.017E-04	$(	2.314E-04	G
Pb-214	N 2.6109E-04	351.92	2.698E-04	(	1.135E-05	G K

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                WI07-0801   D2 Wellhead (NW) i-side concrete  080107
                           295.21 2.443E-04 *(  2.838E-05          G
                            77.11 0.000E+00 %   1.250E-04Energy duplication
                           241.98 4.833E-04 +   1.647E-04          G
                            74.81 1.308E-03 +   2.197E-04Energy duplication
                            87.30 5.877E-04 +   1.955E-04          X

Pb-210   N   5.2055E-04     46.50 5.206E-04  (  3.402E-04          G

AM-241       6.5364E-03     59.54 6.536E-03  (  4.769E-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  01-AUG-2007 13:04:05 Page    5
 4714781                          Spectrum name: Win00460.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	7.0323E-01	2.052E-01	2.068E-01
K-40	5.6503E+00	1.833E+00	1.845E+00
Ac-228	1.8217E+00	3.610E-01	3.674E-01
Pb-212	1.7724E+00	2.568E-01	2.652E-01
CS-137 #	1.0982E-01	6.341E-02	6.355E-02
Th-234	2.0045E+00	9.410E-01	9.421E-01
Pb-214	8.8177E-01	2.180E-01	2.205E-01
Pb-210 C	1.7580E+00	2.586E+00	2.586E+00
AM-241	2.2075E+01	8.829E-01	1.203E+00

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0801 D2 Wellhead (NW) i-side concrete 080107

< - 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) 3.6776695E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0803 D2 Wellhead center Chesapeak 080107

```
     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 12:18:41 Page    1
4714781                          Spectrum name: Win00458.An1

Sample description
     WI07-0803  D2  Wellhead (ctr) Chesapeak  080107


Spectrum Filename: C:\User\Win00458.An1

Acquisition information
       Start time:                 01-Aug-2007 12:08:23
       Live time:                600
       Real time:                609
       Dead time:                  1.40 %
       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:                3.1030E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.1030E+02) =
                                   3.2227E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  01-AUG-2007 12:18:41 Page    2
4714781                          Spectrum name: Win00458.An1
```

WI07-0803 D2 Wellhead center Chesapeak 080107

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: 0.1442

********** 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	
11.44	2.89	3631.	7524.	12.541	3.23	0.854	-	D
15.64	3.94	11759.	7107.	11.845	4.92	0.855	-	D
19.16	4.83	11111.	4706.	7.843	6.97	0.856	-	D
55.71	14.11	188.	100.	0.167	46.42	0.837	PU-239	s
69.87	17.65	339.	1588.	2.647	6.83	1.034	MO-99	s
84.09	21.21	238.	1179.	1.965	7.76	1.133	TC-99M	s
105.02	26.44	215.	1796.	2.993	5.78	0.829	AM-241	
127.76	32.13	449.	217.	0.361	30.80	0.880	XE-138	D
132.11	33.21	511.	205.	0.341	34.19	0.881	CS-137	D
197.65	49.59	11945.	3081.	5.135	13.75	1.442	EU-155	s
395.31	99.00	63.	118.	0.197	33.96	0.675	AC-228	sM
411.02	102.92	39.	83.	0.138	34.63	0.631	GD-153	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 12:18:41 Page 3
4714781 Spectrum name: Win00458.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.32	46.51	4408.	0.	0.000	0.00	0.893
AM-241	237.61	59.58	9538.	119977.	199.962	0.67	0.863
Th-234	253.95	63.66	54.	42.	0.070	68.01	0.633s
Pb-214	298.54	74.81	93.	112.	0.187	30.71	0.917D
Pb-212	298.56	74.81	110.	0.	0.000	225.41	0.391D
Pb-212	307.74	77.11	90.	192.	0.320	20.11	0.919D
Pb-214	307.74	77.11	219.	0.	0.000	361.05	0.484D
Pb-214	347.70	87.10	57.	65.	0.109	46.16	1.053

WI07-0803 D2 Wellhead center Chesapeak 080107

Th-234	368.72	92.35	62.	39.	0.065	65.84	0.933D
Ac-228	380.72	95.35	36.	10.	0.017	181.55	0.935D
Ac-228	833.79	208.59	13.	48.	0.079	41.23	0.780s
Pb-212	953.94	238.62	26.	199.	0.332	15.88	1.057D
Pb-214	967.37	241.98	35.	33.	0.055	61.33	1.060D
Ac-228	1080.32	270.21	16.	28.	0.047	66.50	0.687s
Pb-214	1180.30	295.20	16.	54.	0.090	40.47	0.852
Ac-228	1311.04	327.88	6.	15.	0.025	76.59	0.324s
Ac-228	1352.56	338.25	12.	51.	0.086	37.01	1.032s
Pb-214	1406.95	351.85	9.	105.	0.175	22.62	0.776s
Ac-228	1851.08	462.85	2.	16.	0.027	57.18	0.329s
Bi-214	2437.19	609.33	0.	69.	0.115	24.08	1.085
CS-137	2645.19	661.31	2.	11.	0.018	77.66	0.464s
Bi-214	3072.50	768.10	0.	8.	0.013	70.71	0.250s
Ac-228	3181.00	795.22	0.	7.	0.012	75.59	0.500s
Ac-228	3644.92	911.15	0.	49.	0.082	28.57	0.854s
Bi-214	3736.33	933.99	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	1.	8.	0.013	84.34	1.595D
Ac-228	3876.86	969.11	0.	29.	0.048	37.57	1.598D
Bi-214	4481.27	1120.14	0.	15.	0.025	51.64	0.448s
Bi-214	4952.75	1237.95	0.	6.	0.010	81.65	0.375s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.21	1460.70	0.	39.	0.065	32.03	1.249s
Ac-228	6355.33	1588.40	0.	3.	0.005	115.47	0.375s
Bi-214	7055.75	1763.40	0.	11.	0.018	60.30	0.375s

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

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 12:18:41 Page 4
4714781 Spectrum name: Win00458.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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5362E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.914E-04	&(	3.558E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	4.169E-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	3.887E-04	?(	9.716E-05	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	5.5257E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	5.588E-04	(	2.589E-05	G
			338.32	6.016E-04	(	6.277E-05	G
			964.60	4.713E-04	(	1.374E-04	G
			794.70	4.116E-04	-	2.514E-04	G
			463.00	6.301E-04	(	9.663E-05	G
			209.28	1.009E-03	&	2.445E-04	G
			270.23	8.748E-04	+	3.091E-04	G
			1588.00	4.357E-04	?(	1.452E-04	G
			95.35	1.922E-04	-	1.946E-04	X
			327.64	6.109E-04	(	1.629E-04	G

WI07-0803 D2 Wellhead center Chesapeak 080107

Pb-212	N	4.5810E-04	238.62	4.581E-04	(	1.765E-05	G K	
			77.11	7.346E-04	+	9.285E-05	Energy duplication	
			74.81	0.000E+00	%	9.936E-05	Energy duplication	
CS-137		2.9357E-05	661.66	2.936E-05	?(	7.156E-06	G	
Th-234	N	6.1452E-04	92.35	4.841E-04	(	1.455E-04	G	
			63.29	8.001E-04	$(	2.077E-04	G	
Pb-214	N	3.8202E-04	351.92	3.889E-04	@(	1.767E-05	G K	
			295.21	3.393E-04	(	3.852E-05	G	
			77.11	0.000E+00	%	1.406E-04	Energy duplication	
			241.98	4.574E-04	(	1.227E-04	G	
			74.81	1.254E-03	+	2.316E-04	Energy duplication	
			87.30	9.456E-04	+	2.340E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00		1.927E-03	G	

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 12:18:41 Page 5
4714781 Spectrum name: Win00458.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	2.4705E-01	59.54	2.470E-01	(	2.854E-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	1.1396E+00	2.744E-01	2.777E-01
K-40 #	5.5336E+00	1.772E+00	1.784E+00

WI07-0803 D2 Wellhead center Chesapeak 080107

Ac-228	1.7808E+00	4.634E-01	4.682E-01
Pb-212	1.4763E+00	2.345E-01	2.410E-01
CS-137 #	9.4609E-02	7.347E-02	7.356E-02
Th-234	1.9804E+00	9.374E-01	9.385E-01
Pb-214	1.2311E+00	2.785E-01	2.823E-01
Pb-210 <	6.2101E+00		
AM-241	7.9616E+02	5.304E+00	2.995E+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 01-AUG-2007 12:18:41 Page 6
4714781 Spectrum name: Win00458.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) 8.0939899E+02 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0878 D2 Well #1 080407

Sample description
WI07- 0878 D2 Well #1 080407

Spectrum Filename: C:\User\Win00509.An1

Acquisition information
Start time: 04-Aug-2007 13:35:40
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: 3.7650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7650E+02) = 2.6560E+03
Detection limit method: Traditional ORTEC method

0

WI07-0878 D2 Well #1 080407

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: 0.1023

********** 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	4026.	22336.	37.227	1.76	2.218	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	185.97	46.67	26.	18.	0.031	98.05	0.852
AM-241	237.45	59.54	81.	252.	0.420	19.05	0.782
Th-234	252.81	63.38	39.	28.	0.047	80.02	0.275s
Pb-214	298.54	74.81	67.	82.	0.137	35.62	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	1271.85	0.000D
Pb-212	307.74	77.11	75.	140.	0.233	24.33	0.919D
Pb-214	307.74	77.11	228.	0.	0.000	100.62	0.333D
Pb-214	348.20	87.22	68.	32.	0.054	100.88	1.209s
Th-234	368.72	92.35	42.	37.	0.061	59.78	0.933D
Ac-228	380.72	95.35	29.	7.	0.012	220.17	0.936D
Ac-228	835.50	209.02	8.	41.	0.068	40.91	1.215
Pb-212	953.94	238.62	15.	148.	0.246	18.09	1.057D
Pb-214	967.37	241.98	23.	39.	0.065	47.67	1.060D
Ac-228	1078.12	269.66	6.	31.	0.052	46.49	0.605s

0

ORTEC g v - i (63) wan32 G53W2.06 04-AUG-2007 13:45:51 Page 3
4714781 Spectrum name: Win00509.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.32	295.21	11.	61.	0.102	34.75	0.699s
Ac-228	1309.20	327.42	2.	2.	0.002	328.86	0.252s
Ac-228	1352.77	338.31	8.	38.	0.064	41.80	1.310
Pb-214	1408.07	352.13	8.	50.	0.083	36.61	0.371s
Ac-228	1846.00	461.58	0.	14.	0.023	53.45	0.250s

Bi-214	2437.62	609.44	0.	42.	0.070	30.86	1.031s
CS-137	2648.50	662.14	0.	2.	0.003	141.42	0.500s
Bi-214	3072.33	768.06	0.	9.	0.015	66.67	0.375s
Ac-228	3179.00	794.72	2.	0.	0.001	450.92	0.333s
Ac-228	3645.25	911.23	0.	36.	0.060	33.33	0.937s
Bi-214	3735.00	933.66	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	6.	3.	0.006	229.95	1.595D
Ac-228	3876.86	969.11	5.	19.	0.032	56.74	1.598D
Bi-214	4477.00	1119.08	0.	11.	0.018	60.30	0.250s
Bi-214	4954.83	1238.47	1.	1.	0.001	339.93	0.339s
Bi-214	5511.50	1377.57	0.	4.	0.007	100.00	0.999s
K-40	5844.71	1460.82	0.	69.	0.115	24.08	0.400s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7059.33	1764.29	0.	6.	0.010	81.65	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	Peak MDA Value microCi	Comments
Bi-214	N	2.1632E-04	609.31	1.953E-04	(	4.650E-06	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	%	1.737E-04	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	2.915E-04	?(	9.716E-05	G
K-40	N	3.0379E-03	1460.81	3.038E-03	?(	4.403E-05	G
Ac-228	N	4.1010E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	3.687E-04	(	7.195E-05	G
			338.32	4.512E-04	(	5.163E-05	G
			964.60	0.000E+00	%	2.946E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	5.457E-04	&(	3.898E-05	G
			209.28	8.675E-04	+	2.203E-04	G
			270.23	9.789E-04	&	2.848E-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	0.000E+00	%	1.373E-04	G
Pb-212	N 3.3938E-04	238.62	3.394E-04	(	1.392E-05	G K
		77.11	5.359E-04	+	8.132E-05	Energy duplication
		74.81	0.000E+00	%	1.017E-04	Energy duplication
CS-137	5.4198E-06	661.66	5.420E-06	?(	2.710E-06	G
Th-234	N 4.9000E-04	92.35	4.595E-04	(	1.210E-04	G
		63.29	5.334E-04	?(	1.780E-04	G
Pb-214	N 1.8333E-04	351.92	1.833E-04	(	1.723E-05	G K

```
                                WI07-0878 D2   Well  #1  080407
                                 295.21 3.821E-04 +   7.837E-05          G
                                  77.11 0.000E+00 ?   1.435E-04Energy duplication
                                 241.98 5.356E-04 +   1.610E-04          G
                                  74.81 9.201E-04 +   1.983E-04Energy duplication
                                  87.30 4.716E-04 +   2.126E-04          X

Pb-210   N   3.7766E-04      46.50 3.777E-04 ?(  1.563E-04          G

AM-241       5.1890E-04      59.54 5.189E-04  (  2.726E-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  04-AUG-2007 13:45:51 Page    5
4714781                          Spectrum name: Win00509.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 #	5.7454E-01	1.773E-01	1.786E-01
K-40 #	8.0688E+00	1.943E+00	1.966E+00
Ac-228	1.0892E+00	2.574E-01	2.606E-01
Pb-212	9.0141E-01	1.630E-01	1.665E-01
CS-137 #C	1.4395E-02	2.036E-02	2.037E-02
Th-234	1.3015E+00	6.500E-01	6.507E-01
Pb-214	4.8694E-01	1.782E-01	1.792E-01
Pb-210 #	1.0031E+00	9.835E-01	9.837E-01
AM-241	1.3782E+00	2.625E-01	2.674E-01

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
```

WI07-0878 D2 Well #1 080407

< - 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) 1.4818129E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Lera
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0879 D2 Well #2 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 07:54:00 Page 1
8905696 Spectrum name: Win00516.An1

Sample description
WI07-0879 D2 Well #2 080507

Spectrum Filename: C:\User\Win00516.An1

Acquisition information
Start time: 05-Aug-2007 07:43:49
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: 3.5810E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5810E+02) = 2.7925E+03
Detection limit method: Traditional ORTEC method

D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 07:54:00 Page 2
8905696 Spectrum name: Win00516.An1

WI07-0879 D2 Well #2 080507

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: 0.1070

********** 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	2.91	4726.	10991.	18.318	2.60	0.854	-	D
18.19	4.49	11985.	8021.	13.368	4.46	0.856	-	D
105.03	26.44	47.	127.	0.212	26.42	0.474	AM-241	s
197.49	49.70	835.	254.	0.424	34.51	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	400.	13.	0.022	427.38	0.892D
AM-241	237.64	59.59	768.	9840.	16.400	2.31	0.884
Th-234	252.83	63.38	43.	21.	0.036	103.08	0.806
Pb-214	298.54	74.81	46.	73.	0.121	35.29	0.917D
Pb-212	298.56	74.81	73.	0.	0.000	310.24	0.583D
Pb-212	307.74	77.11	54.	131.	0.218	23.64	0.919D
Pb-214	307.74	77.11	159.	0.	0.000	0.00	0.510D
Pb-214	347.90	87.15	45.	42.	0.070	60.61	1.160s
Th-234	368.72	92.35	42.	62.	0.104	38.75	0.933D
Ac-228	380.72	95.35	34.	13.	0.022	135.58	0.935D
Ac-228	837.13	209.43	19.	23.	0.039	82.11	0.282s

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 07:54:00 Page 3
8905696 Spectrum name: Win00516.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	10.	174.	0.290	15.98	1.057D
Pb-214	967.37	241.98	25.	43.	0.072	44.80	1.060D
Ac-228	1079.86	270.10	11.	31.	0.052	53.57	1.380s
Pb-214	1180.72	295.30	4.	55.	0.092	29.76	0.439s
Ac-228	1303.58	326.01	8.	2.	0.003	586.52	0.205s

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Ac-228	1353.63	338.52	4.	43.	0.072	34.49	1.015
Pb-214	1407.78	352.06	10.	90.	0.151	25.21	1.124s
Ac-228	1854.48	463.70	2.	9.	0.015	86.07	0.465s
Bi-214	2437.41	609.39	0.	72.	0.120	23.57	0.800s
CS-137	2647.64	661.92	0.	12.	0.020	57.74	0.937s
Bi-214	3074.00	768.48	2.	0.	0.000	0.00	0.000s
Ac-228	3178.54	794.60	2.	8.	0.013	93.54	0.295s
Ac-228	3645.46	911.29	0.	56.	0.093	26.73	0.500s
Bi-214	3740.14	934.94	3.	2.	0.004	250.71	1.213
Ac-228	3858.81	964.60	0.	10.	0.017	63.13	1.595D
Ac-228	3876.86	969.11	1.	36.	0.059	34.77	1.598D
Bi-214	4482.78	1120.52	0.	9.	0.015	66.67	0.375s
Bi-214	4954.50	1238.39	0.	10.	0.017	63.25	0.500s
Bi-214	5514.25	1378.25	0.	4.	0.007	100.00	0.375s
K-40	5846.22	1461.20	0.	59.	0.098	26.04	0.464s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	3.4282E-04	609.31	3.348E-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	6.779E-04	+	3.390E-04	G
			768.36	0.000E+00	?	1.335E-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	&	3.597E-04	G
K-40	N	2.5976E-03	1460.81	2.598E-03	(	4.403E-05	G
Ac-228	N	6.4221E-04	911.07	6.167E-04	(	1.101E-05	G K
			969.11	6.918E-04	(	4.329E-05	G
			338.32	5.039E-04	-	1.196E-04	G
			964.60	6.195E-04	(	6.173E-05	G
			794.70	4.704E-04	-	2.940E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 07:54:00 Page 4
8905696 Spectrum name: Win00516.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	3.508E-04	&	2.033E-04	G
		209.28	4.937E-04	-	2.048E-04	G
		270.23	9.789E-04	+	3.024E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.553E-04	-	1.966E-04	X
		327.64	0.000E+00	&	2.036E-04	G
Pb-212	N 4.0044E-04	238.62	4.004E-04	(	1.136E-05	G K
		77.11	5.009E-04	+	7.558E-05	Energy duplication
		74.81	0.000E+00	%	8.157E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 7.7726E-04	92.35	7.773E-04	(	1.204E-04	G

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                          WI07-0879  D2   Well  #2  080507
                            63.29 4.064E-04 -   2.253E-04          G

Pb-214    N   3.3837E-04    351.92 3.352E-04 @(  1.810E-05          G K
                           295.21 3.445E-04  (  2.113E-05          G
                            77.11 0.000E+00 ?   1.204E-04Energy duplication
                           241.98 5.951E-04 +   1.683E-04          G
                            74.81 8.128E-04 +   1.778E-04Energy duplication
                            87.30 6.095E-04 +   1.988E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   5.970E-04          G

AM-241        2.0262E-02     59.54 2.026E-02  (  8.174E-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
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     ORTEC g v - i (  63) wan32  G53W2.06  05-AUG-2007 07:54:00 Page    5
 8905696                          Spectrum name: Win00516.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	9.5732E-01	2.256E-01	2.285E-01
K-40	7.2539E+00	1.889E+00	1.908E+00
Ac-228	1.7934E+00	4.595E-01	4.644E-01
Pb-212	1.1182E+00	1.787E-01	1.835E-01
CS-137 #	9.0809E-02	5.243E-02	5.254E-02
Th-234	2.1705E+00	8.411E-01	8.426E-01
Pb-214	9.4490E-01	1.843E-01	1.876E-01
Pb-210 <	1.6671E+00		
AM-241	5.6582E+01	1.307E+00	2.469E+00

WI07-0879 D2 Well #2 080507

- 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) 7.0910820E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Lann
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07 - 0794 D1 A-F - WZ 7-31 Decon Well head 080107

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
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	184.56	46.31	12.	5.	0.009	207.48	0.583s
AM-241	234.47	58.78	43.	49.	0.082	58.16	0.840
Th-234	249.15	62.45	45.	25.	0.041	112.02	1.269s
Pb-214	298.61	74.81	56.	5.	0.008	440.45	0.970D
Pb-212	298.63	74.81	16.	0.	0.000	276.55	0.000D
Pb-212	307.80	77.11	61.	20.	0.033	118.91	0.972D
Pb-214	307.80	77.11	35.	0.	0.000	348.21	0.000D
Pb-214	350.00	87.65	9.	0.	0.000	0.00	0.000s
Th-234	368.79	92.35	37.	21.	0.035	92.01	0.985D
Ac-228	380.79	95.35	21.	14.	0.023	107.88	0.987D
Ac-228	834.17	208.66	6.	15.	0.026	79.40	0.333s
Pb-212	953.85	238.57	36.	60.	0.100	53.54	0.366s
Pb-214	967.50	241.98	28.	0.	0.000	0.00	1.101
Ac-228	1082.00	270.60	4.	1.	0.001	582.14	0.000s
Pb-214	1178.76	294.78	7.	7.	0.012	136.67	0.297s
Ac-228	1310.86	327.79	0.	20.	0.033	44.72	0.312s
Ac-228	1351.25	337.88	2.	1.	0.002	400.00	0.187s
Pb-214	1406.77	351.76	16.	44.	0.073	50.62	0.766s
Ac-228	1853.00	463.28	1.	0.	0.000	0.00	0.000s
Bi-214	2427.07	606.74	8.	2.	0.002	702.38	0.215s
CS-137	2646.86	661.66	0.	7.	0.012	75.59	0.292s
Bi-214	3073.00	768.16	0.	1.	0.002	200.00	0.250s
Ac-228	3179.50	794.77	0.	4.	0.007	100.00	0.500s
Ac-228	3643.80	910.79	0.	22.	0.037	42.64	0.375s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	2.	8.	0.013	86.07	1.589D
Ac-228	3877.18	969.11	4.	3.	0.005	229.29	1.591D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:38:43 Page 3
4714781 Spectrum name: Win00329.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
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	5512.00	1377.61	0.	1.	0.002	200.00	0.250s
K-40	5844.62	1460.72	1.	1.	0.001	339.93	0.375s
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	0.0000E+00	609.31	0.000E+00	&	9.695E-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	%	5.074E-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	%	5.176E-05	G
Ac-228	N	1.2444E-04	911.07	1.265E-04	?(	5.750E-06	G K
			969.11	0.000E+00	%	4.198E-05	G
			338.32	0.000E+00	%	1.278E-05	G
			964.60	2.515E-04	+	1.565E-04	G
			794.70	1.157E-04	?(	2.893E-05	G
			463.00	0.000E+00	?	3.028E-05	G
			209.28	1.205E-04	&(	3.069E-05	G
			270.23	0.000E+00	%	4.117E-05	G
			1588.00	0.000E+00	?	6.781E-05	G
			95.35	8.514E-05	-	5.445E-05	X
			327.64	2.938E-04	+	1.005E-04	G
Pb-212	N	4.9797E-05	238.62	4.980E-05	*(	7.470E-06	G K
			77.11	2.300E-05	-	1.520E-05	Energy duplication
			74.81	0.000E+00	%	1.184E-05	Energy duplication
CS-137		9.0632E-06	661.66	9.063E-06	?(	1.295E-06	G
Th-234	N	1.0321E-04	92.35	8.314E-05	(	3.573E-05	G
			63.29	1.318E-04	&(	5.361E-05	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:38:43 Page 4
4714781 Spectrum name: Win00329.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Pb-214	N	6.0018E-05	351.92	6.002E-05	@(	8.428E-06	G K
			295.21	1.635E-05	-	1.296E-05	G
			77.11	0.000E+00	%	1.740E-05	Energy duplication
			241.98	0.000E+00	%	3.986E-05	G
			74.81	0.000E+00	%	3.834E-05	Energy duplication
			87.30	0.000E+00	?	2.140E-05	X
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	3.118E-05	G
AM-241		2.7766E-05	59.54	2.777E-05	&(	5.488E-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	

- -

***** 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<	1.2540E-12		
K-40 <	6.6949E-12		
Ac-228	1.6097E-11	6.864E-12	6.874E-12
Pb-212	6.4412E-12	3.449E-12	3.452E-12
CS-137 #	1.1723E-12	8.862E-13	8.866E-13
Th-234	1.3350E-11	9.676E-12	9.681E-12

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:38:43 Page 5
4714781 Spectrum name: Win00329.An1

Nuclide	Time of Count Activity uCi/ml	Uncertainty Counting uCi/ml	2 Sigma Total uCi/ml
Pb-214 #	7.7633E-12	3.929E-12	3.934E-12
Pb-210 <	4.0330E-12		
AM-241	3.5915E-12	2.089E-12	2.093E-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.
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) 4.8415279E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: BC. Fenn

WI07 - 0794 D1 A-F - WZ 7-31 Decon Well head 080107
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0795 D1 A-F - WZ 7-31 Digging Soil 080107

Sample description
WI07-0795 D1 A/F WZ 7/31 Digging Soil 080107

Spectrum Filename: C:\User\Win00328.An1

Acquisition information
Start time: 01-Aug-2007 14:12:20
Live time: 600
Real time: 602
Dead time: 0.27 %
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: 2.4410E+07
Activity scaling factor: 1.0000E+00/(1.0000E+00* 2.4410E+07) =
4.0967E-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 - 0795 D1 A-F - WZ 7-31 Digging Soil 080107

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: 0.0459

********** 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	
29.72	7.61	798.	978.	1.630	13.21	2.532	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	189.74	47.60	16.	26.	0.043	70.78	0.497s
AM-241	230.22	57.72	19.	14.	0.024	122.09	0.689s
Th-234	252.73	63.34	38.	25.	0.042	108.32	0.578s
Pb-214	298.61	74.81	51.	24.	0.041	91.57	0.971D
Pb-212	298.63	74.81	48.	0.	0.000	714.92	0.000D
Pb-212	307.80	77.11	49.	18.	0.030	118.91	0.972D
Pb-214	307.80	77.11	34.	0.	0.000	1661.32	0.000D
Pb-214	348.00	87.15	24.	14.	0.023	132.48	0.267s
Th-234	370.00	92.65	8.	0.	0.000	0.00	0.000s
Ac-228	380.79	95.35	12.	0.	0.000	0.00	0.956D
Ac-228	838.98	209.86	7.	14.	0.023	87.29	0.359s
Pb-212	954.08	238.62	42.	2.	0.004	868.69	1.099D
Pb-214	967.50	241.98	26.	2.	0.004	670.80	1.101D
Ac-228	1074.89	268.82	0.	27.	0.045	38.49	0.333s
Pb-214	1181.74	295.52	12.	8.	0.013	190.90	0.226s
Ac-228	1309.00	327.33	1.	0.	0.000	0.00	0.000s
Ac-228	1353.10	338.35	2.	11.	0.018	80.53	0.236s
Pb-214	1406.20	351.62	17.	0.	0.001	1338.32	0.172s

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:22:29 Page 3
4714781 Spectrum name: Win00328.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1852.00	463.03	0.	3.	0.005	115.47	0.750s
Bi-214	2436.00	608.97	3.	0.	0.000	0.00	0.000s
CS-137	2644.00	660.95	0.	5.	0.008	89.44	0.250s
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

WI07 - 0795 D1 A-F - WZ 7-31 Digging Soil 080107

Ac-228	3636.75	909.03	0.	18.	0.030	47.14	0.375s
Bi-214	3736.67	934.00	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.750D
Ac-228	3878.67	969.48	1.	0.	0.001	240.37	0.197s
Bi-214	4480.67	1119.91	1.	0.	0.000	260.34	0.210s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5513.00	1377.86	0.	1.	0.002	200.00	0.250s
K-40	5841.60	1459.97	0.	25.	0.042	40.00	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	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	0.0000E+00	609.31	0.000E+00	?	6.095E-06	G K
			1764.49	6.986E-05	?	5.889E-05	G
			1120.29	0.000E+00	%	2.299E-05	G
			1238.11	0.000E+00	%	6.233E-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	%	9.899E-05	G
			934.06	0.000E+00	%	1.001E-04	G
K-40	N	5.0515E-04	1460.81	5.051E-04	?(	2.021E-05	G
Ac-228	N	1.0441E-04	911.07	1.035E-04	&(	5.750E-06	G K
			969.11	0.000E+00	%	1.964E-05	G
			338.32	4.546E-05	-	2.396E-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	1.101E-04	&(	3.361E-05	G
			270.23	3.003E-04	&	8.747E-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	?	2.938E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:22:29 Page 4
4714781 Spectrum name: Win00328.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
Pb-212	N	0.0000E+00	238.62	0.000E+00	%	8.212E-06	G K
			77.11	2.079E-05		1.387E-05	Energy duplication
			74.81	0.000E+00	%	1.985E-05	Energy duplication
CS-137		6.4737E-06	661.66	6.474E-06	&(	1.295E-06	G
Th-234	N	0.0000E+00	92.35	0.000E+00	?	1.780E-05	G
			63.29	1.336E-04	$	6.270E-05	G
Pb-214	N	0.0000E+00	351.92	0.000E+00	%	8.665E-06	G K
			295.21	1.672E-05	?	1.526E-05	G
			77.11	0.000E+00	%	1.724E-05	Energy duplication
			241.98	0.000E+00	%	3.986E-05	G
			74.81	8.118E-05		4.232E-05	Energy duplication

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                WI07 - 0795 D1 A-F - WZ 7-31   Digging Soil  080107
                                87.30 6.277E-05 ?   4.139E-05         X

Pb-210   N   1.2762E-04     46.50 1.276E-04 &(  3.033E-05         G

AM-241       8.0672E-06     59.54 8.067E-06 &(  3.732E-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  01-AUG-2007 14:22:29 Page    5
4714781                          Spectrum name: Win00328.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<    2.4968E-13
K-40   #     2.0694E-11    8.278E-12    8.292E-12
Ac-228       4.2772E-12    2.016E-12    2.019E-12
Pb-212 B<    3.3640E-13
CS-137 #     2.6521E-13    2.372E-13    2.373E-13
Th-234  <    7.2907E-13
Pb-214 B<    3.5497E-13
Pb-210 #     5.2280E-12    3.700E-12    3.702E-12
AM-241 #     3.3049E-13    4.035E-13    4.037E-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 - 0795 D1 A-F - WZ 7-31 Digging Soil 080107

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) 3.0795266E-11 uCi/ml

The library has energies which are not separable.

Analyzed by: R.C. Fake
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0800 D2 Wellhead (SE) i-side concrete 080107

Sample description
WI07-0800 D2 Wellhead (SE) I/S concrete 080107

Spectrum Filename: C:\User\Win00459.An1

Acquisition information
Start time: 01-Aug-2007 12:40:07
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: 3.1150E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1150E+02) = 3.2103E+03
Detection limit method: Traditional ORTEC method

0

WI07-0800 D2 Wellhead (SE) i-side concrete 080107

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: 0.1266

********** 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	2.91	6125.	11375.	18.959	2.70	0.854	-	D
16.54	4.13	14723.	9545.	15.909	4.14	0.855	-	D
44.17	11.23	280.	30.	0.050	168.22	0.500	PB-214	s
70.73	17.87	191.	184.	0.307	30.46	0.994	MO-99	
84.17	21.23	125.	227.	0.379	23.36	0.858	TC-99M	s
104.82	26.39	63.	413.	0.688	12.09	0.785	AM-241	s
197.73	49.61	3415.	943.	1.572	24.08	1.160	EU-155	s
358.74	89.78	59.	35.	0.058	71.20	0.931	PB-214	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	185.47	46.55	1629.	0.	0.000	0.00	0.893
AM-241	237.58	59.57	2552.	33734.	56.223	1.25	0.873
Th-234	253.08	63.45	70.	51.	0.085	66.13	0.369s
Pb-214	298.54	74.81	80.	121.	0.201	27.81	0.917D
Pb-212	298.56	74.81	138.	0.	0.000	310.51	0.523D
Pb-212	307.74	77.11	60.	208.	0.347	17.38	0.919D
Pb-214	307.74	77.11	207.	0.	0.000	458.87	0.345D

0

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 12:50:21 Page 3
4714781 Spectrum name: Win00459.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	348.51	87.30	78.	30.	0.051	89.74	0.928D
Th-234	368.72	92.35	54.	62.	0.103	42.03	0.933D
Ac-228	380.72	95.35	38.	1.	0.002	1495.81	0.935D
Ac-228	837.21	209.45	18.	26.	0.043	68.80	0.436s
Pb-212	953.94	238.62	22.	278.	0.464	12.90	1.057D

WI07-0800 D2 Wellhead (SE) i-side concrete 080107

Pb-214	967.37	241.98	34.	36.	0.061	55.79	1.060D
Ac-228	1081.55	270.52	14.	53.	0.088	40.64	1.000s
Pb-214	1179.76	295.07	3.	70.	0.116	26.10	1.267
Ac-228	1312.90	328.34	10.	29.	0.048	58.65	0.964
Ac-228	1353.71	338.54	4.	73.	0.122	26.18	0.929s
Pb-214	1407.54	352.00	6.	104.	0.173	21.76	0.802s
Ac-228	1851.04	462.84	3.	21.	0.036	52.29	0.547s
Bi-214	2437.48	609.40	0.	66.	0.110	24.62	0.650s
CS-137	2643.88	660.98	4.	10.	0.017	88.11	0.750s
Bi-214	3074.75	768.66	0.	7.	0.012	75.59	0.375s
Ac-228	3180.86	795.18	0.	14.	0.023	53.45	1.062s
Ac-228	3645.36	911.26	0.	58.	0.097	26.26	0.425s
Bi-214	3735.17	933.70	0.	6.	0.010	81.65	0.500s
Ac-228	3858.81	964.60	2.	5.	0.009	106.72	1.595D
Ac-228	3876.86	969.11	0.	33.	0.055	34.83	1.598D
Bi-214	4482.84	1120.54	0.	19.	0.032	45.88	0.417s
Bi-214	4944.00	1235.77	0.	5.	0.008	89.44	0.250s
Bi-214	5512.25	1377.76	0.	4.	0.007	100.00	0.375s
K-40	5844.58	1460.79	0.	39.	0.065	32.03	0.364s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7064.83	1765.67	0.	12.	0.020	57.74	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	3.1534E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	4.270E-04	&	1.930E-04	G
			1120.29	4.623E-04	+	1.627E-04	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	4.328E-04	+	3.649E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 12:50:21 Page 4
4714781 Spectrum name: Win00459.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	7.0389E-04	911.07	6.388E-04	(	1.101E-05	G K
			969.11	6.402E-04	(	1.942E-05	G
			338.32	8.575E-04	*(	3.883E-05	G
			964.60	3.378E-04	-	2.639E-04	G
			794.70	8.232E-04	?(	5.880E-05	G
			463.00	8.315E-04	(	1.116E-04	G
			209.28	5.501E-04	-	2.094E-04	G
			270.23	1.656E-03	+	3.776E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.800E-04	X
			327.64	1.181E-03	&	3.806E-04	G
Pb-212	N	6.3921E-04	238.62	6.392E-04	(	1.639E-05	G K
			77.11	7.974E-04	+	9.057E-05	Energy duplication
			74.81	0.000E+00	%	1.108E-04	Energy duplication

CS-137		2.8002E-05	661.66	2.800E-05	?(	8.817E-06		G
Th-234	N	8.5558E-04	92.35	7.741E-04	(	1.360E-04		G
			63.29	9.716E-04	@(	2.351E-04		G
Pb-214	N	4.1661E-04	351.92	3.852E-04	(	1.481E-05		G K
			295.21	4.375E-04	(	1.921E-05		G
			77.11	0.000E+00	%	1.367E-04	Energy duplication	
			241.98	5.043E-04	(	1.203E-04		G
			74.81	1.346E-03	+	2.294E-04	Energy duplication	
			87.30	4.406E-04	(	1.882E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		1.175E-03		G
AM-241		6.9462E-02	59.54	6.946E-02	(	1.482E-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 01-AUG-2007 12:50:21 Page 5
4714781 Spectrum name: Win00459.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		1.0123E+00	2.492E-01	2.521E-01
K-40	#	5.5123E+00	1.765E+00	1.777E+00
Ac-228		2.2597E+00	4.087E-01	4.174E-01
Pb-212		2.0520E+00	2.647E-01	2.757E-01
CS-137	#	8.9895E-02	7.920E-02	7.928E-02
Th-234		2.7466E+00	1.076E+00	1.078E+00

		WI07-0800	D2 Wellhead (SE) i-side concrete 080107	
Pb-214		1.3374E+00	2.910E-01	2.953E-01
Pb-210	<	3.7734E+00		
AM-241		2.2299E+02	2.785E+00	8.712E+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) 2.3800322E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0801 D2 Wellhead (NW) i-side concrete 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:04:05 Page 1
4714781 Spectrum name: Win00460.An1

Sample description
WI07-0801 D2 Wellhead (NW) I/S concrete 080107

Spectrum Filename: C:\User\Win00460.An1

Acquisition information
Start time: 01-Aug-2007 12:53:55
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: 2.9610E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9610E+02) = 3.3772E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:04:05 Page 2
4714781 Spectrum name: Win00460.An1

WI-0001

Survey No._____

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

yor: Glenn Parkhurst (Print) — Sign — 6/2/2007

Reviewer: Chris Higgins (Print) — Sign — 6/2/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.2	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	168	MDC (dpm/100cm2)	24	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: Catapiller 416E Back Hoe
POSE: Incoming Survey

	Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1 I/S Bucket Bottom	1	<MDC	<MDC	<MDC	0
2 I/S Bucket Left	2	<MDC	<MDC	<MDC	0
3 I/S Bucket Right	3	<MDC	<MDC	<MDC	0
4 I/S Bucket Back	4	<MDC	<MDC	<MDC	0
5 O/S Bucket Bottom	5	<MDC	<MDC	<MDC	0
6 O/S Bucket Bottom	6	<MDC	<MDC	<MDC	0
7 O/S Bucket Left	7	<MDC	<MDC	<MDC	0
8 O/S Bucket Right	8	<MDC	<MDC	<MDC	0
9 O/S Bucket Back	9	<MDC	<MDC	<MDC	0
10 O/S Bucket Bottom	10	<MDC	<MDC	<MDC	0
11 Boom	11	<MDC	<MDC	<MDC	0
12 Cab Floor	12	<MDC	<MDC	<MDC	0

Note: 100% Frisk with NDA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_i(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0002

Surveyor: Glenn Parkhurst (Print) — Sign — 6/2/2007

Reviewer: Chris Higgins (Print) — Sign — 6/2/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.2	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	168	MDC (dpm/100cm2)	24	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: Catapiller IT386 Loader
PURPOSE: Incoming Survey

	Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1 I/S Bucket Bottom	1	<MDC	<MDC	<MDC	0
2 I/S Bucket Left	2	<MDC	<MDC	<MDC	0
3 I/S Bucket Right	3	<MDC	<MDC	<MDC	0
4 I/S Bucket Back	4	<MDC	<MDC	<MDC	0
5 O/S Bucket Bottom	5	<MDC	<MDC	<MDC	0
6 O/S Bucket Bottom	6	<MDC	<MDC	<MDC	0
7 O/S Bucket Left	7	<MDC	<MDC	<MDC	0
8 O/S Bucket Right	8	<MDC	<MDC	<MDC	0
9 O/S Bucket Back	9	<MDC	<MDC	<MDC	0
10 O/S Bucket Bottom	10	<MDC	<MDC	<MDC	0
11 Boom	11	<MDC	<MDC	<MDC	0
12 Cab Floor	12	<MDC	<MDC	<MDC	0

Note: 100% Frisk with NDA

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0003

Surveyor: Glenn Parkhurst (Print) — Sign — 6/2/2007

Reviewer: Chris Higgins (Print) — Sign — 6/2/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.2	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	168	MDC (dpm/100cm2)	24	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: Sources
PURPOSE: Incoming

1 Cs-137
2 Th-230
3Mixed Gamma
4 Tc-99 (175)
5 Tc-99 (454)

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	<MDC	<MDC	<MDC	0
2	<MDC	<MDC	<MDC	0
3	<MDC	<MDC	<MDC	0
4	<MDC	<MDC	<MDC	0
5	<MDC	<MDC	<MDC	0
6				
7				
8				
9				
10				
11				
12				

Note: 100% Frisk with NDA

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0004

Surveyor: Glenn Parkhurst (Print) — Sign — 6/2/2007

Reviewer: Chris Higgins (Print) — Sign — 6/2/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.2	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	168	MDC (dpm/100cm2)	24	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: Plywood
PURPOSE: Release

Gross Mazzlin with NDA

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	<MDC	<MDC	<MDC	0
2	<MDC	<MDC	<MDC	0
3	<MDC	<MDC	<MDC	0
4	<MDC	<MDC	<MDC	0
5	<MDC	<MDC	<MDC	0
6	<MDC	<MDC	<MDC	0
7	<MDC	<MDC	<MDC	0
8	<MDC	<MDC	<MDC	0
9	<MDC	<MDC	<MDC	0
10	<MDC	<MDC	<MDC	0
11	<MDC	<MDC	<MDC	0
12	<MDC	<MDC	<MDC	0
13	<MDC	<MDC	<MDC	0
14	<MDC	<MDC	<MDC	0
15	<MDC	<MDC	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB_b t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-0022

yor: Carl Ingle (Print) — Sign — 6/3/2007

Reviewer: Chris Higgins (Print) — Sign — 6/3/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	M19
Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	91491
Cal Due	N/A	Cal Due	N/A	Cal Due	N/A	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	
Type	N/A	Type	N/A	Type	N/A	Type	gamma
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	NA
Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	NA
BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	NA
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	N/A	Action Level (dpm/100cm^2)	NA

ATION: RCA
POSE: Initial Walkover

	Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1 Grid E-4	1				7
2 Grid D-4	2				10
3 Grid C-4	3				9
4 Grid B-4	4				9
5 Grid A-4	5				7
6 Grid E-3	6				10
7 Grid D-3	7				18
8 Grid C-3	8				15
9 Grid B-3	9				15
10 GridA-3	10				7
11 Grid E-2	11				10
12 Grid D-2	12				15
13 Grid C-2	13				30
14 Grid B-2	14				9
15 Grid A-2	15				7
16 Grid E-1	16				10
17 Grid D-1	17				12
18 Grid C-2	18				10
19 Grid B-2	19				9
20 Workover Tank	20				7
21 Contact on Drum	21				24
22 Grid C-3	22				160
23 Contact with Center Drum	23				2mR
24 Contact on Drum	24				60
25 Contact on drum	25				220
26 Contact on Drum	26				20
27 I/S Horse trailer	27				15
28 Workover Tank	28				7

Note: 100% Frisk with NDA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(e_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0082

Surveyor: Carl Ingle (Print) — Sign — 6/5/2007

Reviewer: Chris Higgins (Print) — Sign — 6/5/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	2350w44-10
Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	126179-230079
Cal Due	N/A	Cal Due	N/A	Cal Due	N/A	Cal Due	5/8/08-8/16/07
Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	
Type	N/A	Type	N/A	Type	N/A	Type	gamma
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	NA
Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	NA
BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	NA
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	N/A	Action Level (dpm/100cm^2)	NA

LOCATION: Inside RCA
PURPOSE: Bias contact points in RCA

SEE ATTACHED SHEET FOR LOCATIONS

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	CPM Dose Rate
1				9280
2				13421
3				8530
4				10905
5				13426
6				29842
7				18551
8				44099
9				19355
10				61649
11				35011
12				28838
13				1461111
14				147167
15				102724
16				62024
17				107008
18				18947
19				100746
20				56799
21				77707
22				67356
23				122792
24				0.2 mr/hr
25				38001
26				17224
27				55098
28				63319
29				332007
30				0.5 mr/hr
31				85684
32				0.8 mr/hr
33				22421

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0082

Surveyor: Carl Ingle (Print) — Sign — 6/5/2007

Reviewer: Chris Higgins (Print) — Sign — 6/5/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	2350w44-10
Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	126179-230079
Cal Due	N/A	Cal Due	N/A	Cal Due	N/A	Cal Due	5/8/08-8/16/07
Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	
Type	N/A	Type	N/A	Type	N/A	Type	gamma
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	NA
Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	NA
BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	NA
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	N/A	Action Level (dpm/100cm^2)	NA

LOCATION: Inside RCA
PURPOSE: Bias contact points in RCA

SEE ATTACHED SHEET FOR LOCATIONS

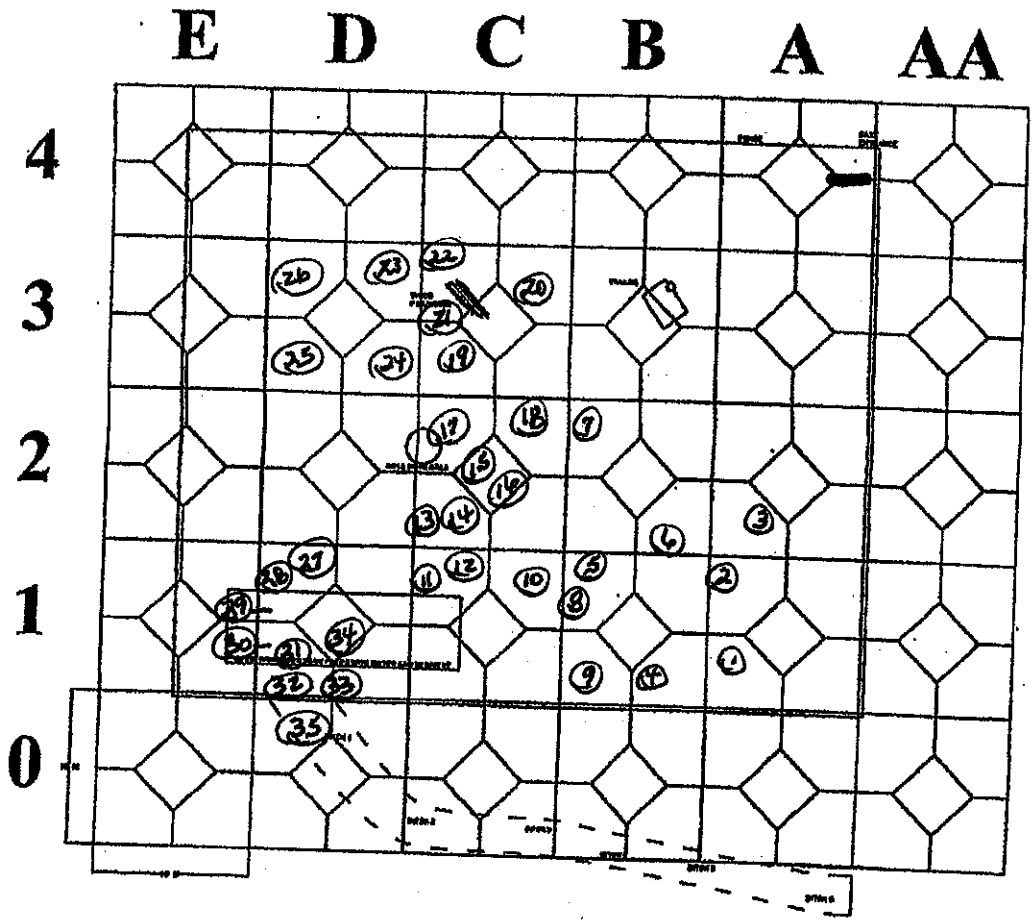
Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	CPM Dose Rate
34				39095
35				18345

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

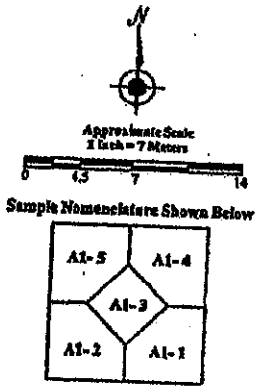
$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level



M19 91491
Calcive 5/8/08

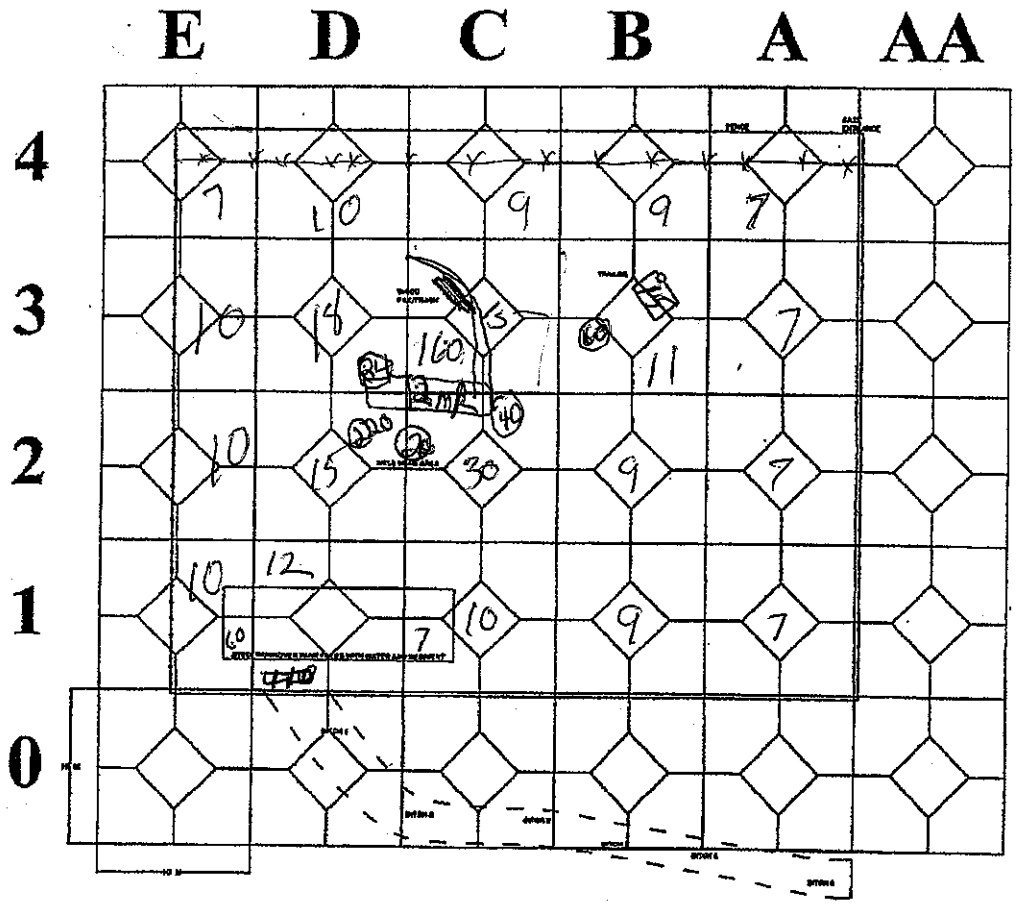
M 2350 / 44-10
#126179 / #230079
Calcive 5/8/08 / 8/16/07

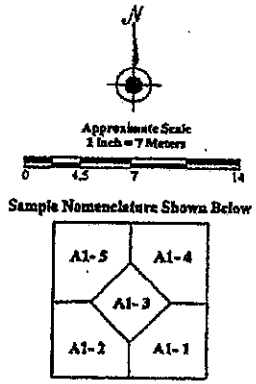


Sample Location Map	Former D&G Operating Company Evans Unit 05775 Lease Chambers County Winnie, Texas
Date: August 2005	
Figure: 3	CORRIGAN CONSULTING, INC.

1.) 9280
2.) 13421
3.) 8530
4.) 10905
5.) 13426
6.) 29 842
7.) 18551
8.) 44099
9.) 19 355
10.) 61 649
11.) 35 011
12.) 28 838
13.) 0.8 mn/Hr 1,460,111
14.) 147 167
15.) 102 724
16.) 62024
17.) ~~18947~~ 107008
18.) 18947
19.) 100 746
20.) 56 799
21.) 77 707
22.) 67 356
23.) 122 792
24.) 239,642 0.2 mn/Hr
25.) 38 001
26.) 17 224
27.) 55 098
28.) ~~0.5 mn/Hr~~ 63319
29.) 332,007
30.) 0.5 mn/Hr
31.) 85,684
32.) 0.8 mn/Hr
33.) 22 421
34.) 39 095
35.) 18345

Bkg 6 uR





Sample Location Map	Former D&G Operating Company Evans Unit 05775 Lease Chambers County Winnie, Texas
Date: August 2005	
Figure: 3	CORRIGAN CONSULTING, INC.

west

91491

5/8/08

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0083

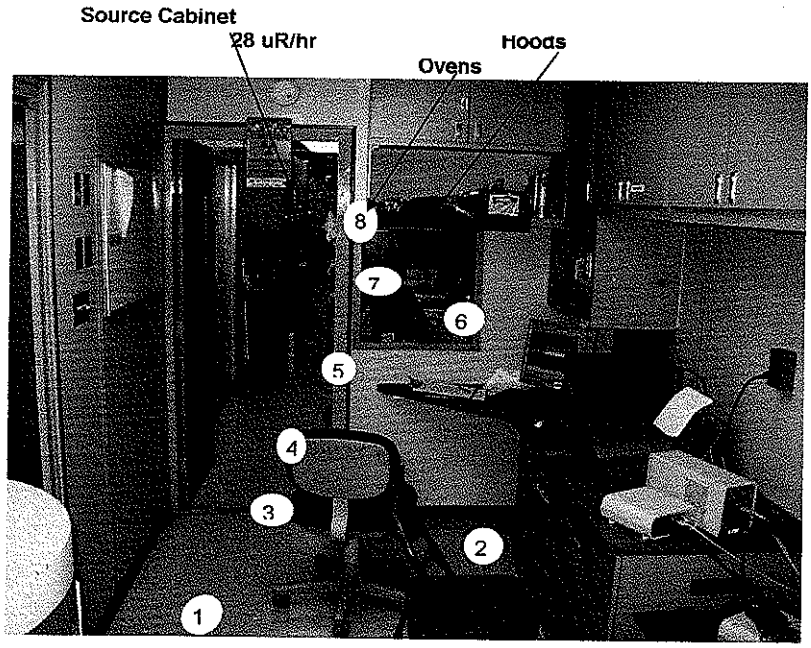
yor: Linda C. Finn (Print) — LC Finn (Sign) — 6/6/2007

Reviewer: Chris Higgins (Print) — (Sign) — 6/6/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.14	BKG (uR)	5
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	168	MDC (dpm/100cm2)	23	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: Energy Solutions Mobile Lab
PURPOSE: 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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	28
5	N/A	<MDC	<MDC	5
6	N/A	<MDC	<MDC	5
7	N/A	<MDC	<MDC	5
8	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB t_s (1 + t_s/t_b)}}{\varepsilon_i(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-0086

Surveyor: Jack Mucia (Print) — Sign — 6/7/2007

Reviewer: Chris Higgins (Print) — Sign — 6/7/2007

Date

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163.00	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	39351.00	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%) (2Pi to 4Pi)	47%	Efficiency (%)(2Pi to 4Pi)	74.80%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1.00	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	50	Background Time (min)	50.00	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.2	BKG (cpm)	0.08	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	82	MDC (dpm/100cm2)	10.53	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: RCA / Misc. Articles
PURPOSE: Contamination Survey

1	green drum
2	pipe
3	wood
4	drums
5	drums
6	drums
7	black hose
8	1500 gallon tank
9	1500 gallon tank
10	gal.grout tank
11	gal.grout tank
12	drum
13	fill head
14	2500 gal tank
15	drums
16	bucket
17	trailer
18	workover tank
19	workover tank
20	workover tank
21	piping
22	piping
23	piping
24	piping
25	piping
26	piping
27	piping
28	piping
29	piping
30	tree trunk

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	~~uR/hr Dose Rate~~ NA
1	<MDC	<MDC	<MDC	0
2	<MDC	<MDC	<MDC	0
3	<MDC	<MDC	40.00	0
4	<MDC	<MDC	<MDC	0
5	<MDC	<MDC	<MDC	0
6	<MDC	<MDC	<MDC	0
7	<MDC	<MDC	<MDC	0
8	<MDC	<MDC	<MDC	0
9	<MDC	<MDC	<MDC	0
10	<MDC	<MDC	<MDC	0
11	<MDC	<MDC	<MDC	0
12	<MDC	<MDC	<MDC	0
13	<MDC	<MDC	<MDC	0
14	<MDC	<MDC	<MDC	0
15	<MDC	<MDC	<MDC	0
16	<MDC	<MDC	<MDC	0
17	<MDC	<MDC	<MDC	0
18	<MDC	<MDC	<MDC	0
19	<MDC	<MDC	<MDC	0
20	<MDC	<MDC	<MDC	0
21	<MDC	<MDC	11.93	0
22	<MDC	<MDC	<MDC	0
23	<MDC	<MDC	<MDC	0
24	<MDC	<MDC	<MDC	0
25	<MDC	<MDC	<MDC	0
26	<MDC	<MDC	<MDC	0
27	<MDC	<MDC	<MDC	0
28	<MDC	<MDC	<MDC	0
29	<MDC	<MDC	<MDC	0
30	<MDC	<MDC	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0095

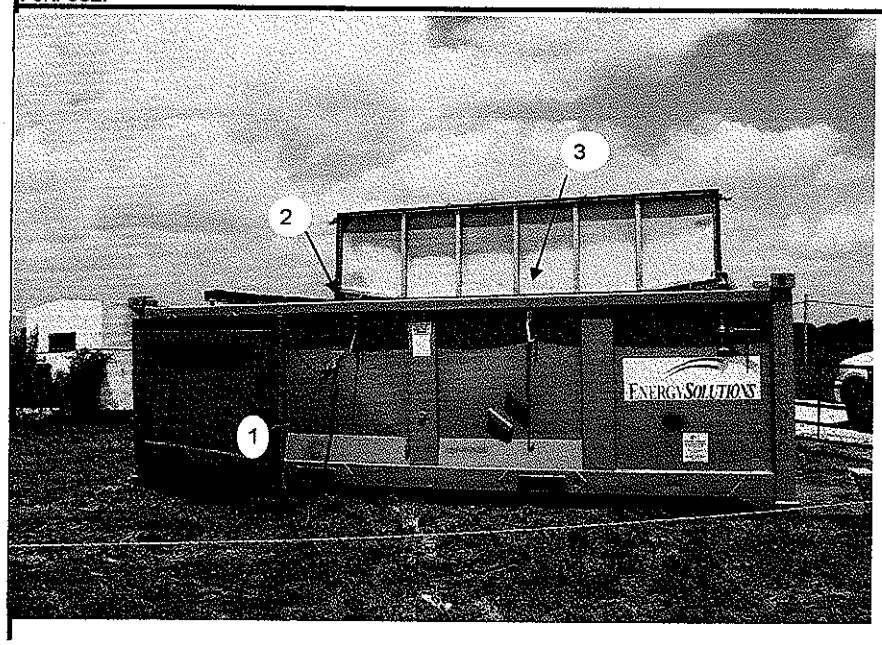
yor: Jack Mucia (Print) — Sign: 6/11/07 — 6/11/2007

Reviewer: Chris Higgins (Print) — Sign: — 6/11/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	21.6	BKG (cpm)	0.12	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	163	MDC (dpm/100cm2)	22	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: Incoming Roll off
PURPOSE: Verification



Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1		<MDC	<MDC	
2		<MDC	<MDC	
3		<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI-07-0023

yor: Jack Mucia (Print) — Sign — 6/4/2007

Reviewer: Chris Higgins (Print) — Sign — 6/4/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	2350w44-10
Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	126179-230079
Cal Due	N/A	Cal Due	N/A	Cal Due	N/A	Cal Due	5/8/08-8/16/07
Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	
Type	N/A	Type	N/A	Type	N/A	Type	gamma
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	NA
Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	NA
BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	NA
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	N/A	Action Level (dpm/100cm^2)	NA

ATION: Surrounding Area O/S RCA
POSE: Random Locations after Scans

SEE ATTACHED SHEET FOR LOCATIONS

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	CPM Dose Rate
1				7966
2				8771
3				8277
4				6787
5				8008
6				7481
7				7245
8				8463
9				9364
10				8848
11				9551
12				9095
13				9300
14				9489
15				9283
16				8690
17				9305
18				9242
19				8561
20				8979
21				8760
22				9169
23				9030
24				9049
25				8797
26				9293
27				9358
28				8763
29				8864
30				9784
31				9314
32				9218
33				9311

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0023

yor: Jack Mucia (Print) — Sign — 6/4/2007

Reviewer: Chris Higgins (Print) — Sign — 6/4/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	2350w44-10
Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	126179-230079
Cal Due	N/A	Cal Due	N/A	Cal Due	N/A	Cal Due	5/8/08-8/16/07
Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	N/A	Efficiency (%)	
Type	N/A	Type	N/A	Type	N/A	Type	gamma
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	NA
Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	N/A	Background Time (min)	NA
BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	N/A	BKG (cpm)	NA
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	N/A	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	N/A	Action Level (dpm/100cm^2)	NA

ATION: Surrounding Area O/S RCA
POSE: Random Locations after Scans

SEE ATTACHED SHEET FOR LOCATIONS

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	CPM Dose Rate
34				8176
35				8467
36				9326
37				9226
38				9257
39				8947
40				9140
41				9460
42				9105
43				9219
44				10156
45				6221
46				8126
47				6804
48				5560
49				7237
50				8813

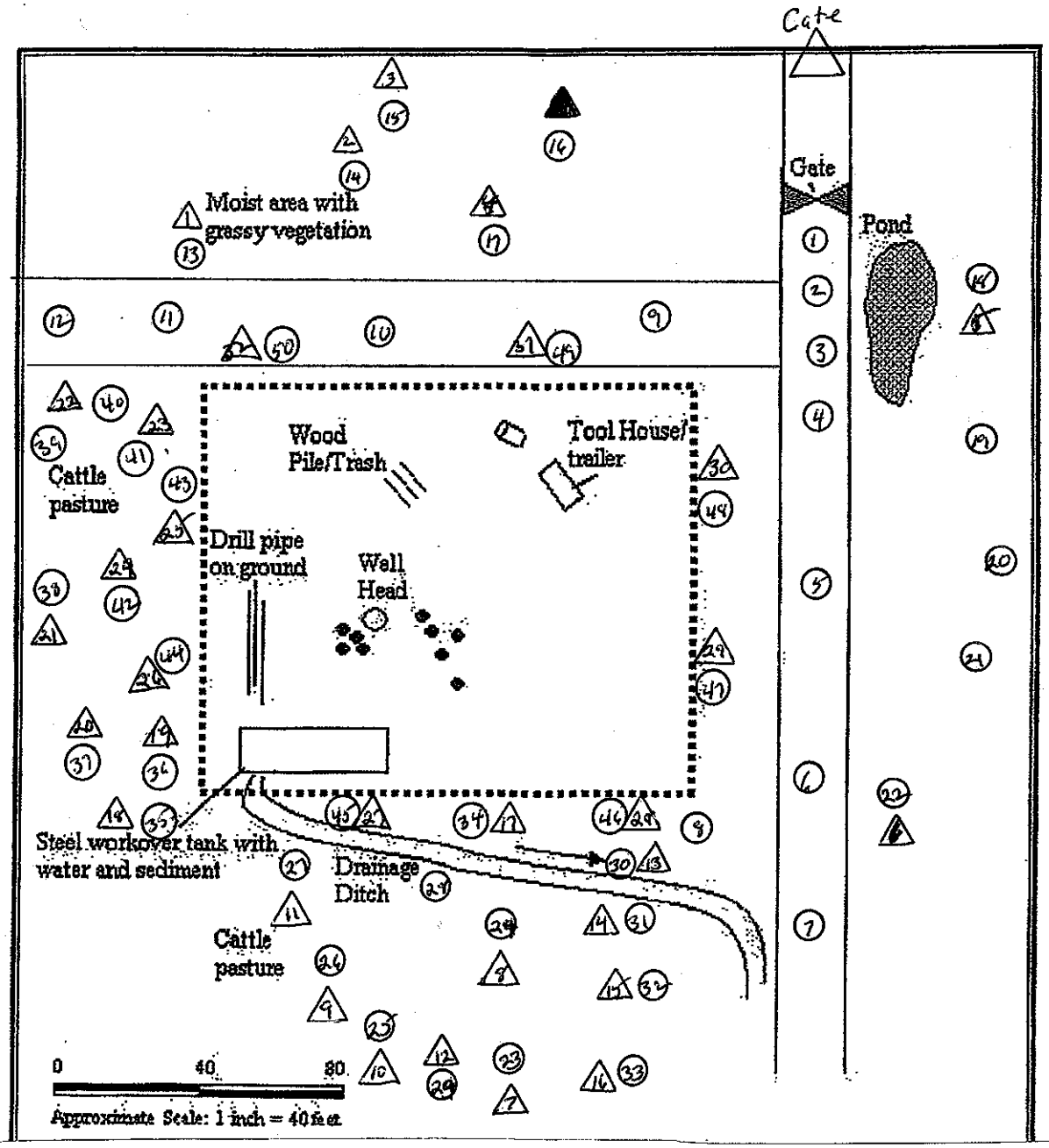
$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

Winnie TX.



○ = Points

△ = Soil Samples

Soil Samples # WI ~~0001~~ 0027 thur 0056

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0118

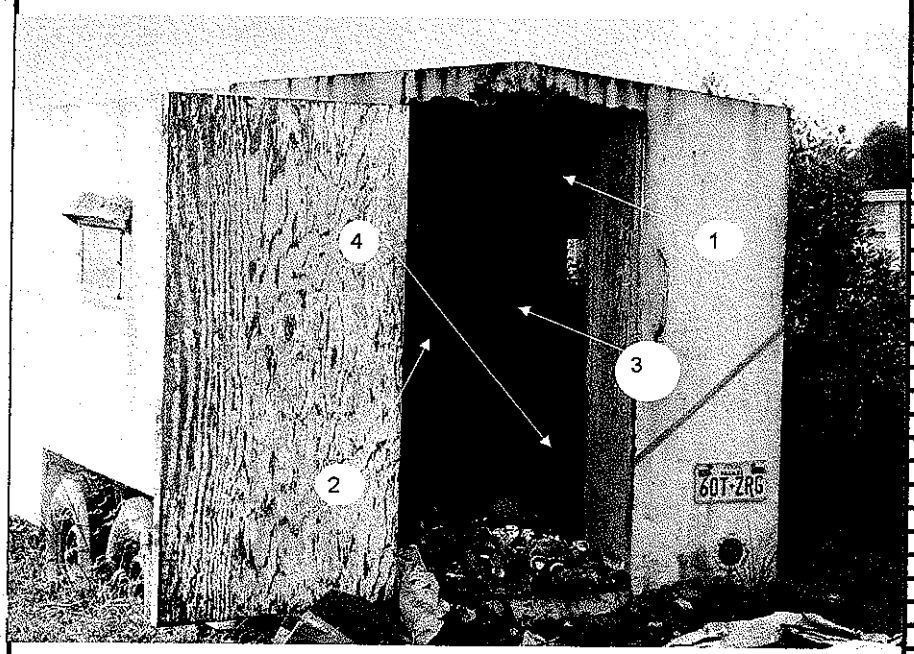
yor: Jack Mucia (Print) — Sign — 6/12/2007

Reviewer: Chris Higgins (Print) — Sign — 6/12/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	100%
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.7	BKG (cpm)	0.04	BKG (cpm)	NA
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	170	MDC (dpm/100cm2)	20	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: I/S RCA Horse Trailer
PURPOSE: Contamination Verification



Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1		<MDC	<MDC	
2		<MDC	<MDC	
3		<MDC	<MDC	
4		<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0119

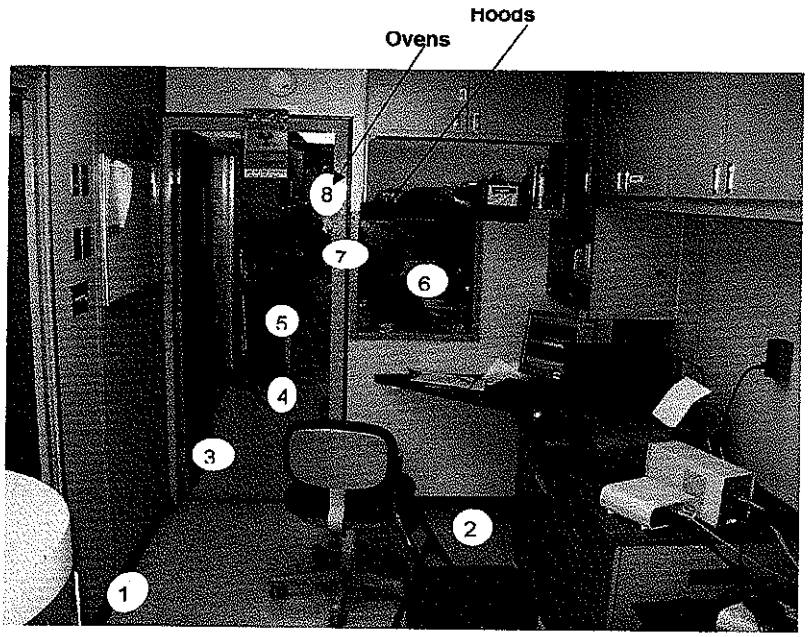
yor: Linda C. Finn (Print) — LC. Finn (Sign) — 6/12/2007

Reviewer: Chris Higgins (Print) — (Sign) — 6/12/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	96784	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	10%	Efficiency (%)	23%	Efficiency (%)	37%	Efficiency (%)	N/A
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	1	Sample Time (min)	NA
Background Time (min)	10	Background Time (min)	10	Background Time (min)	10	Background Time (min)	NA
BKG (cpm)	0	BKG (cpm)	23.7	BKG (cpm)	0.04	BKG (uR)	5
MDC (dpm/100cm2)	388	MDC (dpm/100cm2)	170	MDC (dpm/100cm2)	20	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: Energy Solutions Mobile Lab
PURPOSE: 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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	30
5	N/A	<MDC	<MDC	6
6	N/A	<MDC	<MDC	5
7	N/A	<MDC	<MDC	5
8	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008

Survey Cover Sheet

Survey No. WI07-0139

Surveyor: Jack Mucia (Print) — Sign — 6/14/2007

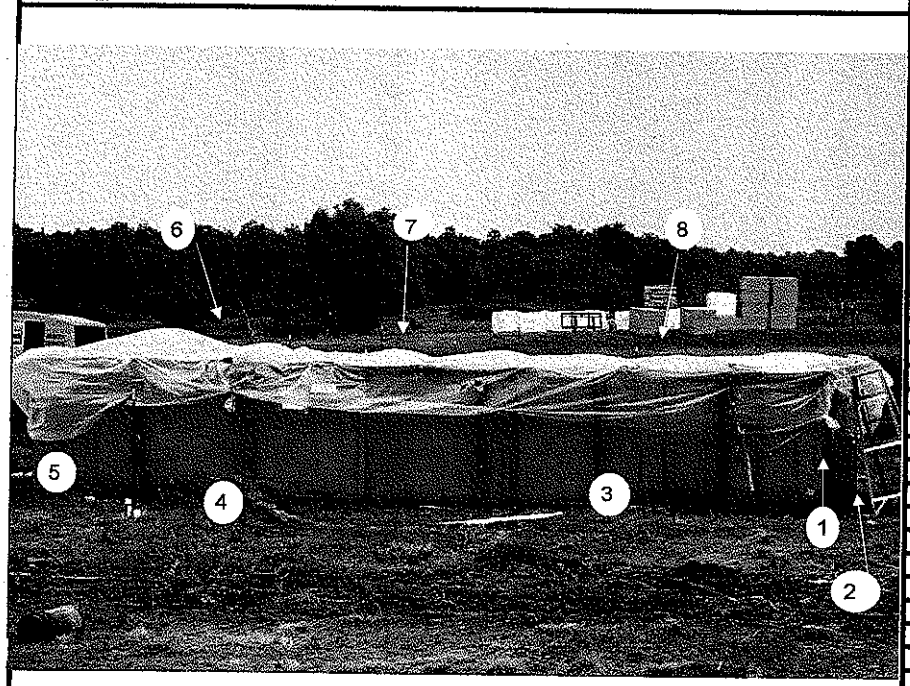
Reviewer: Chris Higgins (Print) — Sign — 6/14/2007 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	NA	Meter Model #	NA	Meter Model #	NA	Meter Model #	M19
Meter Serial #	NA	Meter Serial #	NA	Meter Serial #	NA	Meter Serial #	167145
Cal Due	NA	Cal Due	NA	Cal Due	NA	Cal Due	5/8/2008
Efficiency (%)	NA	Efficiency (%)	NA	Efficiency (%)	NA	Efficiency (%)	100%
Type	NA	Type	NA	Type	NA	Type	gamma
Sample Time (min)	NA	Sample Time (min)	NA	Sample Time (min)	NA	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	NA	Background Time (min)	NA	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	NA	BKG (cpm)	NA	BKG (uCi/hr)	6
	NA						
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	NA	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: I/S RCA Horse Trailer

PURPOSE: Contamination Verification



All Dose Rates are from a 1 meter distance

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1				20
2				15
3				12
4				8
5				8
6				8
7				8
8				12

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0143

or: Carl Carl Ingle
Print

Sign

6/15/2007
Date

Reviewer: Chris Higgins
Print

Sign

6-22-07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	25.6	BKG (cpm)	0.06	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	88	MDC (dpm/100cm2)	11	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: Chop Saw
POSE: Release back to Rental Co.

Smear #1 Blade Housing
Smear #2 Blade Housing
Smear #3 Body & Handle
Smear #4 Bottom

All accesable areas scanned 100% with NDA.

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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	5

A

N

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1 + t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0144

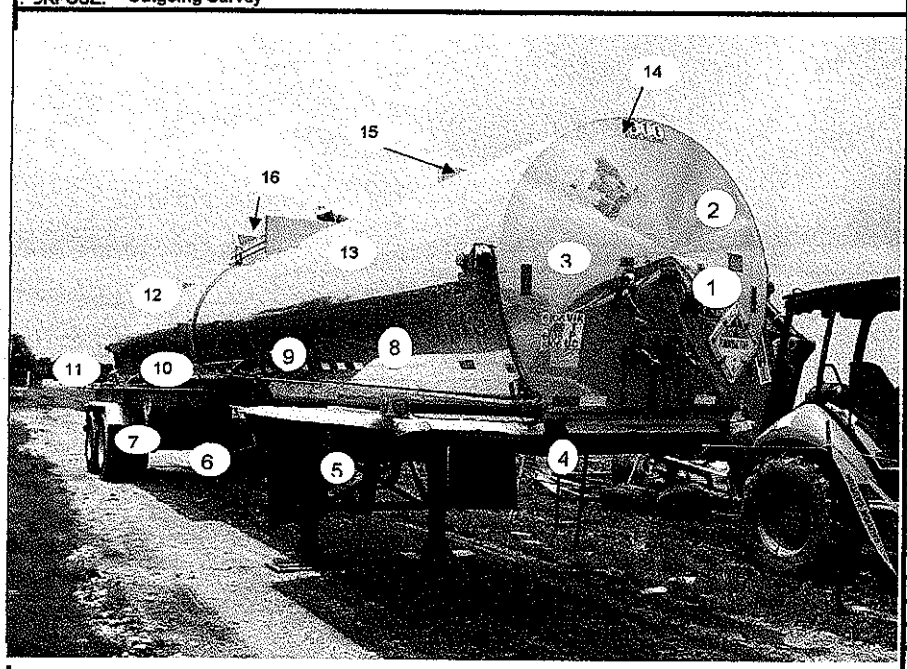
Surveyor: Jack Mucia (Print) — Sign — 6/16/2006

Reviewer: Chris Higgins (Print) — Sign — 6/16/2007 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	26.1	BKG (cpm)	0.1	BKG (uR)	4
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	89	MDC (dpm/100cm2)	12	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: Tanker Truck
PURPOSE: Outgoing Survey



17, 18, 19 Smears on the Truck Cab

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	60
2	N/A	<MDC	<MDC	24
3	N/A	<MDC	<MDC	4
4	N/A	<MDC	<MDC	160
5	N/A	<MDC	<MDC	4
6	N/A	<MDC	<MDC	4
7	N/A	<MDC	<MDC	4
8	N/A	<MDC	<MDC	4
9	N/A	<MDC	<MDC	36
10	N/A	<MDC	<MDC	4
11	N/A	<MDC	<MDC	4
12	N/A	<MDC	<MDC	4
13	N/A	<MDC	<MDC	24
14	N/A	<MDC	<MDC	4
15	N/A	<MDC	<MDC	14
16	N/A	<MDC	<MDC	18
17	N/A	<MDC	<MDC	4
18	N/A	<MDC	<MDC	6
19	N/A	<MDC	<MDC	4

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_i(\varepsilon_s)(A_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0156

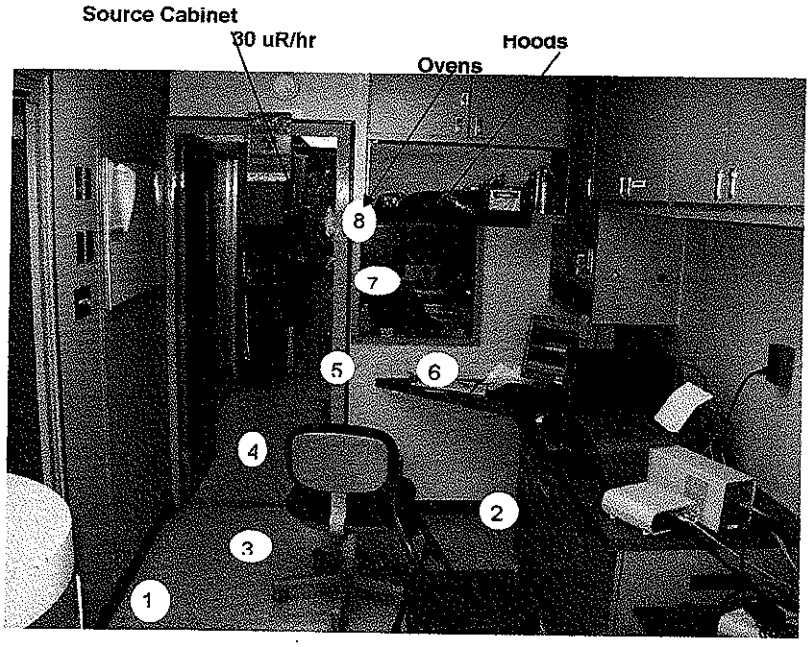
ed by: Linda C. Finn — Sign: LC. Finn — 6/19/2007
Print — Sign — Date

Reviewer: Chris Higgins — Sign: CH — 6-22-07
Print — Sign — Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	25.6	BKG (cpm)	23.1	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	88	MDC (dpm/100cm2)	74	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: Energy Solutions Mobile Lab
OSE: Contamination / Dose Rate



~~All accessable areas scanned 100% with NDA.~~

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	4
2	N/A	<MDC	<MDC	5
3	N/A	<MDC	<MDC	6
4	N/A	<MDC	<MDC	30
5	N/A	<MDC	<MDC	6
6	N/A	<MDC	<MDC	5
7	N/A	<MDC	<MDC	5
8	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0164

Surveyor: Jack Mucia (Print) — (Sign)

Reviewer: (Print) — (Sign)

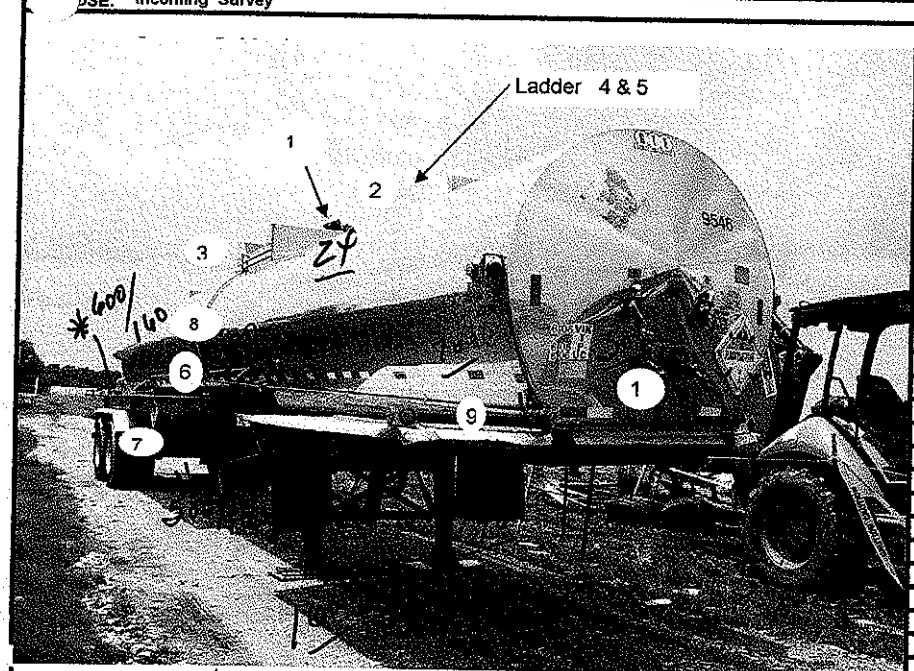
6/20/2007

7-2-07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	21.9	BKG (cpm)	0.06	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	82	MDC (dpm/100cm2)	11	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: Tanker Truck
PURPOSE: Incoming Survey



All readings in micro R/HR
* Contact dose / 1 meter

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	See map
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	
7	N/A	<MDC	<MDC	
8	N/A	<MDC	<MDC	
9	N/A	<MDC	<MDC	
10	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_i(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-~~0083~~ 0165 BC7 6/20/07

yor: Jack Mucia
Print

Sign

6/20/2007

Reviewer:
Print

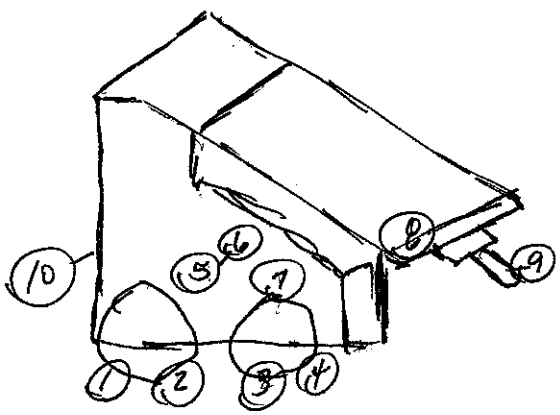
Sign

6-26-07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	21.9	BKG (cpm)	0.06	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	82	MDC (dpm/100cm2)	11	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: Rental Bobcat
POSE: Free Release



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	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	<MDC	<MDC	n/a
6	N/A	<MDC	<MDC	n/a
7	N/A	<MDC	<MDC	n/a
8	N/A	<MDC	<MDC	n/a
9	N/A	<MDC	<MDC	n/a
10	N/A	<MDC	<MDC	n/a

All accesable areas scanned 100% with NDA.

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0166

Surveyor: Jack Mucia / Carl Ingle (Print) — Sign: Jack Mucia, Carl Ingle — 6/19/2007

Reviewer: Chris Higgins (Print) — Sign: [signature] — 6-26-07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	84	MDC (dpm/100cm2)	12	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: Coccrete Around Well Head
PURPOSE: Contamination / Dose Rate

Check Several Pieces of Concrete Level were 10 to 40 cpm above Bkg = 0

Surveyed a load of Concrete from oil head. Direct fish results were 40-60 cpm above bkgd. bkgd = 0

~~All accessable areas scanned 100% with NDA.~~

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	0
2	N/A	<MDC	<MDC	0
3	N/A	<MDC	<MDC	0
4	N/A	<MDC	<MDC	0
5	N/A	<MDC	<MDC	0
6	N/A	<MDC	<MDC	0
7	N/A	<MDC	<MDC	0
8	N/A	<MDC	64.03743316	0
9	N/A	<MDC	<MDC	0
10	N/A	<MDC	14.57219251	0
11	N/A	<MDC	<MDC	0
12	N/A	<MDC	<MDC	0
13	N/A	<MDC	<MDC	0
14	N/A	<MDC	<MDC	0
15	N/A	<MDC	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AL = Rb \div ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AL = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0167

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

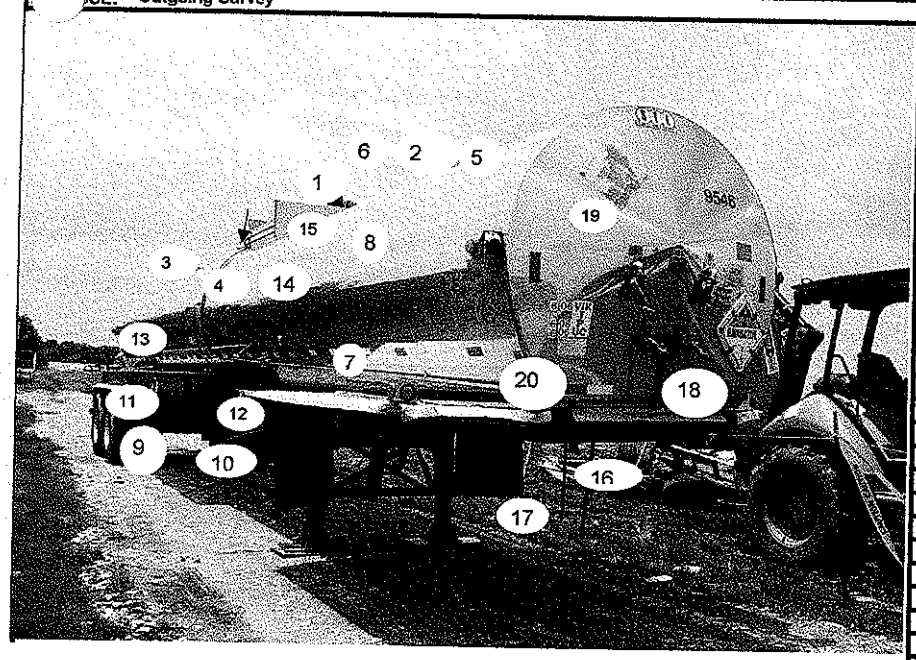
6/20/2007 (Date)

7-4-07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	337	Meter Serial #	1163	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	21.9	BKG (cpm)	0.06	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	82	MDC (dpm/100cm2)	11	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: Tanker Truck
PURPOSE: Outgoing Survey



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	10
2	N/A	<MDC	<MDC	10
3	N/A	<MDC	<MDC	10
4	N/A	<MDC	<MDC	10
5	N/A	<MDC	<MDC	10
6	N/A	<MDC	<MDC	30
7	N/A	<MDC	<MDC	600
8	N/A	<MDC	<MDC	140
9	N/A	<MDC	<MDC	20
10	N/A	<MDC	<MDC	200
11	N/A	<MDC	<MDC	20
12	N/A	<MDC	<MDC	200
13	N/A	<MDC	<MDC	800
14	N/A	<MDC	<MDC	50
15	N/A	<MDC	<MDC	100
16	N/A	<MDC	<MDC	20
17	N/A	<MDC	<MDC	20
18	N/A	<MDC	<MDC	100
19	N/A	<MDC	<MDC	40
20	N/A	<MDC	<MDC	50

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-~~0083~~ 0181
RCF
6/26/07

yor: Jack Mucia
Print

Reviewer: Chris Higgins
Print

Sign

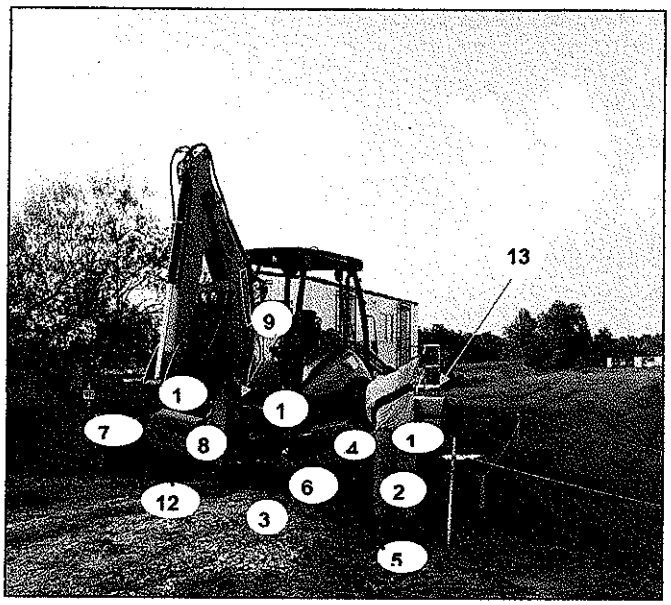
Sign

6/26/2007
6-26-07
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	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	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)	40.3	BKG (cpm)	0.25	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	75	MDC (dpm/100cm2)	14	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: Rental - Back Hoe
OSE: Contamination / Dose Rate



4 & 9 on tires

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	76.94063927	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	81.50684932	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	<MDC	<MDC	5
7	N/A	81.50684932	<MDC	5
8	N/A	<MDC	<MDC	5
9	N/A	<MDC	<MDC	5
10	N/A	<MDC	<MDC	5
11	N/A	<MDC	<MDC	5
12	N/A	<MDC	<MDC	5
13	N/A	<MDC	<MDC	5

All accessible areas frisked using M-3 #96784 cal due 5/14/08
all results < BKGD BKGD = Ø

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm}/100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0187

Sur Jack Mucia
Print

Sign

6/27/07
Date

Reviewer: Glenn Parkhurst
Print

Sign

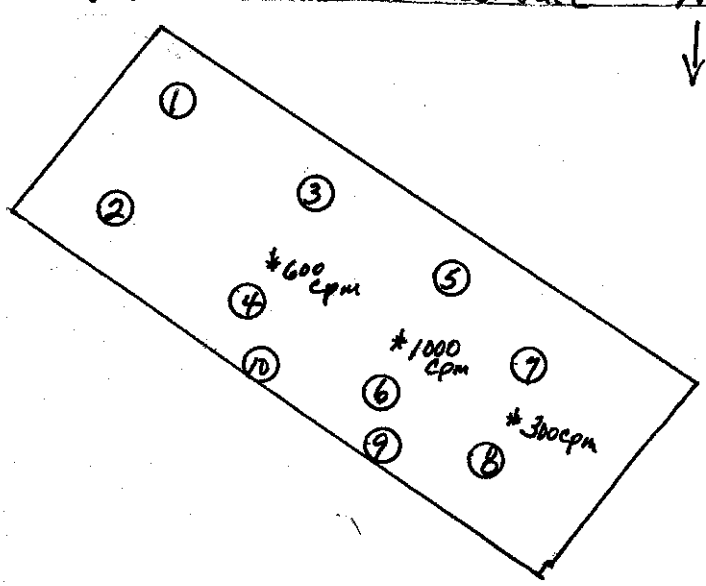
8/5/07
Date

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 #	96784/127389 ~~72900/462485~~	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	10% ~~19%~~	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	alpha ~~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)	25.6	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	61	MDC (dpm/100cm2)	14	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

DC/ Internal Survey of Work-over Tank
JRI Contamination / Dose Rate

* direct frisk 1/2" from Surface



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1.)			100	
2.)			2500	
3.)			1000	
4.)			1600	
5.)			3500	
6.)			2800	
7.)			5000	
8.)			10000	
9.)			2200	
10.)			5000	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0193

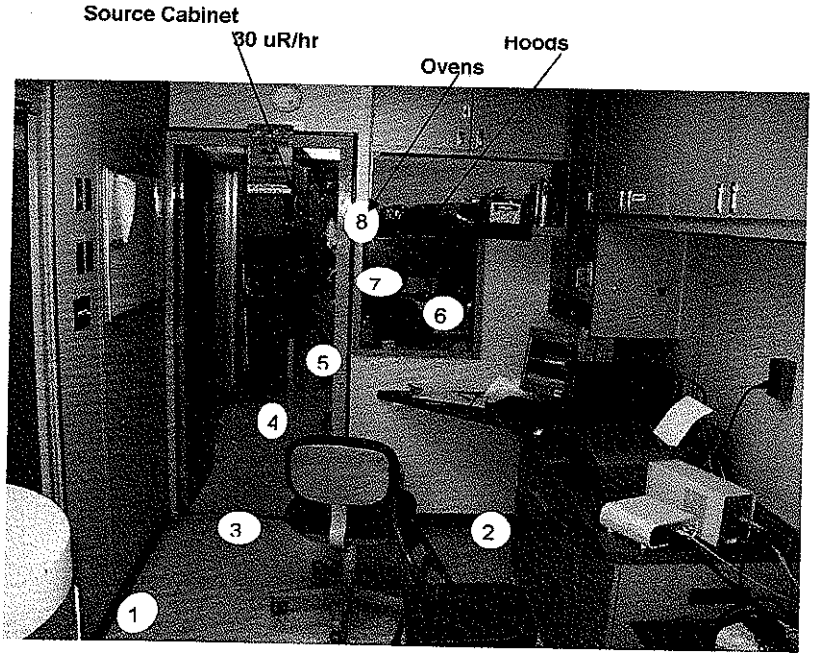
Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 6/27/2007 (Date)

Reviewer: Glenn Hitchcock (Print) — (Sign) — 7-1-07 (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	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.8	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: 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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	30
5	N/A	<MDC	<MDC	6
6	N/A	<MDC	<MDC	5
7	N/A	<MDC	<MDC	5
8	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{E_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0207

yor: Carl Ingle (Print) — Carl Ingle (Sign) — 7-1-07

Reviewer: Glen Parkhurst (Print) — (Sign) — 7-1-07 (Date)

Survey Meters

a Smear Results		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 #	118497/117588	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	11%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.4	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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: Misc. Items in RCA (below)
OSE: Contamination

1 I/S Hood
2 O/S Hood
3 O/S Chaps
4 I/S floor Track hoe
5 Tracks
6 Tracks
7 Bucket *(4.4 K dpm)* *
8 Work Over Tank
9 Work Over Tank
10 Work Over Tank
11 Loader-Floor Bottom
12 Tires
13 I/S Floor
14 Poly Tank
15 Ladder
16 Ladder Step
17 Drum
18 2 x 4 Wood
19 Plywood
20 Hoses

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	74.43	21.83	NA
2	N/A	85.84	286.69	NA
3	N/A	76.71	176.87	NA
4	N/A	90.41	36.05	NA
5	N/A	81.28	126.49	NA
6	N/A	<MDC	108.40	NA
7	N/A	*NA	*NA	NA
8	N/A	<MDC	28.29	NA
9	N/A	<MDC	<MDC	NA
10	N/A	72.15	148.45	NA
11	N/A	<MDC	41.21	NA
12	N/A	<MDC	64.47	NA
13	N/A	<MDC	<MDC	NA
14	N/A	104.11	<MDC	NA
15	N/A	110.96	17.96	NA
16	N/A	<MDC	<MDC	NA
17	N/A	99.54	<MDC	NA
18	N/A	85.84	30.88	NA
19	N/A	<MDC	<MDC	NA
20	N/A	85.84	<MDC	NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07- 0208

Surveyor: Jack Nucia (Print) — Sign: [signature] — Date: 6/29/07

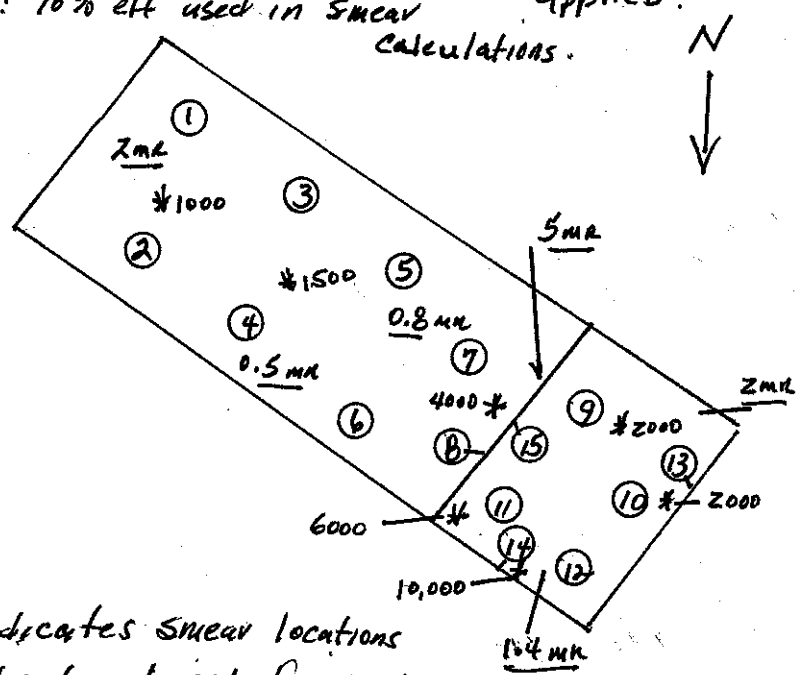
Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 6/29/07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #		Meter Model #	M3	Meter Model #	M19
Meter Serial #	96784/127389	Meter Serial #		Meter Serial #	96784/127389	Meter Serial #	167145
Cal Due	5/14/08	Cal Due		Cal Due	5/14/08	Cal Due	5/8/08
Efficiency (%)	10.4	Efficiency (%) (2Pi)		Efficiency (%) (2Pi)	10.4	Efficiency (%)	N/A
Type	alpha	Efficiency (Intrinsic) Type	N	Efficiency (Intrinsic) Type	alpha	Type	Bt
Sample Time (min)	N/a	Sample Time (min)	a	Sample Time (min)	N/a	Sample Time (min)	N/A
Background Time (min)	N/a	Background Time (min)		Background Time (min)	N/a	Background Time (min)	N/A
BKG (cpm)	Ø	BKG (cpm)		BKG (cpm)	Ø	BKG (uR)	5
MDC (dpm/100cm2)	N/a	MDC (dpm/100cm2)		MDC (dpm/100cm2)	N/a	MDC (dpm/100cm2)	N/A
Guideline (dpm/100cm²)	N/a	Guideline (dpm/100cm²)		Guideline (dpm/100cm²)	N/a	Guideline (dpm/100cm²)	N/A
Action Level (dpm/100cm²)	N/a	Action Level (dpm/100cm²)		Action Level (dpm/100cm²)	N/a	Action Level (dpm/100cm²)	N/A

LOCATION: WORK OVER TANK
PURPOSE: Verification Survey after glue Coating applied.

Note: 10% eff used in smear calculations.



(#) indicates smear locations
* indicates direct frisk alpha readings in cpm

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1			2000	
2			1000	
3			500	
4			1000	
5			800	
6			3500	
7			1500	
8			4000	
9			10000	
10			3000	
11			5000	
12			4200	
13			1500	
14			6000	
15			1400	
	N/a	N/a		N/a
N/a			N/a	

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0209

Surveyor: Carl Ingle
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

6/29/2007
Date

7-1-07
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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.4	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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: Intermodal in RCA
PURPOSE: Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	Bottom Door	1	N/A	110.96	<MDC	N/A
2	Lip of Lid (Left)	2	N/A	117.81	<MDC	N/A
3	Left Side	3	N/A	85.84	<MDC	N/A
4	Front Rollers	4	N/A	113.24	<MDC	N/A
5	Front Top	5	N/A	94.98	<MDC	N/A
6	Lip of Lid (Rt.)	6	N/A	72.15	<MDC	N/A
7	Right Side	7	N/A	<MDC	<MDC	N/A
8	Lid	8	N/A	115.53	<MDC	N/A
9	Back Top	9	N/A	85.84	<MDC	N/A
10	Door	10	N/A	115.53	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0210

yor: Linda C. Finn
Print

Reviewer: Glen Parkhurst
Print

L.C. Finn
Sign

Sign

6/29/2007

7-1-07
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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.4	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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: Energy Solutions Office/Break Trail
OSE: Weekly / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	RSO desk area	1	N/A	<MDC	<MDC	N/A
2	PM desk area	2	N/A	<MDC	<MDC	N/A
3	floor in break area at RSO door	3	N/A	83.56	<MDC	N/A
4	floor in break area	4	N/A	94.98	<MDC	N/A
5	floor at O/S entrance to break area	5	N/A	83.56	<MDC	N/A
6	No. table in break area	6	N/A	<MDC	<MDC	N/A
7	So. Table in break area	7	N/A	83.56	<MDC	N/A
8	Entrance to HP office	8	N/A	76.71	<MDC	N/A
9	Under East desk in HP Office	9	N/A	94.98	<MDC	N/A
10	Under North desk in HP Office	10	N/A	81.28	<MDC	N/A
11	East Desk Top	11	N/A	88.13	<MDC	N/A
12	North Desk Top	12	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0220

eyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/1/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-2-07 (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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.6	BKG (cpm)	0.1	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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: Model 3 #118497
OSE: Free Release

1 Probe Handle
2 Cord
3 Body
4 Probe Face

Frisked using above alpha instrument

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	99.09	<MDC	6
2	N/A	<MDC	<MDC	6
3	N/A	<MDC	<MDC	6
4	N/A	87.67	<MDC	6

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{s_i(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0221

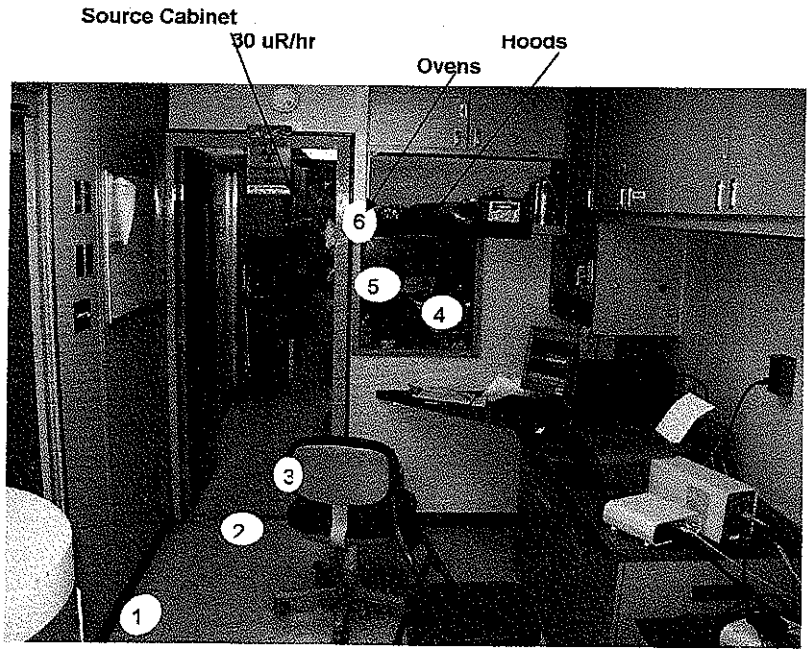
yor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/1/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-2-07 (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	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.5	BKG (cpm)	0.1	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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: Energy Solutions Mobile Lab
POSE: 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	92.46575342	<MDC	5
2	N/A	74.20091324	<MDC	6
3	N/A	99.31506849	<MDC	240
4	N/A	<MDC	<MDC	30
5	N/A	<MDC	<MDC	6
6	N/A	87.89954338	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0224

yor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/2/2007 (Date)

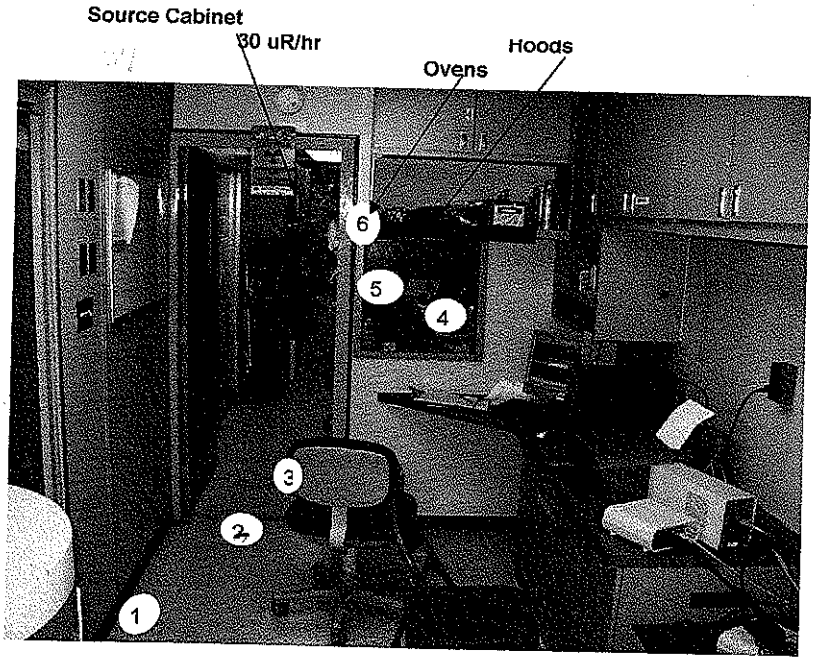
Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-2-07 (Date)

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	5/3/2007	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36.5	BKG (cpm)	0.1	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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

A N

ION: Energy Solutions Mobile Lab
SE: 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	99.31506849	<MDC	5
2	N/A	<MDC	<MDC	6
3	N/A	<MDC	<MDC	15
4	N/A	94.74885845	<MDC	6
5	N/A	<MDC	<MDC	7
6	N/A	92.46575342	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0228

yor: Linda C. Finn
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

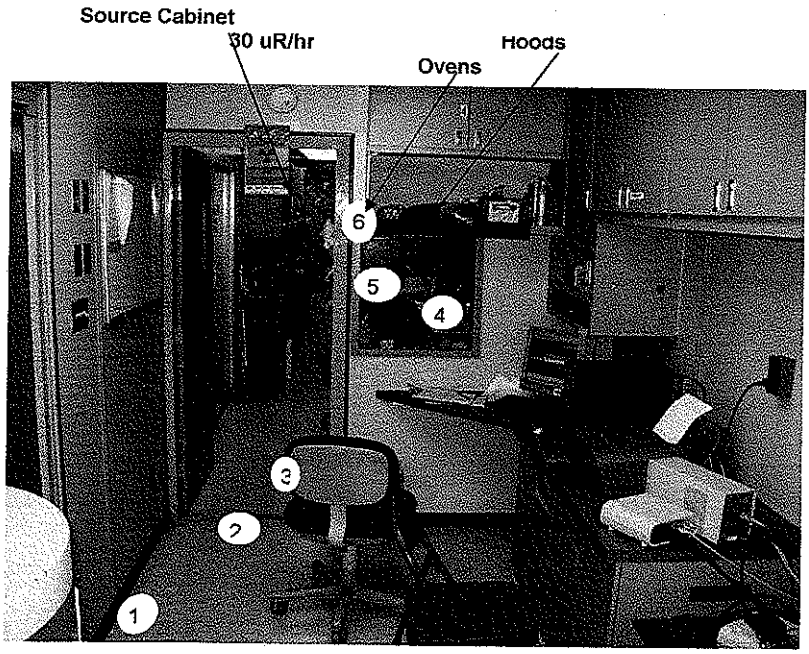
7/3/2007
Date

7/16/07
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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	34.7	BKG (cpm)	0.07	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	11	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: Energy Solutions Mobile Lab
POSE: 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	<MDC	<MDC	6
3	N/A	98.85844749	<MDC	15
4	N/A	89.7260274	<MDC	6
5	N/A	71.46118721	<MDC	7
6	N/A	103.4246575	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{e_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07- 0229

Surveyor: Carl Ingle (Print) — Sign — Date 7-3-07

Reviewer: Glenn Parkhurst (Print) — Sign — Date 7-3-07

Survey Meters

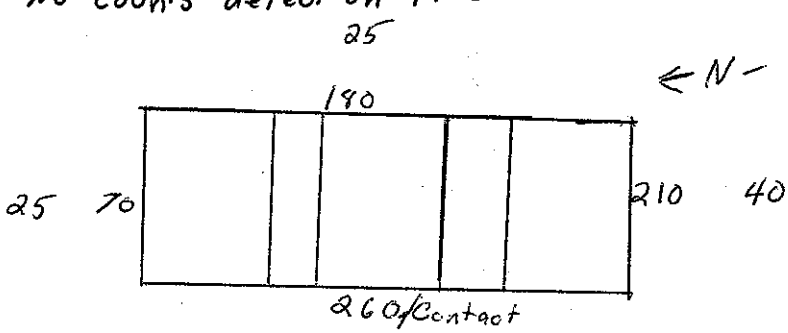
Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #		Meter Model #		Meter Model #	3	Meter Model #	19
Meter Serial #		Meter Serial #		Meter Serial #	96784	Meter Serial #	91491
Cal Due		Cal Due		Cal Due	5/18/08	Cal Due	5-8-08
Efficiency (%)		Efficiency (%) (2Pi)		Efficiency (%) (2Pi)	10%	Efficiency (%)	100%
Type		Efficiency (Intrinsic) Type		Efficiency (Intrinsic) Type	LAW	Type	uR
Sample Time (min)	N/A	Sample Time (min)	N/A	Sample Time (min)	1	Sample Time (min)	N/A
Background Time (min)		Background Time (min)		Background Time (min)	0	Background Time (min)	N/A
BKG (cpm)		BKG (cpm)		BKG (cpm)	0	BKG (uR)	7
MDC (dpm/100cm2)		MDC (dpm/100cm2)		MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A
Guideline (dpm/100cm²)		Guideline (dpm/100cm²)		Guideline (dpm/100cm²)	N/A	Guideline (dpm/100cm²)	N/A
Action Level (dpm/100cm²)		Action Level (dpm/100cm²)		Action Level (dpm/100cm²)	N/A	Action Level (dpm/100cm²)	N/A

LOCATION: Rad Storage
DOSE: Boxes Storage

Survey of B12 Boxes for Release from RCA
To RSA LAWS on Boxes

7 Boxes of sludge

No counts detect on M-3



32-/1- meter

Highest dose rates for all Boxes

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
N/A	N/A	N/A	N/A	N/A

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0230

yor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/3/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-4-07 (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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	34.7	BKG (cpm)	0.07	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	11	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: Energy Solutions Office/Break Trail
OSE: Weekly / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	PM/RSO office floor	1	N/A	82.88	<MDC	N/A
2	Floor in break area	2	N/A	<MDC	<MDC	N/A
3	Floor at front entrance	3	N/A	87.44	<MDC	N/A
4	floor in break area	4	N/A	80.59	<MDC	N/A
5	No. table in break area	5	N/A	<MDC	<MDC	N/A
6	HP office floor	6	N/A	130.82	<MDC	N/A
7	HP East desk (top)	7	N/A	114.84	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0235

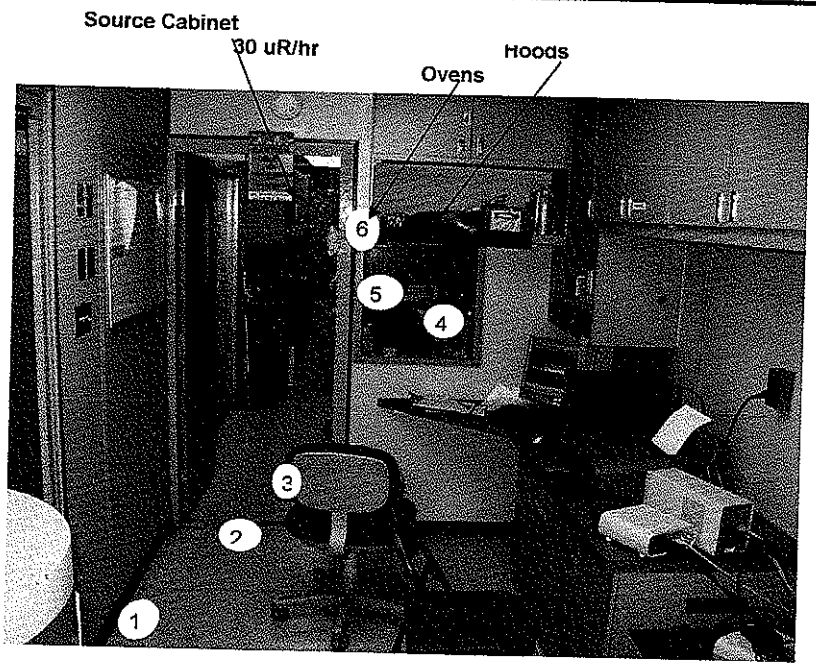
Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-11-07 (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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	34.6	BKG (cpm)	0.12	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	12	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: 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	73.97260274	<MDC	5
2	N/A	<MDC	<MDC	7
3	N/A	96.80365297	<MDC	6
4	N/A	103.652968	<MDC	6
5	N/A	89.9543379	<MDC	6
6	N/A	83.10502283	<MDC	6

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0246

Surveyor: Linda C. Finn (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/9/2007 Date

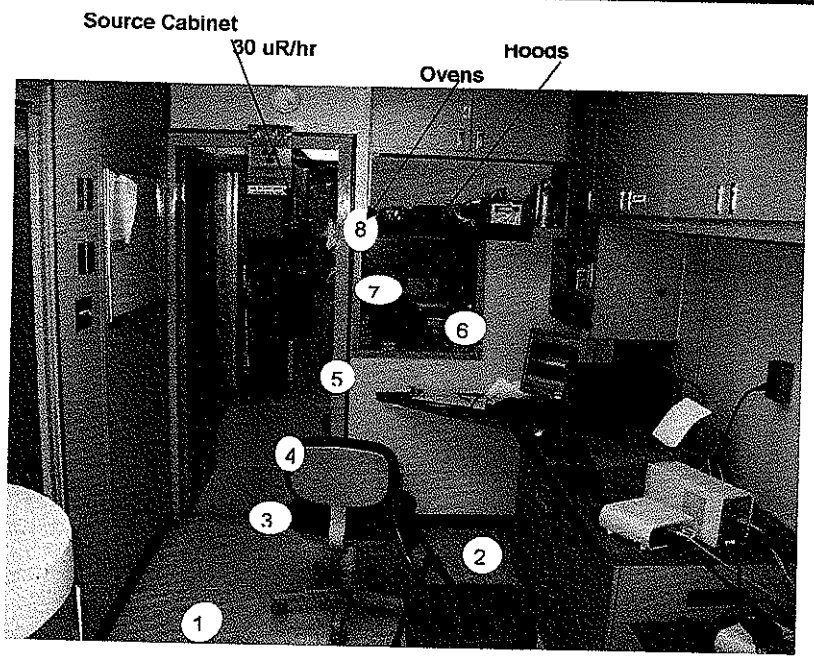
7-10-07 Date

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	5/3/2007	Cal Due	5/3/2007	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)	34.9	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

N A

LOCATION: Energy Solutions Mobile Lab
PURPOSE: Contamination / Dose Rate



All accesable areas scanned 100% with NDA.

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	71.00456621	<MDC	6
2	N/A	80.1369863	<MDC	6
3	N/A	<MDC	<MDC	6
4	N/A	<MDC	<MDC	30
5	N/A	<MDC	<MDC	5
6	N/A	84.70319635	<MDC	5
7	N/A	73.28767123	<MDC	12
8	N/A	100.6849315	<MDC	5

N A

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(6)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0247

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/9/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/16/07 (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)	34.9	BKG (cpm)	0.18	BKG (uR)	6
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: Weekly / Contamination

1 floor in Rso iffice
2 floor in break area
3 floor at I/S entrance to break area
4 No. table in break area
5 Floor in break area
6 Entrance to HP office
7 Under East desk in HP Office
8 North Desk Top

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	73.29	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	75.57	<MDC	N/A
4	N/A	80.14	<MDC	N/A
5	N/A	84.70	<MDC	N/A
6	N/A	96.12	<MDC	N/A
7	N/A	<MDC	<MDC	N/A
8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0252

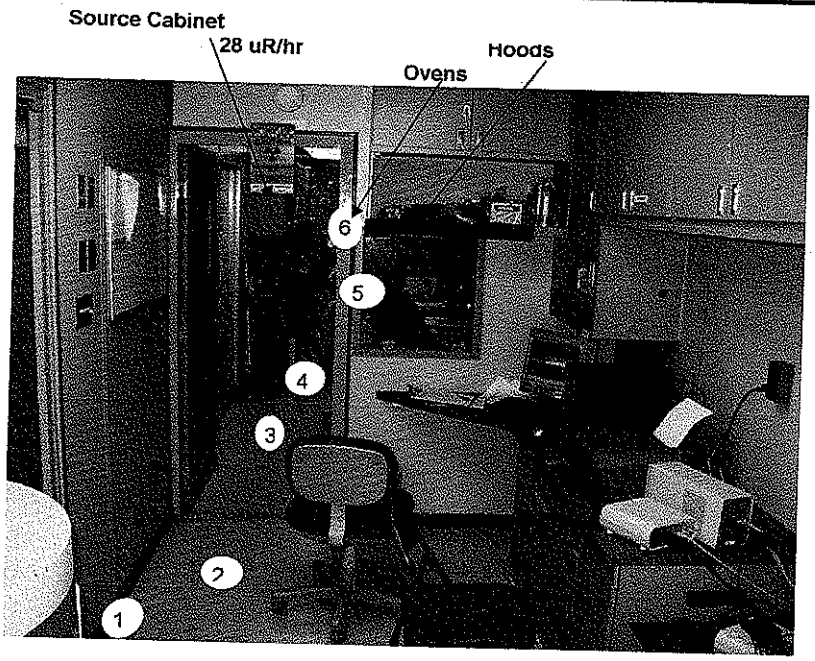
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/10/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-11-07 (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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	34.2	BKG (cpm)	0.08	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	11	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: 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	122.8310502	<MDC	5
2	N/A	<MDC	<MDC	6
3	N/A	93.15068493	<MDC	6
4	N/A	81.73515982	<MDC	6
5	N/A	150.2283105	<MDC	20
6	N/A	77.16894977	<MDC	6

$$MDC = \frac{3 + 3.29\sqrt{RB_t(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0253

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/10/07 (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)	34.2	BKG (cpm)	0.08	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	11	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

1 RSO desk area
2 Entrance to RSO office
3 Floor under No. table
4 floor in break area
5 floor at O/S entrance to break area
6 No. table in break area
7 So. Table in break area
8 HP office floor

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	97.72	<MDC	N/A
2	N/A	77.17	<MDC	N/A
3	N/A	115.98	<MDC	N/A
4	N/A	134.25	<MDC	N/A
5	N/A	<MDC	<MDC	N/A
6	N/A	<MDC	<MDC	N/A
7	N/A	81.74	<MDC	N/A
8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\epsilon_i(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

WI 07 - 0258

7/11/07 1400

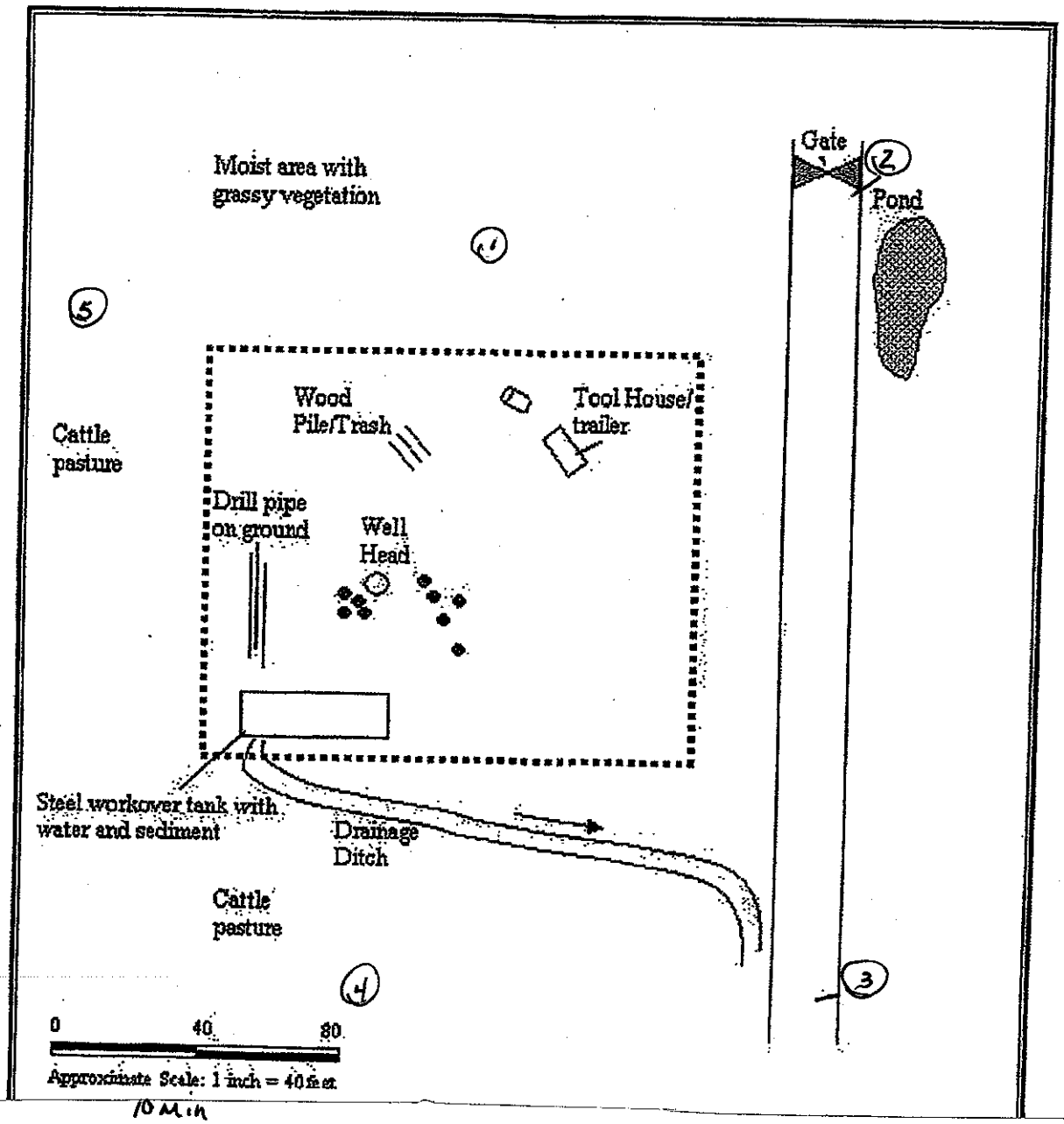
M2350 126170

Cal due 5/21/08

051707B/fiddler

J Alvcig

BKGD Readings



	10 Min	
1.)	120001	12000 cpm
2.)	64632	6463
3.)	66662	6666
4.)	66447	6645
5.)	101964	~~1070~~ 10196

7/11/07

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0259

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/11/2007 (Date)

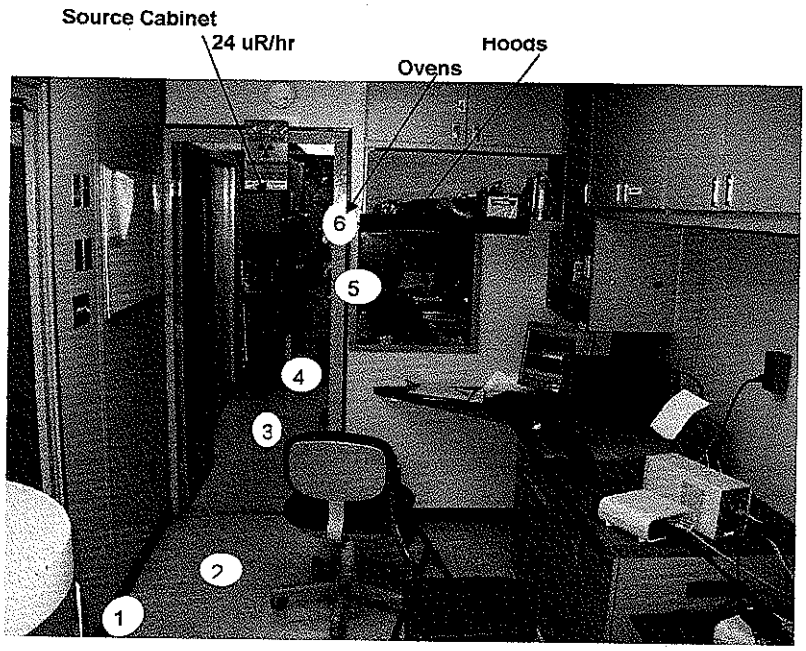
Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-14-07 (Date)

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 (Intrinsic)	50%	Efficiency (Intrinsic)	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)	36	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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

N A

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	127.8538813	<MDC	5
2	N/A	93.60730594	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	109.5890411	<MDC	12
6	N/A	75.34246575	<MDC	6

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0260

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/11/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-14-07 (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 #	11491
Cal Due	8/14/2008	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)	36	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

N A

LOCATION: Energy Solutions Office/Break Trail
PURPOSE: Daily / Contamination

	Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1 RSO desk area	1	N/A	<MDC	<MDC	N/A
2 PM Desk Area	2	N/A	<MDC	<MDC	N/A
3 Floor under No. table	3	N/A	116.44	<MDC	N/A
4 floor in break area	4	N/A	121.00	<MDC	N/A
5 floor at O/S entrance to break area	5	N/A	<MDC	<MDC	N/A
6 No. table in break area	6	N/A	132.42	<MDC	N/A
7 Entrance to Trailer	7	N/A	86.76	<MDC	N/A
8 HP office floor	8	N/A	118.72	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0268

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/12/2007 (Date)

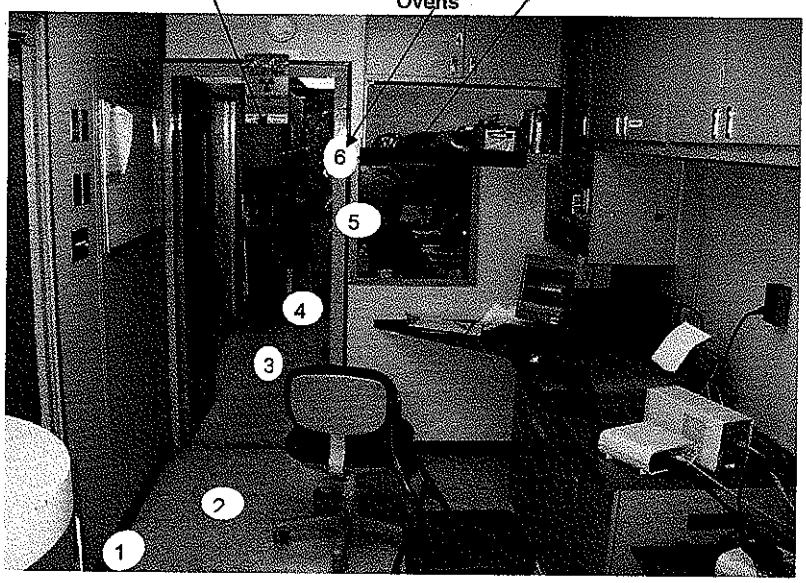
Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-13-07 (Date)

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)	35	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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

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	148.4018265	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	73.05936073	<MDC	5
4	N/A	86.75799087	<MDC	5
5	N/A	70.77625571	<MDC	12
6	N/A	<MDC	<MDC	5

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0269

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/12/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-16-07 (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)	35	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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 RSO desk floor area	1	N/A	77.63	<MDC	N/A
2 Entrance to RSO office	2	N/A	<MDC	<MDC	N/A
3 Floor in break area	3	N/A	86.76	<MDC	N/A
4 Floor in break area	4	N/A	148.40	<MDC	N/A
5 O/S Refrigrator	5	N/A	73.06	<MDC	N/A
6 O/S Micro Wave	6	N/A	79.91	<MDC	N/A
7 Entrance to Trailer	7	N/A	<MDC	<MDC	N/A
8 HP Office Desk	8	N/A	84.47	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{Rb\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0272

eyor: Jack Mucia (Print) — Sign — 7/12/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/23/07 (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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-003
POSE: Contamination / Dose Rate

BAG # S - 003

Contact D/R 30mR

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	119.5454545	<MDC	
3	N/A	124.0909091	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	76.36363636	<MDC	
6	N/A	71.81818182	<MDC	

A

N

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0273

eyor: Jack Mucia
Print

Sign

7/12/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

7/23/07
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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-004
POSE: Contamination / Dose Rate

BAG # S-004

Contact D/R 22 uR

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	76.36363636	<MDC	
2	N/A	99.09090909	<MDC	
3	N/A	92.27272727	<MDC	
4	N/A	99.09090909	<MDC	
5	N/A	87.72727273	<MDC	
6	N/A	85.45454545	<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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0277

Surveyor: Carl Ingle (Print) — Sign — Date: 7/13/2007

Reviewer: Glen Parkhurst (Print) — Sign — Date: 7-14-07

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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: Incoming Loader Cat IT38G
OSE: Contamination

Loader # 004774

#1 Tire
#2 Fender
#3 Tire
#4 Under carriage
#5 Tire
#6 Frame
#7 Tire
#8 Under Carriage
#9 Fork
#10 Bucket

Note : Direct frisk using above M3
0 CPM

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	99.543379	<MDC	0
2	N/A	<MDC	<MDC	0
3	N/A	104.109589	<MDC	0
4	N/A	120.0913242	<MDC	0
5	N/A	76.71232877	<MDC	0
6	N/A	81.27853881	<MDC	0
7	N/A	106.3926941	<MDC	0
8	N/A	85.84474886	<MDC	0
9	N/A	99.543379	<MDC	0
10	N/A	<MDC	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0278

Surveyor: Carl Ingle (Print) — Sign — Date: 7/13/2007

Reviewer: Glen Parkhurst (Print) — Sign — Date: 7-14-07

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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: Incoming Cat 314C #006033
OSE: Contamination

#1-9 Rt. Track + carriage

#10-20 Left track + carriage

#21 I/S Bottom
#22 I/S Left
#23 I/S Right
#24 O/S Bottom
#25 O/S Back
#26 Stick
#27 Stick
#28 Turn table Front
#29 Turn Table Back
#30 Cab

Note : Direct frisk using above M3
10 - 20 CPM (due to clay & limestone rock

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	97.26027397	<MDC	0
2	N/A	85.84474886	<MDC	0
3	N/A	83.56164384	<MDC	0
4	N/A	<MDC	<MDC	0
5	N/A	104.109589	<MDC	0
6	N/A	97.26027397	<MDC	0
7	N/A	78.99543379	<MDC	0
8	N/A	<MDC	<MDC	0
9	N/A	90.4109589	<MDC	0
10	N/A	94.97716895	<MDC	0
11	N/A	106.3926941	<MDC	0
12	N/A	<MDC	<MDC	0
13	N/A	101.826484	<MDC	0
14	N/A	85.84474886	<MDC	0
15	N/A	<MDC	<MDC	0
16	N/A	<MDC	<MDC	0
17	N/A	<MDC	<MDC	0
18	N/A	78.99543379	<MDC	0
19	N/A	<MDC	<MDC	0
20	N/A	88.12785388	<MDC	0
21	N/A	<MDC	<MDC	0
22	N/A	78.99543379	<MDC	0
23	N/A	<MDC	<MDC	0
24	N/A	<MDC	<MDC	0
25	N/A	97.26027397	<MDC	0
26	N/A	88.12785388	<MDC	0
27	N/A	<MDC	<MDC	0
28	N/A	97.26027397	<MDC	0
29	N/A	<MDC	<MDC	0
30	N/A	88.12785388	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB t_s (1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0282

eyor: Jack Mucia (Print) — Sign — 7/13/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/23/07 (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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-005
POSE: Contamination / Dose Rate

BAG # S-005

Contact D/R 70 uR

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	101.3636364	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	128.6363636	<MDC	
5	N/A	94.54545455	<MDC	
6	N/A	119.5454545	<MDC	

RAP

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0283

Surveyor: Jack Mucia (Print) — Sign — Date: 7/13/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

LOCATION: External Surface of Bag # S-006
PURPOSE: Contamination / Dose Rate

BAG # S-006

Contact D/R 320uR @ bottom

1. Front
2. Left
3. Right
4. Back
5. Top
6. bottom

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	<MDC	<MDC	
2	N/A	87.72727273	<MDC	
3	N/A	105.9090909	<MDC	
4	N/A	119.5454545	<MDC	
5	N/A	94.54545455	<MDC	
6	N/A	80.90909091	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0284

eyor: Jack Mucia (Print) — Sign — Date: 7/13/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-007
POSE: Contamination / Dose Rate

BAG # S-007

Contact D/R 44 uR

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	80.90909091	<MDC	
2	N/A	108.1818182	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	80.90909091	<MDC	
5	N/A	101.3636364	<MDC	
6	N/A	96.81818182	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(i_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0285

Surveyor: Jack Mucia (Print) — Sign — Date: 7/13/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: External Surface of Bag # S-008
PURPOSE: Contamination / Dose Rate

BAG # S-008

Contact D/R 140 uR

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	76.36363636	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	96.81818182	<MDC	
5	N/A	90	<MDC	
6	N/A	76.36363636	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0289

Surveyor: Jack Mucia (Print) — Sign — Date: 7/13/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

LOCATION: External Surface of Bag # S-009
PURPOSE: Contamination / Dose Rate

BAG # S-009

Contact D/R 160 uR

1 Front
2 Left
3 Right
4 Back
5 Top
6 Bottom

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	92.27272727	<MDC	
2	N/A	76.36363636	<MDC	
3	N/A	101.3636364	<MDC	
4	N/A	90	<MDC	
5	N/A	124.0909091	<MDC	
6	N/A	103.6363636	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0291

Surveyor: Jack Mucia (Print) — Sign: Jack Mucia — Date: 7/13/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/23/07

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-010
OSE: Contamination / Dose Rate

BAG # S-010

Contact D/R 18 uR

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	96.81818182	<MDC	
3	N/A	78.63636364	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	101.3636364	<MDC	
6	N/A	103.6363636	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0292

Surveyor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/13/2007
Date

7/23/07
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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-011
OSE: Contamination / Dose Rate

BAG # S-011

Contact D/R 36 uR

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	101.3636364	<MDC	
2	N/A	92.27272727	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	85.45454545	<MDC	
5	N/A	110.4545455	<MDC	
6	N/A	96.81818182	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0293

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/13/2007 Date

7/23/07 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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: External Surface of Bag # S-012
PURPOSE: Contamination / Dose Rate

BAG # S-012

Contact D/R 14 uR

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	103.6363636	<MDC	
2	N/A	94.54545455	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	78.63636364	<MDC	
5	N/A	101.3636364	<MDC	
6	N/A	142.2727273	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0294

yor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/13/2007 (Date)

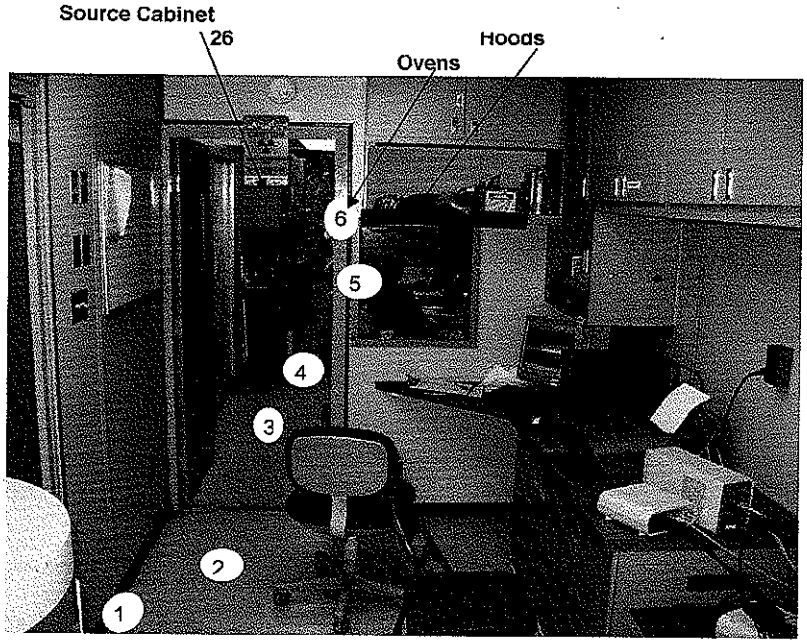
Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-13-07 (Date)

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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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

N/A

TION: Energy Solutions Mobile Lab
OSE: 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	<MDC	<MDC	5
3	N/A	74.4	<MDC	5
4	N/A	97.3	<MDC	5
5	N/A	83.6	<MDC	5
6	N/A	79.0	<MDC	5

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB t_s (1 + t_s/t_b)}}{e_s(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0305

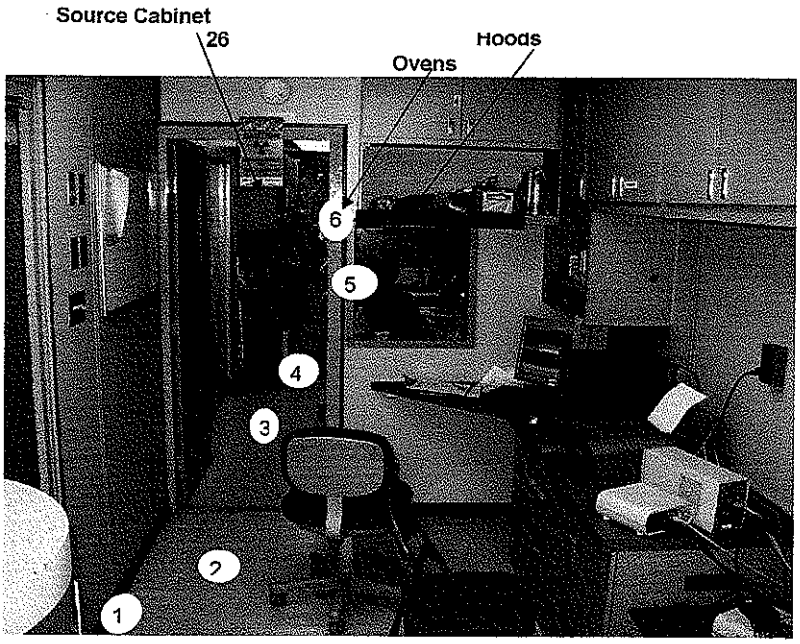
yor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/14/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-15-05 (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%	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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Energy Solutions Mobile Lab
POSE: 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	82.4	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	89.3	<MDC	5
5	N/A	100.7	<MDC	5
6	N/A	93.8	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{c_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0296

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/13/2007

Reviewer: Glenn Parkhurst (Print) — [signature] (Sign) — 7/16/07 (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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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

NA

NA

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
TION:	Energy Solutions Office/Break Trail					
OSE:	Daily / Contamination					
1	PM desk (underneath)	1	N/A	101.83	<MDC	N/A
2	Floor in RSO Office	2	N/A	94.98	<MDC	N/A
3	Floor in break area	3	N/A	79.00	<MDC	N/A
4	Floor in break area	4	N/A	74.43	<MDC	N/A
5	North table	5	N/A	79.00	<MDC	N/A
6	South table	6	N/A	133.79	<MDC	N/A
7	Entrance to Trailer	7	N/A	<MDC	<MDC	N/A
8	HP office floor	8	N/A	124.66	<MDC	N/A

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0297

Surveyor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/13/2007
Date

7/23/07
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)	35.4	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-013
OSE: Contamination / Dose Rate

BAG # S-013

Contact D/R 15 uR

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	96.81818182	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	142.2727273	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	87.72727273	<MDC	
6	N/A	76.36363636	#VALUE!	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0306

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/14/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/16/07 (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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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 in PM Office	1	N/A	91.55	<MDC	N/A
2	Floor in RSO Office under desk	2	N/A	105.25	<MDC	N/A
3	Floor in break area under table	3	N/A	<MDC	<MDC	N/A
4	Floor in break area	4	N/A	118.95	<MDC	N/A
5	North table	5	N/A	<MDC	<MDC	N/A
6	South table	6	N/A	91.55	<MDC	N/A
7	Entrance to Trailer	7	N/A	<MDC	<MDC	N/A
8	HP office floor	8	N/A	109.82	<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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0310

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/14/2007 Date

7/13/07 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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: External Surface of Bag # S-014
PURPOSE: Contamination / Dose Rate

BAG # S-014

Contact D/R 50 uR

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	77.5	<MDC	
3	N/A	88.86363636	<MDC	
4	N/A	111.5909091	<MDC	
5	N/A	118.4090909	<MDC	
6	N/A	82.04545455	<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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0311

Surveyor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/14/2007
Date

7/23/07
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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-015
OSE: Contamination / Dose Rate

BAG # S-015

Contact 24 uR
D/R

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	113.8636364	<MDC	
2	N/A	72.95454545	<MDC	
3	N/A	93.40909091	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	86.59090909	<MDC	
6	N/A	100.2272727	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0322

yor: Jack Mucia
Print

Sign

7/14/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

7/23/07
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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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-016
OSE: Contamination / Dose Rate

BAG # S-016

Contact D/R 20 mR

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	125.2272727	<MDC	
2	N/A	86.59090909	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	77.5	<MDC	
5	N/A	109.3181818	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(\varepsilon_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0323

Surveyor: Jack Mucia (Print) — Sign — Date: 7/14/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: External Surface of Bag # S-017
PURPOSE: Contamination / Dose Rate

BAG # S-017

Contact D/R 18 uR

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	100.2272727	<MDC	
2	N/A	93.40909091	<MDC	
3	N/A	84.31818182	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	127.5	<MDC	
6	N/A	88.86363636	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB_s(t + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0324

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/14/2007 Date

7/23/07 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)	35.9	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: External Surface of Bag # S-018
PURPOSE: Contamination / Dose Rate

BAG # S-018

Contact D/R 34uR

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	88.86363636	<MDC	
2	N/A	72.95454545	<MDC	
3	N/A	104.7727273	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	93.40909091	<MDC	
6	N/A	102.5	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0331

Surveyor: Jack Mucia (Print) — Sign — Date: 7/14/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/23/07

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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	14	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: External Surface of Bag # S-020
PURPOSE: Contamination / Dose Rate

BAG # S-020

Contact D/R 18 uR

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	74.54545455	<MDC	
4	N/A	117.7272727	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	72.27272727	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0332 3 8C4
0332 7/22/07

Surveyor: Jack Mucia
Print
Sign

Reviewer: Glenn Parkhurst
Print
Sign

7/14/2007
Date
7/23/07
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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	14	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-021
OSE: Contamination / Dose Rate

BAG # S-021

Contact D/R 17uR

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	99.54545455	<MDC	
3	N/A	104.0909091	<MDC	
4	N/A	72.27272727	<MDC	
5	N/A	81.36363636	<MDC	
6	N/A	81.36363636	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(2 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0332 0333
8C7
7/20/07

Surveyor: Jack Mucia
Print
Sign
7/14/2007
Date

Reviewer: Glenn Parkhurst
Print
Sign
7/23/07
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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	14	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: External Surface of Bag # S-022
PURPOSE: Contamination / Dose Rate

BAG # S-022

Contact D/R 17uR

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	95	<MDC	
2	N/A	99.54545455	<MDC	
3	N/A	92.72727273	<MDC	
4	N/A	110.9090909	<MDC	
5	N/A	79.09090909	<MDC	
6	N/A	79.09090909	<MDC	

N G

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{s_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0332 350

8C7
7/20/07

yor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/14/2007
Date

7/23/07
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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	14	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-023
OSE: Contamination / Dose Rate

BAG # S-023

Contact D/R 14 mR

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	76.81818182	<MDC	
2	N/A	97.27272727	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	76.81818182	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0369

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/16/2007 (Date)

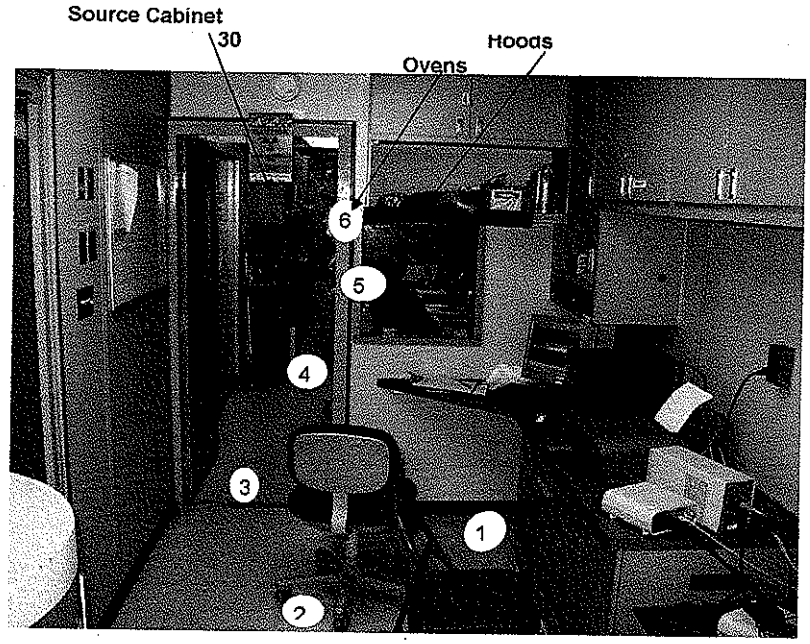
Reviewer: Glenn Parkhurst (Print) — [signature] (Sign) — 7/17/07 (Date)

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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	14	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

NA

TION: Energy Solutions Mobile Lab
OSE: 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	74.9	<MDC	5
2	N/A	86.3	<MDC	5
3	N/A	100.0	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	95.4	<MDC	5
6	N/A	116.0	<MDC	5

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\tau_s(\epsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0370

Surveyor: Linda C. Finn (Print) — LC Finn (Sign) — 7/16/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/17/07 (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)	36.2	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	14	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 in PM Office	1	N/A	72.60	<MDC	N/A
2	Desk in RSO Office under desk	2	N/A	93.15	<MDC	N/A
3	Floor in break area under table	3	N/A	100.00	<MDC	N/A
4	Floor in break area	4	N/A	93.15	<MDC	N/A
5	North table in break room	5	N/A	72.60	<MDC	N/A
6	HP Test (north)	6	N/A	115.98	<MDC	N/A
7	Entrance to Trailer	7	N/A	122.83	<MDC	N/A
8	HP office floor	8	N/A	86.30	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 373

Surveyor: Jack Alvera (Print) — [signature] (Sign) — 7/14/07

Reviewer: Glenn Parkhurst (Print) — [signature] (Sign) — 7/17/07 (Date)

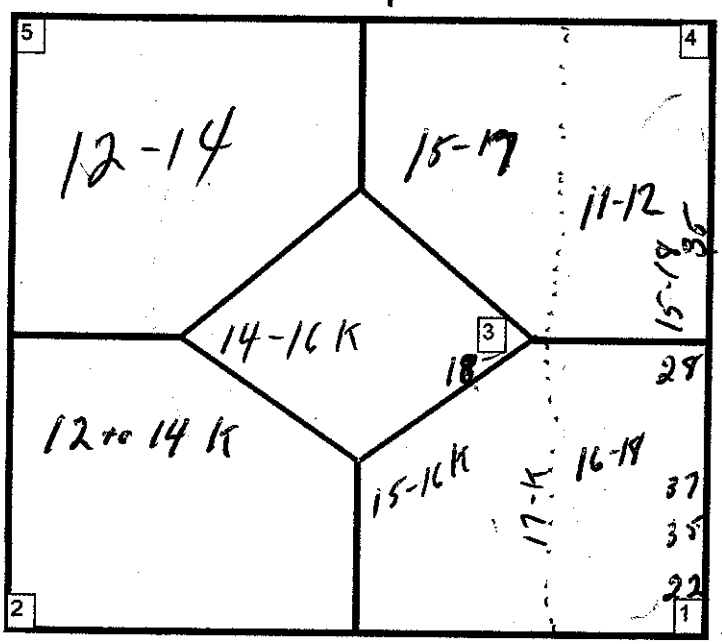
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
			50%	Efficiency (Intrinsic)	25%		
Type	gamma		beta	Type	alpha	Type	gamma
Sample Time (min)	1	N	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10		10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)			23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # E-1



Locatio	cpm Direct			
	N	a		

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(\varepsilon_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 374

Surveyor: Jack Alvis (Print) — Sign

Reviewer: Ethann Porschwest (Print) — Sign

7/14/07

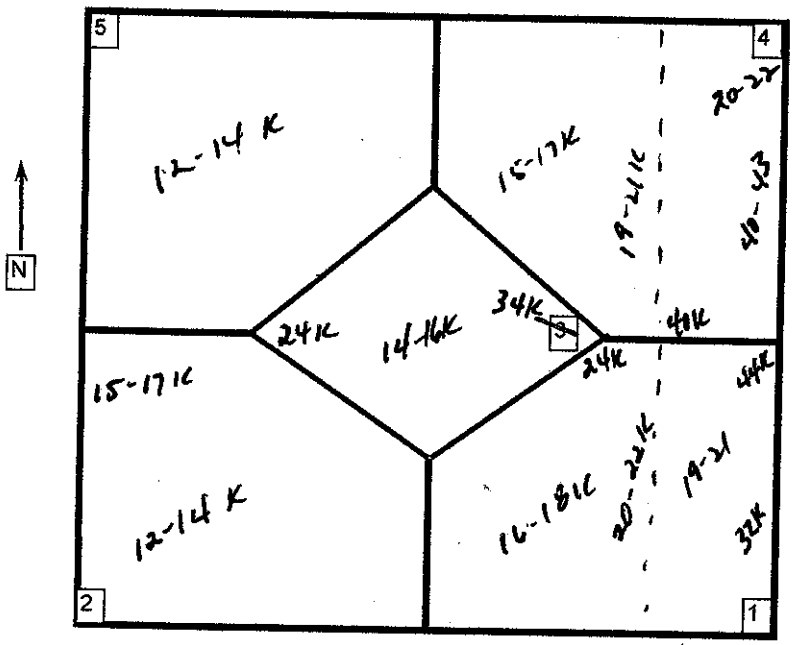
7-17-07
Date

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50% beta	Efficiency (Intrinsic) / Type	26% alpha	Type	gamma
Sample Time (min)	1		1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10		10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)			23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION:
PURPOSE: Direct Reading / Sample Loc.

GRID # E-2



cpm Direct			

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 375

Surveyor: Jack Mucia (Print) — Sign — 7/14/07

Reviewer: Gleen Parkhurst (Print) — Sign — 7/17/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		50%	Efficiency (Intrinsic)	25%		
Type	gamma	beta	Type	alpha	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

N a

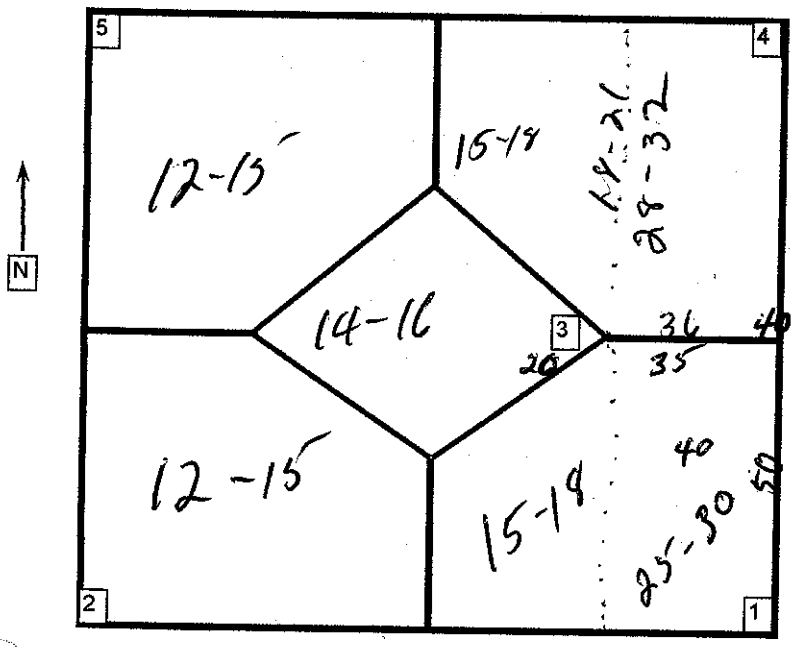
N a

N a

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # E-3



Locatio	cpm Direct			

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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 374

Surveyor: Jack Mucia (Print) — Jack Mucia (Sign) — 7/14/07

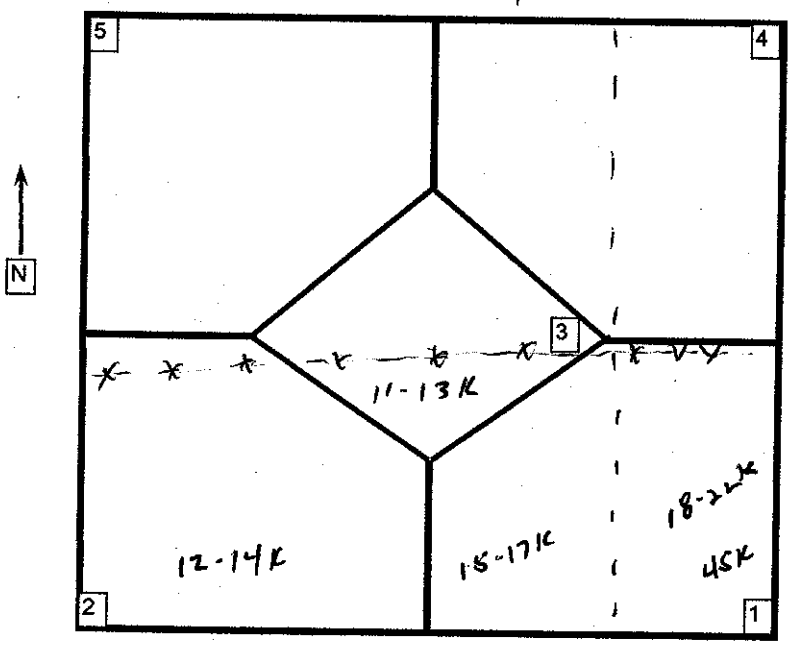
Reviewer: Coleman Parkhurst (Print) — (Sign) — 7-17-07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
			50%	Efficiency (Intrinsic)	25%		
Type	gamma		beta	Type	alpha	Type	gamma
Sample Time (min)	1		1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10		10	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)			23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA		NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm^2)	NA

LOCATION:
PURPOSE: Direct Reading / Sample Loc.

GRID # E-4



Location	cpm Direct			

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0377

ENERGYSOLUTIONS

Surveyor: Jack Lucia (Print) — Sign

Reviewer: Sheldon Fitzhugh (Print) — Sign

7/16/07

7/17/07

Date

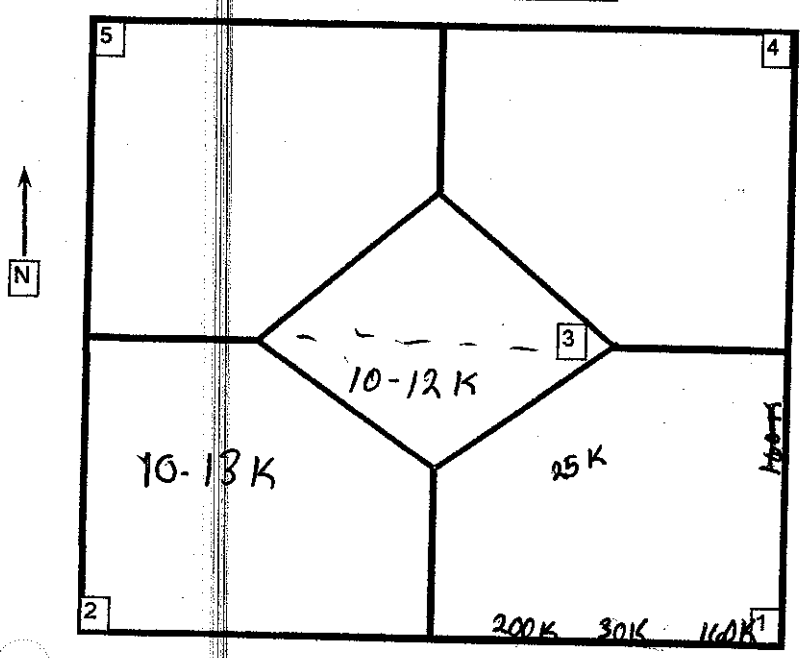
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		50%	Efficiency (Intrinsic)	25%		
Type	gamma	beta	Type	alpha	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # B4



Location	cpm Direct			

$$MDC = \frac{3 + 3.29\sqrt{Rb(t_s/t_b + 1)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0378

ENERGY SOLUTIONS

Surveyor: Jack Mucia (Print) — Sign: [signature] — 7/16/07

Reviewer: Coleman Bakhurst (Print) — Sign: [signature] — 7/17/07 (Date)

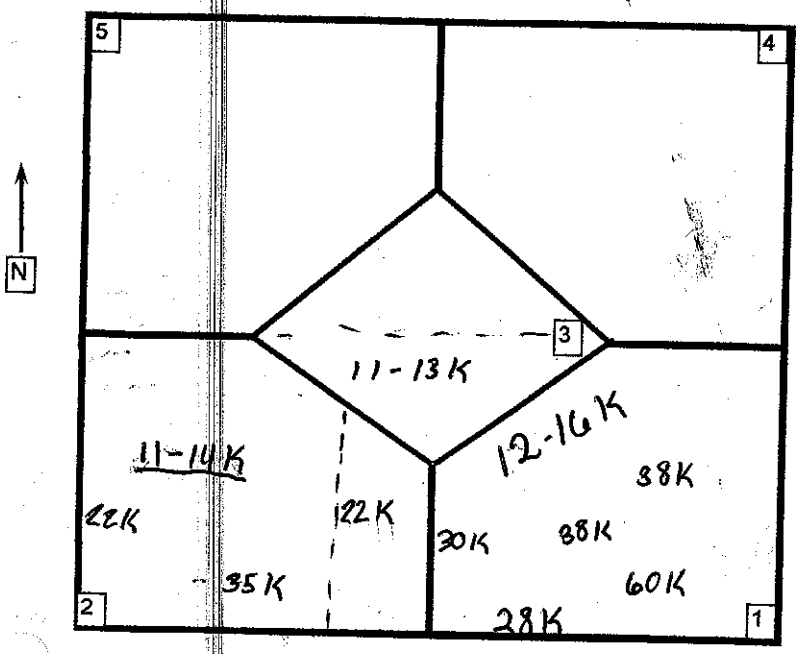
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	N a	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10		10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)			23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # C4



Locatio	cpm Direct			

N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0379

Surveyor: Jack Mucia (Print) — Sign — 7/14/07

Reviewer: Colleen Parkhurst (Print) — Sign — 7/17/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		50%	Efficiency (intrinsic)	25%		
Type	gamma	beta	Type	alpha	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

N a

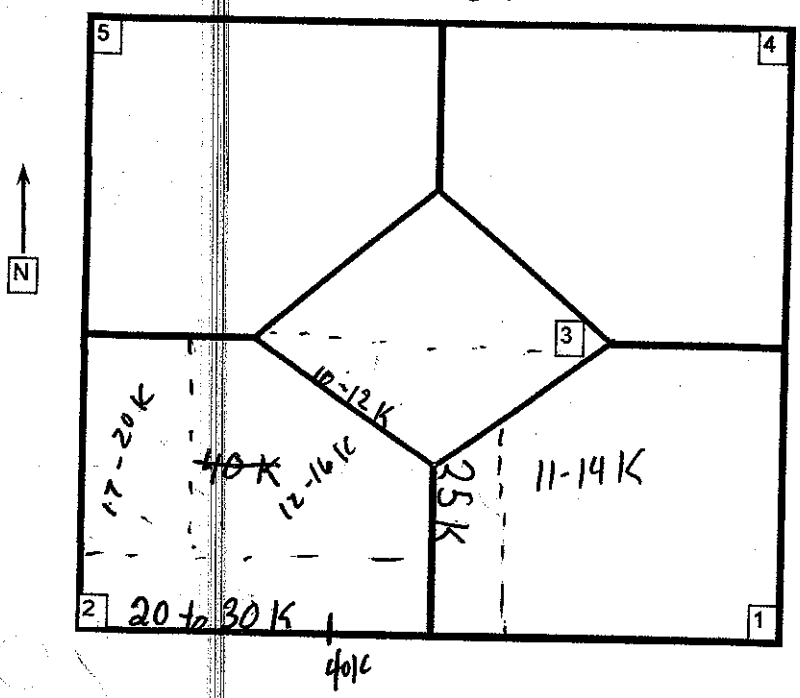
N a

N a

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # D4



Location	cpm Direct			

N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0380

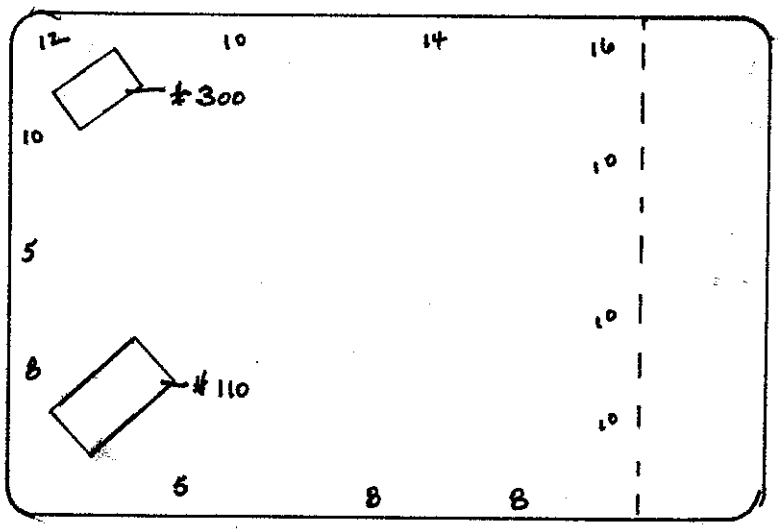
Surveyor: Jack Mycia (Print) — Sign — Date 7/16/07

Reviewer: Coleman Parkhurst (Print) — Sign — Date 7-17-07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #		Meter Model #		Meter Model #		Meter Model #	M3
Meter Serial #		Meter Serial #		Meter Serial #		Meter Serial #	91491
Cal Due		Cal Due		Cal Due		Cal Due	5/8/08
Efficiency (%)		Efficiency (%) (2Pi)		Efficiency (%) (2Pi)		Efficiency (%)	100%
		Efficiency (Intrinsic)		Efficiency (Intrinsic)			
Type		Type		Type		Type	Bγ
Sample Time (min) N/A		Sample Time (min) N/A		Sample Time (min) N/A		Sample Time (min)	N/A
Background Time (min)		Background Time (min)		Background Time (min)		Background Time (min)	N/A
BKG (cpm)		BKG (cpm)		BKG (cpm)		BKG (uR)	5
MDC (dpm/100cm2)		MDC (dpm/100cm2)		MDC (dpm/100cm2)		MDC (dpm/100cm2)	N/A
Guideline (dpm/100cm²)		Guideline (dpm/100cm²)		Guideline (dpm/100cm²)		Guideline (dpm/100cm²)	N/A
Action Level (dpm/100cm²)		Action Level (dpm/100cm²)		Action Level (dpm/100cm²)		Action Level (dpm/100cm²)	N/A

LOCATION: RCA Boundary
PURPOSE:



Note: all readings in uR/Hr
# indicates Contact readings

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
		N/A		

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07- 0382

Surveyor: Jack Mucia (Print) — Sign — 7/17/07 (Date)

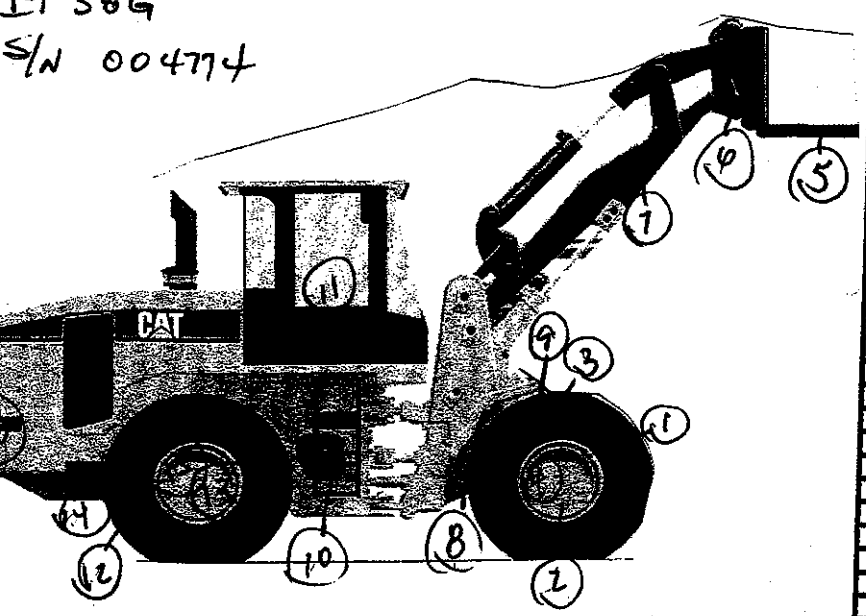
Reviewer: Coleman Parkhurst (Print) — Sign — 7/17/07 (Date)

Survey Meters

Scanning Instrument		βγ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3	Meter Model #	LZ929	Meter Model #	LZ929	Meter Model #	
Meter Serial #	94784	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	
Cal Due	5/14/08	Cal Due	5/3/08	Cal Due	5/3/08	Cal Due	
Efficiency (%)	10.4%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	
		Efficiency (Intrinsic)	50%	Efficiency (Intrinsic)	25%		
Type	alpha	Type	beta	Type	alpha	Type	
Sample Time (min)	N/A	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	
Background Time (min)	N/A	Background Time (min)	60	Background Time (min)	60	Background Time (min)	
BKG (cpm)	Ø	BKG (cpm)	35.9	BKG (cpm)	.12	BKG (uR)	
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	
Guideline (dpm/100cm²)	N/A	Guideline (dpm/100cm²)	N/A	Guideline (dpm/100cm²)	N/A	Guideline (dpm/100cm²)	
Action Level (dpm/100cm²)	N/A	Action Level (dpm/100cm²)	N/A	Action Level (dpm/100cm²)	N/A	Action Level (dpm/100cm²)	

Free release

IT 38G
S/N 004774



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
		<MCR	<MCR	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12	N/A			
13				
14				
15				
16				
17				
18				
19				
20		✓	✓	
	N/A		N/A	

ALL Alpha Scans ± BKGD BKGD = Ø

Scans 17-20 taken on bucket attachment.

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0383

Surveyor: Linda C. Finn (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

Date: 7/17/2007

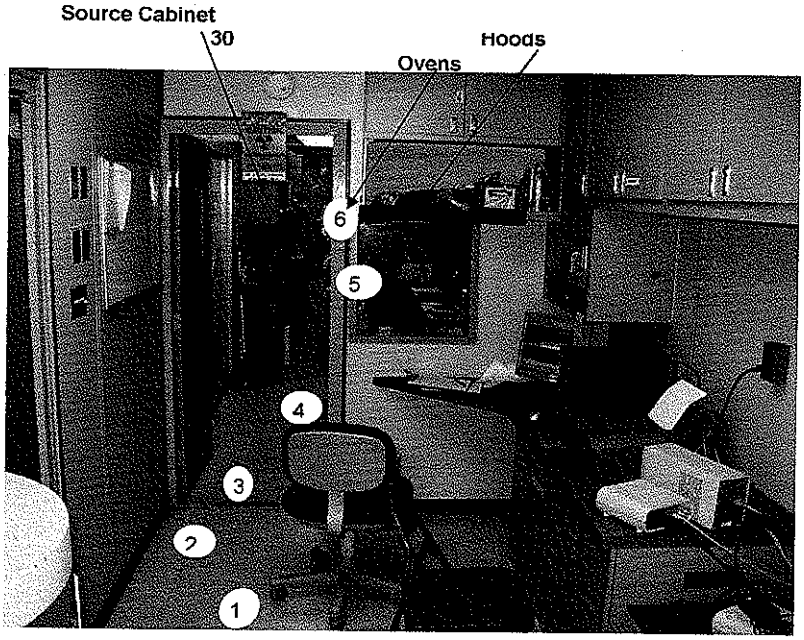
Date: 7/17/07

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)	35.9	BKG (cpm)	0.12	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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

N A

TION: Energy Solutions Mobile Lab
OSE: 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	116.7	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	77.9	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	82.4	<MDC	5
6	N/A	91.6	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{e_s(c)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0395

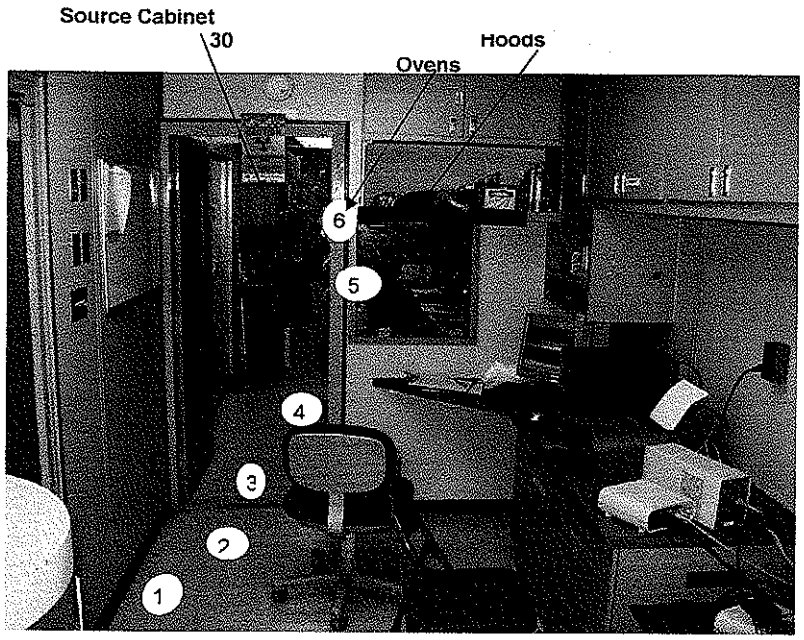
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/18/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-19-07 (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)	36.7	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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	87.4	<MDC	5
3	N/A	87.4	<MDC	5
4	N/A	85.2	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	96.6	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0396

eyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/18/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-19-07 (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)	36.7	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Energy Solutions Office/Break Trail
OSE: Daily / Contamination

	Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1 Floor in PM Office	1	N/A	80.59	<MDC	N/A
2 Floor in RSO Office under desk	2	N/A	<MDC	<MDC	N/A
3 Floor in break area under table	3	N/A	112.56	<MDC	N/A
4 Floor in break area under table (south)	4	N/A	78.31	<MDC	N/A
5 Micowave O/S	5	N/A	<MDC	<MDC	N/A
6 HP Dest (south)	6	N/A	<MDC	<MDC	N/A
7 Entrance to Trailer	7	N/A	82.88	<MDC	N/A
8 Under so. HP desk	8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0398

eyor: Carl Ingle
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

7/18/2007
Date

7-19-07
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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	36.7	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Incoming JLG #10440-54
OSE: Contamination

#1 Rear Right Tire
#2 Rear Right F. Carriage
#3 Front Right Tire
#4 Front Right Carriage
#5 Front Left Tire
#6 Front Left Carriage
#7 Right Left Tire
#8 Right Left Carriage
#9 Forks

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	92.00913242	<MDC	0
2	N/A	<MDC	<MDC	0
3	N/A	<MDC	<MDC	0
4	N/A	76.02739726	<MDC	0
5	N/A	<MDC	<MDC	0
6	N/A	<MDC	<MDC	0
7	N/A	<MDC	<MDC	0
8	N/A	<MDC	<MDC	0
9	N/A	73.74429224	<MDC	0
10	N/A	107.9908676	<MDC	0

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0409

Surveyor: Jack Mucia
Print

Sign

7/19/2007
Date

Reviewer: Glen Parkhurst
Print

Sign

7/19/07
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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Incoming Truck # Q54566
OSE: Contamination

#1 Bed
#2 Tire
#3 Bed
#4 Tire
#5 Bed
#6 Tire
#7 Bed
#8 Tire

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	0
2	N/A	<MDC	<MDC	0
3	N/A	<MDC	<MDC	0
4	N/A	77.16894977	<MDC	0
5	N/A	<MDC	<MDC	0
6	N/A	<MDC	<MDC	0
7	N/A	<MDC	<MDC	0
8	N/A	72.60273973	<MDC	0

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0410

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glen Parkhurst (Print) — Sign

7/19/2007 Date

7/19/07 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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Roll-off container #100080
OSE: Outgoing shipment

front
left side
right side
back
top
bottom

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	74.88584475	<MDC	0
2	N/A	<MDC	<MDC	0
3	N/A	84.01826484	<MDC	0
4	N/A	74.88584475	<MDC	0
5	N/A	81.73515982	<MDC	0
6	N/A	<MDC	<MDC	0

Note: All dose rates ≤ BKGD

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0412

eyor: Jack Mucia
Print

Sign

7/19/2007
Date

Reviewer: Glen Parkhurst
Print

Sign

7/19/07
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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Sealand #DTKU 300211
OSE: Contamination / Dose

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

Note: highest contact dose rate on sealand 110 uR/hr, 20 uR @ 1m.

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	<MDC	16.51162791	0
2	N/A	86.30136986	<MDC	0
3	N/A	<MDC	<MDC	0
4	N/A	102.283105	<MDC	0
5	N/A	93.15068493	<MDC	0
6	N/A	72.60273973	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0415

eyor: Carl Ingle
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

7/19/2007
Date

7-19-07
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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Incoming Trailer #Q52724
OSE: Contamination

#1 Bed
#2 Bed
#3 Tires
#4 Tires
#5 Tires
#6 Tires

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	0
2	N/A	74.88584475	<MDC	0
3	N/A	100	<MDC	0
4	N/A	102.283105	<MDC	0
5	N/A	109.1324201	<MDC	0
6	N/A	86.30136986	<MDC	0

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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0416

eyor: Jack Mucia
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

7/19/2007
Date

7/19/07
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	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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
		B-12 Box # 136					
BKG (cpm)	0	BKG (cpm)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: B-12 #136 - B25 Boxes # 137,138
OSE: Contamination / Dose

B-12 Box # 136

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

B-25 Box # 137

#7 Front
#8 Left
#9 Right
#10 Back
#11 Top
#12 Bottom

B-25 Box # 138
#13 Front
#14 Left
#15 Right
#16 Back
#17 Top
#18 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	<BKG
2	N/A	<MDC	<MDC	<BKG
3	N/A	72.60273973	<MDC	<BKG
4	N/A	102.283105	<MDC	<BKG
5	N/A	77.16894977	<MDC	<BKG
6	N/A	100	<MDC	<BKG
7	N/A	81.73515982	<MDC	<BKG
8	N/A	<MDC	<MDC	<BKG
9	N/A	77.16894977	<MDC	<BKG
10	N/A	106.8493151	<MDC	<BKG
11	N/A	84.01826484	<MDC	<BKG
12	N/A	88.58447489	<MDC	<BKG
13	N/A	77.16894977	<MDC	<BKG
14	N/A	97.71689498	<MDC	<BKG
15	N/A	<MDC	<MDC	<BKG
16	N/A	102.283105	<MDC	<BKG
17	N/A	104.56621	<MDC	<BKG
18	N/A	72.60273973	<MDC	<BKG

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_i(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

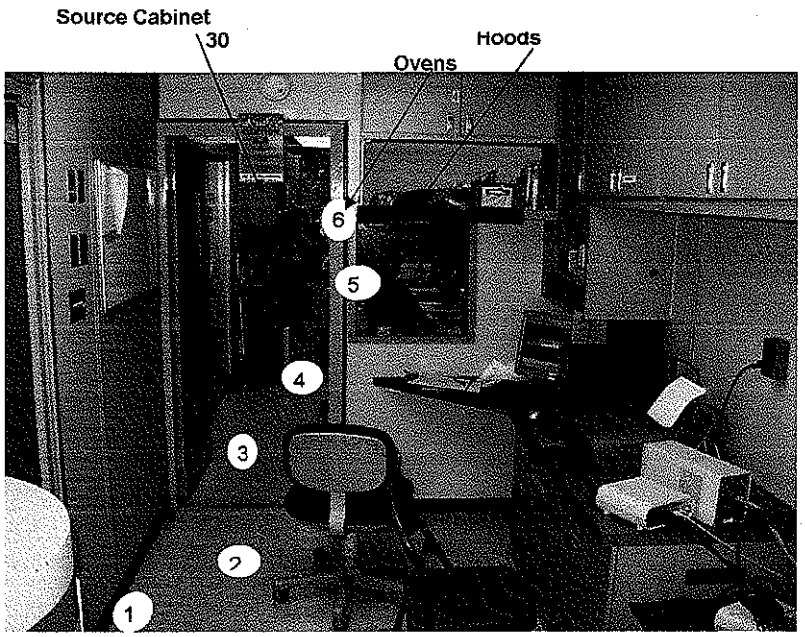
Survey No. WI07-0418

Surveyor:	Linda C. Finn (Print)	L.C. Finn (Sign)	7/19/2007 (Date)
Reviewer:	Glenn Parkhurst (Print)	(Sign)	7/19/07 (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)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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	81.7	<MDC	5
3	N/A	93.2	<MDC	5
4	N/A	74.9	<MDC	5
5	N/A	95.4	<MDC	5
6	N/A	100.0	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{s_i(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0419

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/19/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-19-07 (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)	36.2	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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 in PM Office	1	N/A	97.72	<MDC	N/A
2	Floor under RSO desk	2	N/A	88.58	<MDC	N/A
3	Floor in break area under table	3	N/A	100.00	<MDC	N/A
4	Floor in break area	4	N/A	<MDC	<MDC	N/A
5	North table in break room	5	N/A	100.00	<MDC	N/A
6	HP Office under desk	6	N/A	102.28	<MDC	N/A
7	Entrance to Trailer	7	N/A	93.15	<MDC	N/A
8	HP office floor	8	N/A	88.58	<MDC	N/A

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0428

ENERGYSOLUTIONS

yor: Leroy Cuneo (Print) — Sign — 7/22/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/23/07 (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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	14	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-026
POSE: Contamination / Dose Rate

BAG # S-026

12 uR/HR

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	97.95454545	<MDC	
2	N/A	88.86363636	<MDC	
3	N/A	93.40909091	<MDC	
4	N/A	95.68181818	<MDC	
5	N/A	82.04545455	<MDC	
6	N/A	77.5	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0429

eyor: Leroy Cuneo (Print) — Cuneo (Sign) — 7/22/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/23/07 (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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	14	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-027
POSE: Contamination / Dose Rate

BAG # S-027

1.1 mR/HR

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	82.04545455	<MDC	
2	N/A	95.68181818	<MDC	
3	N/A	88.86363636	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	79.7727272	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0430

Surveyor: Leroy Cuneo (Print) — Sign: Cuneo — Date: 7/22/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/23/07

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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	14	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: External Surface of Bag # S-028
PURPOSE: Contamination / Dose Rate

BAG # S-028

15 uR/HR

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	93.40909091	<MDC	
2	N/A	82.04545455	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	102.5	<MDC	
5	N/A	88.86363636	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0431

yor: Leroy Cuneo (Print) — Sign: Cuneo — Date: 7/22/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/23/07

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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	14	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-029
POSE: Contamination / Dose Rate

BAG # S- 029

400 uR/HR

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	104.7727273	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	93.40909091	<MDC	
4	N/A	95.68181818	<MDC	
5	N/A	122.9545455	<MDC	
6	N/A	<MDC	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0432

yor: Leroy Cuneo (Print) — Cuneo (Sign) — 7/22/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-23-07 (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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	14	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-030
PURPOSE: Contamination / Dose Rate

BAG # S-030

150 uR/HR

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	91.1	<MDC	
3	N/A	104.8	<MDC	
4	N/A	88.9	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0450

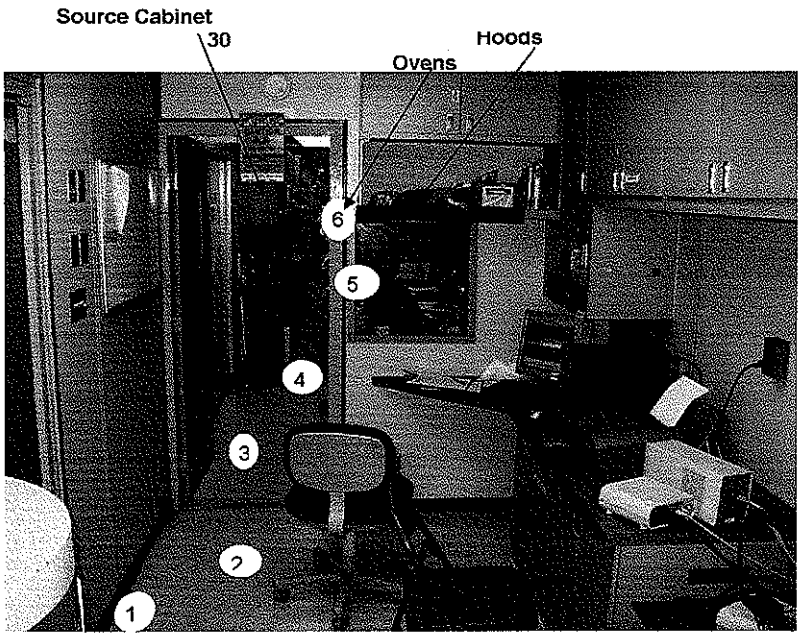
yor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/21/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/21/07 (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)	35.3	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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: Energy Solutions Mobile Lab
POSE: 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	95.2	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	79.2	<MDC	5
4	N/A	83.8	<MDC	5
5	N/A	104.3	<MDC	5
6	N/A	106.6	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{t_s(\varepsilon_i)(I_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0472

eyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/21/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/22/07 (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)	35.3	BKG (cpm)	0.16	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	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

A

N

ATION: Energy Solutions Office/Break Trail
POSE: Daily / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	Floor in PM Office	1	N/A	95.21	<MDC	N/A
2	Floor in PM office	2	N/A	104.34	<MDC	N/A
3	Floor in break area under table	3	N/A	90.64	<MDC	N/A
4	Floor in break area	4	N/A	74.66	<MDC	N/A
5	North table in break room	5	N/A	86.07	<MDC	N/A
6	HP North desk (on top)	6	N/A	92.92	<MDC	N/A
7	Under E. HP desk	7	N/A	<MDC	<MDC	N/A
8	HP office floor	8	N/A	88.36	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0477

yor: Jack Mucia (Print) — Sign — 7/22/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/22/07 (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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	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: Access to RCA
POSE: Daily / Contamination

1 thru 5 - Floor boards
6 & 7 - Benches
8 & 9 - 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	<MDC	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	<MDC	<MDC	N/A
4	N/A	80.14	<MDC	N/A
5	N/A	<MDC	<MDC	N/A
6	N/A	<MDC	<MDC	N/A
7	N/A	77.85	<MDC	N/A
8	N/A	96.12	<MDC	N/A
9	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

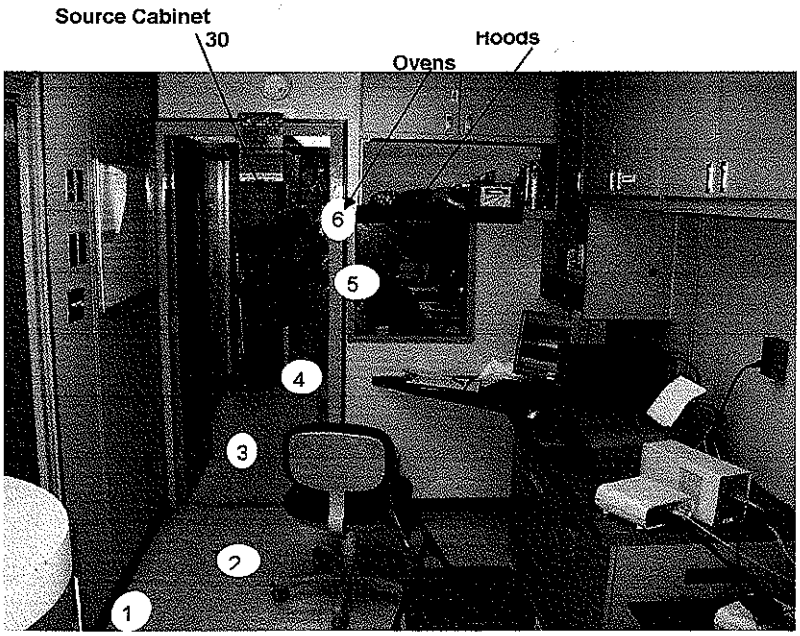
Survey No. WI07-0478

Surveyor:	Linda C. Finn (Print)	L.C. Finn (Sign)	7/22/2007 (Date)
Reviewer:	Glenn Parkhurst (Print)	(Sign)	7/22/07 (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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

LOCATION: Energy Solutions Mobile Lab
PURPOSE: Daily - Contamination / Dose Rate



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	121.2	<MDC	5
2	N/A	82.4	<MDC	5
3	N/A	75.6	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	112.1	<MDC	5
6	N/A	84.7	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0480

yor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/22/2007

7/23/07

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)	37.9	BKG (cpm)	0.22	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	73	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: Papper , welding hood, gages, go
POSE: Free Release

#1 Googles
#2 Air Tube
#3 I/S Welding Shield
#4 O/S Welding Shield
#5 Papper Hood (O/S)
6. Papper Hood I/S

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	107.53	<MDC	N/A
2	N/A	75.57	<MDC	N/A
3	N/A	<MDC	<MDC	N/A
4	N/A	<MDC	<MDC	N/A
5	N/A	<MDC	<MDC	N/A
6	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. WI07-0488

Surveyor: Jack Mucia (Print) — Sign — 7/23/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/23/07 (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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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 5 - Floor boards
6 & 8 - Benches
7 & 10 - Storage Containers

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	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	<MDC	<MDC	N/A
6	N/A	86.30	<MDC	N/A
7	N/A	<MDC	<MDC	N/A
8	N/A	<MDC	<MDC	N/A
9	N/A	90.87	<MDC	N/A
10	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0489

Surveyor: Carl Ingle
Print

Sign

7/23/2007
Date

Reviewer: Glen Parkhurst
Print

Sign

7/24/07
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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: Incoming Crane Pads
OSE: Contamination

#1 thru 8 Random Smears

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	BKG>
2	N/A	<MDC	<MDC	BKG>
3	N/A	<MDC	<MDC	BKG>
4	N/A	<MDC	<MDC	BKG>
5	N/A	<MDC	<MDC	BKG>
6	N/A	<MDC	<MDC	BKG>
7	N/A	<MDC	<MDC	BKG>
8	N/A	<MDC	<MDC	BKG>

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0490

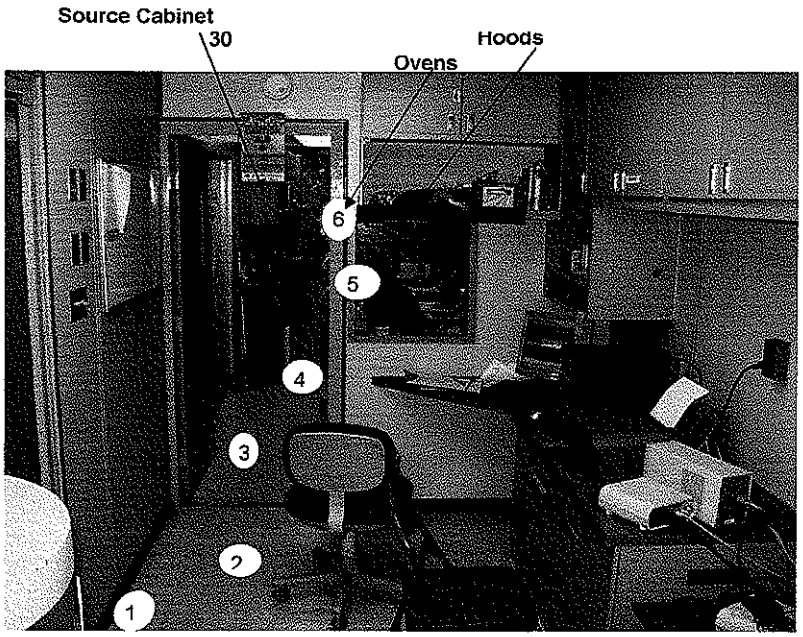
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/23/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7-23-07 (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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0491

Surveyor:	Linda C. Finn (Print)	LC. Finn (Sign)	7/23/2007
Reviewer:	Glenn Parkhurst (Print)	(Sign)	7/23/07 (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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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

1 Floor in PM Office
2 Under PM desk
3 Floor in break area under north table
4 Floor in break area
5 North table in break room
6 HP East desk (on top)
7 Under No. HP desk
8 HP office floor

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	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	<MDC	<MDC	N/A
6	N/A	<MDC	<MDC	N/A
7	N/A	<MDC	<MDC	N/A
8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_b t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0 492

ENERGYSOLUTIONS

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/23/07 Date

7/23/07

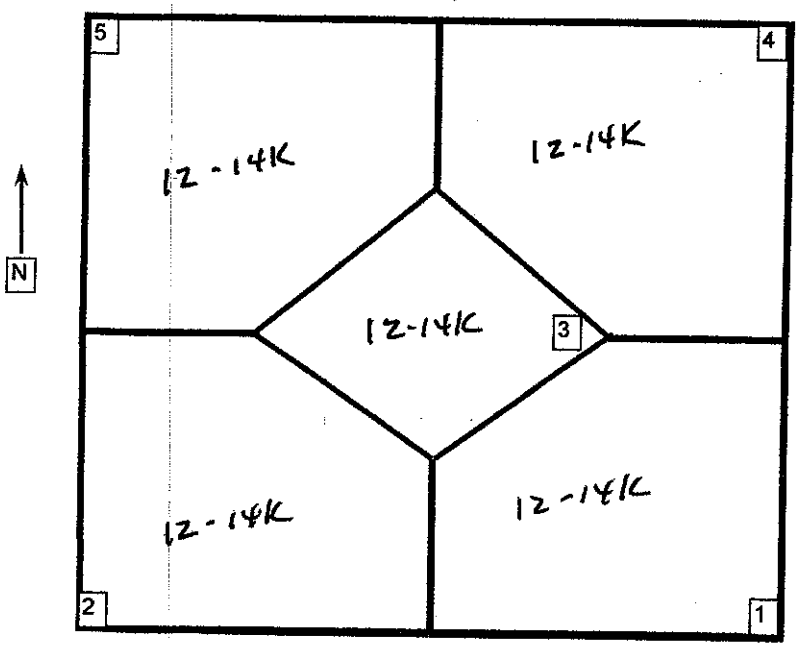
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4		Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337		Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007		Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%		Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
		50%		Efficiency (Intrinsic)	25%		
Type	gamma	beta		Type	alpha	Type	gamma
Sample Time (min)	1	1		Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10		Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	10K	23.1		BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84		MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	NA		Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	NA		Action Level (dpm/100c	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Winnie Well Site

PURPOSE: Direct Reading / Sample Loc.

GRID # A-1



Location	cpm Direct			

$$MDC = \frac{3 + 3.29\sqrt{Rb\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0 493

ENERGYSOLUTIONS

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/23/07 (Date)
7/23/07 (Date)

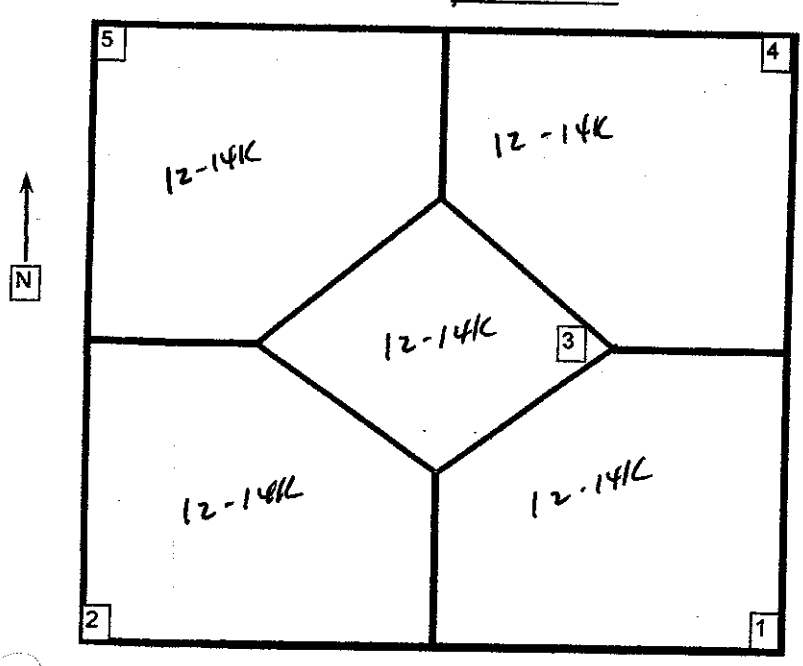
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	76%	Efficiency (%)	100%
			50%	Efficiency (Intrinsic)	25%		
Type	gamma		beta	Type	alpha	Type	gamma
Sample Time (min)	1	N a	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10		10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	10K		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION: WINNIE WELL SITE

PURPOSE: Direct Reading / Sample Loc.

GRID # A-2



Location	cpm Direct			
		N a		

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(A)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0494

Surveyor: Jack Alucia (Print) — Sign — 7/20/07 (Date)

Reviewer: Glen Parkhurst (Print) — Sign — 7/23/07 (Date)

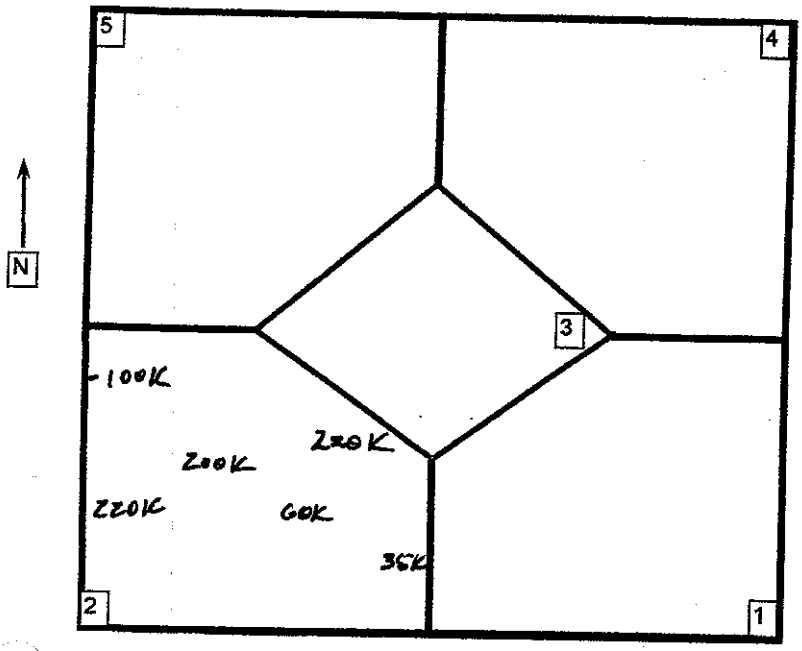
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic) 25% Type	alpha	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	10K	23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	8[illegible]	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm^2)	NA

N/a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # A-3



Location	cpm Direct			

N/a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 495

Surveyor: Jack Nucia (Print) — Sign — 7/20/07

Reviewer: Glenn Pinkhurst (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	76%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	10K	23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	34	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

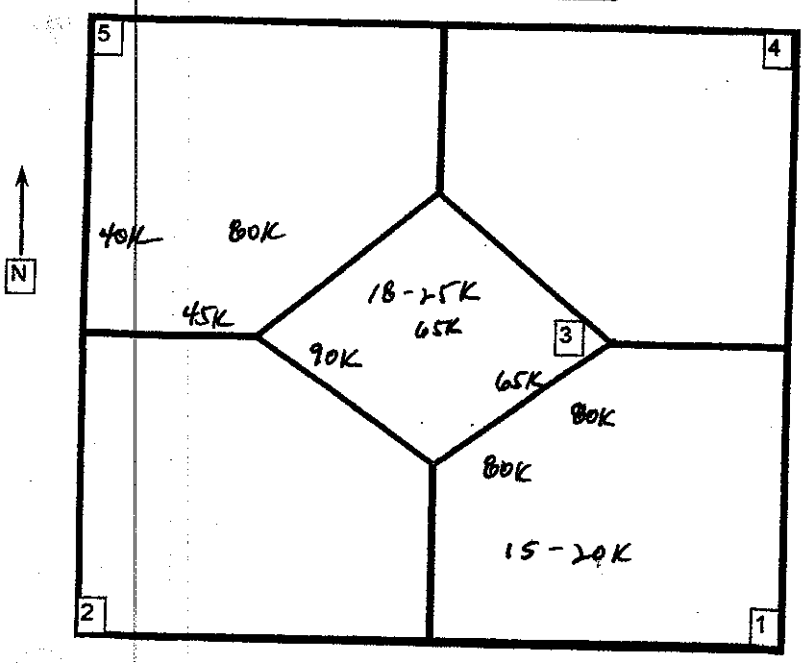
Na

Na

Na

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # B-3



Locatio	cpm Direct			

Na

$$\text{DC} = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 496

Surveyor: Jack Mucia (Print) — Sign — 7/20/07

Reviewer: Coleen Parkhurst (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)	10K	23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

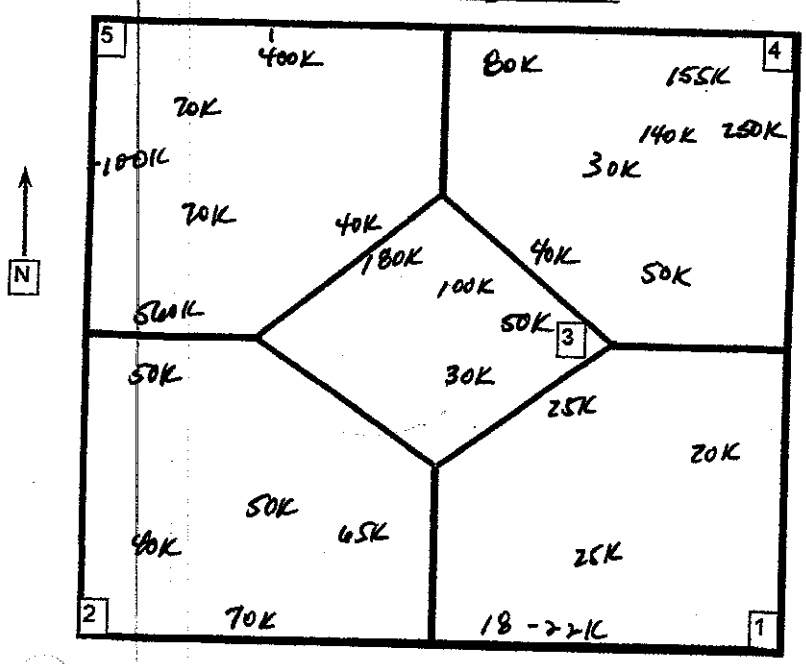
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # B-2



Locatio	cpm Direct			

N a

$$DC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 491

Surveyor: Jack Mucis (Print) — Sign — 7/20/07

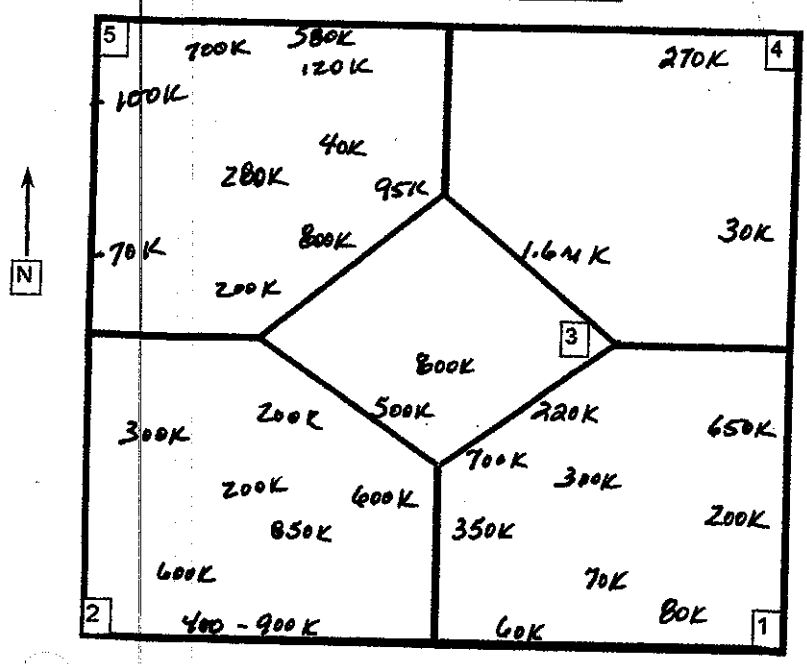
Reviewer: (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	N a 1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	N a 50	Background Time (min)	N a NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-2



Locatio	cpm Direct			
	N a			

$$DC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{c_s(t_s)(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 498

Surveyor: Jack Mucia (Print) — Sign — 7/20/07

Reviewer: Coleman Parkhurst (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

Na

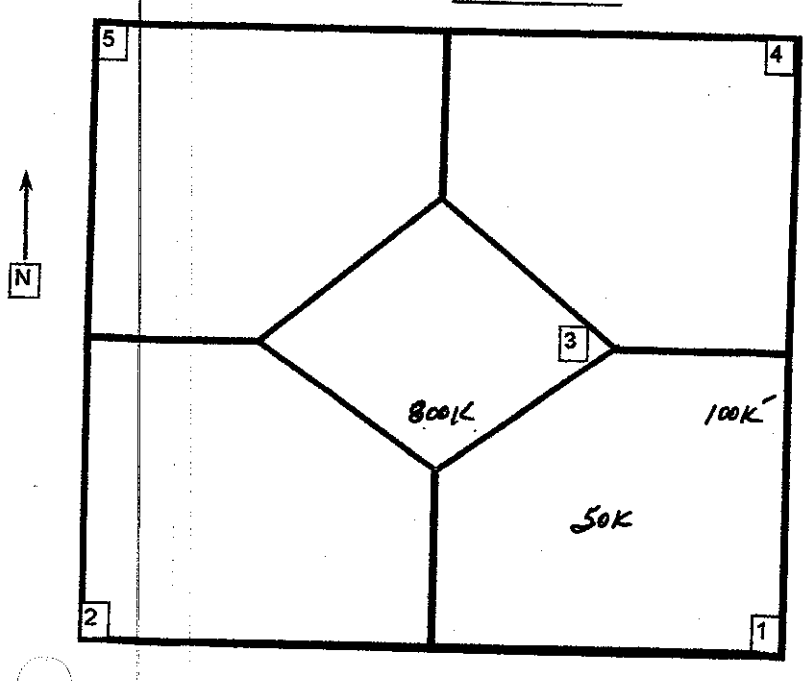
Na

Na

LOCATION: Winnie Well Site

PURPOSE: Direct Reading / Sample Loc.

GRID # D-2



Locatio	cpm Direct			

Na

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(t_c)(t_c)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 499

Surveyor: Jaen Alvcis (Print) — Sign — 7/20/07

Reviewer: Celena Parkhurst (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

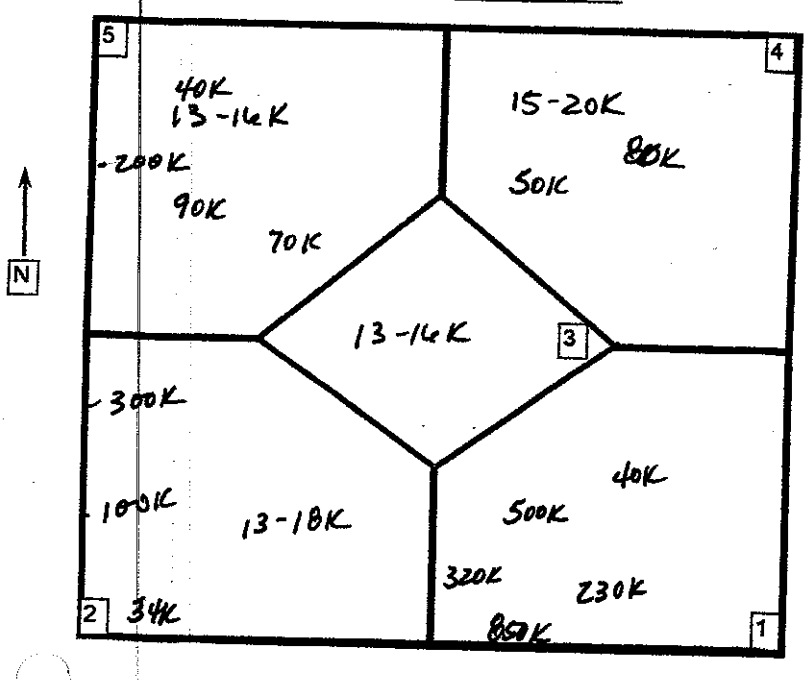
Na

Na

Na

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-3



Location	cpm Direct			

Na

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 500

Surveyor: Jack Mugia (Print) — Sign — 7/20/07

Reviewer: Coleman Parkhurst (Print) — Sign — 7/23/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

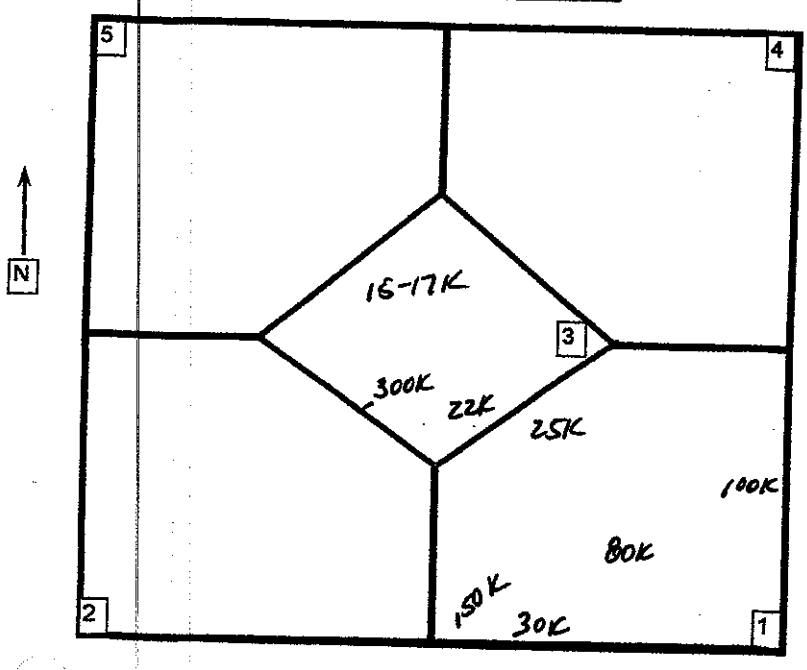
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # D-3



Locatio	cpm Direct			

$$DC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{c_s(t_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0504

yor: Carl Ingle
Print

Sign

7/23/2007
Date

Reviewer: Glen Parkhurst
Print

Sign

7/24/07
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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: Incoming / Outgoing Genie
POSE: Contamination / Dose Rate

#GTH-1056

INCOMING (7/14/07)

1. Rt. Rear Tire
2. Rt. Rear Carriage
3. Rt. Front Tire
4. Rt. Front Carriage
5. Keft Front Tire
6. Left Front Carriage
7. Left Rear Tire
8. Left Rear Carriage
9. Forks
10. Fork Rack

OUTGOING

11. Rt. Rear Tire
12. Rt. Rear Carriage
13. Rt. Front Tire
14. Rt. Front Carriage
15. Keft Front Tire
16. Left Front Carriage
17. Left Rear Tire
18. Left Rear Carriage
19. Forks
20. Fork Rack

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	90.86757991	<MDC	BKG>
2	N/A	<MDC	<MDC	BKG>
3	N/A	<MDC	12.82945736	BKG>
4	N/A	<MDC	<MDC	BKG>
5	N/A	<MDC	<MDC	BKG>
6	N/A	<MDC	<MDC	BKG>
7	N/A	<MDC	<MDC	BKG>
8	N/A	<MDC	<MDC	BKG>
9	N/A	<MDC	<MDC	BKG>
10	N/A	<MDC	<MDC	BKG>
11	N/A	<MDC	<MDC	BKG>
12	N/A	<MDC	<MDC	BKG>
13	N/A	<MDC	<MDC	BKG>
14	N/A	<MDC	<MDC	BKG>
15	N/A	<MDC	<MDC	BKG>
16	N/A	<MDC	<MDC	BKG>
17	N/A	<MDC	<MDC	BKG>
18	N/A	<MDC	<MDC	BKG>
19	N/A	<MDC	<MDC	BKG>
20	N/A	<MDC	<MDC	BKG>

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0503

Surveyor: Jack Mucia (Print) — Sign — Date: 7/23/2007

Reviewer: Glen Parkhurst (Print) — Sign — 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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0	BKG (cpm)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: Loader # 4774
PURPOSE: Release

#1 Fork
#2 Mast
#3 Front Left Tire
4. Front Right Tire
5. Back Right
#6 - Wheel Hub
#7 - Wheel Hub
#8 - Right Rear Tire
9 - Left rear tire
10. - Cab

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	BKG>
2	N/A	95.4	<MDC	BKG>
3	N/A	<MDC	<MDC	BKG>
4	N/A	<MDC	15.4	BKG>
5	N/A	<MDC	<MDC	BKG>
6	N/A	<MDC	<MDC	BKG>
7	N/A	84.0	12.8	BKG>
8	N/A	<MDC	11.5	BKG>
9	N/A	<MDC	<MDC	BKG>
10	N/A	<MDC	11.5	BKG>

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0505

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/25/07 (7/23/2007)

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/25/07

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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: External Surface of Bag # S-031
PURPOSE: Contamination / Dose Rate

BAG # S-031

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	88.2	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0506

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/25/07 (7/23/2007)

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/25/07

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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: External Surface of Bag # S-033
PURPOSE: Contamination / Dose Rate

BAG # S- 033

Contact D/R – 25

#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	<MDC	<MDC	
5	N/A	106.4	<MDC	
6	N/A	90.5	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0507

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7-25-07 7/23/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7-25-07

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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: External Surface of Bag # S-044
PURPOSE: Contamination / Dose Rate

BAG # S-044

Contact D/R – 16

#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	110.9	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0508

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 7/23/2007 (Date) — 7/25/07

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	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)	50.2	BKG (cpm)	0.07	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	83	MDC (dpm/100cm2)	11	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: External Surface of Bag # S-042
PURPOSE: Contamination / Dose Rate

BAG # S-042

Contact D/R -- 8

#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	90.5	<MDC	
3	N/A	85.9	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0509

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/25/07

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/25/07

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

LOCATION: External Surface of Bag # S-036
PURPOSE: Contamination / Dose Rate

BAG # S-036

Contact D/R – 10

#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	105.2	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(t)(L)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0510

Surveyor: Carl Ingle (Print) — Sign — 7/25/07 — Date 7/24/2007

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	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

LOCATION: External Surface of Bag # S-037
PURPOSE: Contamination / Dose Rate

BAG # S-037

Contact D/R – 10

#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	84.8	<MDC	
3	N/A	100.7	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	103.0	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0511

Surveyor: Carl Ingle (Print) — Sign — 7/25/07 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/25/07 (Date)

7/24/2007 (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

LOCATION: External Surface of Bag # S-038
PURPOSE: Contamination / Dose Rate

BAG # S-038

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	78.0	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	87.0	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0512

Surveyor: 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

LOCATION: External Surface of Bag # S-041
PURPOSE: Contamination / Dose Rate

BAG # S-041

Contact D/R – 10

#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	78.0	<MDC	
5	N/A	84.8	<MDC	
6	N/A	80.2	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0513

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/25/07

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 7/25/07

7/24/2007

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

LOCATION: External Surface of Bag # S-043
PURPOSE: Contamination / Dose Rate

BAG # S-043

Contact D/R – 14

#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	84.8	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	78.0	<MDC	
6	N/A	84.8	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{Rb\, t_s (1 + t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0514

Surveyor: 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

LOCATION: External Surface of Bag # S-039
PURPOSE: Contamination / Dose Rate

BAG # S-039

Contact D/R – 8

#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	87.0	<MDC	
2	N/A	80.2	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	84.8	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	112.0	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0515

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 7/25/07 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/25/07 (Date)

7/24/2007 (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

LOCATION: External Surface of Bag # S-040
PURPOSE: Contamination / Dose Rate

BAG # S-040

Contact D/R – 10

#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	107.5	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	98.4	<MDC	
5	N/A	78.0	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0516

Surveyor: Carl Ingle (Print) — 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	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

LOCATION: External Surface of Bag # S-032
PURPOSE: Contamination / Dose Rate

BAG # S-032

Contact D/R -- 10

#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	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	84.8	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0517

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 7/25/07 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 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

LOCATION: External Surface of Bag # S-035
PURPOSE: Contamination / Dose Rate

BAG # S-035

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	98.4	<MDC	
2	N/A	78.0	<MDC	
3	N/A	93.9	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{t_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0518

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 7/25/07 (Date) 7/24/2007

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	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

LOCATION: External Surface of Bag # S-034
PURPOSE: Contamination / Dose Rate

BAG # S-034

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	78.0	<MDC	
2	N/A	82.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0759

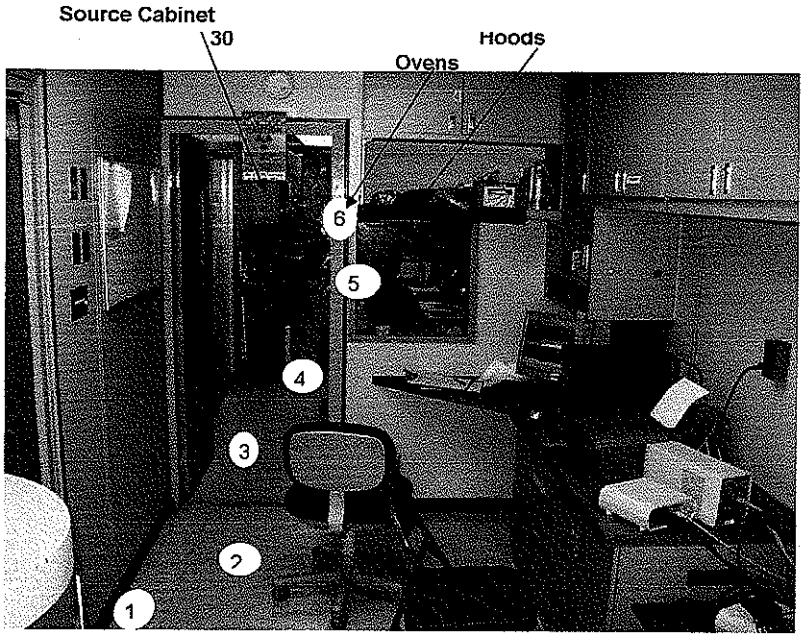
Surveyor: Linda C. Finn (Print) — L. Finn (Sign) — 7/31/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/31/07 (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 #	167145
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)	33.5	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	69	MDC (dpm/100cm2)	12	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	129.0	<MDC	5
2	N/A	99.3	<MDC	5
3	N/A	108.4	<MDC	5
4	N/A	78.8	<MDC	5
5	N/A	110.7	<MDC	5
6	N/A	87.9	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(E_s)(E_p)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0760

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign)

Reviewer: Glenn Parkhurst (Print) — (Sign)

7/31/2007 (Date)

7/31/07 (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 #	N/A	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	N/A	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	N/A	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)	36	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	MDC (dpm/100cm2)	12	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	Desk in RSO/PM Office	1	N/A	91.32	<MDC	N/A
2	RSO Desk	2	N/A	77.63	<MDC	N/A
3	Floor in break area	3	N/A	75.34	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	100.46	<MDC	N/A
5	South table in break room	5	N/A	86.76	<MDC	N/A
6	HP Desk	6	N/A	98.17	<MDC	N/A
7	HP Floor	7	N/A	89.04	<MDC	N/A
8	Entrance to HP Office	8	N/A	118.72	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0782

Surveyor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/4/2007
Date

8/6/07
Date

Instrument	M3
S/N	72899/163405
R_B	NA
t_s	NA
t_b	NA
ε_s	0.5
ε_i	12%
probe area	15
MDC	#VALUE!

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 #	167145
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)	34	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

LOCATION: External Surface of Bag #103
PURPOSE: Contamination / Dose Rate

Bag # 103

Contact D/R – 10 mR

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate	CPM - Direct Beta/G	CPM Beta/G
1	N/A	<MDC	<MDC			63
2	N/A	75.0	<MDC			67
3	N/A	79.5	<MDC			69
4	N/A	<MDC	<MDC			61
5	N/A	97.7	<MDC			77
6	N/A	86.4	<MDC			72

$$MDC = \frac{3 + 3.29\sqrt{R_B t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0789

eyor: Carl Ingle (Print) — Sign — 8/6/07 — 8/4/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #110
POSE: Contamination / Dose Rate

Bag # 110

Contact D/R – 12 mr

#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	80.9	<MDC	
3	N/A	103.6	<MDC	
4	N/A	90.0	<MDC	
5	N/A	96.8	<MDC	
6	N/A	90.0	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0783

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/4/07 — Date: 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn — Date: 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #104
PURPOSE: Contamination / Dose Rate

Bag # 104

Contact D/R -- 10 mr

#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	96.8	<MDC	
3	N/A	83.2	<MDC	
4	N/A	74.1	<MDC	
5	N/A	105.9	<MDC	
6	N/A	83.2	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0784

yor: Carl Ingle (Print) — Sign — 8/4/07 8/4/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #105
OSE: Contamination / Dose Rate

Bag # 105

Contact D/R – 14 mr

#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	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	101.4	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0785

Surveyor: Carl Ingle (Print) — Sign — 8/4/07 — Date 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #106
PURPOSE: Contamination / Dose Rate

Bag # 106

Contact D/R – 200 mr

#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	87.7	<MDC	
2	N/A	133.2	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	83.2	<MDC	
5	N/A	87.7	<MDC	
6	N/A	85.5	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_s(1+t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0786

Surveyor: Carl Ingle (Print) — Sign — Date 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #107
PURPOSE: Contamination / Dose Rate

Bag # 107

Contact D/R -- 12 uR

#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	85.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	74.1	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	80.9	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0787

Surveyor: Carl Ingle (Print) — Sign — 4/6/07 — 8/4/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #108
PURPOSE: Contamination / Dose Rate

Bag # 108

Contact D/R – 10mr

#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	115.0	<MDC	
2	N/A	87.7	<MDC	
3	N/A	85.5	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	87.7	<MDC	
6	N/A	<MDC	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0788

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — Date 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #109
PURPOSE: Contamination / Dose Rate

Bag # 109

Contact D/R -- 12mr

#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	71.8	<MDC	
2	N/A	94.5	<MDC	
3	N/A	90.0	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	108.2	<MDC	
6	N/A	90.0	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0790

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/6/07 — Date: 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #111
PURPOSE: Contamination / Dose Rate

Bag # 111

Contact D/R – 15mn

#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	94.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	85.5	<MDC	
5	N/A	92.3	<MDC	
6	N/A	85.5	<MDC	

N/a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0791

eyor: Carl Ingle
Print

Sign

8/6/07 8/4/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

8/6/07
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 #	167145
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)	35.4	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #112
POSE: Contamination / Dose Rate

Bag # 112

Contact D/R - 14uR

#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	85.5	<MDC	
3	N/A	92.3	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	78.6	<MDC	
6	N/A	78.6	<MDC	

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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0792

Surveyor: Carl Ingle (Print) — Sign — 4/6/07 8/5/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #113
PURPOSE: Contamination / Dose Rate

Bag # 113

Contact D/R – 15 mr

#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	71.8	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	85.5	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	76.4	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0793

Surveyor: Carl Ingle (Print) — Sign: [signature] — Date: 8/6/07 8/5/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #114
POSE: Contamination / Dose Rate

Bag # 114

Contact D/R – 12mn

#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	115.0	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	71.8	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	80.9	<MDC	

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. WI07-0796

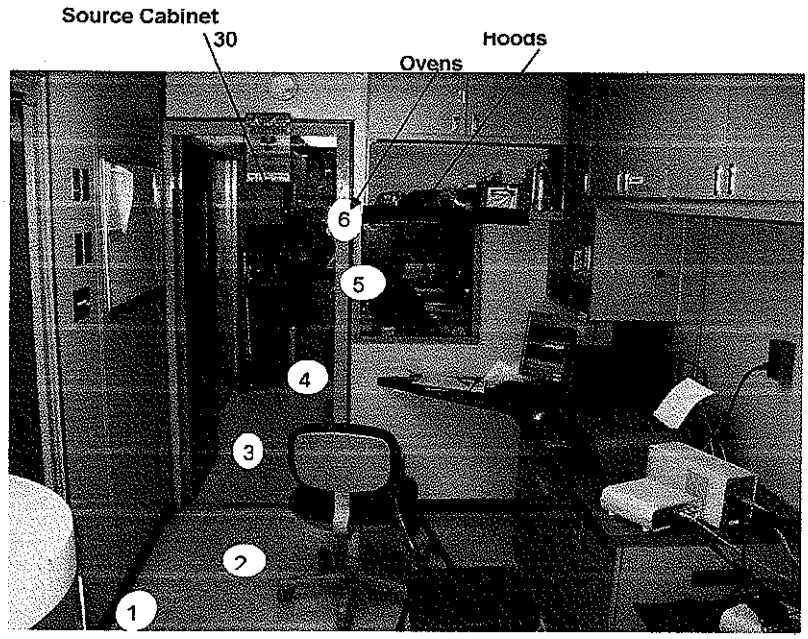
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 8/1/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/2/07 (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 #	167145
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)	33.5	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	12	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	92.5	<MDC	5
2	N/A	108.4	<MDC	5
3	N/A	74.2	<MDC	5
4	N/A	87.9	<MDC	5
5	N/A	147.3	<MDC	5
6	N/A	106.2	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0797

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 8/1/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/2/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	N/A	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	N/A	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	N/A	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)	33.9	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	12	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	RSO Desk	1	N/A	82.42	<MDC	N/A
2	Underneath RSO Desk	2	N/A	<MDC	<MDC	N/A
3	Entrance to PM/RSO Office	3	N/A	84.70	<MDC	N/A
4	Entrance to Break Area	4	N/A	93.84	<MDC	N/A
5	Floor under tabls	5	N/A	80.14	<MDC	N/A
6	Under North HP Desk	6	N/A	91.55	<MDC	N/A
7	HP Floor	7	N/A	105.25	<MDC	N/A
8	On top of East HP Desk	8	N/A	82.42	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0802

Surveyor: Carl Ingle (Print) — Sign: [signature] — Date: 8/6/07 8/5/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #115
PURPOSE: Contamination / Dose Rate

Bag # 115

Contact D/R – 12mr

#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	74.1	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	92.3	<MDC	
5	N/A	83.2	<MDC	
6	N/A	74.1	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 800

Surveyor: Jason Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/31/07

8/3/07
Date

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

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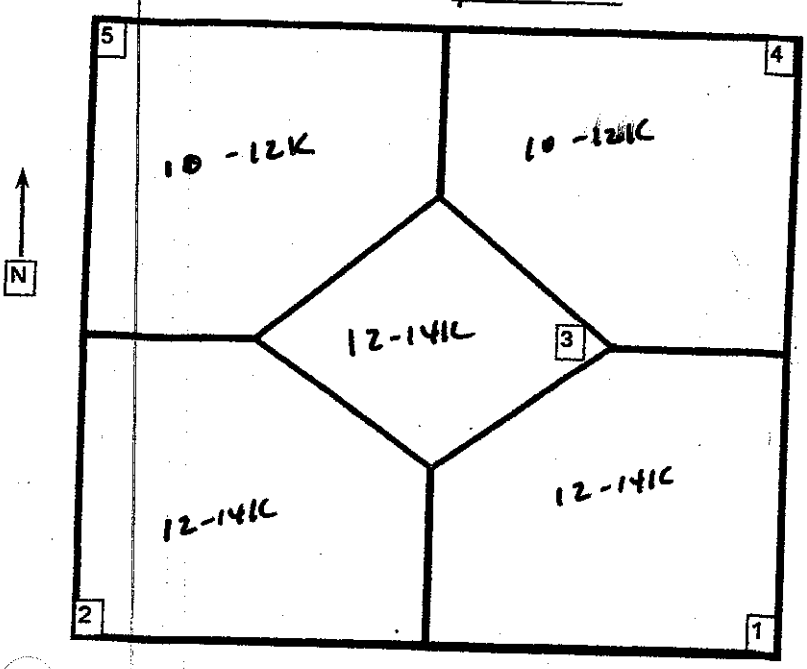
LOCATION: Winnie Well Site Free release
PURPOSE: Direct Reading / Sample Loc.

GRID # A-3



Locatio	cpm Direct			

N a

$$c = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0810

Surveyor: Jack Mucia (Print) — Sign — 7/31/07

Reviewer: Glenn Parkhurst (Print) — Sign — 8/2/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

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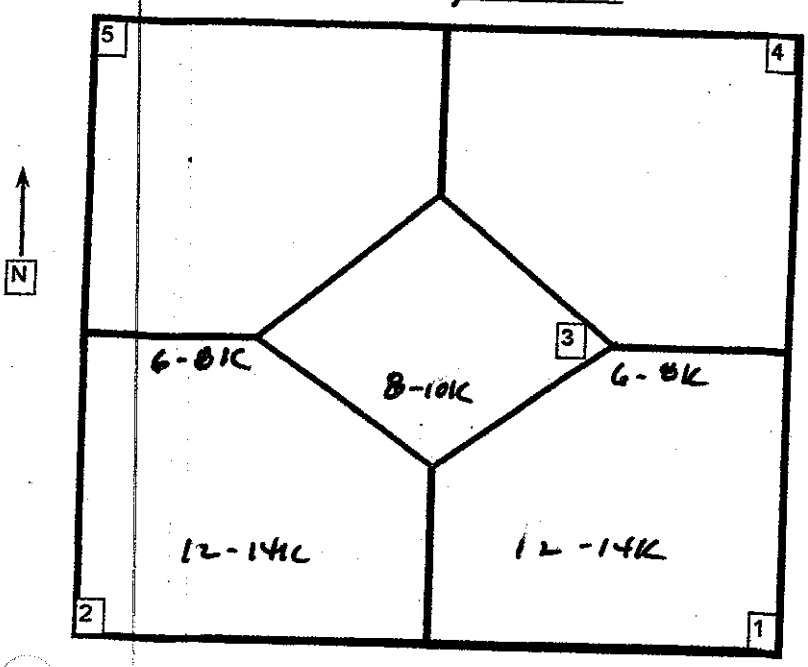
LOCATION: Winnie Well Site Free release
PURPOSE: Direct Reading / Sample Loc.

GRID # A-4



Location	cpm Direct			

N a

$$c = \frac{3 + 3.29\sqrt{RBt_b(1+t_b/t_s)}}{\varepsilon_i(\varepsilon_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0811

Surveyor: Jack Mucia (Print) — Sign — 7/31/07

Reviewer: Glenn Pontchurst (Print) — Sign — 8/2/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

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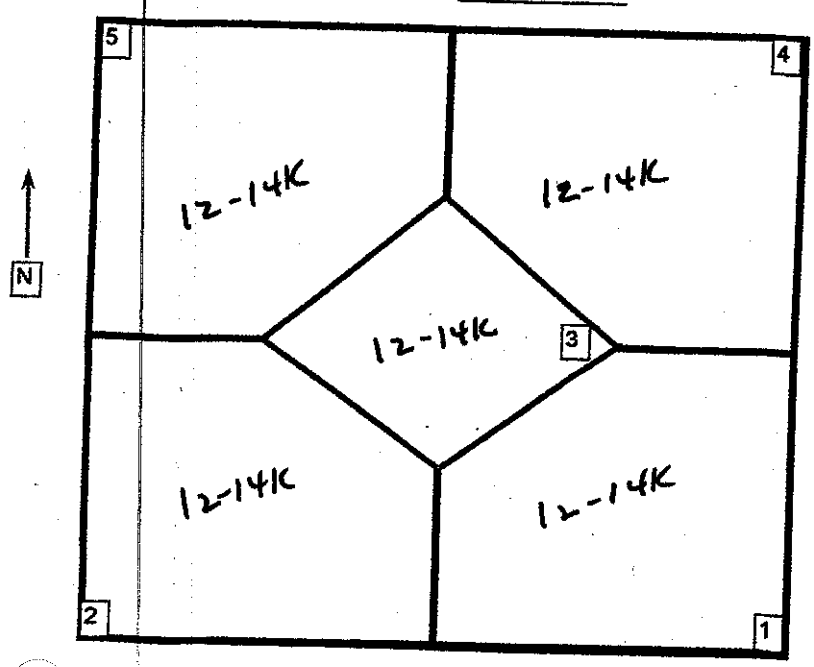
LOCATION: Winnie Well Site Free release
PURPOSE: Direct Reading / Sample Loc.

GRID # C-3



Location	cpm Direct			

N a

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0 812

ENERGYSOLUTIONS

Surveyor: Jacob Nucia (Print) — Sign

Reviewer: Glenda Parkhurst (Print) — Sign

7/31/07

8-2-07
Date

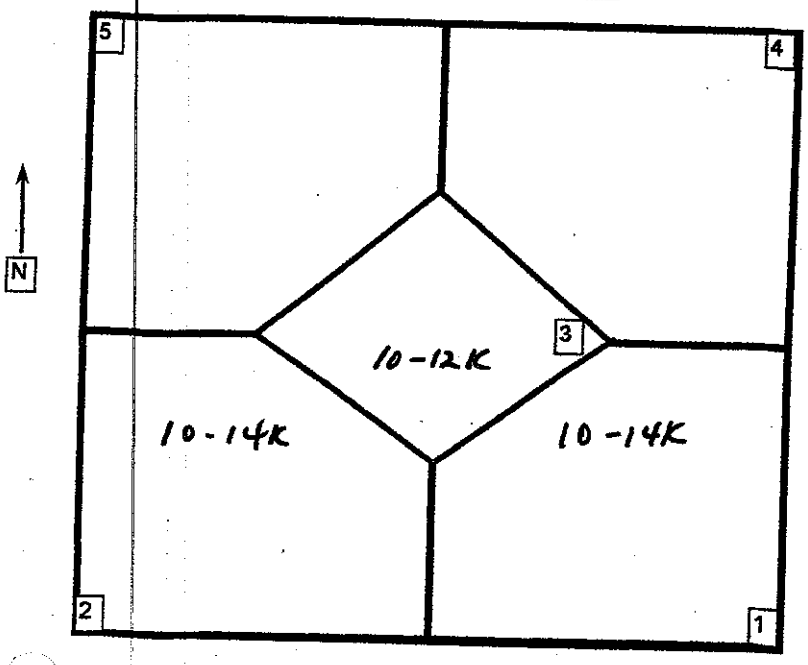
Survey Meters

Scanning/Direct Counts Instrument		βγ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50%	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1		beta	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	N a	1	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)			10	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA		23.1	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		84	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			NA	Action Level (dpm/100c	NA		

LOCATION: Winnie Well Site Free release

PURPOSE: Direct Reading / Sample Loc.

GRID # C-4



Location	cpm Direct			

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 813

Surveyor: Jack Nucig (Print) — Sign — 7/31/07

Reviewer: Glenn Pakhurst (Print) — Sign — 8/2/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

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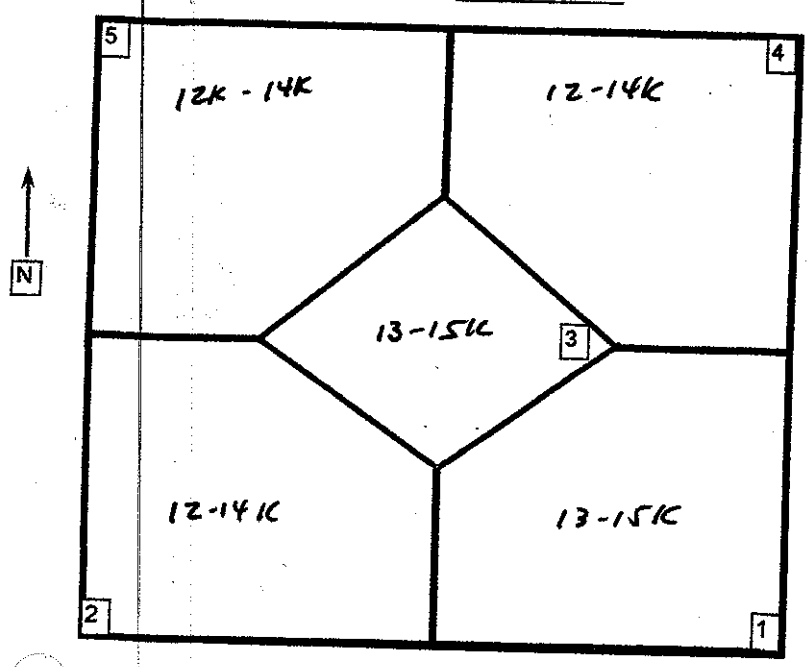
LOCATION: Winnie Well Site Free release

PURPOSE: Direct Reading / Sample Loc.

GRID # B1



Location	cpm Direct			

N a

$$DC = \frac{3 + 3.29\sqrt{RB t_s (1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 814

Surveyor: Jack Klucia (Print) — Sign — 7/31/07

Reviewer: Glenn Parkhurst (Print) — Sign — 8/2/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	10	10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)		23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

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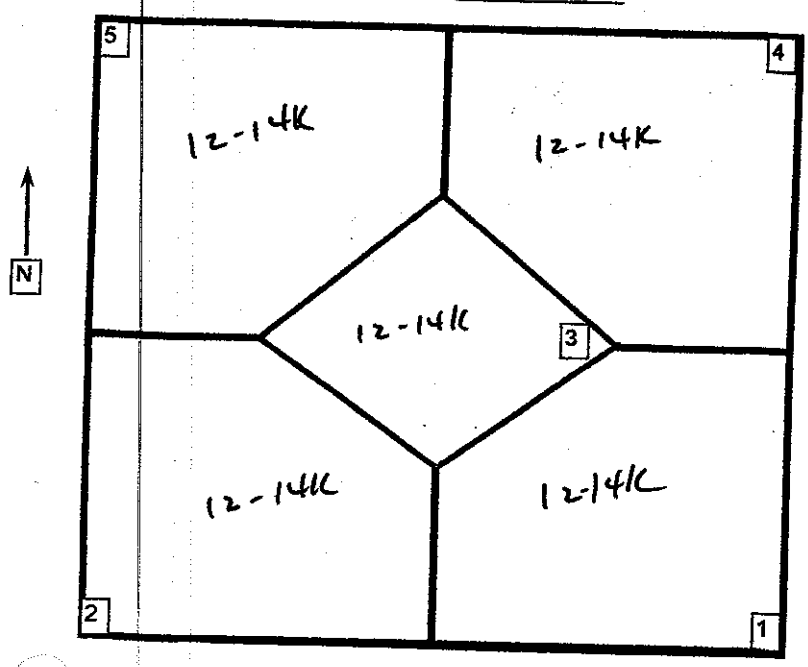
LOCATION: Winnie Well Site Free release

PURPOSE: Direct Reading / Sample Loc.

GRID # B2



Location	cpm Direct			

N a

$$DC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_r(\varepsilon_t)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0 815

ENERGYSOLUTIONS

Surveyor: Jack Alvcia (Print) — Sign

Reviewer: Colleen Hawthorne (Print) — Sign

7/31/07

8/2/07

Date

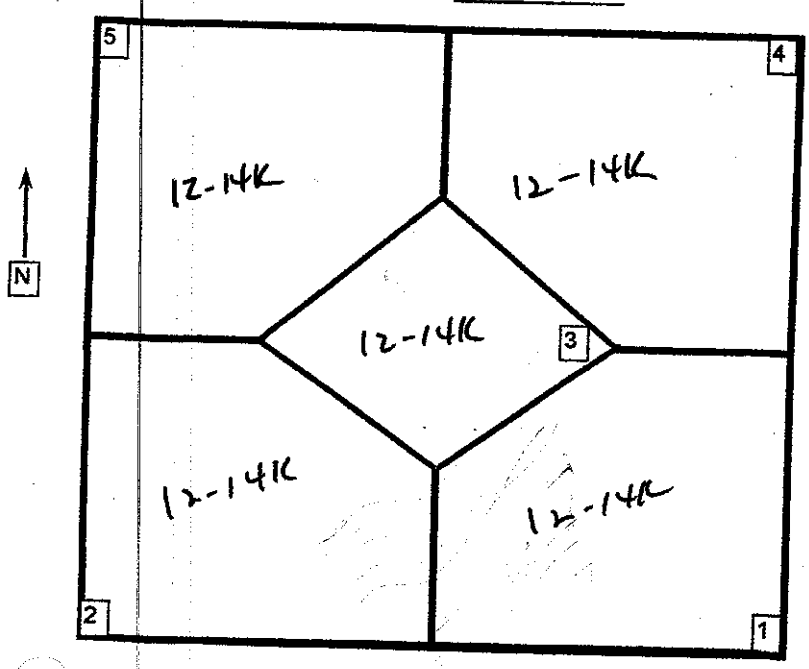
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	N a	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10		10	Sample Time (min) N a	2	Background Time (min)	NA
BKG (cpm)			23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
				Action Level (dpm/100c	NA		

LOCATION: Winnie Well Site Free release

PURPOSE: Direct Reading / Sample Loc.

GRID # B-3



Location	cpm Direct			
	N a			

$$DC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 816

Surveyor: Jack Mucia (Print) — Sign — 7/31/07

Reviewer: Glenn Parkhurst (Print) — Sign — 8/2/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	N a	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10		10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)			23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
				Action Level (dpm/100c	NA		

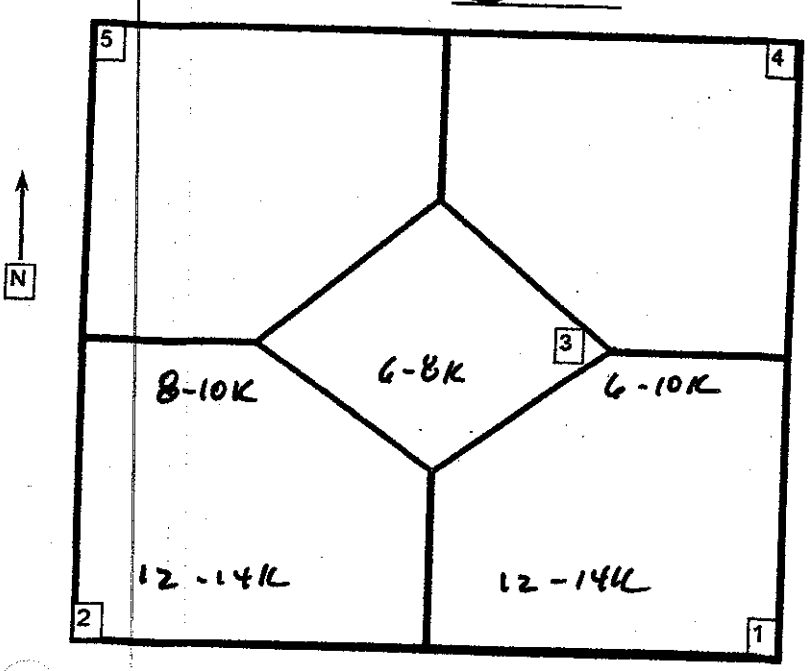
N a

N a

N a

LOCATION: Winnie Well Site Free release
PURPOSE: Direct Reading / Sample Loc.

GRID # B-4



Locatio	cpm Direct			
	N a			

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0822

eyor: Jack Mucia
Print

Sign

8/1/2007

Reviewer: Glenn Parkhurst
Print

Sign

8/3/07
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 #	167145
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)	33.9	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	12	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: Access to RCA
OSE: 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	109.82	<MDC	N/A
2	N/A	86.99	<MDC	N/A
3	N/A	84.70	<MDC	N/A
4	N/A	86.99	<MDC	N/A
5	N/A	71.00	<MDC	N/A
6	N/A	77.85	<MDC	N/A
7	N/A	75.57	<MDC	N/A
8	N/A	<MDC	<MDC	N/A
9	N/A	82.42	<MDC	N/A
10	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(L_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0829

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

8/1/2007
8/3/07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #		Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #		Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due		Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)		Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type		Type	beta	Type	alpha	Type	gamma
Sample Time (min)		Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)		Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)		BKG (cpm)	33.9	BKG (cpm)	0.15	BKG (uR)	5
MDC (dpm/100cm2)		MDC (dpm/100cm2)	70	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)		Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)		Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

N A

LOCATION: Mini - Excavator #03 #4048
PURPOSE: Free Release

Mini-Excavator #4048

1. Track
2. I/S Hub
3. Track
4. I/S Hub
5. Blade
6. Blade Frame
7. I/S Track
8. I/S Track
9. I/S Floor
10. O/S Frame
11. Bucket Arm
12. Under Carriage
13. Under Carriage
14. Controls
15. Seat

all direct fresh results.
- bkgd. BKGD = Ø cpm

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	<MDC	<MDC	N/A
2	N/A	93.84	<MDC	N/A
3	N/A	102.97	<MDC	N/A
4	N/A	80.14	<MDC	N/A
5	N/A	107.53	<MDC	N/A
6	N/A	91.55	<MDC	N/A
7	N/A	73.29	<MDC	N/A
8	N/A	125.80	<MDC	N/A
9	N/A	109.82	<MDC	N/A
10	N/A	100.68	<MDC	N/A
11	N/A	109.82	<MDC	N/A
12	N/A	75.57	<MDC	N/A
13	N/A	<MDC	<MDC	N/A
14	N/A	114.38	<MDC	N/A
15	N/A	86.99	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0832

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 8/2/2007 (Date)

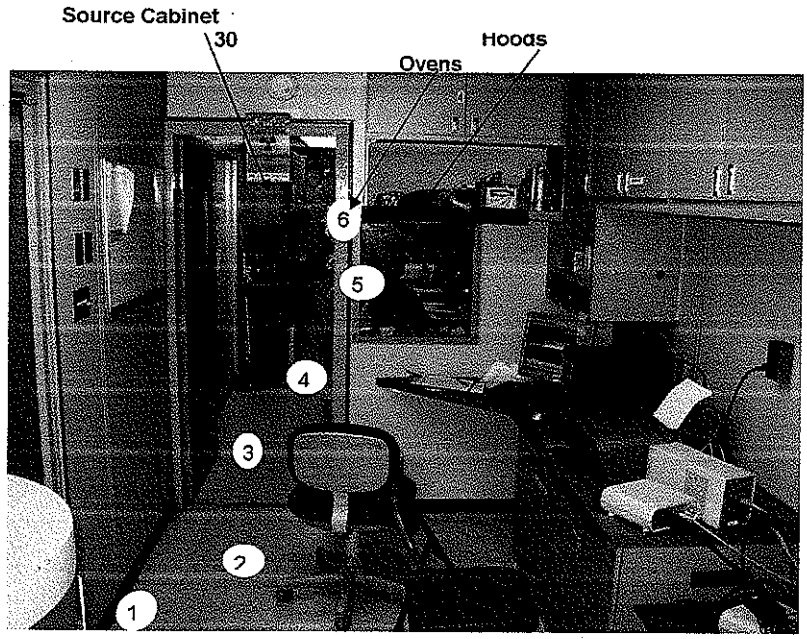
Reviewer: Glenn Parkhurst (Print) — [signature] (Sign) — 8/2/07 (Date)

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 #	167145
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)	35	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	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

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	95.9	<MDC	5
2	N/A	100.5	<MDC	5
3	N/A	107.3	<MDC	5
4	N/A	89.0	<MDC	5
5	N/A	73.1	<MDC	5
6	N/A	111.9	<MDC	5

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0849

Surveyor: Carl Ingle (Print) — Sign — 8/3/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/3/07 (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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
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)	36.3	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	72	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: Instruments Returned to TN.
PURPOSE: Free Release

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	81.51	<MDC	N/A
2	N/A	74.66	<MDC	N/A
3	N/A	<MDC	<MDC	N/A
4	N/A	<MDC	<MDC	N/A
5	N/A	97.49	<MDC	N/A

Instruments / Ser. Numbers

M-12	#117173	Smear #1
w/ 43-5	#171284	
Ludlum-19	95453	Smear #2
L-2360	# 193664	Smear #3
w/ 43-89	# 199350	
L-2929	#102015	Smear #4
w/43-10-1	#100443	
S.A.C. # 1163		Smear #5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0868

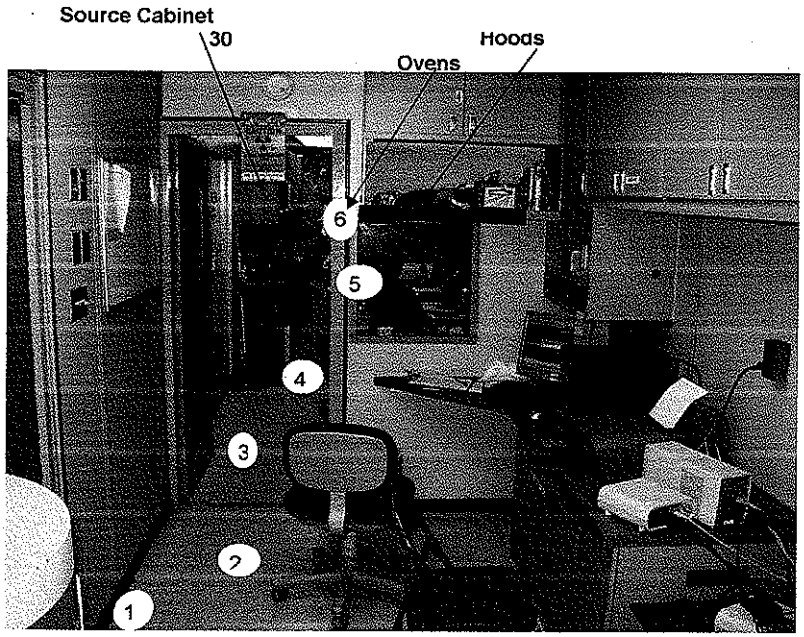
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 8/3/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/3/07 (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 #	167145
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)	36.3	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	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	99.8	<MDC	5
2	N/A	131.7	<MDC	5
3	N/A	92.9	<MDC	5
4	N/A	81.5	<MDC	5
5	N/A	90.6	<MDC	5
6	N/A	97.5	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0876

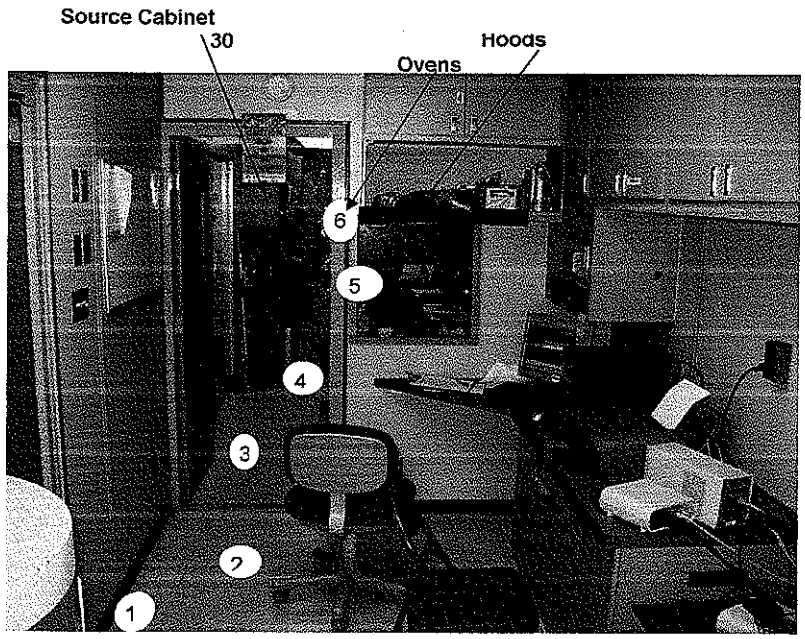
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 8/4/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/5/07 (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 #	167145
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)	34	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA

LOCATION: Energy Solutions Mobile Lab
PURPOSE: Daily - Contamination / Dose Rate



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	uR/hr Dose Rate
1	N/A	102.7	<MDC	5
2	N/A	82.2	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	70.8	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	102.7	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0873

eyor: Jack Mucia
Print

Sign

8/3/2007

Reviewer: Glenn Parkhurst
Print

Sign

8/6/07
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 #	167145
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)	34	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	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: Access to RCA
POSE: 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	116.44	<MDC	N/A
2	N/A	86.76	<MDC	N/A
3	N/A	77.63	<MDC	N/A
4	N/A	89.04	<MDC	N/A
5	N/A	111.87	<MDC	N/A
6	N/A	84.47	<MDC	N/A
7	N/A	86.76	<MDC	N/A
8	N/A	75.34	<MDC	N/A
9	N/A	<MDC	<MDC	N/A
10	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{Rb\,t_s(1+t_s/t_b)}}{\varepsilon_s(\eta)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0877

Surveyor: Linda C. Finn (Print) — Sign — 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	N/A	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	N/A	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	N/A	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	N/A	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	N/A	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)	34	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	70	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	PM Desk	1	N/A	98.17	<MDC	N/A
2	Underneath RSO Desk	2	N/A	280.82	15.28	N/A
3	Entrance to PM/RSO Office	3	N/A	79.91	<MDC	N/A
4	Entrance to Break Area	4	N/A	89.04	<MDC	N/A
5	Break Area Middle of Room	5	N/A	105.02	<MDC	N/A
6	HP Desk	6	N/A	84.47	<MDC	N/A
7	HP Floor	7	N/A	73.06	<MDC	N/A
8	Entrance to office	8	N/A	86.76	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e)(y)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0880

eyor: Jack Mucia
Print

Sign

8/5/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

8/6/07
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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #136
POSE: Contamination / Dose Rate

Bag # 136

Contact D/R -- 11

#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	110.5	<MDC	
2	N/A	76.4	<MDC	
3	N/A	94.5	<MDC	
4	N/A	83.2	<MDC	
5	N/A	76.4	<MDC	
6	N/A	96.8	<MDC	

N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0881

yor: Jack Mucia (Print) — Sign — 8/5/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #137
POSE: Contamination / Dose Rate

Bag # 137

Contact D/R – 11 uR

#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	119.5	<MDC	
2	N/A	140.0	<MDC	
3	N/A	151.4	<MDC	
4	N/A	142.3	<MDC	
5	N/A	144.5	<MDC	
6	N/A	144.5	<MDC	

N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0882

Surveyor: Jack Mucia (Print) — Sign — 8/5/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #138
PURPOSE: Contamination / Dose Rate

Bag # 138

Contact D/R – 10mr

#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	99.1	<MDC	
2	N/A	74.1	<MDC	
3	N/A	101.4	<MDC	
4	N/A	94.5	<MDC	
5	N/A	87.7	<MDC	
6	N/A	105.9	<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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0883

Surveyor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/7/07 (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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #139
PURPOSE: Contamination / Dose Rate

Bag # 139

Contact D/R – 15

#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	100.9	<MDC	
2	N/A	112.3	<MDC	
3	N/A	157.7	<MDC	
4	N/A	139.5	<MDC	
5	N/A	125.9	<MDC	
6	N/A	110.0	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008

Survey Cover Sheet

SurveyNo. WI07-0884

eyor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/7/07 (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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #140

PURPOSE: Contamination / Dose Rate

Bag # 140

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	91.8	<MDC	
2	N/A	89.5	<MDC	
3	N/A	73.6	<MDC	
4	N/A	98.6	<MDC	
5	N/A	100.9	<MDC	
6	N/A	87.3	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0885

Surveyor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #141
PURPOSE: Contamination / Dose Rate

Bag # 141

Contact D/R – 1C

#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	91.8	<MDC	
2	N/A	89.5	<MDC	
3	N/A	73.6	<MDC	
4	N/A	98.6	<MDC	
5	N/A	100.9	<MDC	
6	N/A	87.3	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0886

Surveyor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/7/07 (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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #142
PURPOSE: 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	114.5	<MDC	
2	N/A	116.8	<MDC	
3	N/A	94.1	<MDC	
4	N/A	91.8	<MDC	
5	N/A	119.1	<MDC	
6	N/A	98.6	<MDC	

Bag # 142

Contact D/R -- 15

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0887

yor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/7/07 (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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #143
PURPOSE: Contamination / Dose Rate

Bag # 143

Contact D/R -- 10

#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	114.5	<MDC	
2	N/A	116.8	<MDC	
3	N/A	94.1	<MDC	
4	N/A	91.8	<MDC	
5	N/A	119.1	<MDC	
6	N/A	98.6	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(L)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0888

Surveyor: Jack Mucia (Print) — Sign — Date: 8/6/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 8/7/07

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 #	167145
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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #144
PURPOSE: Contamination / Dose Rate

Bag # 144

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	80.5	<MDC	
2	N/A	75.9	<MDC	
3	N/A	94.1	<MDC	
4	N/A	73.6	<MDC	
5	N/A	110.0	<MDC	
6	N/A	119.1	<MDC	

N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0890

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — Date 8/5/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 — 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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #116
PURPOSE: Contamination / Dose Rate

Bag # 116

Contact D/R – 10mR

#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	101.4	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	71.8	<MDC	
6	N/A	92.3	<MDC	

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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0891

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — 8/5/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #117
PURPOSE: Contamination / Dose Rate

Bag # 117

Contact D/R – 12 mr

#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	153.6	<MDC	
2	N/A	169.5	<MDC	
3	N/A	153.6	<MDC	
4	N/A	174.1	<MDC	
5	N/A	146.8	<MDC	
6	N/A	190.0	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0892

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — 8/5/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #118
PURPOSE: Contamination / Dose Rate

Bag # 118

Contact D/R – 10 mr

#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	74.1	<MDC	
2	N/A	76.4	<MDC	
3	N/A	78.6	<MDC	
4	N/A	103.6	<MDC	
5	N/A	99.1	<MDC	
6	N/A	76.4	<MDC	

$$MDC = \frac{Rb + 3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0894

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — 8/5/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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: External Surface of Bag #120
PURPOSE: Contamination / Dose Rate

Bag # 120

Contact D/R – 10 mr

#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	92.3	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	99.1	<MDC	
4	N/A	85.5	<MDC	
5	N/A	87.7	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0895

Surveyor: Carl Ingle (Print) — Sign — 8/6/07 — Date 8/5/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date 8/6/07

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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #121
POSE: Contamination / Dose Rate

Bag # 121

Contact D/R – 12 uR

#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	155.9	<MDC	
2	N/A	192.3	<MDC	
3	N/A	171.8	<MDC	
4	N/A	171.8	<MDC	
5	N/A	153.6	<MDC	
6	N/A	194.5	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB_b t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0896

yor: Carl Ingle
Print

Sign

8/6/07 8/5/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

8/6/07
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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #122
POSE: Contamination / Dose Rate

Bag # 122

Contact D/R – 15 mr

#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	83.2	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	71.8	<MDC	
4	N/A	92.3	<MDC	
5	N/A	76.4	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0897

yor: Carl Ingle (Print) — Sign — 8/6/07 — 8/5/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/6/07 (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 #	167145
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)	35.4	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #123
OSE: Contamination / Dose Rate

Bag # 123

Contact D/R -- 14mn

#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	146.8	<MDC	
2	N/A	165.0	<MDC	
3	N/A	155.9	<MDC	
4	N/A	137.7	<MDC	
5	N/A	99.1	<MDC	
6	N/A	101.4	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1056

Surveyor: Jason Alvarez (Print) — Sign — 8/5/07
Reviewer: Glenn Parkhurst (Print) — Sign — 8/8/07 (Date)

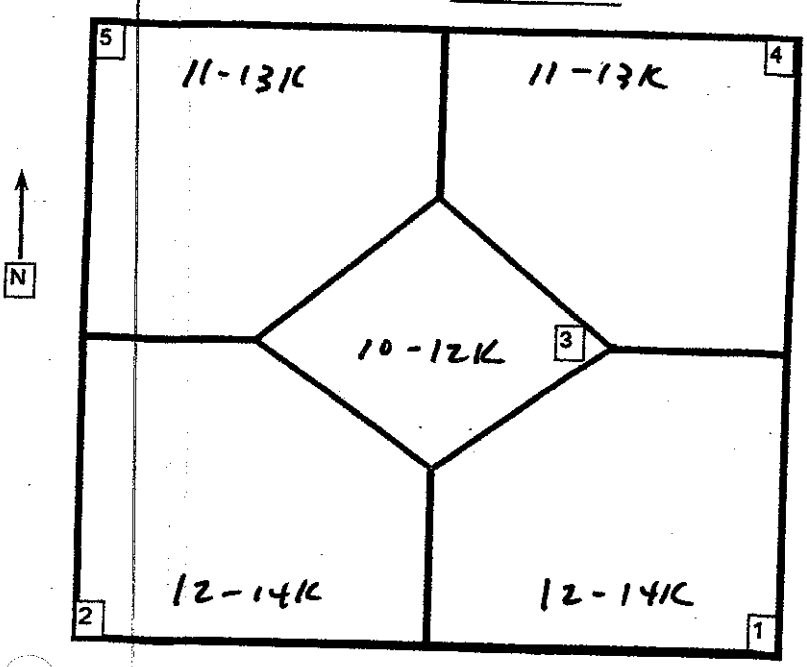
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/061707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)		23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

N/A

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # D-0



Location	cpm Direct			

N/A

$$c = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{t_s(e)(A)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1057

Surveyor: Jaen Alucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

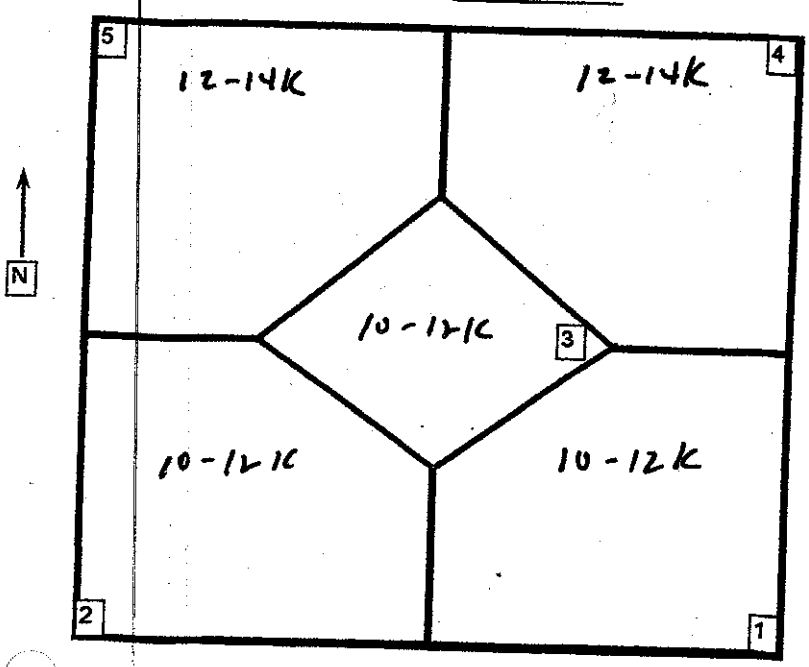
8/4/07
8/4/07
Date

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
			50%	Efficiency (intrinsic)	25%		
Type	gamma		beta	Type	alpha	Type	gamma
Sample Time (min)	1	N	a 1	Sample Time (min)	N a 2	Sample Time (min)	N a NA
Background Time (min)	10		10	Background Time (min)	50	Background Time (min)	NA
BKG (cpm)			23.1	BKG (cpm)	0.1	BKG (uR)	5
MDC (dpm/100cm2)	NA		84	MDC (dpm/100cm2)	12	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA		NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA		NA	Action Level (dpm/100c	NA	Action Level (dpm/100cm²)	NA

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # E0



Location	cpm Direct			
N a				

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(A_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008

Survey Cover Sheet

SurveyNo. WI07-01058

Surveyor: Jack Mucia (Print) — Sign — 8/6/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/11/07 (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 #	167145
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)	33.5	BKG (cpm)	0.12	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	0	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 #162

POSE: Contamination / Dose Rate

Bag # 162

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	87.5	<MDC	
2	N/A	112.5	<MDC	
3	N/A	105.7	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	89.8	<MDC	
6	N/A	80.7	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1059

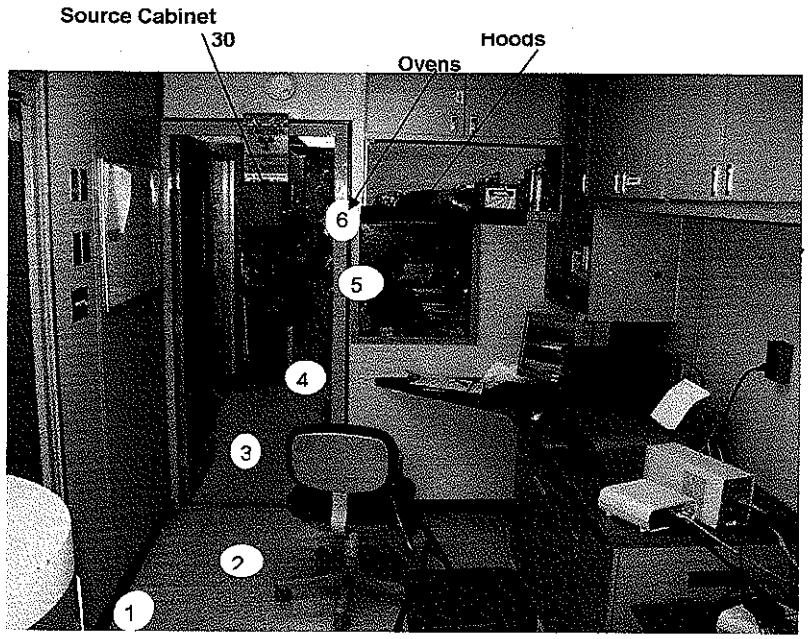
Surveyor: Linda C. Finn (Print) — Sign: LC. Finn — Date: 8/8/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/8/07

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 #	167145
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)	33.5	BKG (cpm)	0.12	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	MDC (dpm/100cm2)	12	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	81.1	<MDC	5
2	N/A	87.9	<MDC	5
3	N/A	106.2	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	92.5	<MDC	5
6	N/A	108.4	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1060

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/9/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn Parkhurst — 8/9/07 (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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
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)	35.8	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	12	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: Air Samplers / Winnie Project
POSE: Free Release

Air Samplers / Serial Numbers

Lv-1	#3361	Smear #1 & 2
Lv-1	#3360	Smear #3 & 4
Lv-1	#3364	Smear # 5 & 6
HV-1	#1671	Smear # 7 & 8
HV-1	#866	Smear # 9 & 10

Note: The above were used at Winnie Project

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	78.08	<MDC	N/A
3	N/A	119.18	<MDC	N/A
4	N/A	128.31	<MDC	N/A
5	N/A	110.05	<MDC	N/A
6	N/A	<MDC	<MDC	N/A
7	N/A	87.21	<MDC	N/A
8	N/A	78.08	<MDC	N/A
9	N/A	82.65	<MDC	N/A
10	N/A	82.65	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1062

Surveyor: Carl Ingle (Print) — Sign — 8/9/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 8/9/07 (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 #	118497	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
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)	35.8	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	71	MDC (dpm/100cm2)	12	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: Ovens #1 & 2 in E.S. Mobile Lab
PURPOSE: Free Release

Oven #1
Smear #1 Top O/S
Smear #2 Right O/S
Smear #3 Left O/S
Smear #4 Top I/S
Smear #5 Back I/S
Smear #6 Right I/S
Smear #7 Right I/S
Smear #8 Left I/S
Smear #9 Bottom Rack
Smear #10 Door I/S

Oven #2
Smear #11 Top O/S
Smear #12 Right O/S
Smear #13 Left O/S
Smear #14 Top I/S
Smear #15 Back I/S
Smear #16 Right I/S
Smear #17 Right I/S
Smear #18 Left I/S
Smear #19 Bottom Rack
Smear #20 Door I/S

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	N/A
2	N/A	82.65	<MDC	N/A
3	N/A	82.65	<MDC	N/A
4	N/A	82.65	<MDC	N/A
5	N/A	75.80	<MDC	N/A
6	N/A	<MDC	<MDC	N/A
7	N/A	91.78	<MDC	N/A
8	N/A	84.93	<MDC	N/A
9	N/A	87.21	<MDC	N/A
10	N/A	<MDC	<MDC	N/A
11	N/A	75.80	<MDC	N/A
12	N/A	<MDC	<MDC	N/A
13	N/A	78.08	<MDC	N/A
14	N/A	<MDC	<MDC	N/A
15	N/A	<MDC	<MDC	N/A
16	N/A	96.35	<MDC	N/A
17	N/A	75.80	<MDC	N/A
18	N/A	91.78	<MDC	N/A
19	N/A	87.21	<MDC	N/A
20	N/A	82.65	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1070

Surveyor: Jack Mucia (Print) — Sign — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: Flatbed Truck # 515
PURPOSE: Incoming

Smear # 1-3 Tires
Smear # 4-6 Flatbed

direct fish results
< BKGD BKGD = 40cpm

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	111.42	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	100.00	<MDC	N/A
4	N/A	100.00	<MDC	N/A
5	N/A	127.40	<MDC	N/A
6	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_b t_s (1 + t_s/t_b)}}{\epsilon_s(\epsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1071

yor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/10/2007

8/11/07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: Flatbed Truck # 521
POSE: Incoming

Smear # 1-3 Tires
Smear # 4-6 Flatbed

direct fush results
≤ BKGD BKGD = 40 cpm

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	109.13	<MDC	N/A
2	N/A	90.87	<MDC	N/A
3	N/A	86.30	<MDC	N/A
4	N/A	127.40	<MDC	N/A
5	N/A	104.57	<MDC	N/A
6	N/A	100.00	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{e_s(t_s)(t_b)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1076

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-012
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-012

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	48
2	N/A	90.87	19.21	240
3	N/A	90.87	<MDC	250
4	N/A	147.95	<MDC	240
5	N/A	90.87	<MDC	250
6	N/A	136.53	<MDC	250

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{t_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1076

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/10/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-007
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-007

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	134.25	<MDC	60
2	N/A	109.13	<MDC	80
3	N/A	109.13	16.63	170
4	N/A	95.43	<MDC	60
5	N/A	102.28	<MDC	160
6	N/A	81.74	<MDC	200

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(t + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1077

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-013
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-013

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	122.83	<MDC	30
2	N/A	129.68	15.34	200
3	N/A	95.43	<MDC	150
4	N/A	147.95	<MDC	170
5	N/A	143.38	<MDC	200
6	N/A	100.00	<MDC	200

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{s_i(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{off.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1078

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-009
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-009

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	74.89	14.04	32
2	N/A	95.43	<MDC	200
3	N/A	<MDC	<MDC	280
4	N/A	209.59	<MDC	100
5	N/A	88.58	<MDC	170
6	N/A	115.98	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1079

Surveyor: Leroy Cuneo (Print) — Sign: Cuneo — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-008
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-008

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	145.66	<MDC	38
2	N/A	122.83	<MDC	100
3	N/A	95.43	<MDC	50
4	N/A	100.00	<MDC	30
5	N/A	122.83	<MDC	100
6	N/A	150.23	<MDC	100

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1079

yor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-016
POSE: Pre-Shipping

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	120.55	<MDC	8
2	N/A	72.60	19.21	10
3	N/A	<MDC	<MDC	10
4	N/A	111.42	<MDC	10
5	N/A	84.02	<MDC	10
6	N/A	79.45	<MDC	12

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-016

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1080

eyor: Jack Mucia (Print) — Sign — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: Flatbed Truck # 530
PURPOSE: Incoming

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	72.60	<MDC	N/A
2	N/A	90.87	<MDC	N/A
3	N/A	95.43	<MDC	N/A
4	N/A	97.72	<MDC	N/A
5	N/A	88.58	<MDC	N/A
6	N/A	102.28	<MDC	N/A

Smear # 1-3 Tires
Smear # 4-6 Flatbed

direct fish results
≤ BKGD BKGD = 40 cpm

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1083

yor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-011
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-011

Dose rate in uR/hr

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	118.26	<MDC	40
2	N/A	<MDC	<MDC	50
3	N/A	102.28	<MDC	60
4	N/A	<MDC	<MDC	70
5	N/A	90.87	<MDC	48
6	N/A	74.89	<MDC	50

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (t + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1084

Surveyor: Leroy Cuneo (Print) — Sign: Cuneo — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # B-014
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

B-014

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	134.25	<MDC	4
2	N/A	118.26	<MDC	8
3	N/A	109.13	<MDC	6
4	N/A	95.43	<MDC	6
5	N/A	86.30	<MDC	6
6	N/A	77.17	<MDC	10

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)X(L)(\text{probe area}/100cm^2)}$$

$$AL = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1085

Surveyor: Jack Mucia (Print) — Sign — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: Flatbed Truck # 512
PURPOSE: Incoming

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	106.85	<MDC	N/A
2	N/A	113.70	<MDC	N/A
3	N/A	77.17	<MDC	N/A
4	N/A	95.43	<MDC	N/A
5	N/A	95.43	<MDC	N/A
6	N/A	111.42	<MDC	N/A

Smear # 1-3 Tires
Smear # 4-6 Flatbed

Check first results
± BKGD BKGD = 40cpm

$$MDC = \frac{3 + 3.29\sqrt{Rb\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008

Survey No. WI07-1086

ENERGYSOLUTIONS

Survey Cover Sheet

Surveyor: Jack Mucia (Print) — Sign — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — Sign — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: Shipment

PURPOSE: Outgoing

SHIPMENT # 2007-0002-A

Smear #1-3 - Tires
Smear #4,5 - Bed
Smear #6 - Cab

all dose rates @ 1 meter
≤ 0.1 mR/hr

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	N/A
2	N/A	109.13	<MDC	N/A
3	N/A	72.60	<MDC	N/A
4	N/A	104.57	<MDC	N/A
5	N/A	74.89	<MDC	N/A
6	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(c)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1087

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # 124
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

#124

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	115.98	<MDC	5
2	N/A	93.15	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	90.87	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1 + t_s/t_b)}}{s_s(c)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1088

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # 131
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

#131

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	106.85	<MDC	5
2	N/A	122.83	<MDC	5
3	N/A	118.26	<MDC	6
4	N/A	131.96	<MDC	6
5	N/A	95.43	<MDC	5
6	N/A	86.30	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1089

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # 126
PURPOSE: Pre-Shipping

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

#126

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	150.23	<MDC	5
2	N/A	131.96	<MDC	7
3	N/A	111.42	<MDC	5
4	N/A	95.43	<MDC	5
5	N/A	90.87	<MDC	6
6	N/A	100.00	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1090

Surveyor: Leroy Cuneo (Print) — Cuneo (Sign) — 8/10/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 8/11/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899 /163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.5	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	beta	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)	30-40cpm	BKG (cpm)	35.2	BKG (cpm)	0.13	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	35	MDC (dpm/100cm2)	0	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: B-12 Box # 128
PURPOSE: Pre-Shipping

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	122.83	<MDC	6
2	N/A	<MDC	<MDC	5
3	N/A	77.17	<MDC	5
4	N/A	<MDC	<MDC	7
5	N/A	88.58	<MDC	7
6	N/A	84.02	<MDC	8

Smear #1 Top
Smear #2 Backside
Smear #3 Front Side
Smear #4 Left End
Smear #5 Right End
Smear #6 Bottom

#128

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

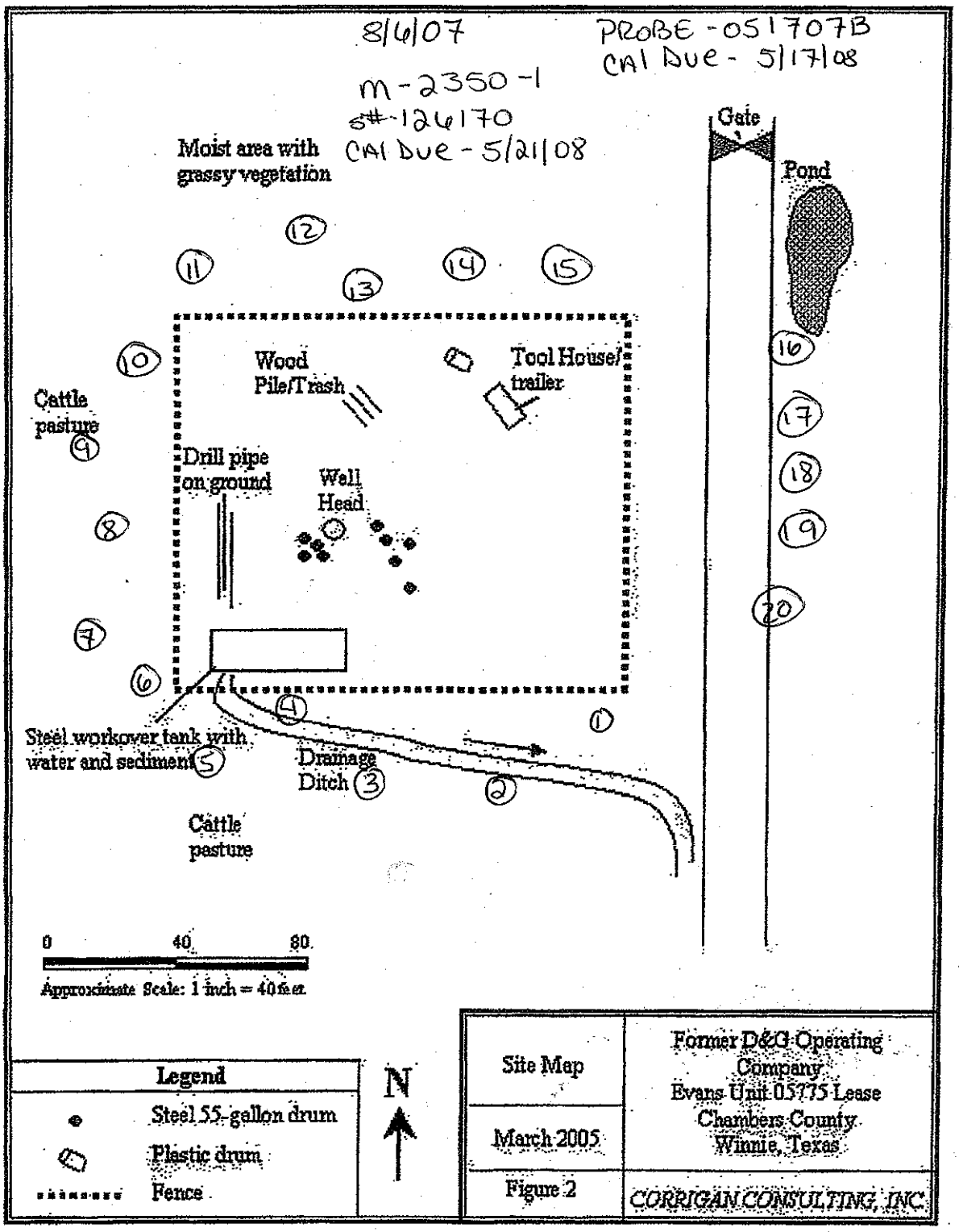
Leroy Gomez 01-07-986 Page 1

Review: Glenn Parkhurst
Gomez

FINAL OUTSIDE SURVEY

8/6/07 PROBE-051707B
CAL DUE - 5/17/08

M-2350-1
S#-126170
CAL DUE - 5/21/08



1) 11700
2) 13100
3) 11600
4) 11300
5) 11600
6) 12500
7) 11700
8) 12200
9) 11300
10) 11900
11) 11300
12) 11200
13) 12100
14) 11700
15) 12300
16) 11500
17) 10900
18) 12100
19) 11800
20) 11600

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1063

Surveyor: L Cuneo (Print) — Cuneo (Sign) — 8/9/07 (Date)

Reviewer: G. Palkhurst (Print) — [signature] (Sign) — 8/9/07 (Date)

Survey Meters

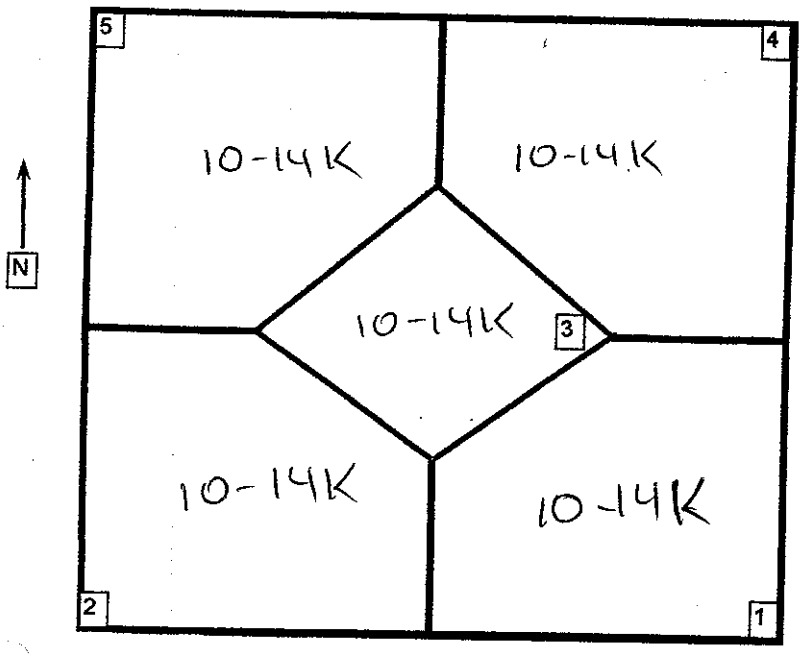
Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

NA

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # 0-4



Locatio	cpm Direct			

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{c_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1064

Surveyor: L Cuneo (Print) — Cuneo (Sign) — 8/9/07

Reviewer: G Parkhurst (Print) — [signature] (Sign) — 8/8/07 (Date)

Survey Meters

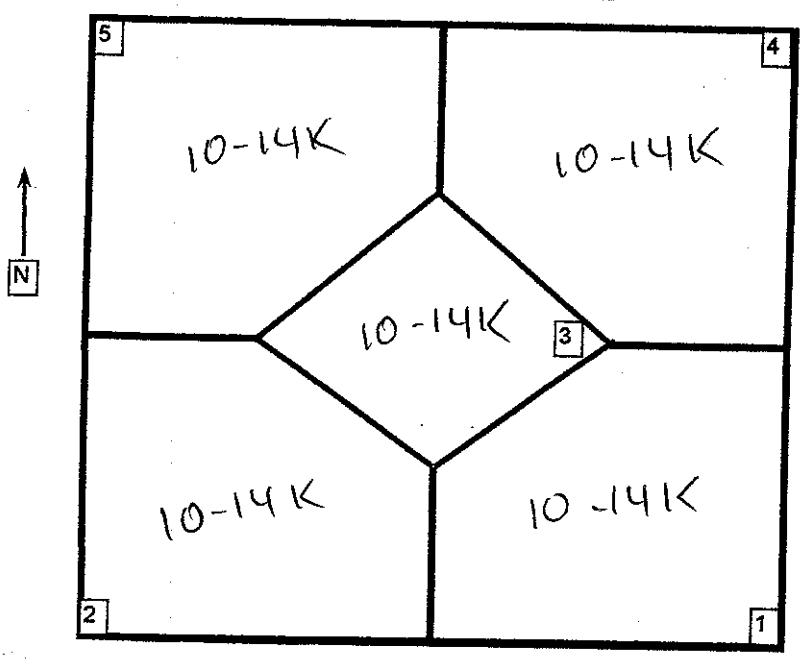
Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

N A

LOCATION:

PURPOSE: Direct Reading / Sample Loc.

GRID # 0-3



Locatio	cpm Direct			

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1065

Surveyor: L Cuneo (Print) — Cuneo (Sign) — 8/9/07

Reviewer: G Parkhurst (Print) — [signature] (Sign) — 8/9/07 (Date)

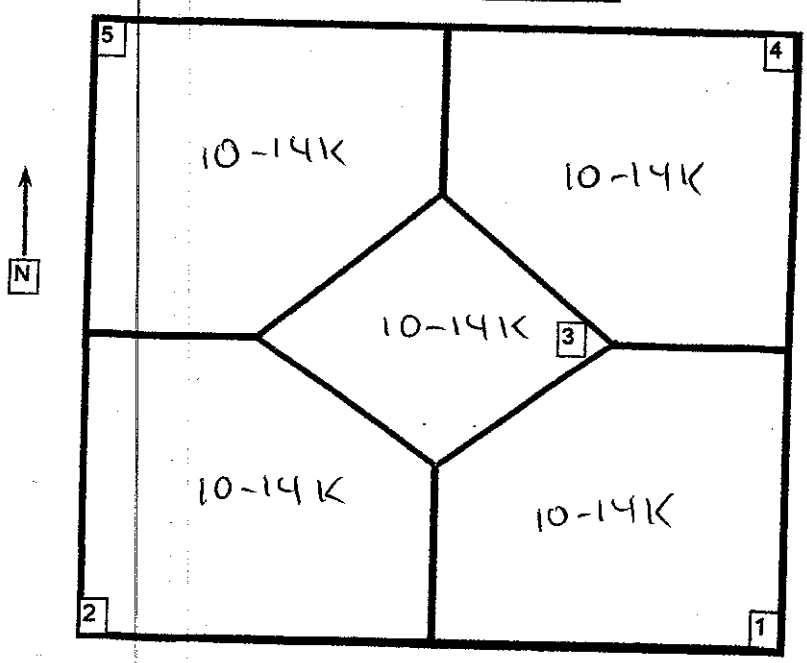
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

N A

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # 0-2



Locatio	cpm Direct			

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1066

Surveyor: L Cuneo (Print) — Cuneo (Sign) — 8/9/07

Reviewer: G Parkhurst (Print) — [signature] (Sign) — 8/9/07 (Date)

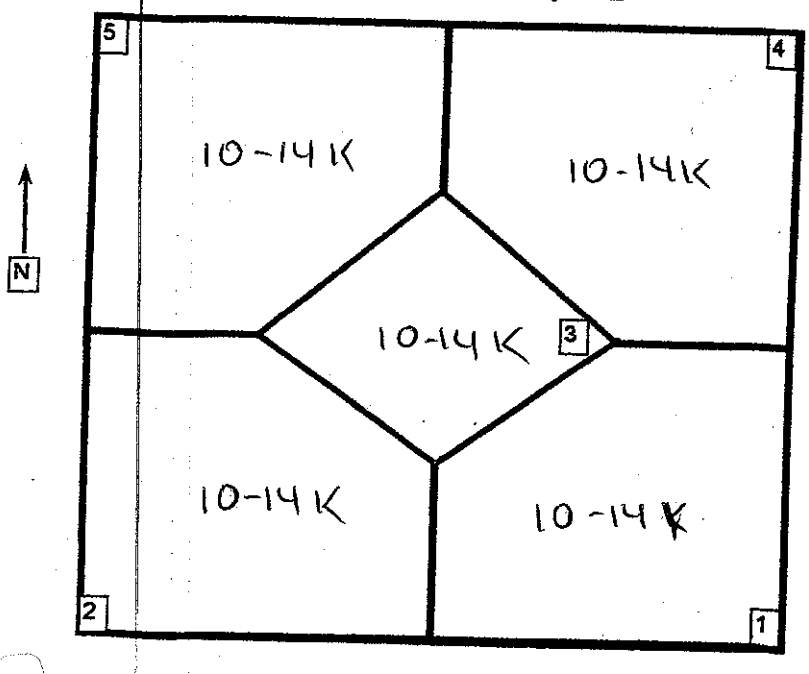
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

NA

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # 0-1



Locatio	cpm Direct			

NA

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(\varepsilon_s)(\varepsilon_i)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1067

Surveyor: LeRoy Cuneo (Print) — Cuneo (Sign) — 8/9/07

Reviewer: G Parkhurst (Print) — [signature] (Sign) — 8/9/07 (Date)

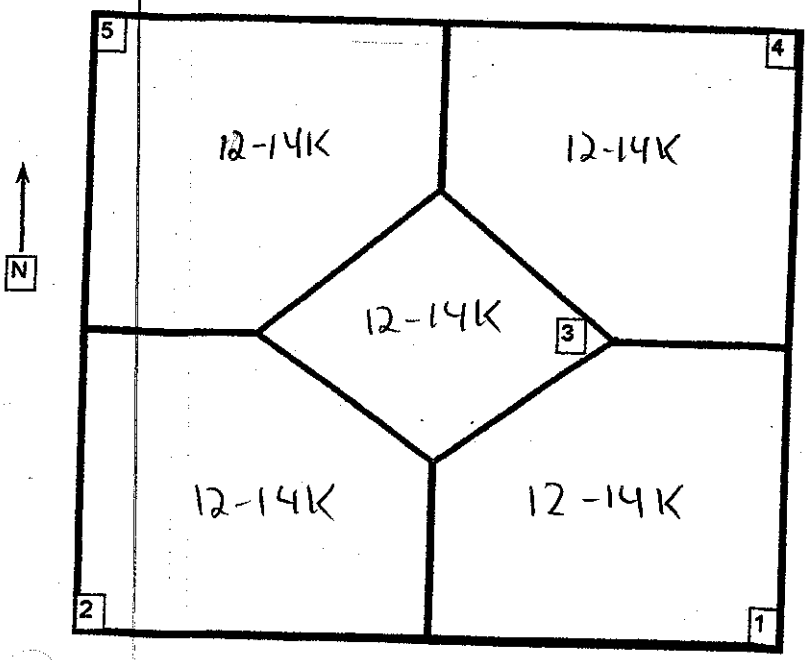
Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

N A

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # D-1



Location	cpm Direct			

NA

$$c = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1068

Surveyor: L Cuneo (Print) — Cuneo (Sign) — 8/9/07

Reviewer: [signature] (Print) — [signature] (Sign) — 8/9/07 (Date)

Survey Meters

Scanning/Direct Counts Instrument		β γ Smear Results	α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B	337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008	11/14/2007	Cal Due	9/28/2007	Cal Due	5/8/2008
Efficiency (%)	100%	47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma	50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	1	Type	alpha	Sample Time (min)	NA
Background Time (min)	10	10	Sample Time (min)	2	Background Time (min)	NA
BKG (cpm)	10K	23.1	Background Time (min)	50	BKG (uR)	5
MDC (dpm/100cm2)	NA	84	BKG (cpm)	0.1	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm²)	NA	NA	MDC (dpm/100cm2)	12	Guideline (dpm/100cm²)	NA
Action Level (dpm/100cm²)	NA	NA	Guideline (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA
			Action Level (dpm/100c	NA		

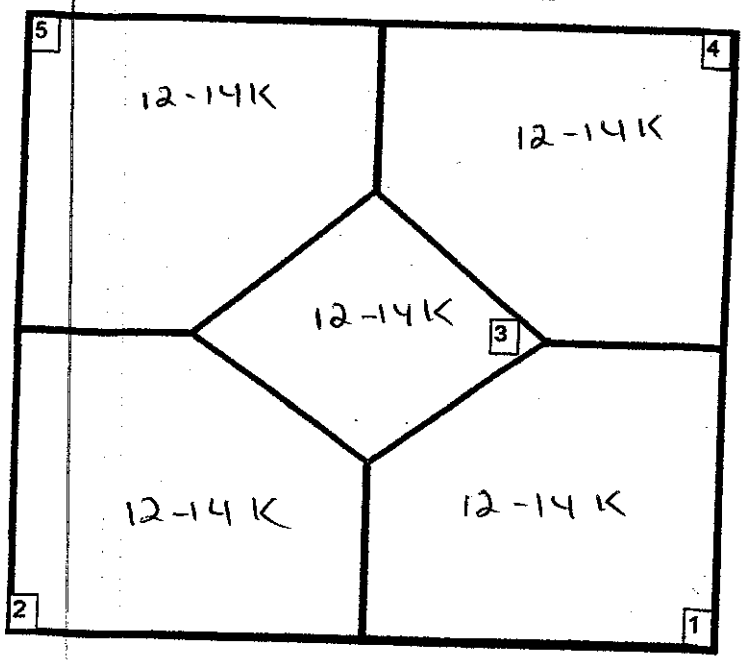
NA

NA

NA

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-1



Locatio	cpm Direct			

NA

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-2003

Surveyor: Carl Ingle/ Linda Finn
Print

Carl Ingle / L.C. Finn
Sign

8/12/2007
Date

Reviewer: Glen Parkhurst
Print

Sign

8/14/07
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 #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0.44	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	14	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: ES Mobile Lab - Misc Items
POSE: Free Release

	Item	Serial #
Smear #1	2350-1	#126170
Smear #2	Fiddler	#51707
Smear #3	Fiddler Handle	
Smear #4	44-10 (2)	#402
		#230079
Smear #5,6	L-2929	#182585
	43-10	#186558
Smear #7	Denver XE-4100	#74688
Smear #8	Troemner	#28629
Smear #9	RO-20	#1468
Smear #10	M-19	#109899
Smear #11	M-3w/	#118497 /119588

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	149.7	<MDC	0
2	N/A	163.4	<MDC	0
3	N/A	158.8	<MDC	0
4	N/A	163.4	<MDC	0
5	N/A	181.6	<MDC	0
6	N/A	161.1	<MDC	0
7	N/A	181.6	<MDC	0
8	N/A	124.6	<MDC	0
9	N/A	174.8	<MDC	0
10	N/A	165.7	<MDC	0
11	N/A	156.5	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-2004

Surveyor: Carl Ingle/ Linda Finn
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

8/12/2007
Date

8/14/07
Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w 44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0.44	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	14	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: ES Mobile Lab - Fume Hoods
PURPOSE: Release

Smear #1 (left hood) Hepa Filter
Smear #2 Back
Smear #3 Center
Smear #4 Left Wall
Smear #5 Top
Smear #6 Bottom
Smear #7 Liner Bottom
Smear #8 Liner Top
Smear #9 Front Window I/S
Smear #10 Front O/S
Smear #11 (Right Hood) Bottom
Smear #12 Side/Back
Smear #13 Top

All accessible areas scanned for alpha & beta
Only used left hood and this pre-filter was disposed of

M3 w 43-5 (alpha) #118497 /117588 (used) eff. 11.1%
cal. Due 5/14/08

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	163.4	<MDC	0
2	N/A	145.1	<MDC	0
3	N/A	170.2	<MDC	0
4	N/A	204.5	<MDC	0
5	N/A	152.0	<MDC	0
6	N/A	181.6	<MDC	0
7	N/A	170.2	<MDC	0
8	N/A	163.4	<MDC	0
9	N/A	186.2	<MDC	0
10	N/A	156.5	<MDC	0
11	N/A	188.5	<MDC	0
12	N/A	129.1	<MDC	0
13	N/A	179.4	<MDC	0

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-2006

Surveyor: Carl Ingle
Print

Reviewer: Glen Parkhurst
Print

Sign

Sign

8/12/2007
Date

8/14/07
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 #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie 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)	0.44	BKG (cpm)	0.18	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	14	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: ES Mobile Lab - Misc Items
PURPOSE: Free Release

	Item	
Smear #1 - 3	Ext. Cords	(orange)
Smear #4 - 6	Ext. Cords	(yellow))
Smear #7 - 9	Ext. Cords	(red))
Smear #10	Misc.	
Smear #11 - 12	Shovel	
Smear #13 - 14	Shovel	
Smear #15 - 16	Shovel	
Smear #17 - 18	Posr Driver	
Smear #19 - 20	Chain	

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	167.9	<MDC	N/A
2	N/A	167.9	<MDC	N/A
3	N/A	154.2	<MDC	N/A
4	N/A	163.4	<MDC	N/A
5	N/A	193.1	<MDC	N/A
6	N/A	145.1	<MDC	N/A
7	N/A	158.8	<MDC	N/A
8	N/A	206.8	<MDC	N/A
9	N/A	154.2	<MDC	N/A
10	N/A	161.1	<MDC	N/A
11	N/A	167.9	<MDC	N/A
12	N/A	147.4	<MDC	N/A
13	N/A	190.8	<MDC	N/A
14	N/A	209.0	<MDC	N/A
15	N/A	174.8	<MDC	N/A
16	N/A	133.7	<MDC	N/A
17	N/A	172.5	<MDC	N/A
18	N/A	126.8	<MDC	N/A
19	N/A	131.4	<MDC	N/A
20	N/A	161.1	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{s_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-2029

Surveyor: Linda C. Finn (Print) — Sign: LC. Finn — Date: 8/14/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/14/07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w 44-9	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	72899/163405	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2007	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficie Efficiency (surface	50%	Efficiency (surface)	25%		
Type	beta	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)	48.1	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	82	MDC (dpm/100cm2)	14	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: Outgoing / Free Release

Energy Solutions Mobile Lab
Leaving Winnie, TX. 8/14/07

Smear # 1 - 10 Floor in back half of trailer
Smear #11 - 16 Counter in back half of trailer
Smear # 17 - 20 Cabinet doors on back half of trailer
Smear # 21 - 25 Floor in front of trailer
Smear # 26 - 29 Desk / Cabinets in front
Smear # 30 - 31 Gamma Shielding
Smear # 32 - 33 Floor / Packard / Table in Front End

* Note - Ovens & Hodds on separate surveys

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	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	<MDC	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	82.0	<MDC	5
7	N/A	<MDC	<MDC	5
8	N/A	<MDC	<MDC	5
9	N/A	<MDC	<MDC	5
10	N/A	<MDC	<MDC	5
11	N/A	<MDC	<MDC	5
12	N/A	<MDC	<MDC	5
13	N/A	<MDC	<MDC	5
14	N/A	<MDC	<MDC	5
15	N/A	<MDC	<MDC	5
16	N/A	<MDC	<MDC	5
17	N/A	<MDC	<MDC	5
18	N/A	<MDC	<MDC	5
19	N/A	<MDC	<MDC	5
20	N/A	<MDC	<MDC	5
21	N/A	<MDC	<MDC	5
22	N/A	<MDC	<MDC	5
23	N/A	<MDC	<MDC	5
24	N/A	<MDC	<MDC	5
25	N/A	<MDC	<MDC	5
26	N/A	<MDC	<MDC	5
27	N/A	<MDC	<MDC	5
28	N/A	<MDC	<MDC	5
29	N/A	<MDC	<MDC	5
30	N/A	<MDC	<MDC	5
31	N/A	<MDC	<MDC	5
32	N/A	<MDC	<MDC	5
33	N/A	<MDC	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1 + t_s/t_b)}}{e_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGY SOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-2041

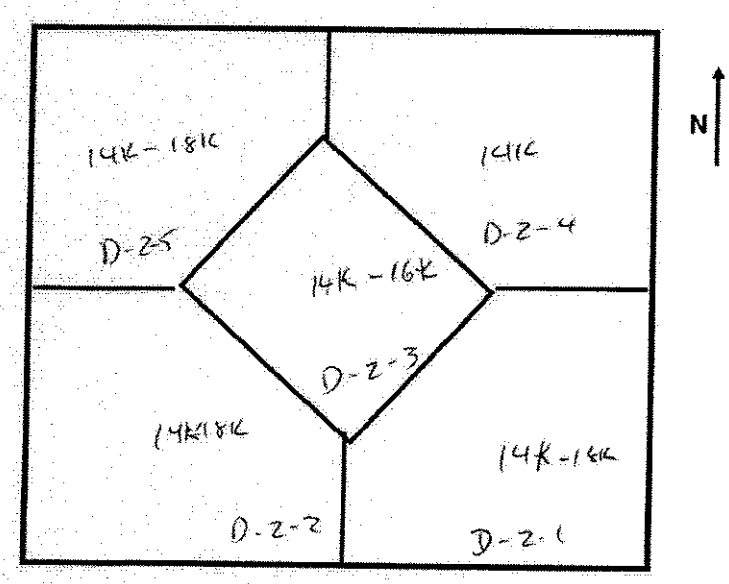
Surveyor: Glenn Parkhurst (Print) — Sign — Date: 8/5/2007

Reviewer: MIKE PRIES (Print) — Sign — Date: 8-5-07

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid D-2
PURPOSE: Final Survey



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 3.29\sqrt{RBC\,(1+t_s/t_b)}}{t_s(c)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + 1(\text{guideline})\,(\text{eff.})$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. 61107-2042

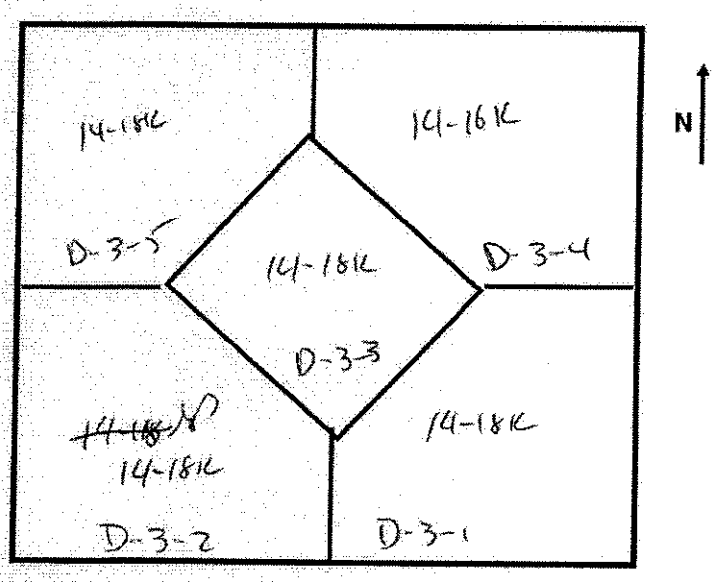
Surveyor: Glenn Parkhurst (Print) — Sign — 8/5/2007 (Date)

Reviewer: MIKE PRIES (Print) — Sign — 8-5-07 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid D-3
PURPOSE: Final Survey



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 3.29\sqrt{RB_s(1+t_s/t_b)}}{(c)(S)(Probe\ area/100cm^2)}$$

$$Al = Rb + (\text{guideline})(\text{eff.})$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-2043

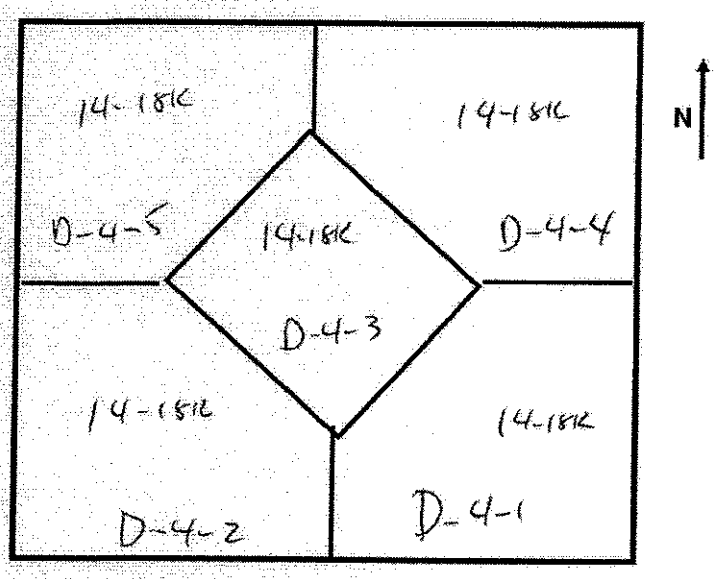
Surveyor: Glenn Parkhurst (Print) — Sign — 8/5/2007 (Date)

Reviewer: MIKE PRIES (Print) — Sign — 8-5-07 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	0517078	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid
PURPOSE: Final Survey D-4



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(t_s + t_b)}}{t_s\,(t_b)\,(t_s)\,(\text{probe area}\,100\text{cm}^2)}$$

$$Al = Rb + (\text{guideline}\,(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-2044

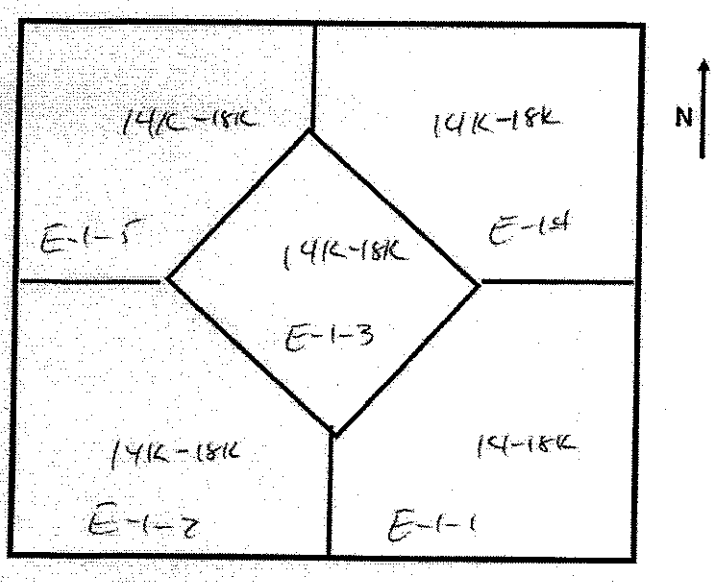
Surveyor: Glenn Parkhurst (Print) — Sign — Date 8/5/2007

Reviewer: MIKE PRIES (Print) — Sign — Date 8-5-07

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid E-1
PURPOSE: Final Survey



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 3.29\sqrt{RB_s(T+Ts)}}{3.29\sqrt{Ts}\,(probe\ area/100cm^2)}$$

$$Al = Rb + (guideline)(eff.)$$

$$dpm/100cm^2 = \frac{gross\ cpm - bkg\ cpm}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. U1107-2045

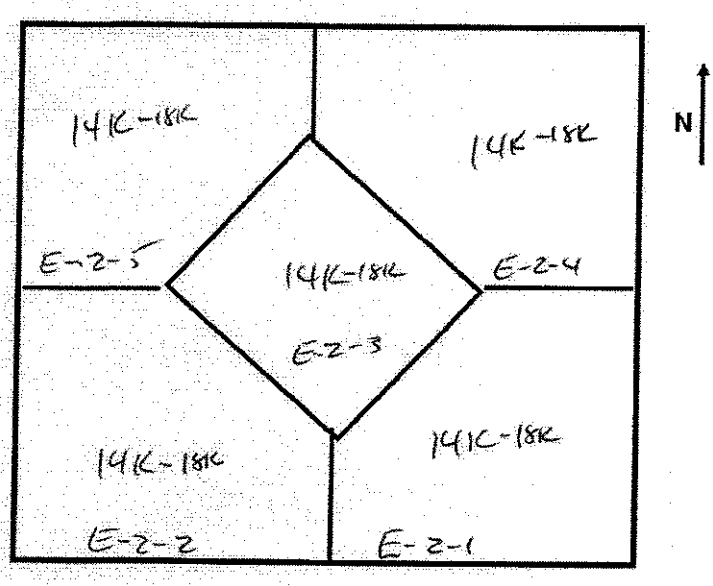
Surveyor: Glenn Parkhurst (Print) — Sign — 8/5/2007 (Date)

Reviewer: MIKE PRIES (Print) — Sign — 8-5-07 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid E-2
PURPOSE: Final Survey



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{1 + 3.29\sqrt{RB\,t\,(1+t/Ts)}}{t\,(\text{Ts})\,(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + (\text{guideline})\,(\text{eff.})$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-2046

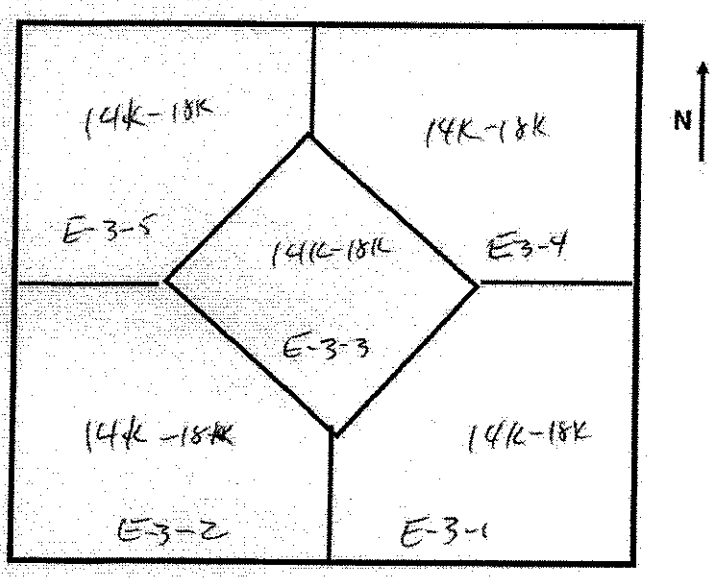
Surveyor: Glenn Parkhurst (Print) — Sign — 8/5/2007 (Date)

Reviewer: MIKE PRIES (Print) — Sign — 8-5-07 (Date)

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid E2
PURPOSE: Final Survey



Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 3.29\sqrt{RB_s(1 + t_s/t_b)}}{(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})\ \text{ief}_s))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. W107-2047

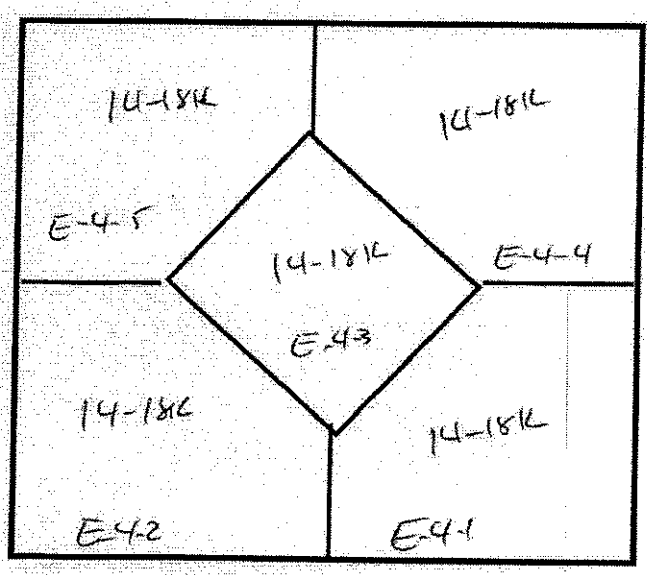
Surveyor: Glenn Parkhurst (Print) — Sign — Date: 8/5/2007

Reviewer: MIKE PRIES (Print) — Sign — Date: 8-5-07

Survey Meters

Direct Frisk		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler	Meter Model #	N/A	Meter Model #	N/A	Meter Model #	N/A
Meter Serial #	126170	Meter Serial #	N/A	Meter Serial #	N/A	Meter Serial #	N/A
Probe Serial #	051707B	Probe Serial #	N/A	Probe Serial #	N/A	Cal Due	N/A
Cal Due	5/21/2008	Cal Due	N/A	Cal Due	N/A	Type α, β γ	N/A
Efficiency (%)	100%	Efficiency (%)	N/A	Efficiency (%)	N/A	BKG (μR/hr)	N/A
Type α, β γ	Gamma	Type α, β γ	N/A	Type α, β γ	N/A	Guideline (μR/hr)	N/A
Sample Time (min)	1	Sample Time (min)	N/A	Sample Time (min)	N/A	Action Level (μR/hr)	N/A
Background Time (min)	10	Background Time (min)	N/A	Background Time (min)	N/A		
Background Reading (counts)	14,000	Background Reading (counts)	N/A	Background Reading (counts)	N/A		
BKG (cpm)	14,000	BKG (cpm)	N/A	BKG (cpm)	N/A		
MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A	MDC (dpm/100cm2)	N/A		
Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA	Guideline (dpm/100cm²)	NA		
Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA	Action Level (dpm/100cm²)	NA		

LOCATION: Grid E-4
PURPOSE: Final Survey



N

Location	dpm/100cm² Beta/G - Direct	dpm/100cm² Beta/G	dpm/100cm² Alpha	mR/hr Dose Rate

$$MDC = \frac{3 + 4.65\sqrt{RB(1+1/T)}}{(E)(G)(probe\ area/100cm^2)}$$

$$AL = Rb + (guideline)(eff.)$$

$$dpm/100cm^2 = \frac{gross\ cpm - bkg\ cpm}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample counting time
AL = action level

WI07 - 0403 D1 Sludge Box #127 #1 071807

Sample description
WI07-0403 D1 Sludge -Box # 127 Sample #1 071807

Spectrum Filename: C:\User\Win00194.An1

Acquisition information
Start time: 18-Jul-2007 16:26:46
Live time: 600
Real time: 620
Dead time: 3.23 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 3.3000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3000E+00) = 3.0303E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

WI07 - 0403 D1 Sludge Box #127 #1 071807

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: 0.1297

********** 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	
26.03	6.67	2041.	1565.	2.609	9.60	0.915	CU-64	D
31.08	7.93	2468.	3075.	5.124	5.82	0.916	ZN-65	D
43.68	11.08	2052.	1106.	1.843	13.05	0.919	PB-214	D
55.55	14.05	2672.	7415.	12.359	3.05	0.921	PU-239	D
69.96	17.67	3372.	27450.	45.751	1.46	1.315	MO-99	s
83.95	21.16	2202.	11636.	19.393	2.46	1.310	TC-99M	s
104.97	26.42	925.	10774.	17.957	2.25	1.045	AM-241	s
131.77	33.11	618.	686.	1.144	15.55	1.050	CS-137	
198.52	49.80	23434.	7628.	12.714	8.18	1.699	EU-155	s
395.36	98.92	46.	149.	0.248	20.92	0.990	PA-234	D
410.72	102.83	33.	219.	0.364	17.43	1.060	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	185.32	46.50	12724.	0.	0.000	0.00	0.948
AM-241	237.70	59.59	18536.	292881.	488.135	0.41	1.103
Th-234	251.70	63.09	86.	36.	0.059	88.94	1.000
Pb-214	298.61	74.81	109.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	42.	0.	0.000	430.12	0.316D
Pb-212	307.61	77.06	107.	272.	0.454	18.92	1.348s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	307.80	77.11	234.	0.	0.000	0.00	0.350D
Pb-214	347.45	87.02	18.	9.	0.014	175.07	0.214s
Th-234	368.79	92.35	20.	10.	0.017	138.72	0.985D
Ac-228	380.79	95.35	34.	2.	0.003	815.07	0.987D
Ac-228	838.44	209.73	2.	2.	0.002	328.86	0.271s

WI07 - 0403 D1 Sludge Box #127 #1 071807

Pb-212	954.08	238.62	10.	12.	0.020	96.91	1.099D
Pb-214	967.50	241.98	5.	8.	0.013	107.87	1.101D
Ac-228	1082.60	270.75	0.	5.	0.008	89.44	0.437s
Pb-214	1179.40	294.94	0.	5.	0.008	89.44	0.500s
Ac-228	1299.79	325.02	5.	5.	0.008	189.74	0.704s
Ac-228	1353.78	338.52	1.	2.	0.003	227.82	0.446s
Pb-214	1407.33	351.90	0.	8.	0.013	70.71	0.250s
Ac-228	1853.00	463.28	0.	1.	0.002	200.00	0.250s
Bi-214	2434.75	608.66	0.	5.	0.008	89.44	0.375s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3074.00	768.40	0.	1.	0.002	200.00	0.250s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3645.00	911.09	0.	2.	0.003	141.42	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	254.88	1.589D
Ac-228	3877.18	969.11	0.	2.	0.004	131.36	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	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	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	1.5438E-05	609.31	1.544E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G

0

ORTEC g v - i (63) wan32 G53W2.06 18-JUL-2007 16:37:12 Page 4
EnergySolutions Spectrum name: Win00194.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
K-40	N	0.0000E+00	1460.81	0.000E+00	%	6.114E-05	G
Ac-228	N	3.3439E-05	911.07	1.489E-05	?(	7.444E-06	G K
			969.11	3.052E-05	(	1.317E-05	G
			338.32	0.000E+00	%	2.292E-05	G
			964.60	0.000E+00	%	1.072E-04	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	0.000E+00	%	5.126E-05	G
			209.28	0.000E+00	%	4.617E-05	G
			270.23	1.014E-04	?(	2.028E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	1.019E-04	X
			327.64	1.327E-04	&(	9.822E-05	G
Pb-212	N	1.7460E-05	238.62	1.746E-05	(	7.536E-06	G K
			77.11	6.125E-04	+	6.306E-05	X

```
                    WI07 - 0403  D1 Sludge Box #127  #1 071807
                            74.81 0.000E+00 %   3.688E-05Energy duplication

CS-137        0.0000E+00    661.66 0.000E+00 ?   1.805E-06          G

Th-234    N   2.0641E-04     92.35 7.421E-05  (  4.971E-05          G
                             63.29 3.946E-04  (  1.510E-04          G

Pb-214    N   1.9687E-05    351.92 1.934E-05 ?(  2.417E-06          G K
                            295.21 2.036E-05 ?(  4.073E-06          G
                             77.11 0.000E+00 ?   8.536E-05Energy duplication
                            241.98 7.071E-05 +   5.039E-05          G
                             74.81 0.000E+00 %   1.003E-04Energy duplication
                             87.30 7.290E-05 +   6.616E-05          X

Pb-210    N   0.0000E+00     46.50 0.000E+00     1.762E-03          G

AM-241        3.4873E-01     59.54 3.487E-01  (  2.299E-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 #     4.6783E+00    4.184E+00     4.187E+00
 K-40    <    1.8528E+01
 Ac-228  C    1.0133E+01    7.221E+00     7.229E+00
 Pb-212       5.2910E+00    5.127E+00     5.131E+00
 CS-137  <    5.4703E-01
```

WI07 - 0403 D1 Sludge Box #127 #1 071807

Th-234	C	6.2550E+01	5.154E+01	5.156E+01
Pb-214		5.9657E+00	3.401E+00	3.407E+00
Pb-210	<	5.3393E+02		
AM-241		1.0567E+05	4.330E+02	3.931E+03

- 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) 1.0576348E+05 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fine
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0404 D1 Sludge Box #127 #2 071907

Sample description
WI07- 0404 D1 Sludge #2 from Box 127 071907

Spectrum Filename: C:\User\Win00197.An1

Acquisition information
Start time: 19-Jul-2007 08:39:27
Live time: 600
Real time: 638
Dead time: 5.89 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 2.9000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9000E+00) = 3.4483E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

WI07 - 0404 D1 Sludge Box #127 #2 071907

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	
26.12	6.70	3437.	2637.	4.394	7.40	0.915	CU-64	D
30.95	7.90	4312.	4785.	7.975	4.84	0.916	ZN-65	D
44.00	11.16	3880.	1788.	2.980	10.93	0.919	PB-214	D
55.38	14.01	4665.	12770.	21.283	2.33	0.921	PU-239	D
69.87	17.64	6350.	45586.	75.978	1.16	1.338	MO-99	s
83.91	21.15	4088.	19266.	32.111	1.94	1.368	TC-99M	s
104.99	26.42	1897.	18923.	31.539	1.73	1.162	AM-241	s
131.76	33.11	1584.	1378.	2.297	12.53	1.031	CS-137	s
198.54	49.80	47331.	14607.	24.345	6.06	1.670	EU-155	s
293.16	73.36	314.	229.	0.382	25.52	0.969	BI-207	D
322.07	80.59	106.	153.	0.256	24.90	0.975	J-131	D
395.20	98.94	111.	255.	0.425	17.14	0.990	PA-234	D
411.22	102.95	93.	349.	0.582	15.39	1.243	GD-153	sM
475.56	119.03	29.	222.	0.369	17.08	1.189	NP-239	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 08:50:11 Page 3
EnergySolutions Spectrum name: Win00197.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.34	46.50	25359.	0.	0.000	0.00	0.948
AM-241	237.84	59.62	40357.	570327.	950.544	0.31	1.161s
Th-234	254.18	63.71	195.	17.	0.028	237.34	0.399s
Pb-214	298.61	74.81	68.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	68.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	281.	412.	0.687	15.13	0.972D
Pb-214	307.80	77.11	442.	0.	0.000	362.57	0.722D
Pb-214	349.00	87.40	13.	1.	0.002	922.73	0.000s

WI07 - 0404 D1 Sludge Box #127 #2 071907

Th-234	368.79	92.35	59.	11.	0.018	211.66	0.985D
Ac-228	380.79	95.35	37.	0.	0.000	0.00	0.243D
Ac-228	835.62	209.02	1.	1.	0.001	339.93	0.375s
Pb-212	954.08	238.62	3.	15.	0.026	58.54	1.099D
Pb-214	967.50	241.98	5.	7.	0.012	113.28	1.102D
Ac-228	1079.00	269.85	0.	0.	0.001	223.61	0.100s
Pb-214	1176.33	294.17	0.	11.	0.018	60.30	0.250s
Ac-228	1310.00	327.58	1.	0.	0.000	0.00	0.000s
Ac-228	1348.87	337.29	1.	1.	0.001	388.73	0.227s
Pb-214	1400.00	350.07	0.	13.	0.022	55.47	0.250s
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	2647.00	661.70	0.	1.	0.002	200.00	0.250s
Bi-214	3073.00	768.16	0.	6.	0.010	81.65	0.250s
Ac-228	3178.33	794.48	1.	0.	0.001	240.37	0.197s
Ac-228	3645.00	911.09	0.	0.	0.001	223.61	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	3877.00	969.07	0.	0.	0.001	223.61	0.000s
Bi-214	4481.50	1120.12	0.	4.	0.007	100.00	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	5843.33	1460.40	1.	1.	0.001	339.93	0.197s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	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	0.0000E+00	609.31	0.000E+00	?	3.088E-06	G K
			1764.49	5.004E-05	?	6.408E-05	G
			1120.29	6.652E-05	?	5.608E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	2.096E-04	?	1.398E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	%	1.315E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	7.831E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.489E-05	G K
			969.11	0.000E+00	%	2.633E-05	G
			338.32	0.000E+00	&	1.957E-05	G
			964.60	0.000E+00	?	4.185E-05	G
			794.70	0.000E+00	%	7.897E-05	G
			463.00	0.000E+00	?	5.126E-05	G
			209.28	0.000E+00	%	3.507E-05	G
			270.23	0.000E+00	%	4.056E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	1.028E-04	X
			327.64	0.000E+00	?	5.307E-05	G

```
                    WI07 - 0404  D1 Sludge Box #127  #2 071907
Pb-212   N   2.3047E-05    238.62 2.305E-05  (  4.172E-06          G K
                            77.11 9.276E-04 +   8.487E-05Energy duplication
                            74.81 0.000E+00 ?   4.638E-05Energy duplication

CS-137       0.0000E+00    661.66 0.000E+00 %   3.610E-06          G

Th-234   N   0.0000E+00     92.35 0.000E+00 %   9.000E-05          G
                            63.29 0.000E+00 %   2.345E-04          G

Pb-214   N   3.9356E-05    351.92 3.142E-05 &(  2.417E-06          G K
                           295.21 4.480E-05 &(  4.073E-06          G
                            77.11 0.000E+00 %   1.166E-04Energy duplication
                           241.98 6.479E-05 $(  3.252E-05          G
                            74.81 0.000E+00 ?   7.991E-05Energy duplication
                            87.30 0.000E+00 %   4.891E-05          X

Pb-210   N   0.0000E+00     46.50 0.000E+00     2.485E-03          G
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 08:50:11 Page    5
 EnergySolutions                  Spectrum name: Win00197.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       6.7908E-01     59.54 6.791E-01  (  3.389E-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 B<     1.0647E+00
 K-40    <     2.7003E+01
```

WI07 - 0404 D1 Sludge Box #127 #2 071907

Ac-228	B<	5.1341E+00		
Pb-212		7.9474E+00	4.653E+00	4.661E+00
CS-137	<	1.2450E+00		
Th-234	<	3.1036E+01		
Pb-214		1.3571E+01	6.324E+00	6.341E+00
Pb-210	<	8.5696E+02		
AM-241		2.3416E+05	7.184E+02	8.686E+03

< - 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

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 08:50:11 Page 6
EnergySolutions Spectrum name: Win00197.An1

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

Total Activity (2.7 to 1999.2 keV) 2.3418548E+05 pCi/g

The library has energies which are not separable.

Analyzed by: K. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0405 D1 Sludge Box #127 #3 071907

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:26:17 Page 1
EnergySolutions Spectrum name: Win00198.An1

Sample description
WI07- 0405 D1 Sludge #3 from Box 127 071907

Spectrum Filename: C:\User\Win00198.An1

Acquisition information
Start time: 19-Jul-2007 09:09:29
Live time: 600
Real time: 653
Dead time: 8.17 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 4.4000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.4000E+00) = 2.2727E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:26:17 Page 2
EnergySolutions Spectrum name: Win00198.An1

WI07 - 0405 D1 Sludge Box #127 #3 071907

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	
26.07	6.69	5930.	4531.	7.551	5.65	0.915	CU-64	D
30.96	7.91	7529.	8064.	13.440	3.77	0.916	ZN-65	D
43.80	11.12	6574.	2595.	4.325	9.67	0.919	PB-214	D
55.37	14.01	9123.	24617.	41.028	1.68	0.921	PU-239	D
69.88	17.65	11719.	79333.	132.222	0.89	1.379	Y-91M	s
83.94	21.16	7485.	29335.	48.892	1.66	1.387	TC-99M	s
105.03	26.43	3224.	26682.	44.469	1.52	1.184	AM-241	s
131.50	33.05	2666.	1756.	2.926	12.47	1.194	XE-138	s
198.42	49.77	70156.	20630.	34.383	5.22	1.697	EU-155	s
293.28	73.38	668.	417.	0.695	20.08	0.969	BI-207	D
321.97	80.55	323.	258.	0.430	23.29	0.975	J-131	D
395.31	98.87	203.	343.	0.572	15.96	0.990	PA-234	D
411.27	102.97	217.	456.	0.759	15.31	1.087	GD-153	M
476.04	119.16	86.	320.	0.534	16.23	1.094	NP-239	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:26:17 Page 3
EnergySolutions Spectrum name: Win00198.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.34	46.50	36115.	0.	0.000	0.00	0.948
AM-241	237.87	59.63	55495.	750206.	1250.343	0.28	1.172s
Th-234	253.77	63.60	838.	20.	0.032	471.77	0.271s
Pb-214	298.61	74.81	1050.	98.	0.163	96.09	0.971D
Pb-212	298.63	74.81	151.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	649.	763.	1.271	11.91	0.972D
Pb-214	307.80	77.11	797.	0.	0.000	131.70	0.358D
Pb-214	350.00	87.65	24.	0.	0.000	0.00	0.125s

WI07 - 0405 D1 Sludge Box #127 #3 071907

Th-234	368.79	92.35	147.	5.	0.009	659.40	0.985D
Ac-228	380.79	95.35	102.	0.	0.000	0.00	0.286D
Ac-228	837.67	209.53	4.	0.	0.001	479.58	0.214s
Pb-212	954.08	238.62	10.	16.	0.026	75.97	1.099D
Pb-214	967.50	241.98	6.	6.	0.010	143.47	1.101D
Ac-228	1081.17	270.39	2.	2.	0.003	311.13	0.609s
Pb-214	1177.00	294.34	2.	0.	0.001	368.18	0.386s
Ac-228	1310.50	327.70	3.	1.	0.002	529.15	0.208s
Ac-228	1353.00	338.32	0.	10.	0.017	63.25	0.417s
Pb-214	1406.33	351.65	0.	10.	0.017	63.25	0.250s
Ac-228	1851.50	462.90	0.	2.	0.003	141.42	0.500s
Bi-214	2437.33	609.30	1.	0.	0.001	240.37	0.197s
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	3648.25	911.90	0.	6.	0.010	81.65	0.375s
Bi-214	3738.00	934.33	0.	2.	0.003	141.42	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	4954.50	1238.31	0.	2.	0.003	141.42	0.500s
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.	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.

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:26:17 Page 4
EnergySolutions Spectrum name: Win00198.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	0.0000E+00	609.31	0.000E+00	%	6.175E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	9.320E-05	?	1.194E-04	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	1.315E-04	?	1.685E-04	G
K-40	N	6.1142E-05	1460.81	6.114E-05	?(	3.057E-05	G
Ac-228	N	5.3654E-05	911.07	4.467E-05	&(	7.444E-06	G K
			969.11	0.000E+00	?	1.317E-05	G
			338.32	7.641E-05	?(	7.641E-06	G
			964.60	0.000E+00	?	4.185E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	5.126E-05	?(	2.563E-05	G
			209.28	0.000E+00	%	4.617E-05	G
			270.23	0.000E+00	%	6.840E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	1.672E-04	X
			327.64	0.000E+00	%	8.948E-05	G

Pb-212	N	2.3577E-05	238.62	2.358E-05	(	7.501E-06		G K
			77.11	1.715E-03	+	1.207E-04	Energy duplication	
			74.81	0.000E+00	?	6.814E-05	Energy duplication	
CS-137		0.0000E+00	661.66	0.000E+00	?	1.805E-06		G
Th-234	N	0.0000E+00	92.35	0.000E+00	%	1.308E-04		G
			63.29	0.000E+00	%	4.661E-04		G
Pb-214	N	2.9021E-05	351.92	2.417E-05	?(	2.417E-06		G K
			295.21	0.000E+00	&	1.043E-05		G
			77.11	0.000E+00	?	1.559E-04	Energy duplication	
			241.98	5.311E-05	(	3.603E-05		G
			74.81	6.407E-04	+	3.179E-04	Energy duplication	
			87.30	0.000E+00	?	6.263E-05		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		2.965E-03		G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
AM-241	8.9325E-01	59.54	8.933E-01	(	3.973E-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	B<	1.4035E+00		
K-40	#C	1.3896E+01	1.965E+01	1.966E+01

WI07 - 0405 D1 Sludge Box #127 #3 071907

Ac-228	#	1.2194E+01	7.118E+00	7.130E+00
Pb-212		5.3585E+00	4.071E+00	4.075E+00
CS-137	<	4.1027E-01		
Th-234	<	2.9737E+01		
Pb-214		6.5957E+00	4.171E+00	4.178E+00
Pb-210	<	6.7379E+02		
AM-241		2.0301E+05	5.740E+02	7.527E+03

- 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 19-JUL-2007 09:26:17 Page 6
EnergySolutions Spectrum name: Win00198.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 1999.2 keV) 2.0305025E+05 pCi/g

The library has energies which are not separable.

Analyzed by: D.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0406 D1 Sludge Box #127 #4 071907

Sample description
WI07- 0406 D1 sludge #4 from Box 127 071907

Spectrum Filename: C:\User\Win00199.An1

Acquisition information
Start time: 19-Jul-2007 09:36:12
Live time: 600
Real time: 648
Dead time: 7.36 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 3.3000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3000E+00) = 3.0303E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

WI07 - 0406 D1 Sludge Box #127 #4 071907

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: 0.1229

********** 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	
25.97	6.67	5278.	3547.	5.912	6.70	0.915	CU-64	D
30.97	7.92	6271.	6930.	11.549	4.03	0.916	ZN-65	D
43.58	11.07	5558.	2305.	3.841	10.05	0.919	PB-214	D
55.38	14.02	7304.	20000.	33.334	1.86	0.921	PU-239	D
69.94	17.66	9755.	67601.	112.668	0.96	1.364	MO-99	s
83.98	21.17	6134.	27004.	45.006	1.66	1.377	TC-99M	s
105.03	26.43	2849.	24772.	41.287	1.57	1.175	AM-241	s
132.11	33.20	2534.	1878.	3.130	12.27	1.107	CS-137	s
198.62	49.82	60764.	19283.	32.139	5.21	1.822	EU-155	s
293.19	73.32	556.	319.	0.532	23.71	0.969	BI-207	D
321.38	80.36	258.	192.	0.319	27.78	0.975	J-131	D
395.12	98.98	115.	345.	0.576	13.88	0.990	AC-228	D
411.44	103.01	108.	420.	0.701	14.03	1.154	GD-153	sM
475.76	119.09	50.	313.	0.522	15.03	0.963	NP-239	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:47:08 Page 3
EnergySolutions Spectrum name: Win00199.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.16	46.46	32540.	0.	0.000	0.00	0.948
AM-241	237.88	59.63	48530.	705193.	1175.322	0.27	1.158s
Th-234	251.81	63.11	568.	42.	0.071	180.04	0.612s
Pb-214	298.61	74.81	748.	90.	0.150	88.40	0.971D
Pb-212	298.63	74.81	170.	0.	0.000	1689.18	0.281D
Pb-212	307.80	77.11	485.	566.	0.943	13.85	0.973D
Pb-214	307.80	77.11	718.	0.	0.000	612.98	0.694D
Pb-214	349.06	87.42	33.	4.	0.006	439.01	0.555s

WI07 - 0406 D1 Sludge Box #127 #4 071907

Th-234	368.79	92.35	60.	10.	0.017	229.92	0.985D
Ac-228	380.79	95.35	46.	0.	0.000	0.00	0.226D
Ac-228	836.60	209.27	4.	2.	0.003	336.65	0.350s
Pb-212	954.08	238.62	3.	15.	0.025	60.97	1.099D
Pb-214	967.50	241.98	4.	9.	0.016	88.05	1.101D
Ac-228	1077.00	269.35	0.	4.	0.007	100.00	0.250s
Pb-214	1178.40	294.69	0.	10.	0.017	63.25	0.437s
Ac-228	1310.50	327.70	0.	5.	0.008	89.44	0.500s
Ac-228	1353.00	338.32	0.	0.	0.001	223.61	0.000s
Pb-214	1405.30	351.39	2.	6.	0.009	129.41	0.215s
Ac-228	1853.00	463.28	1.	1.	0.001	388.73	0.000s
Bi-214	2437.00	609.22	0.	8.	0.013	70.71	0.292s
CS-137	2648.00	661.95	0.	1.	0.002	200.00	0.250s
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
Ac-228	3643.00	910.59	0.	0.	0.000	0.00	0.000s
Bi-214	3737.50	934.21	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3875.00	968.57	0.	0.	0.001	223.61	0.100s
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	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.4701E-05	609.31	2.470E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	%	3.326E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	1.315E-04	+	1.685E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	6.114E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	7.444E-06	G K
			969.11	0.000E+00	%	2.633E-05	G
			338.32	0.000E+00	%	1.528E-05	G
			964.60	0.000E+00	?	4.185E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	0.000E+00	%	6.565E-05	G
			209.28	0.000E+00	%	5.477E-05	G
			270.23	8.113E-05	&	6.840E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	&	1.150E-04	X
			327.64	1.327E-04	?	9.822E-05	G

WI07 - 0406 D1 Sludge Box #127 #4 071907

```
Pb-212    N   2.2373E-05    238.62 2.237E-05  (  4.454E-06          G K
                             77.11 1.273E-03 +   1.043E-04Energy duplication
                             74.81 0.000E+00 %   7.218E-05Energy duplication

CS-137        0.0000E+00    661.66 0.000E+00 %   3.610E-06          G

Th-234    N   0.0000E+00     92.35 0.000E+00 %   9.000E-05          G
                             63.29 4.724E-04 ?   3.942E-04          G

Pb-214    N   7.9875E-05    351.92 1.370E-05 ?(  6.568E-06          G K
                            295.21 4.073E-05 ?(  4.073E-06          G
                             77.11 0.000E+00 %   1.481E-04Energy duplication
                            241.98 8.475E-05  (  3.003E-05          G
                             74.81 5.915E-04  (  2.572E-04Energy duplication
                             87.30 0.000E+00 %   7.668E-05          X

Pb-210    N   0.0000E+00     46.50 0.000E+00     2.814E-03          G
0
```

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 09:47:08 Page 5
EnergySolutions Spectrum name: Win00199.An1

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       8.3966E-01     59.54 8.397E-01  (  3.715E-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 #     7.4852E+00    5.293E+00     5.299E+00
 K-40    <    1.8528E+01
```

WI07 - 0406 D1 Sludge Box #127 #4 071907

Ac-228	B<	2.2559E+00		
Pb-212		6.7797E+00	4.134E+00	4.140E+00
CS-137	<	1.0941E+00		
Th-234	<	2.7274E+01		
Pb-214		2.4204E+01	1.153E+01	1.156E+01
Pb-210	<	8.5285E+02		
AM-241		2.5444E+05	6.965E+02	9.432E+03

- 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 19-JUL-2007 09:47:08 Page 6
EnergySolutions Spectrum name: Win00199.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 1999.2 keV) 2.5448034E+05 pCi/g

The library has energies which are not separable.

Analyzed by: KC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07 - 0407 D1 Sludge Box #127 #5 071907

```
     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 10:10:22 Page    1
EnergySolutions                  Spectrum name: Win00200.An1

Sample description
     WI07- 0407   D1  Sludge #5  from Box 127   071907


Spectrum Filename: C:\User\Win00200.An1

Acquisition information
       Start time:                 19-Jul-2007 09:59:00
       Live time:                600
       Real time:                674
       Dead time:                 10.93 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                3.7000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.7000E+00) =
                                   2.7027E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  19-JUL-2007 10:10:22 Page    2
EnergySolutions                  Spectrum name: Win00200.An1
```

WI07 - 0407 D1 Sludge Box #127 #5 071907

Th-234	368.79	92.35	41.	20.	0.033	102.38	0.985D
Ac-228	380.79	95.35	101.	0.	0.000	0.00	0.987D
Ac-228	835.00	208.87	0.	0.	0.001	223.61	0.100s
Pb-212	954.08	238.62	4.	8.	0.013	108.13	1.099D
Pb-214	967.50	241.98	4.	5.	0.009	135.28	1.101D
Ac-228	1081.33	270.43	1.	0.	0.001	240.37	0.197s
Pb-214	1179.19	294.89	1.	3.	0.004	180.28	0.323s
Ac-228	1308.50	327.20	0.	5.	0.008	89.44	0.375s
Ac-228	1353.75	338.51	2.	6.	0.009	110.60	0.449s
Pb-214	1407.00	351.82	2.	0.	0.000	0.00	0.000s
Ac-228	1862.00	465.53	0.	8.	0.013	70.71	0.250s
Bi-214	2436.50	609.10	0.	9.	0.015	66.67	0.375s
CS-137	2645.50	661.32	0.	7.	0.012	75.59	0.500s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3179.60	794.79	0.	5.	0.008	89.44	0.500s
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	3859.13	964.60	0.	4.	0.006	104.62	1.588D
Ac-228	3877.18	969.11	0.	4.	0.006	111.46	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	5843.75	1460.50	0.	5.	0.008	89.44	0.375s
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	2.7789E-05	609.31	2.779E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	1.5286E-04	1460.81	1.529E-04	?(	3.057E-05	G
Ac-228	N	6.4755E-05	911.07	1.489E-05	?(	7.444E-06	G K
			969.11	4.891E-05	(	1.851E-05	G
			338.32	4.203E-05	?(	1.760E-05	G
			964.60	1.529E-04	(	4.185E-05	G
			794.70	1.974E-04	?(	3.948E-05	G
			463.00	2.050E-04	&(	2.563E-05	G
			209.28	0.000E+00	%	2.738E-05	G
			270.23	0.000E+00	%	4.056E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	1.667E-04	X
			327.64	1.327E-04	?(	2.653E-05	G

WI07 - 0407 D1 Sludge Box #127 #5 071907

Pb-212	N	3.7421E-04	238.62	1.119E-05	(	5.268E-06		G K
			77.11	1.274E-03	$(	1.049E-04	Energy duplication	
			74.81	0.000E+00	?	7.945E-05	Energy duplication	
CS-137		1.2636E-05	661.66	1.264E-05	?(	1.805E-06		G
Th-234	N	1.4404E-04	92.35	1.440E-04	(	6.998E-05		G
			63.29	0.000E+00	%	4.832E-04		G
Pb-214	N	0.0000E+00	351.92	0.000E+00	?	6.192E-06		G K
			295.21	1.086E-05	?	1.374E-05		G
			77.11	0.000E+00	%	1.749E-04	Energy duplication	
			241.98	4.726E-05	$	4.276E-05		G
			74.81	5.513E-04	$	3.420E-04	Energy duplication	
			87.30	0.000E+00	?	5.047E-05		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		3.551E-03		G

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 10:10:22 Page 5
EnergySolutions Spectrum name: Win00200.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
AM-241	1.3455E+00	59.54	1.346E+00	(	4.585E-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	#	7.5105E+00	5.007E+00	5.014E+00
K-40	#	4.1312E+01	3.695E+01	3.698E+01

WI07 - 0407 D1 Sludge Box #127 #5 071907

Ac-228	C	1.7501E+01	6.920E+00	6.946E+00
Pb-212		1.0114E+02	1.854E+01	1.886E+01
CS-137	#	3.4152E+00	2.582E+00	2.584E+00
Th-234		3.8930E+01	3.986E+01	3.987E+01
Pb-214	B<	1.6734E+00		
Pb-210	<	9.5981E+02		
AM-241		3.6365E+05	7.504E+02	1.346E+04

- 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 19-JUL-2007 10:10:22 Page 6
EnergySolutions Spectrum name: Win00200.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 1999.2 keV) 3.6385909E+05 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Lewis
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0563 D1 Sludge Box #133 #1 072507

Sample description
WI07-0563 D1 Sludge Box#133 Sample #1 072507

Spectrum Filename: C:\User\Win00245.An1

Acquisition information
Start time: 25-Jul-2007 07:52:11
Live time: 600
Real time: 703
Dead time: 14.59 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 8.6000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 8.6000E+00) = 1.1628E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00
0

WI07 - 0563 D1 Sludge Box #133 #1 072507

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	
26.05	6.68	11357.	7740.	12.901	4.51	0.915	CU-64	D
31.08	7.93	12068.	16374.	27.290	2.46	0.916	ZN-65	D
43.85	11.13	11603.	6209.	10.348	5.52	0.919	PB-214	D
55.40	14.01	11803.	51583.	85.972	1.06	0.921	PU-239	D
69.85	17.64	18170.	155001.	258.335	0.61	1.178	MO-99	s
83.90	21.15	11206.	61196.	101.994	1.05	1.199	TC-99M	s
104.99	26.42	6346.	53148.	88.579	1.08	0.931	AM-241	
131.03	32.93	4260.	4658.	7.763	7.20	1.094	XE-138	s
198.56	49.81	129002.	43199.	71.999	3.39	1.710	EU-155	s
293.48	73.50	1764.	743.	1.238	17.60	0.970	BI-207	D
321.48	80.50	649.	420.	0.700	19.75	0.975	J-131	D
342.61	85.73	148.	116.	0.193	40.80	1.001	BI-207	s
395.35	98.93	166.	786.	1.310	8.51	0.990	PA-234	D
411.36	102.99	262.	900.	1.501	10.13	0.837	GD-153	
475.78	119.09	175.	1406.	2.343	6.29	1.048	NP-239	
490.99	122.92	30.	38.	0.063	51.96	1.009	EU-154	D
500.76	125.37	18.	185.	0.308	16.09	1.011	PA-234	D

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

0

********** 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	68749.	0.	0.000	0.00	0.948
AM-241	237.87	59.63	105762.	1509507.	2515.845	0.18	0.945
Th-234	252.78	63.36	2646.	216.	0.359	81.50	0.344s
Pb-214	298.61	74.81	2552.	59.	0.098	243.89	0.971D
Pb-212	298.63	74.81	415.	0.	0.000	360.41	0.500D
Pb-212	307.80	77.11	1614.	1403.	2.338	9.70	0.972D

Pb-214	307.80	77.11	1705.	0.	0.000	157.97	0.689D
Pb-214	349.45	87.52	206.	0.	0.000	0.00	0.981
Th-234	368.79	92.35	91.	26.	0.043	111.22	0.985D
Ac-228	380.79	95.35	129.	0.	0.000	0.00	0.987D
Ac-228	835.10	208.89	5.	1.	0.002	507.44	0.141s
Pb-212	954.08	238.62	4.	22.	0.037	49.94	1.099D
Pb-214	967.50	241.98	3.	4.	0.007	163.35	1.101D
Ac-228	1080.00	270.10	4.	2.	0.003	336.65	0.000s
Pb-214	1180.25	295.15	0.	13.	0.022	55.47	0.312s
Ac-228	1311.19	327.87	3.	7.	0.012	124.54	0.342s
Ac-228	1353.33	338.41	1.	2.	0.003	200.00	0.720s
Pb-214	1406.67	351.73	0.	9.	0.015	66.67	0.625s
Ac-228	1850.00	462.53	0.	0.	0.000	0.00	0.000s
Bi-214	2439.59	609.87	2.	6.	0.009	110.60	0.359s
CS-137	2646.83	661.66	1.	1.	0.001	339.93	0.339s
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	3647.20	911.64	0.	5.	0.008	89.44	0.375s
Bi-214	3737.50	934.21	0.	2.	0.003	141.42	0.500s
Ac-228	3860.00	964.82	0.	1.	0.002	200.00	0.250s
Ac-228	3877.53	969.20	0.	0.	0.000	0.00	1.591
Bi-214	4480.67	1119.91	1.	0.	0.000	260.34	0.210s
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	5845.50	1460.94	0.	4.	0.007	100.00	0.500s
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	2.4409E-05	609.31	1.698E-05	?(	7.110E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	%	3.326E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	1.315E-04	?(	6.576E-05	G
K-40	N	1.2228E-04	1460.81	1.223E-04	?(	3.057E-05	G
Ac-228	N	5.2603E-05	911.07	3.722E-05	?(	7.444E-06	G K
			969.11	0.000E+00		1.317E-05	G
			338.32	0.000E+00	%	2.292E-05	G
			964.60	0.000E+00	%	8.370E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	0.000E+00	?	2.563E-05	G
			209.28	0.000E+00	%	5.477E-05	G
			270.23	0.000E+00	%	8.113E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	1.876E-04	X

```
                    WI07 - 0563  D1 Sludge Box #133  #1  072507
                                327.64 1.857E-04 ?(  7.960E-05          G

Pb-212    N   3.3177E-05     238.62 3.318E-05  (  5.191E-06          G K
                             77.11 3.156E-03 +   1.758E-04Energy duplication
                             74.81 0.000E+00 %   1.117E-04Energy duplication

CS-137        0.0000E+00     661.66 0.000E+00 %   4.624E-06          G

Th-234    N   1.0995E-03      92.35 1.892E-04  (  1.021E-04          G
                              63.29 2.396E-03  (  8.142E-04          G

Pb-214    N   3.2779E-05     351.92 2.175E-05 ?(  2.417E-06          G K
                             295.21 5.295E-05 ?(  4.073E-06          G
                              77.11 0.000E+00 ?   2.271E-04Energy duplication
                             241.98 3.583E-05  (  2.805E-05          G
                              74.81 0.000E+00 %   4.777E-04Energy duplication
                              87.30 0.000E+00 %   1.750E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00     4.088E-03          G
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 08:04:01 Page    5
 EnergySolutions                    Spectrum name: Win00245.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        1.7973E+00     59.54 1.797E+00  (  5.482E-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
```

WI07 - 0563 D1 Sludge Box #133 #1 072507

Bi-214	#	2.8382E+00	2.548E+00	2.550E+00
K-40	#	1.4219E+01	1.422E+01	1.423E+01
Ac-228	#	6.1166E+00	4.689E+00	4.694E+00
Pb-212		3.8578E+00	1.927E+00	1.931E+00
CS-137	<	5.3768E-01		
Th-234		1.2785E+02	8.814E+01	8.819E+01
Pb-214		3.8115E+00	2.114E+00	2.118E+00
Pb-210	<	4.7539E+02		
AM-241		2.0899E+05	3.823E+02	7.736E+03

- 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 25-JUL-2007 08:04:01 Page 6
EnergySolutions Spectrum name: Win00245.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 1999.2 keV) 2.0915134E+05 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0564 D1 Sludge Box #133 #2 072507

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 08:20:52 Page    1
EnergySolutions                  Spectrum name: Win00246.An1

Sample description
     WI07-0564  D1  Sludge Box#133 Sample #2  072507


Spectrum Filename: C:\User\Win00246.An1

Acquisition information
       Start time:                 25-Jul-2007 08:10:06
       Live time:                600
       Real time:                638
       Dead time:                  5.88 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                  ( -6.935993E-02*Log(E)^2 )
            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:                3.5000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  3.5000E+00) =
                                   2.8571E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 08:20:52 Page    2
EnergySolutions                  Spectrum name: Win00246.An1
```

WI07 - 0564 D1 Sludge Box #133 #2 072507

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: 0.1120

********** 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	
26.21	6.71	4046.	2910.	4.850	7.21	0.915	CU-64	D
31.09	7.93	4487.	6056.	10.093	4.05	0.916	ZN-65	D
43.87	11.13	4150.	2243.	3.738	9.16	0.919	PB-214	D
55.43	14.02	4213.	17756.	29.594	1.82	0.921	PU-239	D
69.85	17.64	6474.	56610.	94.350	1.01	1.198	MO-99	s
83.89	21.15	3930.	22915.	38.192	1.70	1.222	TC-99M	s
104.99	26.42	2140.	20052.	33.420	1.71	0.979	AM-241	
131.59	33.07	1542.	1430.	2.383	12.19	0.960	CS-137	s
198.56	49.80	45450.	15206.	25.344	5.72	1.681	EU-155	s
267.34	67.00	512.	126.	0.210	71.05	0.551	CS-136	sM
293.79	73.48	290.	282.	0.470	20.82	0.970	BI-207	D
321.74	80.47	155.	169.	0.282	25.87	0.975	J-131	D
395.37	98.84	69.	292.	0.487	14.19	0.990	PA-234	D
410.99	102.90	48.	404.	0.673	12.09	1.070	GD-153	
475.96	119.13	28.	171.	0.285	19.02	1.038	NP-239	
500.34	125.23	20.	52.	0.087	42.48	0.534	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 08:20:52 Page 3
EnergySolutions Spectrum name: Win00246.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.44	46.53	24520.	0.	0.000	0.00	0.948
AM-241	237.89	59.64	34142.	553700.	922.834	0.30	0.966
Th-234	254.34	63.75	507.	43.	0.072	188.85	0.449s
Pb-214	298.61	74.81	576.	32.	0.053	216.69	0.971D
Pb-212	298.63	74.81	102.	0.	0.000	2615.34	0.239D
Pb-212	307.80	77.11	326.	472.	0.787	14.20	0.973D

WI07 - 0564 D1 Sludge Box #133 #2 072507

Pb-214	307.80	77.11	443.	0.	0.000	87.26	0.639D
Pb-214	348.67	87.32	17.	1.	0.001	1087.30	0.208s
Th-234	368.79	92.35	35.	18.	0.031	102.10	0.985D
Ac-228	380.79	95.35	49.	11.	0.019	183.61	0.987D
Ac-228	837.00	209.37	1.	0.	0.000	0.00	0.000s
Pb-212	954.08	238.62	5.	12.	0.021	74.91	1.099D
Pb-214	967.50	241.98	4.	5.	0.009	138.02	1.101D
Ac-228	1079.86	270.06	2.	2.	0.004	198.98	0.223s
Pb-214	1177.00	294.34	2.	0.	0.001	450.92	0.077s
Ac-228	1304.00	326.08	0.	3.	0.005	115.47	0.250s
Ac-228	1348.87	337.29	2.	6.	0.010	122.16	0.215s
Pb-214	1405.60	351.47	0.	11.	0.018	60.30	0.500s
Ac-228	1847.00	461.78	0.	6.	0.010	81.65	0.250s
Bi-214	2437.14	609.26	0.	8.	0.013	70.71	0.500s
CS-137	2645.00	661.20	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
Ac-228	3643.50	910.72	0.	2.	0.003	141.42	0.500s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	1.	0.002	287.28	1.589D
Ac-228	3877.18	969.11	3.	1.	0.002	417.10	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.	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4701E-05	609.31	2.470E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	6.114E-05	G
Ac-228	N	4.5953E-05	911.07	1.489E-05	?(	7.444E-06	G K
			969.11	0.000E+00	%	4.653E-05	G
			338.32	4.457E-05	&(	2.018E-05	G
			964.60	0.000E+00	%	1.123E-04	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	1.538E-04	&(	2.563E-05	G
			209.28	0.000E+00	?	2.738E-05	G
			270.23	4.732E-05	?(	4.853E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	1.286E-04	(	1.175E-04	X

```
                    WI07 - 0564  D1 Sludge Box #133  #2  072507
                                327.64 7.960E-05 &(  2.653E-05          G

Pb-212    N   1.8476E-05      238.62 1.848E-05  (  5.319E-06          G K
                                77.11 1.062E-03 +   9.099E-05Energy duplication
                                74.81 0.000E+00 %   5.636E-05Energy duplication

CS-137        0.0000E+00      661.66 0.000E+00 %   3.610E-06          G

Th-234    N   2.7578E-04       92.35 1.337E-04  (  6.447E-05          G
                                63.29 4.780E-04 ?(  3.596E-04          G

Pb-214    N   2.9922E-05      351.92 2.659E-05 ?(  2.417E-06          G K
                               295.21 0.000E+00 &   1.222E-05          G
                                77.11 0.000E+00 ?   1.167E-04Energy duplication
                               241.98 4.648E-05  (  2.963E-05          G
                                74.81 0.000E+00 %   2.322E-04Energy duplication
                                87.30 0.000E+00 %   5.485E-05          X

Pb-210    N   0.0000E+00       46.50 0.000E+00     2.444E-03          G
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 08:20:52 Page    5
 EnergySolutions                    Spectrum name: Win00246.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        6.5928E-01      59.54 6.593E-01  (  3.117E-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
```

WI07 - 0564 D1 Sludge Box #133 #2 072507

Bi-214	#	7.0575E+00	4.990E+00	4.996E+00
K-40	<	1.7469E+01		
Ac-228	C	1.3129E+01	7.836E+00	7.849E+00
Pb-212		5.2787E+00	3.954E+00	3.958E+00
CS-137	<	1.0315E+00		
Th-234		7.8794E+01	8.045E+01	8.047E+01
Pb-214		8.5492E+00	5.155E+00	5.164E+00
Pb-210	<	6.9823E+02		
AM-241		1.8837E+05	5.600E+02	6.986E+03

- 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 25-JUL-2007 08:20:52 Page 6
EnergySolutions Spectrum name: Win00246.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 1999.2 keV) 1.8847827E+05 pCi/g

The library has energies which are not separable.

Analyzed by: J.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0565 D1 Sludge Box #133 #3 072507

Sample description
WI07-0565 D1 Sludge Box#133 Sample #3 072507

Spectrum Filename: C:\User\Win00247.An1

Acquisition information
Start time: 25-Jul-2007 08:32:40
Live time: 600
Real time: 632
Dead time: 5.04 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 2.9000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9000E+00) = 3.4483E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

WI07 - 0565 D1 Sludge Box #133 #3 072507

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	
26.04	6.68	3150.	2292.	3.821	8.09	0.915	CU-64	D
31.10	7.94	3566.	4506.	7.510	4.79	0.916	ZN-65	D
43.82	11.12	3146.	1744.	2.907	10.28	0.919	PB-214	D
55.42	14.02	3217.	12053.	20.088	2.26	0.921	PU-239	D
69.86	17.64	5077.	42068.	70.113	1.18	1.190	MO-99	s
83.89	21.15	3278.	17856.	29.760	1.95	1.209	TC-99M	s
105.00	26.42	1667.	16868.	28.114	1.84	0.981	AM-241	
132.04	33.18	1115.	1119.	1.866	12.89	0.829	CS-137	s
173.14	43.46	6905.	396.	0.659	60.25	0.945	EU-155	D
198.48	49.80	30405.	8108.	13.513	6.48	0.950	EU-155	D
268.16	67.20	419.	85.	0.141	97.17	0.578	TA-182	sM
293.01	73.32	205.	188.	0.314	25.95	0.969	BI-207	D
322.04	80.57	107.	131.	0.219	28.30	0.975	J-131	D
395.30	98.86	58.	262.	0.436	14.85	0.990	PA-234	D
411.46	103.01	60.	293.	0.488	16.05	0.801	GD-153	M
476.11	119.17	21.	146.	0.243	20.54	1.057	NP-239	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 08:43:20 Page 3
EnergySolutions Spectrum name: Win00247.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.33	46.50	15078.	0.	0.000	0.00	0.948D
AM-241	237.87	59.63	31345.	474801.	791.335	0.33	0.968
Th-234	253.67	63.58	244.	51.	0.085	106.48	0.595s
Pb-214	298.61	74.81	55.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	55.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	220.	381.	0.636	15.02	0.972D

WI07 - 0565 D1 Sludge Box #133 #3 072507

Pb-214	307.80	77.11	368.	0.	0.000	157.60	0.361D
Pb-214	344.00	86.15	34.	30.	0.050	84.42	0.417s
Th-234	368.79	92.35	51.	6.	0.010	342.45	0.985D
Ac-228	380.79	95.35	8.	0.	0.000	0.00	0.000D
Ac-228	836.50	209.24	1.	5.	0.008	119.52	0.465s
Pb-212	953.22	238.41	0.	23.	0.038	41.70	0.417s
Pb-214	967.50	241.98	0.	0.	0.000	0.00	0.500D
Ac-228	1079.32	269.93	2.	5.	0.009	124.60	0.217s
Pb-214	1179.50	294.96	2.	0.	0.000	0.00	0.292s
Ac-228	1309.20	327.38	0.	8.	0.013	70.71	0.375s
Ac-228	1352.51	338.20	1.	3.	0.005	163.44	0.325s
Pb-214	1408.00	352.07	2.	0.	0.001	412.31	0.000s
Ac-228	1851.00	462.78	0.	5.	0.008	89.44	0.250s
Bi-214	2438.00	609.47	0.	6.	0.010	81.65	1.250
CS-137	2640.00	659.95	0.	5.	0.008	89.44	0.250s
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	3640.00	909.84	0.	5.	0.008	89.44	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	0.250D
Ac-228	3875.00	968.57	0.	2.	0.003	141.42	0.250s
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	5838.00	1459.07	0.	5.	0.008	89.44	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	Peak Activity microCi	Peak Code	MDA Value microCi	Comments
Bi-214	N	1.8526E-05	609.31	1.853E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	1.5286E-04	1460.81	1.529E-04	&(	3.057E-05	G
Ac-228	N	5.0723E-05	911.07	3.722E-05	&(	7.444E-06	G K
			969.11	2.633E-05	?(	1.317E-05	G
			338.32	2.165E-05	?(	1.610E-05	G
			964.60	0.000E+00	?	4.185E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	1.282E-04	?(	2.563E-05	G
			209.28	6.389E-05	?(	3.023E-05	G
			270.23	1.048E-04	?(	5.028E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	?	5.130E-05	X

```
                    WI07 - 0565  D1 Sludge Box #133  #3  072507
                              327.64 2.123E-04 ?(  2.653E-05          G

Pb-212    N   3.4251E-05     238.62 3.425E-05  (  1.489E-06          G K
                             77.11 8.580E-04 +   7.911E-05Energy duplication
                             74.81 0.000E+00 ?   4.191E-05Energy duplication

CS-137        9.0260E-06     661.66 9.026E-06 &(  1.805E-06          G

Th-234    N   0.0000E+00      92.35 0.000E+00 %   8.159E-05          G
                             63.29 5.688E-04 ?   2.756E-04          G

Pb-214    N   0.0000E+00     351.92 0.000E+00 %   7.251E-06          G K
                             295.21 0.000E+00 ?   1.043E-05          G
                             77.11 0.000E+00 ?   1.066E-04Energy duplication
                             241.98 0.000E+00 ?   8.961E-06          G
                             74.81 0.000E+00 ?   7.221E-05Energy duplication
                             87.30 2.523E-04 &   9.946E-05          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   1.918E-03          G
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 08:43:20 Page    5
 EnergySolutions                    Spectrum name: Win00247.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        5.6533E-01     59.54 5.653E-01  (  2.987E-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
```

WI07 - 0565 D1 Sludge Box #133 #3 072507

Bi-214	#	6.3882E+00	5.216E+00	5.221E+00
K-40	#	5.2709E+01	4.714E+01	4.718E+01
Ac-228	#	1.7491E+01	7.803E+00	7.826E+00
Pb-212		1.1811E+01	4.925E+00	4.942E+00
CS-137	#	3.1124E+00	2.784E+00	2.786E+00
Th-234	<	2.8135E+01		
Pb-214	B<	2.5005E+00		
Pb-210	<	6.6123E+02		
AM-241		1.9494E+05	6.499E+02	7.236E+03

- 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 25-JUL-2007 08:43:20 Page 6
EnergySolutions Spectrum name: Win00247.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 1999.2 keV) 1.9503461E+05 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07 - 0566 D1 Sludge Box #133 #4 072507

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 09:12:13 Page 1
EnergySolutions Spectrum name: Win00248.An1

Sample description
WI07-0566 D1 Sludge Box#133 Sample #4 072507

Spectrum Filename: C:\User\Win00248.An1

Acquisition information
Start time: 25-Jul-2007 09:01:37
Live time: 600
Real time: 628
Dead time: 4.49 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 2.7000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7000E+00) = 3.7037E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 09:12:13 Page 2
EnergySolutions Spectrum name: Win00248.An1

WI07 - 0566 D1 Sludge Box #133 #4 072507

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: 0.2367

********** 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	
26.17	6.71	3152.	2455.	4.091	7.63	0.915	CU-64	D
31.10	7.94	3594.	4640.	7.733	4.69	0.916	ZN-65	D
43.85	11.13	3224.	1765.	2.941	10.27	0.919	PB-214	D
55.42	14.02	3237.	14703.	24.505	1.98	0.921	PU-239	D
69.84	17.63	4904.	43872.	73.119	1.14	1.173	MO-99	s
83.85	21.14	3186.	17017.	28.362	2.03	1.217	TC-99M	s
104.98	26.42	1586.	14822.	24.702	2.00	0.964	AM-241	
131.41	33.02	1086.	1082.	1.803	13.62	1.011	CS-137	s
198.65	49.83	32920.	10824.	18.041	6.84	1.632	EU-155	s
293.48	73.45	213.	175.	0.292	28.03	0.970	BI-207	D
395.95	99.14	48.	221.	0.368	18.24	1.072	AC-228	M
411.54	103.03	28.	265.	0.441	14.21	1.086	GD-153	
475.30	118.97	14.	95.	0.158	25.76	0.828	NP-239	
501.02	125.40	8.	55.	0.092	33.39	0.857	PA-234	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 09:12:13 Page 3
EnergySolutions Spectrum name: Win00248.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.34	46.50	17795.	0.	0.000	0.00	0.948
AM-241	237.85	59.63	26055.	409617.	682.695	0.37	0.972
Th-234	254.88	63.88	306.	75.	0.126	87.82	0.546s
Pb-214	298.61	74.81	372.	29.	0.049	189.77	0.971D
Pb-212	298.63	74.81	60.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	229.	330.	0.550	17.00	0.972D
Pb-214	307.80	77.11	428.	0.	0.000	235.76	0.710D
Pb-214	350.67	87.82	15.	6.	0.010	200.00	0.278s

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Th-234	368.79	92.35	28.	12.	0.020	134.29	0.985D
Ac-228	380.79	95.35	26.	0.	0.001	4581.26	0.987D
Ac-228	835.43	208.97	2.	3.	0.005	176.38	0.278s
Pb-212	954.08	238.62	6.	17.	0.029	61.32	1.099D
Pb-214	967.50	241.98	6.	3.	0.005	243.50	1.101D
Ac-228	1079.14	269.88	1.	1.	0.002	281.40	0.440s
Pb-214	1183.00	295.84	0.	10.	0.017	63.25	0.250s
Ac-228	1309.00	327.33	0.	0.	0.000	0.00	0.000s
Ac-228	1350.50	337.70	0.	8.	0.013	70.71	0.375s
Pb-214	1405.20	351.37	0.	11.	0.018	60.30	0.292s
Ac-228	1852.00	463.03	0.	1.	0.002	200.00	0.250s
Bi-214	2433.50	608.35	0.	7.	0.012	75.59	0.500s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3075.00	768.65	0.	1.	0.002	200.00	0.250s
Ac-228	3173.50	793.27	0.	4.	0.007	100.00	0.500s
Ac-228	3643.50	910.72	0.	3.	0.005	115.47	0.500s
Bi-214	3735.33	933.67	1.	0.	0.001	240.37	0.197s
Ac-228	3858.00	964.32	0.	2.	0.003	141.42	0.250s
Ac-228	3877.41	969.17	0.	0.	0.000	0.00	1.591
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4951.78	1237.63	1.	1.	0.002	346.41	0.217s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5841.83	1460.03	1.	1.	0.001	366.67	0.223s
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.

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 09:12:13 Page 4
EnergySolutions Spectrum name: Win00248.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	2.1614E-05	609.31	2.161E-05	&(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	0.000E+00	%	1.194E-04	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	%	1.315E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	7.831E-05	G
Ac-228	N	4.9868E-05	911.07	2.233E-05	?(	7.444E-06	G K
			969.11	0.000E+00		1.317E-05	G
			338.32	6.113E-05	&(	7.641E-06	G
			964.60	8.370E-05	?(	4.185E-05	G
			794.70	1.579E-04	&(	3.948E-05	G
			463.00	0.000E+00	%	5.126E-05	G
			209.28	4.107E-05	?(	3.507E-05	G
			270.23	0.000E+00	%	5.195E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	8.751E-05	X
			327.64	0.000E+00	?	2.653E-05	G

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Pb-212	N	2.5962E-05	238.62	2.596E-05	(	5.769E-06		G K
			77.11	7.425E-04	+	7.634E-05	Energy duplication	
			74.81	0.000E+00	?	4.368E-05	Energy duplication	
CS-137		0.0000E+00	661.66	0.000E+00	?	1.805E-06		G
Th-234	N	3.9802E-04	92.35	8.938E-05	(	5.809E-05		G
			63.29	8.374E-04	&(	2.805E-04		G
Pb-214	N	3.1402E-05	351.92	2.659E-05	?(	2.417E-06		G K
			295.21	4.073E-05	&(	4.073E-06		G
			77.11	0.000E+00	%	1.147E-04	Energy duplication	
			241.98	0.000E+00	%	4.276E-05		G
			74.81	1.923E-04	+	1.892E-04	Energy duplication	
			87.30	0.000E+00	&	5.888E-05		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		2.083E-03		G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 09:12:13 Page 5
EnergySolutions Spectrum name: Win00248.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	4.8772E-01	59.54	4.877E-01	(	2.724E-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	#	8.0050E+00	6.051E+00	6.057E+00
K-40	<	2.9004E+01		

WI07 - 0566 D1 Sludge Box #133 #4 072507

Ac-228	#	1.8470E+01	1.041E+01	1.043E+01
Pb-212		9.6155E+00	5.896E+00	5.905E+00
CS-137	<	6.6859E-01		
Th-234	C	1.4742E+02	1.183E+02	1.183E+02
Pb-214		1.1630E+01	5.082E+00	5.097E+00
Pb-210	<	7.7136E+02		
AM-241		1.8064E+05	6.749E+02	6.712E+03

- 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 25-JUL-2007 09:12:13 Page 6
EnergySolutions Spectrum name: Win00248.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 1999.2 keV) 1.8083286E+05 pCi/g

The library has energies which are not separable.

Analyzed by: H. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07 - 0567 D1 Sludge Box #133 #5 072507

Sample description
WI07-0567 D1 Sludge Box #133 Sample #5 072507

Spectrum Filename: C:\User\Win00249.An1

Acquisition information
Start time: 25-Jul-2007 09:18:30
Live time: 600
Real time: 638
Dead time: 5.95 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 3.4000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4000E+00) = 2.9412E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

WI07 - 0407 D1 Sludge Box #127 #5 071907

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: 0.0972

********** 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	
26.07	6.68	7326.	4861.	8.102	5.75	0.915	CU-64	D
30.99	7.91	8176.	10420.	17.367	3.14	0.916	ZN-65	D
43.94	11.15	7639.	3912.	6.519	7.08	0.919	PB-214	D
55.48	14.03	8536.	24964.	41.606	1.64	0.921	PU-239	D
69.94	17.66	12928.	95812.	159.686	0.80	1.274	MO-99	s
83.98	21.17	9240.	40716.	67.860	1.37	1.312	TC-99M	s
105.05	26.44	4034.	39901.	66.501	1.19	1.097	AM-241	s
131.82	33.13	3249.	3101.	5.168	8.18	1.149	XE-138	s
198.58	49.81	95920.	29632.	49.387	4.25	1.697	EU-155	s
293.20	73.39	889.	413.	0.689	22.64	0.969	BI-207	D
307.74	77.03	1376.	254.	0.423	43.20	0.972	PB-214	D
395.29	98.90	166.	563.	0.939	10.62	0.990	PA-234	D
411.29	102.97	226.	653.	1.088	12.23	1.171	GD-153	
475.90	119.12	121.	774.	1.291	8.61	1.045	NP-239	
500.85	125.36	22.	136.	0.227	20.90	1.182	PA-234	

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

ORTEC g v - i (63) wan32 G53W2.06 19-JUL-2007 10:10:22 Page 3
EnergySolutions Spectrum name: Win00200.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.45	46.53	51853.	0.	0.000	0.00	0.948
AM-241	237.88	59.63	73937.	1130030.	1883.384	0.21	1.073
Th-234	254.02	63.67	887.	36.	0.061	252.57	0.249s
Pb-214	298.61	74.81	1247.	84.	0.140	120.93	0.971D
Pb-212	298.63	74.81	207.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	1064.	566.	0.944	18.33	0.972D
Pb-214	307.80	77.11	1006.	0.	0.000	745.14	0.492D
Pb-214	350.00	87.65	15.	0.	0.000	0.00	0.125s

WI07 - 0567 D1 Sludge Box #133 #5 072507

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	
26.04	6.68	5720.	3863.	6.439	6.40	0.915	CU-64	D
31.06	7.94	5862.	8147.	13.579	3.46	0.916	ZN-65	D
43.18	10.97	5740.	2277.	3.795	10.30	0.919	PB-214	D
46.93	11.90	7340.	1473.	2.456	17.25	0.920	PB-210	D
55.38	14.02	5803.	29193.	48.656	1.38	0.921	PU-239	D
69.83	17.63	8834.	80865.	134.774	0.84	1.201	MO-99	s
83.88	21.15	5273.	29043.	48.405	1.53	1.210	TC-99M	s
104.99	26.42	2548.	23023.	38.372	1.61	0.958	AM-241	
125.74	31.69	1417.	302.	0.503	37.12	0.936	XE-138	D
132.56	33.39	1479.	1191.	1.985	10.82	0.937	CS-137	D
198.65	49.79	41968.	17532.	29.220	5.00	1.711	EU-155	s
293.29	73.43	350.	460.	0.767	14.81	0.969	BI-207	D
321.80	80.55	157.	254.	0.423	18.81	0.975	J-131	D
395.28	98.94	43.	301.	0.502	13.06	0.990	PA-234	D
411.26	102.96	51.	368.	0.614	13.07	0.876	GD-153	M
475.77	119.09	31.	173.	0.288	19.78	1.245	NP-239	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

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********** 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	46.49	21093.	0.	0.000	0.00	0.948
AM-241	237.89	59.64	29801.	539857.	899.761	0.29	0.966
Th-234	252.91	63.39	477.	60.	0.101	120.96	0.330s
Pb-214	298.61	74.81	760.	90.	0.150	89.14	0.971D
Pb-212	298.63	74.81	142.	0.	0.000	1032.08	0.187D
Pb-212	307.80	77.11	398.	718.	1.197	10.83	0.972D

Pb-214	307.80	77.11	750.	0.	0.000	579.66	0.000D
Pb-214	351.33	87.99	24.	8.	0.013	206.16	0.487s
Th-234	368.79	92.35	46.	12.	0.020	167.72	0.985D
Ac-228	380.79	95.35	15.	0.	0.000	0.00	0.309D
Ac-228	837.50	209.49	1.	1.	0.001	339.93	0.417s
Pb-212	954.08	238.62	10.	2.	0.003	447.35	1.099D
Pb-214	967.50	241.98	13.	4.	0.007	251.88	1.101D
Ac-228	1082.01	270.60	2.	6.	0.010	115.47	0.341s
Pb-214	1179.38	294.93	0.	9.	0.015	66.67	0.375s
Ac-228	1308.33	327.16	0.	5.	0.008	89.44	0.375s
Ac-228	1351.00	337.82	0.	0.	0.000	0.00	0.000s
Pb-214	1407.62	351.97	0.	13.	0.022	55.47	0.375s
Ac-228	1851.67	462.94	1.	1.	0.001	339.93	0.197s
Bi-214	2437.75	609.41	0.	4.	0.007	100.00	0.375s
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	3178.33	794.48	0.	3.	0.005	115.47	0.250s
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.	0.001	223.61	0.100s
Bi-214	4480.00	1119.74	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	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.7493E-05	609.31	1.235E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	3.326E-05	?(	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	6.114E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	7.444E-06	G K
			969.11	0.000E+00	%	2.633E-05	G
			338.32	0.000E+00	?	7.641E-06	G
			964.60	0.000E+00	%	4.185E-05	G
			794.70	1.185E-04	?	1.185E-04	G
			463.00	0.000E+00	%	6.565E-05	G
			209.28	0.000E+00	%	3.507E-05	G
			270.23	1.217E-04	?	9.190E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	6.828E-05	X

```
                                327.64 1.327E-04 ?   9.822E-05          G

Pb-212    N   0.0000E+00        238.62 0.000E+00 %   8.080E-06          G K
                                 77.11 1.615E-03     1.074E-04Energy duplication
                                 74.81 0.000E+00 %   6.614E-05Energy duplication

CS-137        0.0000E+00        661.66 0.000E+00 %   3.610E-06          G

Th-234    N   3.2877E-04         92.35 8.861E-05  (  7.357E-05          G
                                 63.29 6.707E-04 ?(  3.488E-04          G

Pb-214    N   3.3204E-05        351.92 3.142E-05 ?(  2.417E-06          G K
                                295.21 3.666E-05 ?(  4.073E-06          G
                                 77.11 0.000E+00 %   1.513E-04Energy duplication
                                241.98 0.000E+00 %   5.693E-05          G
                                 74.81 5.910E-04 +   2.740E-04Energy duplication
                                 87.30 0.000E+00 &   7.163E-05          X

Pb-210    N   0.0000E+00         46.50 0.000E+00     2.267E-03          G
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        6.4280E-01     59.54 6.428E-01  (  2.913E-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
```

WI07 - 0567 D1 Sludge Box #133 #5 072507

Bi-214	#	5.1449E+00	4.456E+00	4.459E+00
K-40	<	1.7983E+01		
Ac-228	B<	2.1896E+00		
Pb-212	B<	2.3764E+00		
CS-137	<	1.0619E+00		
Th-234	C	9.6698E+01	9.998E+01	1.000E+02
Pb-214		9.7660E+00	4.235E+00	4.248E+00
Pb-210	<	6.6676E+02		
AM-241		1.8906E+05	5.569E+02	7.011E+03

- 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 25-JUL-2007 09:29:16 Page 6
EnergySolutions Spectrum name: Win00249.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 1999.2 keV) 1.8916919E+05 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07 - 0617 D1 Sludge Box #130 #1 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:28:40 Page 1
4714781 Spectrum name: Win00269.An1

Sample description
WI07-0617 D1 Box #130 - #1 072707

Spectrum Filename: C:\User\Win00269.An1

Acquisition information
Start time: 27-Jul-2007 08:17:26
Live time: 600
Real time: 667
Dead time: 10.00 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 4.8000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.8000E+00) = 2.0833E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:28:40 Page 2
4714781 Spectrum name: Win00269.An1

WI07 - 0617 D1 Sludge Box #130 #1 072707

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: 0.1127

********** 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	
26.08	6.69	6486.	4822.	8.036	5.53	0.915	CU-64	D
31.11	7.94	7256.	9610.	16.016	3.23	0.916	ZN-65	D
43.68	11.08	6674.	4056.	6.760	6.50	0.919	PB-214	D
55.41	14.01	6450.	26559.	44.265	1.50	0.921	PU-239	D
69.83	17.63	10472.	90835.	151.392	0.80	1.188	MO-99	s
83.87	21.14	7001.	38002.	63.336	1.34	1.221	TC-99M	s
104.96	26.41	4221.	34205.	57.008	1.35	0.963	AM-241	
131.41	33.02	3285.	2749.	4.582	9.17	0.923	CS-137	s
167.17	41.96	13429.	906.	1.510	36.77	0.944	CE-144	D
172.87	43.39	18252.	2269.	3.782	17.36	0.945	EU-155	D
197.59	49.56	77980.	28273.	47.122	3.04	0.950	EU-155	D
293.86	73.56	791.	373.	0.622	23.71	0.970	BI-207	D
321.90	80.56	312.	309.	0.515	19.79	0.975	J-131	D
395.20	98.96	118.	539.	0.898	10.33	0.990	AC-228	D
411.49	103.02	117.	651.	1.085	9.82	1.099	GD-153	
459.62	115.05	83.	47.	0.078	70.28	0.707	PA-234	s
475.83	119.10	100.	585.	0.975	10.91	1.089	NP-239	
501.26	125.46	36.	98.	0.163	31.75	0.805	PA-234	

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:28:40 Page 3
4714781 Spectrum name: Win00269.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.33	46.50	36467.	0.	0.000	0.00	0.948D
AM-241	237.86	59.63	70533.	980050.	1633.416	0.23	0.953
Th-234	252.48	63.28	1084.	56.	0.093	201.46	0.765
Pb-214	298.61	74.81	1125.	117.	0.195	83.02	0.971D
Pb-212	298.63	74.81	278.	0.	0.000	865.64	0.127D

Pb-212	307.80	77.11	687.	848.	1.414	11.11	0.972D
Pb-214	307.80	77.11	861.	0.	0.000	104.48	0.551D
Pb-214	349.57	87.55	37.	14.	0.023	142.30	0.395s
Th-234	368.79	92.35	71.	22.	0.037	116.13	0.985D
Ac-228	380.79	95.35	84.	9.	0.015	300.66	0.987D
Ac-228	836.67	209.28	2.	1.	0.002	416.33	0.225s
Pb-212	954.08	238.62	10.	52.	0.086	32.78	1.099D
Pb-214	967.50	241.98	5.	17.	0.029	60.67	1.101D
Ac-228	1081.17	270.39	3.	12.	0.021	76.25	0.641s
Pb-214	1179.00	294.84	3.	0.	0.000	0.00	0.000s
Ac-228	1311.57	327.97	2.	2.	0.004	198.98	0.292s
Ac-228	1354.00	338.57	3.	0.	0.001	437.16	0.000s
Pb-214	1405.72	351.50	0.	37.	0.062	32.88	0.406s
Ac-228	1852.33	463.11	1.	0.	0.001	240.37	0.197s
Bi-214	2438.19	609.52	0.	28.	0.047	37.80	1.093
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	3646.30	911.42	0.	10.	0.017	63.25	0.562s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.61	964.72	0.	0.	0.000	0.00	1.589
Ac-228	3877.80	969.27	0.	5.	0.008	89.44	0.625s
Bi-214	4480.00	1119.74	0.	5.	0.008	89.44	0.250s
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	5846.77	1461.26	0.	13.	0.022	55.47	0.562s
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	8.5641E-05	609.31	8.645E-05	(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	8.315E-05	?(	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.497E-04	+	1.917E-04	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	3.9742E-04	1460.81	3.974E-04	?(	3.057E-05	G
Ac-228	N	7.0592E-05	911.07	7.444E-05	?(	7.444E-06	G K
			969.11	6.584E-05	?(	1.317E-05	G
			338.32	0.000E+00	%	2.292E-05	G
			964.60	0.000E+00		4.185E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	0.000E+00	%	5.126E-05	G
			209.28	0.000E+00	%	4.107E-05	G
			270.23	2.501E-04	+	1.217E-04	G
			1588.00	0.000E+00	?	1.014E-04	G

```
                    WI07 - 0617  D1 Sludge Box #130  #1  072707
                              95.35 0.000E+00 %   1.602E-04         X
                             327.64 6.191E-05 ?(  6.349E-05         G

Pb-212   N   7.7195E-05     238.62 7.719E-05  (  7.500E-06         G K
                              77.11 1.908E-03 +   1.258E-04Energy duplication
                              74.81 0.000E+00 %   9.176E-05Energy duplication

CS-137       0.0000E+00     661.66 0.000E+00 ?   1.805E-06         G

Th-234   N   1.6081E-04      92.35 1.608E-04  (  9.059E-05         G
                              63.29 0.000E+00 %   5.362E-04         G

Pb-214   N   9.2280E-05     351.92 8.943E-05 ?(  2.417E-06         G K
                             295.21 0.000E+00 ?   1.222E-05         G
                              77.11 0.000E+00 ?   1.620E-04Energy duplication
                             241.98 1.562E-04 +   6.501E-05         G
                              74.81 7.694E-04 +   3.305E-04Energy duplication
                              87.30 1.150E-04 ?(  7.701E-05         X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   2.979E-03         G
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 08:28:40 Page    5
 4714781                          Spectrum name: Win00269.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       1.1669E+00     59.54 1.167E+00  (  4.478E-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		1.7842E+01	6.744E+00	6.771E+00
K-40	#	8.2797E+01	4.593E+01	4.601E+01
Ac-228	#	1.4707E+01	9.301E+00	9.315E+00
Pb-212		1.6082E+01	5.271E+00	5.300E+00
CS-137	<	3.7608E-01		
Th-234		3.3501E+01	3.890E+01	3.891E+01
Pb-214		1.9225E+01	6.321E+00	6.355E+00
Pb-210	<	6.2064E+02		
AM-241		2.4311E+05	5.702E+02	9.005E+03

- 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 27-JUL-2007 08:28:40 Page 6
4714781 Spectrum name: Win00269.Anl

< - 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) 2.4329327E+05 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0618 D1 Sludge Box #130 #2 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 08:51:41 Page    1
4714781                          Spectrum name: Win00270.An1

Sample description
     WI07-0618   D1   Box #130 - #2  072707


Spectrum Filename: C:\User\Win00270.An1

Acquisition information
       Start time:                 27-Jul-2007 08:39:52
       Live time:                600
       Real time:                701
       Dead time:                 14.41 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                7.5000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  7.5000E+00) =
                                   1.3333E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
0

     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 08:51:41 Page    2
4714781                          Spectrum name: Win00270.An1
```

WI07 - 0618 D1 Sludge Box #130 #2 072707

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: 0.1679

********** 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	
26.10	6.68	8045.	5956.	9.927	4.99	0.915	CU-64	D
31.12	7.94	9293.	11874.	19.790	2.94	0.916	ZN-65	D
43.51	11.03	8731.	5140.	8.567	5.85	0.919	PB-214	D
55.42	14.01	8183.	28255.	47.092	1.50	0.921	PU-239	D
69.85	17.64	12926.	102848.	171.414	0.76	1.161	MO-99	s
83.91	21.15	8610.	46454.	77.424	1.21	1.209	TC-99M	s
104.96	26.41	5757.	45690.	76.151	1.16	0.936	AM-241	
126.93	31.98	4563.	1314.	2.191	15.55	0.936	XE-138	D
132.62	33.40	4522.	3269.	5.449	6.79	0.937	CS-137	D
197.65	49.58	151867.	57897.	96.496	2.76	1.948	EU-155	s
293.43	73.45	1259.	486.	0.809	22.58	0.970	BI-207	D
321.70	80.52	422.	511.	0.851	14.41	0.975	J-131	D
395.38	98.98	170.	820.	1.367	8.30	0.990	AC-228	D
411.00	102.90	318.	1012.	1.687	9.27	1.020	GD-153	
475.70	119.07	271.	1248.	2.079	7.63	0.817	NP-239	
500.97	125.38	48.	175.	0.292	21.89	0.910	PA-234	
633.84	158.59	12.	44.	0.074	39.18	0.975	-	

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:51:41 Page 3
4714781 Spectrum name: Win00270.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.40	46.52	84408.	0.	0.000	0.00	0.948
AM-241	237.87	59.63	101701.	1495072.	2491.787	0.18	0.946
Th-234	252.86	63.38	2324.	126.	0.210	140.84	0.303s
Pb-214	298.61	74.81	1588.	157.	0.261	73.71	0.971D
Pb-212	298.63	74.81	393.	0.	0.000	811.75	0.284D
Pb-212	307.80	77.11	947.	1188.	1.979	9.35	0.972D

WI07 - 0618 D1 Sludge Box #130 #2 072707

Pb-214	307.80	77.11	1408.	0.	0.000	241.44	0.412D
Pb-214	350.00	87.65	56.	4.	0.007	495.42	0.000s
Th-234	368.79	92.35	135.	25.	0.042	136.12	0.985D
Ac-228	380.79	95.35	160.	0.	0.000	0.00	0.987D
Ac-228	835.63	209.02	14.	6.	0.011	195.21	0.270s
Pb-212	954.08	238.62	7.	46.	0.076	34.14	1.099D
Pb-214	967.50	241.98	15.	16.	0.027	85.15	1.101D
Ac-228	1080.48	270.22	4.	7.	0.012	114.81	0.278s
Pb-214	1178.71	294.77	0.	28.	0.047	37.80	0.719s
Ac-228	1310.67	327.74	2.	4.	0.007	127.66	0.322s
Ac-228	1354.17	338.61	3.	4.	0.007	158.11	0.405s
Pb-214	1408.43	352.17	2.	36.	0.059	36.96	0.326s
Ac-228	1852.00	463.03	1.	0.	0.000	0.00	0.000s
Bi-214	2436.08	608.99	6.	2.	0.004	331.04	0.402s
CS-137	2650.67	662.62	0.	13.	0.022	55.47	0.292s
Bi-214	3075.00	768.65	0.	1.	0.002	200.00	0.250s
Ac-228	3179.33	794.73	1.	0.	0.001	240.37	0.197s
Ac-228	3645.25	911.15	0.	11.	0.018	60.30	0.312s
Bi-214	3738.50	934.46	0.	3.	0.005	115.47	0.500s
Ac-228	3859.13	964.60	2.	2.	0.003	275.86	1.588D
Ac-228	3877.18	969.11	1.	8.	0.014	75.91	1.591D
Bi-214	4478.00	1119.24	0.	4.	0.007	100.00	0.250s
Bi-214	4952.00	1237.68	0.	0.	0.000	0.00	0.000s
Bi-214	5509.78	1377.06	1.	1.	0.002	346.41	0.217s
K-40	5845.00	1460.82	5.	1.	0.001	724.19	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.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:51:41 Page 4
4714781 Spectrum name: Win00270.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	0.0000E+00	609.31	0.000E+00	%	1.399E-05	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	6.652E-05	&	5.608E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	1.917E-04	G
			934.06	1.973E-04	?	1.973E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.223E-04	G
Ac-228	N	9.6885E-05	911.07	8.189E-05	?(	7.444E-06	G K
			969.11	1.084E-04	(	2.417E-05	G
			338.32	3.057E-05	-	3.267E-05	G
			964.60	0.000E+00	%	1.411E-04	G
			794.70	0.000E+00	%	7.897E-05	G
			463.00	0.000E+00	?	5.126E-05	G
			209.28	8.900E-05	?(	7.832E-05	G
			270.23	1.487E-04	?(	6.599E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	!	2.083E-04	X

```
                    WI07 - 0618  D1 Sludge Box #130  #2  072707
                                327.64 1.194E-04 ?(  6.110E-05          G

Pb-212    N   6.7829E-05     238.62 6.783E-05  (  6.542E-06          G K
                             77.11 2.671E-03 +   1.481E-04Energy duplication
                             74.81 0.000E+00 %   1.087E-04Energy duplication

Cs-137        2.3467E-05     661.66 2.347E-05 &(  1.805E-06          G

Th-234    N   6.8596E-04      92.35 1.840E-04  (  1.234E-04          G
                              63.29 1.401E-03  (  7.634E-04          G

Pb-214    N   1.0121E-04     351.92 8.621E-05  (  6.568E-06          G K
                             295.21 1.140E-04  (  4.073E-06          G
                              77.11 0.000E+00 %   2.066E-04Energy duplication
                             241.98 1.429E-04  (  5.386E-05          G
                              74.81 1.028E-03 +   3.911E-04Energy duplication
                              87.30 0.000E+00 %   9.644E-05          X

Pb-210    N   0.0000E+00      46.50 0.000E+00     4.529E-03          G
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 08:51:41 Page    5
 4714781                          Spectrum name: Win00270.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        1.7801E+00     59.54 1.780E+00  (  5.376E-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
```

WI07 - 0618 D1 Sludge Box #130 #2 072707

Bi-214	B<	1.8654E+00		
K-40	<	1.6305E+01		
Ac-228		1.2918E+01	7.168E+00	7.182E+00
Pb-212		9.0438E+00	3.088E+00	3.103E+00
CS-137	#	3.1290E+00	1.736E+00	1.739E+00
Th-234	C	9.1461E+01	8.957E+01	8.960E+01
Pb-214		1.3495E+01	4.509E+00	4.532E+00
Pb-210	<	6.0393E+02		
AM-241		2.3735E+05	4.320E+02	8.785E+03

- 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 27-JUL-2007 08:51:41 Page 6
4714781 Spectrum name: Win00270.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 1999.2 keV) 2.3748336E+05 pCi/g

The library has energies which are not separable.

Analyzed by: K.O. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0619 D1 Sludge Box #130 #3 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:15:41 Page 1
4714781 Spectrum name: WI07-0603 D2 Grid C4- 3 @

Sample description
WI07-0619 D1 Box #130 - #3 072707

Spectrum Filename: C:\User\D2 Samples\WI07-0603 D2 Grid C4- 3 @
6 in 072707.An1

Acquisition information
Start time: 27-Jul-2007 09:04:29
Live time: 600
Real time: 664
Dead time: 9.66 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) +
(-6.935993E-02*Log(E)^2)
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: 5.0000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 5.0000E+00) =
2.0000E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:15:41 Page 2
4714781 Spectrum name: WI07-0603 D2 Grid C4- 3 @

WI07 - 0619 D1 Sludge Box #130 #3 072707

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: 0.1286

********** 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	
26.18	6.71	6227.	4558.	7.596	5.72	0.915	CU-64	D
31.11	7.94	6961.	9055.	15.092	3.35	0.916	ZN-65	D
43.88	11.13	6410.	3584.	5.973	7.15	0.919	PB-214	D
55.41	14.01	6520.	25028.	41.713	1.56	0.921	PU-239	D
69.86	17.64	10523.	86957.	144.928	0.82	1.184	MO-99	s
83.90	21.15	6959.	36123.	60.206	1.39	1.194	TC-99M	s
104.97	26.41	3878.	32761.	54.602	1.37	0.957	AM-241	
126.60	31.88	2938.	721.	1.201	22.53	0.936	XE-138	D
132.65	33.39	2779.	2149.	3.581	8.17	0.937	CS-137	D
194.99	48.70	76115.	12478.	20.797	6.50	0.950	EU-155	D
198.90	49.68	89449.	18366.	30.609	4.84	0.950	EU-154	D
293.64	73.44	775.	382.	0.636	23.04	0.970	BI-207	D
321.81	80.48	321.	317.	0.529	19.53	0.975	J-131	D
395.64	99.06	151.	484.	0.807	12.65	0.831	AC-228	M
411.55	103.04	126.	569.	0.948	10.54	0.980	GD-153	
475.80	119.09	74.	554.	0.923	10.74	1.053	NP-239	
500.75	125.33	31.	106.	0.176	28.37	0.922	PA-234	

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:15:41 Page 3
4714781 Spectrum name: WI07-0603 D2 Grid C4- 3 @

********** 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	49000.	0.	0.000	0.00	0.948D
AM-241	237.87	59.63	65834.	945840.	1576.401	0.25	0.959
Th-234	253.15	63.45	964.	97.	0.161	110.04	1.046
Pb-214	298.61	74.81	1080.	82.	0.137	115.22	0.971D

WI07 - 0619 D1 Sludge Box #130 #3 072707

Pb-212	298.63	74.81	243.	0.	0.000	2418.26	0.000D
Pb-212	307.80	77.11	612.	874.	1.456	10.49	0.973D
Pb-214	307.80	77.11	1006.	0.	0.000	10033.44	0.511D
Pb-214	349.25	87.47	28.	7.	0.012	226.78	0.225s
Th-234	368.79	92.35	53.	22.	0.036	103.85	0.985D
Ac-228	380.79	95.35	41.	3.	0.005	633.11	0.987D
Ac-228	834.11	208.64	8.	18.	0.031	72.32	0.576s
Pb-212	954.08	238.62	6.	49.	0.081	32.13	1.099D
Pb-214	967.50	241.98	9.	2.	0.003	487.07	1.101D
Ac-228	1079.00	269.85	0.	12.	0.020	57.74	0.375s
Pb-214	1179.84	295.05	0.	19.	0.032	45.88	0.309s
Ac-228	1311.82	328.03	2.	8.	0.013	102.52	0.328s
Ac-228	1352.02	338.08	9.	8.	0.013	162.45	0.256s
Pb-214	1409.70	352.49	3.	37.	0.061	39.00	0.986s
Ac-228	1850.62	462.68	1.	1.	0.001	339.93	0.375s
Bi-214	2438.25	609.53	0.	20.	0.033	44.72	0.416s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3074.75	768.59	0.	9.	0.015	66.67	0.375s
Ac-228	3180.60	795.04	0.	5.	0.008	89.44	0.500s
Ac-228	3645.00	911.09	2.	0.	0.001	450.92	0.333s
Bi-214	3737.67	934.25	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	2.	1.	0.001	699.39	1.588D
Ac-228	3877.18	969.11	1.	6.	0.010	89.33	1.591D
Bi-214	4482.00	1120.24	2.	0.	0.001	368.18	0.000s
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	5844.90	1460.79	0.	13.	0.022	55.47	0.312s
Ac-228	6353.33	1587.83	1.	0.	0.001	240.37	0.197s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:15:41 Page 4
4714781 Spectrum name: WI07-0603 D2 Grid C4- 3 @

***** 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	6.1753E-05	609.31	6.175E-05	(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	0.000E+00	%	4.260E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	3.145E-04	+	1.667E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	%	1.315E-04	G
K-40	N	3.9742E-04	1460.81	3.974E-04	?(	3.057E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	2.233E-05	G K
			969.11	8.214E-05		5.629E-05	G
			338.32	5.858E-05	?	4.854E-05	G
			964.60	0.000E+00	%	1.255E-04	G
			794.70	1.974E-04	?	1.462E-04	G
			463.00	0.000E+00	%	6.565E-05	G
			209.28	2.533E-04	&	1.058E-04	G
			270.23	2.434E-04	?	1.100E-04	G

```
                    WI07 - 0619  D1 Sludge Box #130  #3  072707
                          1588.00 0.000E+00 %   2.028E-04         G
                            95.35 0.000E+00 %   1.120E-04         X
                           327.64 2.034E-04 ?   1.327E-04         G

Pb-212    N   7.2568E-05    238.62 7.257E-05  (  6.071E-06         G K
                            77.11 1.965E-03 +   1.237E-04Energy duplication
                            74.81 0.000E+00 %   8.586E-05Energy duplication

CS-137        0.0000E+00    661.66 0.000E+00 ?   1.805E-06         G

Th-234    N   5.3676E-04     92.35 1.590E-04  (  7.895E-05         G
                            63.29 1.075E-03 ?(  4.938E-04         G

Pb-214    N   8.4801E-05    351.92 8.863E-05  (  7.565E-06         G K
                           295.21 7.739E-05 ?(  4.073E-06         G
                            77.11 0.000E+00 %   1.749E-04Energy duplication
                           241.98 0.000E+00 %   4.675E-05         G
                            74.81 5.395E-04 +   3.198E-04Energy duplication
                            87.30 0.000E+00 %   7.471E-05         X

Pb-210    N   0.0000E+00     46.50 0.000E+00 !   3.452E-03         G
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:15:41 Page    5
 4714781                          Spectrum name: WI07-0603   D2    Grid  C4- 3 @

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       1.1262E+00     59.54 1.126E+00  (  4.326E-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		1.2351E+01	5.523E+00	5.540E+00
K-40	#	7.9485E+01	4.409E+01	4.417E+01
Ac-228	B<	4.4667E+00		
Pb-212		1.4514E+01	4.663E+00	4.689E+00
CS-137	<	3.6104E-01		
Th-234		1.0735E+02	8.122E+01	8.126E+01
Pb-214		1.6960E+01	5.106E+00	5.139E+00
Pb-210	<	6.9047E+02		
AM-241		2.2524E+05	5.616E+02	8.346E+03

- 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 27-JUL-2007 09:15:41 Page 6
4714781 Spectrum name: WI07-0603 D2 Grid C4- 3 @

< - 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) 2.2546894E+05 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0620 D1 Sludge Box #130 #4 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:37:13 Page    1
4714781                          Spectrum name: Win00272.An1

Sample description
     WI07-0620  D1   Box #130 - #4  072707


Spectrum Filename: C:\User\Win00272.An1

Acquisition information
       Start time:                 27-Jul-2007 09:21:16
       Live time:                600
       Real time:                699
       Dead time:                 14.15 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                  ( -6.935993E-02*Log(E)^2 )
            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:                7.1000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  7.1000E+00) =
                                   1.4085E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:37:13 Page    2
4714781                          Spectrum name: Win00272.An1
```

WI07 - 0620 D1 Sludge Box #130 #4 072707

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: 0.1121

********** 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	
25.99	6.66	11297.	7572.	12.620	4.59	0.915	CU-64	D
31.08	7.94	11701.	16118.	26.864	2.47	0.916	ZN-65	D
43.83	11.12	11127.	5806.	9.676	5.77	0.919	PB-214	D
55.40	14.02	11343.	50484.	84.140	1.07	0.921	PU-239	D
69.85	17.64	17371.	151709.	252.848	0.62	1.179	MO-99	s
83.86	21.14	10866.	58280.	97.134	1.08	1.214	TC-99M	s
105.01	26.42	5863.	49827.	83.044	1.10	0.935	AM-241	
131.09	32.94	5328.	4202.	7.003	7.60	1.035	XE-138	s
197.73	49.60	147374.	61808.	103.012	2.66	1.987	EU-155	s
253.58	63.56	2696.	195.	0.325	93.34	0.391	PA-234	s
293.32	73.43	1504.	803.	1.338	15.38	0.969	BI-207	D
321.78	80.54	638.	596.	0.993	14.53	0.975	J-131	D
342.38	85.92	143.	105.	0.175	37.56	0.979	BI-207	D
395.33	98.88	174.	743.	1.238	8.89	0.990	PA-234	D
411.19	102.95	246.	995.	1.658	8.74	1.029	GD-153	M
475.58	119.04	175.	1236.	2.060	7.81	1.045	NP-239	M
500.69	125.32	57.	159.	0.266	24.36	1.019	PA-234	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
M - Peak is close to a library peak.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:37:13 Page 3
4714781 Spectrum name: Win00272.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.44	46.53	72723.	0.	0.000	0.00	0.948
AM-241	237.87	59.63	98925.	1412295.	2353.824	0.19	0.946
Th-234	252.58	63.31	2493.	0.	0.000	0.00	0.961
Pb-214	298.61	74.81	2271.	219.	0.365	62.95	0.971D
Pb-212	298.63	74.81	416.	0.	0.000	478.76	-0.086D

WI07 - 0620 D1 Sludge Box #130 #4 072707

Pb-212	307.80	77.11	1337.	1686.	2.811	7.83	0.972D
Pb-214	307.80	77.11	2148.	0.	0.000	77.25	0.589D
Pb-214	348.58	87.30	183.	13.	0.022	300.72	0.980D
Th-234	368.79	92.35	124.	28.	0.046	119.92	0.985D
Ac-228	380.79	95.35	40.	0.	0.000	0.00	0.487D
Ac-228	835.61	209.02	10.	2.	0.003	469.04	0.355s
Pb-212	954.08	238.62	9.	52.	0.087	32.14	1.099D
Pb-214	967.50	241.98	15.	7.	0.011	181.76	1.101D
Ac-228	1080.00	270.10	8.	3.	0.005	310.32	0.000s
Pb-214	1179.44	294.95	3.	25.	0.041	50.71	0.311s
Ac-228	1308.24	327.14	3.	10.	0.017	86.80	0.228s
Ac-228	1353.94	338.56	0.	18.	0.030	47.14	0.500s
Pb-214	1406.77	351.76	0.	32.	0.053	35.36	0.854s
Ac-228	1851.67	462.94	1.	1.	0.001	339.93	0.197s
Bi-214	2429.04	607.23	6.	2.	0.003	447.21	0.327s
CS-137	2646.50	661.57	0.	6.	0.010	81.65	0.500s
Bi-214	3072.75	768.09	0.	8.	0.013	70.71	0.375s
Ac-228	3178.00	794.39	0.	0.	0.000	0.00	0.000s
Ac-228	3644.00	910.84	2.	1.	0.001	478.42	0.000s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.197D
Ac-228	3877.33	969.15	1.	1.	0.001	339.93	0.197s
Bi-214	4481.50	1120.12	0.	6.	0.010	81.65	1.000s
Bi-214	4955.20	1238.48	0.	6.	0.010	81.65	0.375s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.46	1461.43	0.	13.	0.022	55.47	0.500s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.40	1764.49	0.	6.	0.010	81.65	0.500s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:37:13 Page 4
4714781 Spectrum name: Win00272.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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	&	1.399E-05	G K
			1764.49	1.501E-04	?	1.001E-04	G
			1120.29	9.978E-05	?	6.652E-05	G
			1238.11	2.796E-04	?	1.864E-04	G
			768.36	2.795E-04	?	1.583E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	3.9742E-04	1460.81	3.974E-04	?(	3.057E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	2.233E-05	G K
			969.11	0.000E+00	%	3.373E-05	G
			338.32	1.375E-04	?	4.983E-05	G
			964.60	0.000E+00	%	7.358E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	0.000E+00	%	6.565E-05	G
			209.28	0.000E+00	%	7.427E-05	G
			270.23	0.000E+00	%	1.058E-04	G
			1588.00	0.000E+00	?	1.014E-04	G

```
                    WI07 - 0620  D1 Sludge Box #130  #4  072707
                                 95.35 0.000E+00 %   1.071E-04         X
                                327.64 2.742E-04 ?   1.492E-04         G

Pb-212    N   7.8179E-05       238.62 7.818E-05  (  7.222E-06         G K
                                 77.11 3.793E-03 +   1.760E-04Energy duplication
                                 74.81 0.000E+00 %   1.118E-04Energy duplication

CS-137        1.0831E-05       661.66 1.083E-05 ?(  1.805E-06         G

Th-234    N   2.0214E-04        92.35 2.021E-04  (  1.187E-04         G
                                 63.29 0.000E+00     7.905E-04         G

Pb-214    N   8.5218E-05       351.92 7.735E-05  (  2.417E-06         G K
                                295.21 1.005E-04 ?(  1.275E-05         G
                                 77.11 0.000E+00 ?   2.547E-04Energy duplication
                                241.98 6.021E-05 -   6.409E-05         G
                                 74.81 1.439E-03 +   4.666E-04Energy duplication
                                 87.30 0.000E+00 %   1.708E-04         X

Pb-210    N   0.0000E+00        46.50 0.000E+00     4.205E-03         G
0

      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:37:13 Page    5
 4714781                          Spectrum name: Win00272.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        1.6816E+00       59.54 1.682E+00  (  5.302E-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	B<	1.9705E+00		
K-40	#	5.5975E+01	3.105E+01	3.111E+01
Ac-228	B<	3.1456E+00		
Pb-212		1.1011E+01	3.539E+00	3.559E+00
CS-137	#	1.5255E+00	1.246E+00	1.247E+00
Th-234		2.8471E+01	3.414E+01	3.415E+01
Pb-214		1.2003E+01	3.710E+00	3.732E+00
Pb-210	<	5.9221E+02		
AM-241		2.3684E+05	4.479E+02	8.767E+03

- 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 27-JUL-2007 09:37:13 Page 6
4714781 Spectrum name: Win00272.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 1999.2 keV) 2.3695244E+05 pCi/g

The library has energies which are not separable.

Analyzed by: H.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0621 D1 Sludge Box #130 #5 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:55:37 Page    1
4714781                          Spectrum name: Win00273.An1

Sample description
     WI07-0621  D1   Box #130 - #5  072707


Spectrum Filename: C:\User\Win00273.An1

Acquisition information
       Start time:                 27-Jul-2007 09:42:47
       Live time:                600
       Real time:                717
       Dead time:                 16.31 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                7.8000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  7.8000E+00) =
                                   1.2821E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:55:37 Page    2
4714781                          Spectrum name: Win00273.An1
```

WI07 - 0621 D1 Sludge Box #130 #5 072707

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: 0.0670

********** 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	
26.10	6.69	11703.	8372.	13.953	4.26	0.915	CU-64	D
31.06	7.93	12912.	16932.	28.220	2.44	0.916	ZN-65	D
43.77	11.11	12123.	6618.	11.031	5.31	0.919	PB-214	D
55.41	14.02	11950.	50981.	84.969	1.07	0.921	PU-239	D
69.85	17.64	18609.	160889.	268.148	0.60	1.181	MO-99	s
83.89	21.15	11971.	63782.	106.304	1.04	1.209	TC-99M	s
105.01	26.42	6993.	56028.	93.379	1.05	0.947	AM-241	
126.70	31.93	5432.	1556.	2.593	14.33	0.936	XE-138	D
132.59	33.40	5078.	3709.	6.182	6.35	0.937	CS-137	D
173.86	43.64	38292.	1374.	2.289	40.65	0.945	EU-155	D
197.64	49.59	143735.	44025.	73.376	2.62	0.950	EU-155	D
293.24	73.41	1998.	916.	1.527	15.30	0.969	BI-207	D
321.53	80.48	722.	703.	1.172	13.19	0.975	J-131	D
342.83	86.06	210.	134.	0.223	35.26	0.979	BI-207	D
394.82	98.86	332.	909.	1.515	9.81	0.935	PA-234	
411.27	102.97	392.	1118.	1.863	8.57	1.008	GD-153	
475.72	119.07	250.	1653.	2.755	6.28	0.982	NP-239	
491.79	123.12	14.	57.	0.094	32.63	1.009	EU-154	D
500.65	125.34	20.	223.	0.371	14.56	1.011	PA-234	D

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:55:37 Page 3
4714781 Spectrum name: Win00273.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.33	46.50	73268.	0.	0.000	0.00	0.948D
AM-241	237.86	59.63	120390.	1672007.	2786.678	0.17	0.952
Th-234	252.58	63.31	3150.	126.	0.211	150.61	0.785
Pb-214	298.61	74.81	2616.	255.	0.424	58.20	0.971D

WI07 - 0621 D1 Sludge Box #130 #5 072707

Pb-212	298.63	74.81	454.	0.	0.000	0.00	0.000D
Pb-212	307.80	77.11	1580.	1714.	2.856	8.15	0.972D
Pb-214	307.80	77.11	2034.	0.	0.000	752.02	0.594D
Pb-214	348.58	87.30	305.	10.	0.016	520.19	0.980D
Th-234	369.24	92.46	168.	0.	0.000	0.00	0.985
Ac-228	381.24	95.46	226.	0.	0.000	0.00	0.987
Ac-228	840.95	210.35	16.	4.	0.006	415.80	0.203s
Pb-212	954.08	238.62	8.	48.	0.080	33.14	1.099D
Pb-214	967.50	241.98	5.	17.	0.028	61.00	1.101D
Ac-228	1081.00	270.35	1.	0.	0.000	0.00	0.000s
Pb-214	1180.36	295.18	8.	20.	0.034	66.71	0.318s
Ac-228	1309.47	327.44	2.	6.	0.011	103.67	0.415s
Ac-228	1340.88	335.29	12.	22.	0.038	82.95	0.501s
Pb-214	1408.13	352.10	6.	29.	0.048	51.77	0.454s
Ac-228	1849.75	462.46	0.	7.	0.012	75.59	0.375s
Bi-214	2438.04	609.48	0.	24.	0.040	40.82	0.500s
CS-137	2647.33	661.78	2.	1.	0.002	416.33	0.225s
Bi-214	3070.33	767.49	2.	1.	0.001	478.42	0.197s
Ac-228	3181.20	795.19	0.	6.	0.010	81.65	0.375s
Ac-228	3644.33	910.93	0.	15.	0.025	51.64	0.750s
Bi-214	3736.67	934.00	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	1.	0.	0.001	756.87	1.588D
Ac-228	3877.18	969.11	0.	4.	0.006	104.44	1.591D
Bi-214	4480.50	1119.87	0.	4.	0.007	100.00	0.500s
Bi-214	4952.33	1237.77	0.	4.	0.007	100.00	0.250s
Bi-214	5511.00	1377.36	0.	1.	0.002	200.00	0.250s
K-40	5842.67	1460.23	0.	24.	0.040	40.82	0.250s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.29	1764.46	0.	9.	0.015	66.67	0.500s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:55:37 Page 4
4714781 Spectrum name: Win00273.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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	7.2238E-05	609.31	7.410E-05	?(	3.088E-06	G K
			1764.49	2.252E-04	+	1.194E-04	G
			1120.29	6.652E-05	?(	1.663E-05	G
			1238.11	1.864E-04	+	1.571E-04	G
			768.36	0.000E+00	&	1.048E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	1.497E-04	G
			934.06	0.000E+00	%	1.315E-04	G
K-40	N	7.3371E-04	1460.81	7.337E-04	?(	3.057E-05	G
Ac-228	N	1.4562E-04	911.07	1.117E-04	?(	7.444E-06	G K
			969.11	5.115E-05	-	4.440E-05	G
			338.32	1.719E-04	&(	4.222E-05	G
			964.60	0.000E+00	%	8.370E-05	G
			794.70	2.369E-04	?(	3.948E-05	G
			463.00	1.794E-04	?(	2.563E-05	G
			209.28	0.000E+00	&	9.371E-05	G
			270.23	0.000E+00	?	4.056E-05	G

```
                    WI07 - 0621  D1 Sludge Box #130  #5  072707
                          1588.00 0.000E+00 ?   1.014E-04         G
                            95.35 0.000E+00 %   2.465E-04         X
                           327.64 1.680E-04 ?(  6.349E-05         G

Pb-212    N   7.1777E-05    238.62 7.178E-05  (  6.674E-06         G K
                            77.11 3.854E-03 +   1.837E-04Energy duplication
                            74.81 0.000E+00 ?   1.167E-04Energy duplication

CS-137        0.0000E+00    661.66 0.000E+00 %   5.416E-06         G

Th-234    N   0.0000E+00     92.35 0.000E+00     1.374E-04         G
                            63.29 1.404E-03 $   9.054E-04         G

Pb-214    N   8.3026E-05    351.92 6.929E-05  (  9.896E-06         G K
                           295.21 8.350E-05 ?(  1.794E-05         G
                            77.11 0.000E+00 %   2.479E-04Energy duplication
                           241.98 1.500E-04  (  3.222E-05         G
                            74.81 1.671E-03 +   5.007E-04Energy duplication
                            87.30 0.000E+00 %   2.154E-04         X

Pb-210    N   0.0000E+00     46.50 0.000E+00 !   4.220E-03         G
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:55:37 Page    5
 4714781                          Spectrum name: Win00273.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        1.9908E+00     59.54 1.991E+00  (  5.849E-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	#	9.2613E+00	3.781E+00	3.794E+00
K-40	#	9.4065E+01	3.840E+01	3.854E+01
Ac-228		1.8669E+01	6.749E+00	6.780E+00
Pb-212		9.2022E+00	3.050E+00	3.066E+00
CS-137	<	6.9430E-01		
Th-234	<	1.7619E+01		
Pb-214		1.0644E+01	3.696E+00	3.714E+00
Pb-210	<	5.4107E+02		
AM-241		2.5523E+05	4.449E+02	9.446E+03

- 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 27-JUL-2007 09:55:37 Page 6
4714781 Spectrum name: Win00273.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 1999.2 keV) 2.5537548E+05 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0622 D1 Sludge Box #123 #1 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:56:02 Page    1
4714781                          Spectrum name: Win00274.An1

Sample description
     WI07-0622  D1   Box #123 - #1  072707


Spectrum Filename: C:\User\Win00274.An1

Acquisition information
       Start time:                 27-Jul-2007 11:43:00
       Live time:                600
       Real time:                773
       Dead time:                 22.43 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                1.0200E+01
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  1.0200E+01) =
                                   9.8039E+04
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:56:02 Page    2
4714781                          Spectrum name: Win00274.An1
```

WI07 - 0622 D1 Sludge Box #123 #1 072707

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: 0.1078

********** 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	
26.14	6.70	18520.	13101.	21.834	3.42	0.915	CU-64	D
31.09	7.94	20133.	27007.	45.011	1.92	0.916	ZN-65	D
43.90	11.14	18871.	10102.	16.837	4.33	0.919	PB-214	D
55.42	14.02	19453.	86327.	143.878	0.82	0.921	PU-239	D
69.87	17.64	29920.	256207.	427.012	0.48	1.158	MO-99	s
83.91	21.15	18808.	99245.	165.409	0.83	1.209	TC-99M	s
105.05	26.43	10840.	85344.	142.241	0.86	0.931	AM-241	
126.96	31.96	8106.	2917.	4.861	9.48	0.936	XE-138	D
132.72	33.40	8631.	5414.	9.023	5.56	0.937	CS-137	D
194.42	48.61	172020.	28003.	46.671	4.36	0.950	EU-155	D
198.77	49.69	212313.	50009.	83.348	2.76	0.950	EU-154	D
266.70	66.83	7399.	431.	0.718	73.51	0.725	AU-196	
293.33	73.45	4408.	1527.	2.544	13.32	0.970	BI-207	D
321.72	80.55	1478.	783.	1.306	15.61	0.975	J-131	D
342.82	85.80	331.	237.	0.394	25.34	0.979	BI-207	D
395.39	98.88	335.	1260.	2.100	6.97	0.990	PA-234	D
410.95	102.89	424.	1792.	2.986	7.26	0.967	GD-153	
475.75	119.08	464.	3519.	5.865	4.05	1.020	NP-239	
501.02	125.40	65.	278.	0.463	16.03	0.846	PA-234	

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:56:02 Page 3
4714781 Spectrum name: Win00274.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.33	46.50	120165.	0.	0.000	0.00	0.948D
AM-241	237.87	59.63	168256.	2421066.	4035.111	0.15	0.934
Th-234	252.51	63.29	6908.	0.	0.000	0.00	0.455D
Pb-214	298.61	74.81	5854.	92.	0.153	237.17	0.971D

WI07 - 0622 D1 Sludge Box #123 #1 072707

Pb-212	298.63	74.81	1023.	0.	0.000	173.40	0.000D
Pb-212	307.80	77.11	3705.	2731.	4.552	7.37	0.972D
Pb-214	307.80	77.11	3922.	0.	0.000	5659.67	0.000D
Pb-214	348.58	87.30	458.	5.	0.009	1161.63	0.981D
Th-234	368.79	92.35	231.	50.	0.084	89.87	0.985D
Ac-228	380.79	95.35	260.	3.	0.005	1516.20	0.987D
Ac-228	839.67	210.03	5.	1.	0.002	637.70	0.257s
Pb-212	954.08	238.62	14.	41.	0.069	39.89	1.099D
Pb-214	967.50	241.98	13.	6.	0.011	178.22	1.101D
Ac-228	1080.50	270.22	2.	18.	0.029	58.55	0.855
Pb-214	1180.67	295.26	8.	17.	0.028	80.08	0.983s
Ac-228	1309.00	327.33	1.	0.	0.000	0.00	0.000s
Ac-228	1353.22	338.38	2.	15.	0.025	61.10	1.302
Pb-214	1407.64	351.98	5.	28.	0.046	49.68	0.377s
Ac-228	1854.00	463.53	0.	5.	0.008	89.44	0.375s
Bi-214	2438.04	609.48	0.	29.	0.048	37.14	0.750s
CS-137	2649.43	662.31	0.	9.	0.015	66.67	0.292s
Bi-214	3072.50	768.03	0.	3.	0.005	115.47	0.500s
Ac-228	3172.00	792.89	0.	4.	0.007	100.00	0.250s
Ac-228	3645.89	911.31	0.	14.	0.023	53.45	0.292s
Bi-214	3737.00	934.08	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	3.	2.	0.003	320.98	1.588D
Ac-228	3877.18	969.11	2.	13.	0.022	62.59	1.591D
Bi-214	4480.67	1119.91	1.	0.	0.000	260.34	0.210s
Bi-214	4955.00	1238.43	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	1.	0.002	200.00	0.250s
K-40	5845.20	1460.87	0.	7.	0.012	75.59	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.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 11:56:02 Page 4
4714781 Spectrum name: Win00274.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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	9.3424E-05	609.31	8.954E-05	(	3.088E-06	G K
			1764.49	5.004E-05	-	6.408E-05	G
			1120.29	0.000E+00	%	3.326E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	1.048E-04	?(	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	1.497E-04	G
			934.06	1.315E-04	?(	6.576E-05	G
K-40	N	2.1400E-04	1460.81	2.140E-04	?(	3.057E-05	G
Ac-228	N	1.3010E-04	911.07	1.042E-04	?(	7.444E-06	G K
			969.11	1.767E-04	(	3.443E-05	G
			338.32	1.146E-04	(	1.957E-05	G
			964.60	0.000E+00	%	1.512E-04	G
			794.70	1.579E-04	&(	3.948E-05	G
			463.00	1.282E-04	?(	2.563E-05	G
			209.28	0.000E+00	&	5.477E-05	G
			270.23	3.549E-04	+	1.388E-04	G

```
                    WI07 - 0622  D1 Sludge Box #123  #1  072707
                          1588.00 0.000E+00 ?   1.014E-04         G
                            95.35 0.000E+00 %   2.654E-04         X
                           327.64 0.000E+00 ?   5.307E-05         G

Pb-212    N   6.1793E-05    238.62 6.179E-05  (  8.520E-06         G K
                            77.11 6.143E-03 +   2.563E-04Energy duplication
                            74.81 0.000E+00 ?   1.743E-04Energy duplication

CS-137        1.6247E-05    661.66 1.625E-05 ?(  1.805E-06         G

Th-234    N   3.6708E-04     92.35 3.671E-04  (  1.603E-04         G
                            63.29 0.000E+00 ?   1.312E-03         G

Pb-214    N   6.6381E-05    351.92 6.687E-05 ?(  9.195E-06         G K
                           295.21 6.924E-05 *(  1.846E-05         G
                            77.11 0.000E+00 %   3.434E-04Energy duplication
                           241.98 5.661E-05  (  4.984E-05         G
                            74.81 0.000E+00 %   7.192E-04Energy duplication
                            87.30 0.000E+00 %   2.602E-04         X

Pb-210    N   0.0000E+00     46.50 0.000E+00 !   5.403E-03         G
0

      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 11:56:02 Page    5
 4714781                          Spectrum name: Win00274.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        2.8827E+00     59.54 2.883E+00  (  6.913E-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	9.1592E+00	3.402E+00	3.416E+00
K-40 #	2.0980E+01	1.586E+01	1.588E+01
Ac-228	1.2755E+01	4.307E+00	4.329E+00
Pb-212	6.0582E+00	2.417E+00	2.426E+00
CS-137 #	1.5928E+00	1.062E+00	1.063E+00
Th-234	3.5988E+01	3.234E+01	3.235E+01
Pb-214	6.5080E+00	3.233E+00	3.241E+00
Pb-210 <	5.2973E+02		
AM-241	2.8262E+05	4.199E+02	1.046E+04

- 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 27-JUL-2007 11:56:02 Page 6
4714781 Spectrum name: Win00274.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 1999.2 keV) 2.8271178E+05 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0623 D1 Sludge Box #123 #2 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:15:55 Page 1
4714781 Spectrum name: WI07-0592 D2 Bag # S-064 Grid

Sample description
WI07-0623 D1 Box #123 - #2 072707

Spectrum Filename: C:\User\D2 Samples\WI07-0592 D2 Bag # S-064 Grid C4-2 072707.An1

Acquisition information
Start time: 27-Jul-2007 12:03:34
Live time: 600
Real time: 733
Dead time: 18.10 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 8.3000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 8.3000E+00) = 1.2048E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:15:55 Page 2
4714781 Spectrum name: WI07-0592 D2 Bag # S-064 Grid

WI07 - 0623 D1 Sludge Box #123 #2 072707

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: 0.1431

********** 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	
26.22	6.72	13342.	9875.	16.458	3.87	0.915	CU-64	D
31.08	7.94	14787.	19721.	32.868	2.25	0.916	ZN-65	D
43.92	11.15	13888.	7566.	12.610	4.97	0.919	PB-214	D
55.45	14.03	13850.	61087.	101.812	0.98	0.921	PU-239	D
69.91	17.65	21681.	189073.	315.122	0.55	1.164	MO-99	s
83.94	21.16	13866.	75321.	125.534	0.95	1.196	TC-99M	s
105.05	26.44	7826.	65803.	109.672	0.97	0.945	AM-241	
126.94	31.98	6239.	1880.	3.134	12.74	0.936	XE-138	D
132.61	33.39	6087.	4421.	7.368	5.83	0.937	CS-137	D
197.74	49.60	182238.	83524.	139.206	2.20	2.019	EU-155	s
293.09	73.41	2660.	986.	1.643	16.11	0.969	BI-207	D
321.54	80.52	992.	727.	1.212	14.32	0.975	J-131	D
342.65	85.75	235.	145.	0.242	34.10	0.979	BI-207	D
395.35	98.92	186.	1059.	1.765	7.14	0.990	PA-234	D
411.56	103.04	257.	1139.	1.899	7.84	1.050	GD-153	
475.77	119.09	303.	2088.	3.479	5.34	1.038	NP-239	
501.03	125.40	50.	200.	0.334	18.90	0.778	PA-234	

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:15:55 Page 3
4714781 Spectrum name: WI07-0592 D2 Bag # S-064 Grid

********** 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	90119.	0.	0.000	0.00	0.948
AM-241	237.89	59.64	118881.	1918110.	3196.850	0.16	0.941
Th-234	253.33	63.49	3196.	114.	0.191	157.26	0.218s
Pb-214	298.61	74.81	3304.	333.	0.554	50.09	0.971D
Pb-212	298.63	74.81	619.	0.	0.000	0.00	0.000D

WI07 - 0623 D1 Sludge Box #123 #2 072707

Pb-212	307.80	77.11	1920.	2274.	3.790	6.88	0.972D
Pb-214	307.80	77.11	2862.	0.	0.000	61.49	0.388D
Pb-214	348.58	87.30	236.	3.	0.005	1489.92	0.981D
Th-234	368.79	92.35	177.	36.	0.060	110.57	0.985D
Ac-228	380.79	95.35	198.	13.	0.021	318.72	0.987D
Ac-228	836.33	209.20	13.	2.	0.003	529.15	0.702s
Pb-212	954.08	238.62	13.	43.	0.072	38.12	1.099D
Pb-214	967.50	241.98	8.	13.	0.021	84.81	1.101D
Ac-228	1080.50	270.22	2.	0.	0.000	0.00	0.292s
Pb-214	1179.50	294.96	6.	20.	0.033	66.33	0.382s
Ac-228	1308.00	327.08	6.	8.	0.014	131.58	0.208s
Ac-228	1353.91	338.55	5.	18.	0.030	66.20	0.662s
Pb-214	1407.76	352.01	2.	32.	0.054	39.52	0.673s
Ac-228	1846.50	461.65	0.	12.	0.020	57.74	0.375s
Bi-214	2437.10	609.24	0.	21.	0.035	43.64	0.416s
CS-137	2649.00	662.20	2.	1.	0.002	416.33	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	1.	0.002	200.00	0.250s
Ac-228	3644.78	911.04	0.	13.	0.022	55.47	0.291s
Bi-214	3735.00	933.58	0.	0.	0.001	223.61	0.100s
Ac-228	3859.13	964.60	0.	2.	0.004	129.64	1.589D
Ac-228	3877.18	969.11	3.	8.	0.014	86.73	1.591D
Bi-214	4482.75	1120.43	0.	5.	0.008	89.44	0.375s
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	5845.86	1461.03	0.	19.	0.032	45.88	0.500s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7058.33	1763.97	0.	5.	0.008	89.44	0.375s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:15:55 Page 4
4714781 Spectrum name: WI07-0592 D2 Bag # S-064 Grid

***** 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	6.9343E-05	609.31	6.484E-05	(	3.088E-06	G K
			1764.49	1.251E-04	+	9.261E-05	G
			1120.29	8.315E-05	?(	1.663E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	0.000E+00	%	1.315E-04	G
K-40	N	5.8085E-04	1460.81	5.809E-04	?(	3.057E-05	G
Ac-228	N	1.1431E-04	911.07	9.678E-05	?(	7.444E-06	G K
			969.11	1.116E-04	(	3.687E-05	G
			338.32	1.375E-04	(	2.829E-05	G
			964.60	9.960E-05	(	4.185E-05	G
			794.70	0.000E+00	%	7.897E-05	G
			463.00	3.076E-04	&	1.390E-04	G
			209.28	0.000E+00	%	8.215E-05	G
			270.23	0.000E+00	?	5.195E-05	G
			1588.00	0.000E+00	?	1.014E-04	G

```
                    WI07 - 0623  D1 Sludge Box #123  #2  072707
                                 95.35 0.000E+00 %   2.383E-04         X
                                327.64 2.211E-04 ?(  1.036E-04         G

Pb-212    N   6.4688E-05       238.62 6.469E-05  (  8.246E-06         G K
                                 77.11 5.115E-03 +   2.071E-04Energy duplication
                                 74.81 0.000E+00 ?   1.360E-04Energy duplication

CS-137        0.0000E+00       661.66 0.000E+00 %   5.416E-06         G

Th-234    N   6.7822E-04        92.35 2.606E-04  (  1.410E-04         G
                                 63.29 1.273E-03 ?(  8.944E-04         G

Pb-214    N   8.3617E-05       351.92 7.856E-05  (  6.747E-06         G K
                                295.21 8.146E-05  (  1.629E-05         G
                                 77.11 0.000E+00 ?   2.937E-04Energy duplication
                                241.98 1.143E-04  (  4.115E-05         G
                                 74.81 2.184E-03 +   5.632E-04Energy duplication
                                 87.30 0.000E+00 %   1.882E-04         X

Pb-210    N   0.0000E+00        46.50 0.000E+00     4.680E-03         G
```

```
      ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:15:55 Page    5
 4714781                          Spectrum name: WI07-0592  D2 Bag # S-064  Grid

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241        2.2839E+00      59.54 2.284E+00  (  5.812E-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		8.3546E+00	3.646E+00	3.657E+00
K-40	#	6.9982E+01	3.211E+01	3.220E+01
Ac-228		1.3773E+01	6.104E+00	6.122E+00
Pb-212		7.7938E+00	2.971E+00	2.983E+00
CS-137	<	6.5248E-01		
Th-234		8.1713E+01	7.854E+01	7.857E+01
Pb-214		1.0074E+01	3.852E+00	3.867E+00
Pb-210	<	5.6385E+02		
AM-241		2.7516E+05	4.339E+02	1.018E+04

- 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 27-JUL-2007 12:15:55 Page 6
4714781 Spectrum name: WI07-0592 D2 Bag # S-064 Grid

< - 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) 2.7535453E+05 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0624 D1 Sludge Box #123 #3 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:41:08 Page    1
4714781                          Spectrum name: Win00276.An1

Sample description
     WI07-0624  D1   Box #123 - #3  072707


Spectrum Filename: C:\User\Win00276.An1

Acquisition information
       Start time:                 27-Jul-2007 12:28:06
       Live time:                600
       Real time:                730
       Dead time:                 17.86 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                6.7000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  6.7000E+00) =
                                   1.4925E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:41:08 Page    2
4714781                          Spectrum name: Win00276.An1
```

WI07 - 0624 D1 Sludge Box #123 #3 072707

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: 0.0677

********** 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	
26.08	6.69	15575.	10474.	17.457	3.90	0.915	CU-64	D
31.10	7.94	15843.	22590.	37.650	2.06	0.916	ZN-65	D
44.07	11.19	15182.	8050.	13.417	4.87	0.919	PB-214	D
55.44	14.03	15317.	73256.	122.094	0.88	0.921	PU-239	D
69.89	17.65	23894.	213526.	355.876	0.52	1.170	MO-99	s
83.93	21.16	14847.	81068.	135.114	0.92	1.209	TC-99M	s
105.07	26.44	8225.	67250.	112.083	0.96	0.955	AM-241	
126.80	31.93	6392.	1587.	2.645	15.11	0.936	XE-138	D
132.65	33.39	5824.	4120.	6.866	6.10	0.937	CS-137	D
194.57	48.64	145048.	22475.	37.458	4.98	0.950	EU-155	D
198.76	49.68	159999.	36629.	61.049	3.26	0.950	EU-154	D
267.20	66.96	4935.	602.	1.003	44.42	1.291	CS-136	sM
293.52	73.47	3081.	1057.	1.762	16.07	0.970	BI-207	D
321.49	80.46	1195.	553.	0.922	19.62	0.975	J-131	D
342.45	85.67	207.	172.	0.287	28.10	0.979	BI-207	D
395.35	98.91	266.	956.	1.593	8.07	0.990	PA-234	D
411.29	102.97	438.	1125.	1.875	9.77	0.975	GD-153	
475.82	119.10	281.	2025.	3.375	5.26	0.962	NP-239	
490.87	122.92	34.	57.	0.095	39.39	1.009	EU-154	D
500.67	125.37	30.	193.	0.321	16.48	1.011	PA-234	D

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	185.33	46.50	88179.	0.	0.000	0.00	0.948D
AM-241	237.89	59.64	117387.	1858452.	3097.420	0.16	0.945

WI07 - 0624 D1 Sludge Box #123 #3 072707

Th-234	253.43	63.52	3597.	0.	0.000	0.00	0.596s
Pb-214	298.61	74.81	4173.	0.	0.000	0.00	0.971D
Pb-212	298.63	74.81	642.	0.	0.000	403.47	0.262D
Pb-212	307.80	77.11	2447.	2058.	3.429	8.10	0.972D
Pb-214	307.80	77.11	2908.	0.	0.000	1796.36	0.663D
Pb-214	348.58	87.30	275.	21.	0.036	222.45	0.981D
Th-234	368.79	92.35	144.	39.	0.065	92.50	0.985D
Ac-228	380.79	95.35	166.	0.	0.000	0.00	0.987D
Ac-228	838.00	209.62	3.	0.	0.000	0.00	0.000s
Pb-212	954.08	238.62	3.	44.	0.073	32.57	1.099D
Pb-214	967.50	241.98	9.	17.	0.029	68.82	1.101D
Ac-228	1077.46	269.46	7.	18.	0.030	71.43	0.256s
Pb-214	1182.14	295.62	3.	27.	0.045	45.40	1.063s
Ac-228	1310.71	327.75	1.	1.	0.002	281.40	0.229s
Ac-228	1352.54	338.21	2.	6.	0.010	109.32	0.583s
Pb-214	1408.12	352.10	0.	25.	0.042	40.00	0.500s
Ac-228	1852.33	463.11	0.	5.	0.008	89.44	0.250s
Bi-214	2437.48	609.34	0.	25.	0.042	40.00	0.916s
CS-137	2647.00	661.70	0.	9.	0.015	66.67	0.250s
Bi-214	3073.83	768.36	1.	1.	0.001	339.93	0.339s
Ac-228	3180.00	794.89	0.	1.	0.002	200.00	0.250s
Ac-228	3642.78	910.54	1.	1.	0.002	346.41	0.218s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	2.	5.	0.009	115.90	1.588D
Ac-228	3877.18	969.11	0.	9.	0.014	68.19	1.591D
Bi-214	4481.00	1119.99	0.	0.	0.000	0.00	0.000s
Bi-214	4948.00	1236.69	0.	5.	0.008	89.44	0.250s
Bi-214	5512.00	1377.61	0.	0.	0.001	223.61	0.100s
K-40	5842.00	1460.07	6.	1.	0.002	800.00	0.000s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.50	1764.27	0.	5.	0.008	89.44	0.500s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:41:08 Page 4
4714781 Spectrum name: Win00276.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	MDA Value microCi	Comments
Bi-214	N	8.9378E-05	609.31	7.719E-05	(	3.088E-06	G K
			1764.49	1.251E-04	?(	2.502E-05	G
			1120.29	0.000E+00	?	1.663E-05	G
			1238.11	2.330E-04	&	1.725E-04	G
			768.36	0.000E+00	%	8.950E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	1.497E-04	G
			934.06	0.000E+00	?	6.576E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.307E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	1.907E-05	G K
			969.11	1.133E-04		6.160E-05	G
			338.32	4.712E-05	?	3.462E-05	G
			964.60	2.150E-04		1.789E-04	G
			794.70	0.000E+00	%	7.897E-05	G
			463.00	1.282E-04	?	9.487E-05	G

WI07 - 0624 D1 Sludge Box #123 #3 072707

			209.28	0.000E+00	?	4.107E-05		G
			270.23	3.651E-04	&	1.539E-04		G
			1588.00	0.000E+00	?	1.014E-04		G
			95.35	0.000E+00	%	2.123E-04		X
			327.64	0.000E+00	%	6.797E-05		G
Pb-212	N	6.4919E-05	238.62	6.492E-05	(	4.702E-06		G K
			77.11	4.628E-03	+	2.146E-04	Energy duplication	
			74.81	0.000E+00	%	1.384E-04	Energy duplication	
CS-137		1.6247E-05	661.66	1.625E-05	?(	1.805E-06		G
Th-234	N	2.8508E-04	92.35	2.851E-04	(	1.274E-04		G
			63.29	0.000E+00	%	9.500E-04		G
Pb-214	N	6.0428E-05	351.92	6.043E-05	?(	2.417E-06		G K
			295.21	1.106E-04	+	3.365E-05		G
			77.11	0.000E+00	%	2.960E-04	Energy duplication	
			241.98	1.537E-04	+	6.926E-05		G
			74.81	0.000E+00	%	6.030E-04	Energy duplication	
			87.30	0.000E+00	%	2.089E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00	!	4.629E-03		G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:41:08 Page 5
4714781 Spectrum name: Win00276.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
AM-241	2.2128E+00	59.54	2.213E+00	(	5.775E-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 *****
Time of Count Uncertainty 2 Sigma

WI07 - 0624 D1 Sludge Box #123 #3 072707

Nuclide	Activity pCi/g	Counting pCi/g	Total pCi/g
Bi-214	1.3340E+01	5.336E+00	5.356E+00
K-40 <	1.9506E+01		
Ac-228 B<	2.8462E+00		
Pb-212	9.6895E+00	3.156E+00	3.174E+00
CS-137 #	2.4249E+00	1.617E+00	1.619E+00
Th-234	4.2550E+01	3.936E+01	3.937E+01
Pb-214	9.0191E+00	3.608E+00	3.621E+00
Pb-210 <	6.9095E+02		
AM-241	3.3027E+05	5.389E+02	1.222E+04

- 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 27-JUL-2007 12:41:08 Page 6
4714781 Spectrum name: Win00276.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 1999.2 keV) 3.3034841E+05 pCi/g

The library has energies which are not separable.

Analyzed by: Ro. Fern
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07 - 0625 D1 Sludge Box #123 #4 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:57:03 Page    1
4714781                          Spectrum name: Win00277.An1

Sample description
     WI07-0625  D1   Box #123 - #4  072707


Spectrum Filename: C:\User\Win00277.An1

Acquisition information
       Start time:                 27-Jul-2007 12:44:32
       Live time:                600
       Real time:                743
       Dead time:                 19.27 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                  ( -6.935993E-02*Log(E)^2 )
            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:                7.9000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  7.9000E+00) =
                                   1.2658E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 12:57:03 Page    2
4714781                          Spectrum name: Win00277.An1
```

WI07 - 0625 D1 Sludge Box #123 #4 072707

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: 0.1288

********** 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	
26.13	6.70	14939.	11048.	18.413	3.66	0.915	CU-64	D
31.14	7.95	16644.	22111.	36.852	2.13	0.916	ZN-65	D
44.00	11.17	15539.	8322.	13.870	4.77	0.919	PB-214	D
55.46	14.03	15683.	67960.	113.266	0.93	0.921	PU-239	D
69.90	17.65	24327.	213199.	355.332	0.52	1.150	MO-99	s
83.94	21.16	15433.	84525.	140.875	0.90	1.200	TC-99M	s
105.08	26.44	8370.	72884.	121.473	0.91	0.950	AM-241	
126.92	31.97	6749.	1985.	3.309	12.54	0.936	XE-138	D
132.73	33.42	6444.	4418.	7.363	5.96	0.937	CS-137	D
197.70	49.59	193825.	90666.	151.109	2.09	1.989	EU-155	s
293.34	73.44	2884.	1175.	1.958	14.18	0.970	BI-207	D
321.58	80.50	1234.	965.	1.609	12.14	0.975	J-131	D
395.41	98.93	287.	1044.	1.740	7.71	0.990	PA-234	D
411.29	102.97	368.	1377.	2.294	7.30	1.036	GD-153	
475.80	119.09	294.	2409.	4.015	4.82	1.132	NP-239	
500.76	125.33	54.	243.	0.405	16.77	0.920	PA-234	

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:57:03 Page 3
4714781 Spectrum name: Win00277.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.40	46.52	94235.	0.	0.000	0.00	0.948
AM-241	237.89	59.64	123466.	2063143.	3438.572	0.16	0.940
Th-234	254.43	63.77	2939.	90.	0.150	178.25	0.320s
Pb-214	298.61	74.81	4168.	146.	0.243	126.44	0.971D
Pb-212	298.63	74.81	672.	0.	0.000	4234.78	0.000D
Pb-212	307.80	77.11	2514.	2541.	4.235	6.85	0.972D
Pb-214	307.80	77.11	3282.	0.	0.000	73.48	0.594D

WI07 - 0625 D1 Sludge Box #123 #4 072707

Pb-214	351.09	87.93	126.	3.	0.005	1188.84	0.326s
Th-234	368.79	92.35	113.	27.	0.045	119.14	0.985D
Ac-228	380.79	95.35	213.	3.	0.005	1357.10	0.987D
Ac-228	833.99	208.61	12.	26.	0.044	61.34	0.470s
Pb-212	954.08	238.62	3.	41.	0.069	32.97	1.099D
Pb-214	967.50	241.98	9.	20.	0.033	62.42	1.101D
Ac-228	1082.27	270.66	0.	15.	0.025	51.64	0.375s
Pb-214	1179.12	294.87	8.	7.	0.012	144.75	0.492s
Ac-228	1310.00	327.58	0.	13.	0.022	55.47	0.312s
Ac-228	1353.00	338.32	0.	16.	0.027	50.00	0.500s
Pb-214	1407.37	351.91	4.	19.	0.032	58.61	0.486s
Ac-228	1852.00	463.03	1.	0.	0.000	0.00	0.000s
Bi-214	2437.92	609.45	0.	24.	0.040	40.82	1.874s
CS-137	2642.50	660.57	0.	5.	0.008	89.44	0.500s
Bi-214	3072.33	767.99	1.	0.	0.001	240.37	0.197s
Ac-228	3178.00	794.39	0.	3.	0.005	115.47	0.250s
Ac-228	3645.56	911.23	0.	9.	0.015	66.67	0.562s
Bi-214	3736.80	934.03	0.	5.	0.008	89.44	0.375s
Ac-228	3859.13	964.60	1.	2.	0.003	277.62	1.588D
Ac-228	3877.18	969.11	1.	11.	0.018	67.71	1.591D
Bi-214	4482.33	1120.33	0.	6.	0.010	81.65	0.375s
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	5845.07	1460.83	0.	15.	0.025	51.64	0.562s
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.

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:57:03 Page 4
4714781 Spectrum name: Win00277.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	8.0418E-05	609.31	7.410E-05	(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	9.978E-05	?(	1.663E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	3.288E-04	+	2.434E-04	G
K-40	N	4.5857E-04	1460.81	4.586E-04	?(	3.057E-05	G
Ac-228	N	1.1330E-04	911.07	6.700E-05	?(	7.444E-06	G K
			969.11	1.416E-04	(	2.841E-05	G
			338.32	1.223E-04	?(	7.641E-06	G
			964.60	0.000E+00	%	1.255E-04	G
			794.70	1.185E-04	?(	3.948E-05	G
			463.00	0.000E+00	?	5.126E-05	G
			209.28	3.605E-04	&	1.264E-04	G
			270.23	3.042E-04	(	2.028E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	%	2.411E-04	X
			327.64	3.449E-04	+	1.492E-04	G

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Pb-212	N	6.1661E-05	238.62	6.166E-05	(	4.218E-06		G K
			77.11	5.716E-03	+	2.273E-04	Energy duplication	
			74.81	0.000E+00	%	1.415E-04	Energy duplication	
CS-137		9.0260E-06	661.66	9.026E-06	&(	1.805E-06		G
Th-234	N	5.2799E-04	92.35	1.948E-04	(	1.135E-04		G
			63.29	1.002E-03	?(	8.578E-04		G
Pb-214	N	4.5925E-05	351.92	4.593E-05	(	8.151E-06		G K
			295.21	2.851E-05	-	2.444E-05		G
			77.11	0.000E+00	?	3.143E-04	Energy duplication	
			241.98	1.775E-04	+	7.288E-05		G
			74.81	9.563E-04	+	6.131E-04	Energy duplication	
			87.30	0.000E+00	&	1.394E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00		4.786E-03		G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:57:03 Page 5
4714781 Spectrum name: Win00277.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AM-241	2.4565E+00	59.54	2.457E+00	(	5.923E-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	1.0179E+01	4.156E+00	4.170E+00

WI07 - 0625 D1 Sludge Box #123 #4 072707

K-40	#	5.8046E+01	2.998E+01	3.004E+01
Ac-228		1.4342E+01	4.759E+00	4.784E+00
Pb-212		7.8052E+00	2.573E+00	2.587E+00
CS-137	#	1.1425E+00	1.022E+00	1.023E+00
Th-234		6.6834E+01	7.165E+01	7.166E+01
Pb-214		5.8133E+00	3.407E+00	3.413E+00
Pb-210	<	6.0576E+02		
AM-241		3.1095E+05	5.075E+02	1.151E+04

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.

0

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 12:57:03 Page 6
4714781 Spectrum name: Win00277.Anl

< - 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) 3.1111850E+05 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0626 D1 Sludge Box #123 #5 072707

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 13:13:57 Page    1
4714781                          Spectrum name: Win00278.An1

Sample description
     WI07-0626  D1   Box #123 - #5  072707


Spectrum Filename: C:\User\Win00278.An1

Acquisition information
       Start time:                 27-Jul-2007 13:02:24
       Live time:                600
       Real time:                686
       Dead time:                 12.50 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                  ( -6.935993E-02*Log(E)^2 )
            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:                4.6000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  4.6000E+00) =
                                   2.1739E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
       Systematic error:           1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 13:13:57 Page    2
4714781                          Spectrum name: Win00278.An1
```

WI07 - 0626 D1 Sludge Box #123 #5 072707

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: 0.1297

********** 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	
26.23	6.72	8592.	6498.	10.830	4.74	0.915	CU-64	D
31.13	7.95	9742.	12819.	21.366	2.80	0.916	ZN-65	D
43.96	11.15	9217.	5195.	8.658	5.92	0.919	PB-214	D
55.48	14.03	9387.	37396.	62.326	1.27	0.921	PU-239	D
69.93	17.66	15127.	122003.	203.338	0.70	1.163	MO-99	s
83.98	21.17	9823.	50717.	84.528	1.17	1.210	TC-99M	s
105.07	26.44	5460.	44639.	74.398	1.18	0.956	AM-241	
131.36	33.01	4497.	3459.	5.765	8.47	0.947	CS-137	s
197.73	49.60	118801.	54996.	91.661	2.70	1.993	EU-155	s
293.49	73.41	1211.	665.	1.108	16.71	0.970	BI-207	D
322.15	80.57	458.	456.	0.760	16.26	0.975	J-131	D
395.39	98.96	184.	663.	1.105	9.69	0.990	AC-228	D
411.42	103.00	213.	740.	1.234	10.29	0.994	GD-153	M
476.01	119.15	203.	913.	1.521	10.12	1.024	NP-239	M
500.78	125.34	26.	124.	0.207	23.17	1.121	PA-234	M

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	185.43	46.52	58151.	0.	0.000	0.00	0.948
AM-241	237.90	59.64	76041.	1268358.	2113.930	0.20	0.941
Th-234	252.57	63.30	1448.	112.	0.186	109.55	0.287s
Pb-214	298.61	74.81	1739.	171.	0.284	70.83	0.971D
Pb-212	298.63	74.81	297.	0.	0.000	496.30	0.000D
Pb-212	307.80	77.11	1007.	1397.	2.328	8.36	0.973D
Pb-214	307.80	77.11	1563.	0.	0.000	963.29	0.572D

WI07 - 0626 D1 Sludge Box #123 #5 072707

Pb-214	349.00	87.40	60.	5.	0.008	481.66	0.000s
Th-234	368.79	92.35	76.	11.	0.018	231.35	0.985D
Ac-228	380.79	95.35	30.	0.	0.000	0.00	0.362D
Ac-228	838.17	209.66	9.	5.	0.008	220.39	0.262s
Pb-212	954.08	238.62	5.	40.	0.067	35.02	1.099D
Pb-214	967.50	241.98	8.	15.	0.024	76.90	1.101D
Ac-228	1081.00	270.35	3.	0.	0.001	437.16	0.000s
Pb-214	1177.42	294.44	2.	19.	0.031	55.10	0.368s
Ac-228	1309.40	327.43	2.	2.	0.002	328.86	0.278s
Ac-228	1353.11	338.35	4.	14.	0.023	73.70	0.403s
Pb-214	1408.11	352.09	3.	25.	0.042	47.70	0.903
Ac-228	1853.00	463.28	0.	5.	0.008	89.44	1.250
Bi-214	2436.17	609.01	0.	18.	0.030	47.14	0.750s
CS-137	2645.33	661.28	0.	7.	0.012	75.59	0.375s
Bi-214	3074.00	768.40	0.	0.	0.001	223.61	0.000s
Ac-228	3177.33	794.23	0.	3.	0.005	115.47	0.250s
Ac-228	3635.94	908.83	2.	4.	0.006	184.53	0.237s
Bi-214	3738.50	934.46	0.	4.	0.007	100.00	1.000s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.218D
Ac-228	3872.67	967.98	0.	10.	0.017	63.25	0.375s
Bi-214	4481.20	1120.04	0.	5.	0.008	89.44	0.375s
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	5844.55	1460.70	0.	16.	0.027	50.00	0.458s
Ac-228	6353.00	1587.74	0.	3.	0.005	115.47	0.250s
Bi-214	7059.50	1764.27	0.	2.	0.003	141.42	0.500s

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

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 13:13:57 Page 4
4714781 Spectrum name: Win00278.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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	5.9836E-05	609.31	5.558E-05	?(	3.088E-06	G K
			1764.49	5.004E-05	?(	2.502E-05	G
			1120.29	8.315E-05	?(	1.663E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	2.631E-04	+	2.218E-04	G
K-40	N	4.8914E-04	1460.81	4.891E-04	?(	3.057E-05	G
Ac-228	N	9.2248E-05	911.07	2.730E-05	&(	2.023E-05	G K
			969.11	1.317E-04	&(	1.317E-05	G
			338.32	1.032E-04	?(	2.706E-05	G
			964.60	0.000E+00	%	8.370E-05	G
			794.70	1.185E-04	?(	3.948E-05	G
			463.00	1.282E-04	?(	2.563E-05	G
			209.28	0.000E+00	%	7.962E-05	G
			270.23	0.000E+00	%	6.085E-05	G
			1588.00	3.042E-04	?(	1.014E-04	G
			95.35	0.000E+00	%	9.355E-05	X
			327.64	0.000E+00	%	8.948E-05	G

```
Pb-212    N   5.9969E-05    238.62 5.997E-05  (  5.385E-06          G K
                             77.11 3.142E-03 +   1.571E-04Energy duplication
                             74.81 0.000E+00 %   9.478E-05Energy duplication

CS-137        1.2636E-05    661.66 1.264E-05 ?(  1.805E-06          G

Th-234    N   0.0000E+00     92.35 0.000E+00 %   9.991E-05          G
                             63.29 1.239E-03 ?   6.263E-04          G

Pb-214    N   6.6004E-05    351.92 6.083E-05  (  7.088E-06          G K
                            295.21 7.603E-05 &(  1.107E-05          G
                             77.11 0.000E+00 %   2.175E-04Energy duplication
                            241.98 1.306E-04 +   6.542E-05          G
                             74.81 1.120E-03 +   4.090E-04Energy duplication
                             87.30 0.000E+00 %   1.002E-04          X

Pb-210    N   0.0000E+00     46.50 0.000E+00     3.760E-03          G
```

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 13:13:57 Page 5
4714781 Spectrum name: Win00278.An1

```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AM-241       1.5102E+00     59.54 1.510E+00  (  4.649E-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 #     1.3008E+01     6.132E+00     6.148E+00
```

WI07 - 0626 D1 Sludge Box #123 #5 072707

K-40	#	1.0633E+02	5.317E+01	5.329E+01
Ac-228	#	2.0054E+01	9.343E+00	9.369E+00
Pb-212		1.3037E+01	4.566E+00	4.588E+00
CS-137	#	2.7470E+00	2.077E+00	2.079E+00
Th-234	<	2.1719E+01		
Pb-214		1.4349E+01	5.228E+00	5.252E+00
Pb-210	<	8.1749E+02		
AM-241		3.2831E+05	6.570E+02	1.215E+04

- 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 27-JUL-2007 13:13:57 Page 6
4714781 Spectrum name: Win00278.Anl

< - 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) 3.2847522E+05 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0627 D1 Sandy Sludge Box #125 #1 072807

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 1
4714781 Spectrum name: Win00280.An1

Sample description
WI07-0 D1 Daily Source Check 072807

Spectrum Filename: C:\User\Win00280.An1

Acquisition information
Start time: 28-Jul-2007 07:32:31
Live time: 600
Real time: 617
Dead time: 2.68 %
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: Calib.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: 5.5200E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 5.5200E+02) = 1.8116E+03
Detection limit method: Nureg 4.16

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 2
4714781 Spectrum name: Win00280.An1

WI07 - 0627 D1 Sandy Sludge Box #125 #1 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:	YES	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1674

********** 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	
27.98	7.17	652.	666.	1.110	15.38	1.686	CU-64	sM
48.41	12.10	1893.	2662.	4.436	6.03	0.920	PB-214	D
60.16	15.04	1646.	524.	0.873	23.58	0.922	PU-239	D
71.69	17.92	1344.	439.	0.731	25.49	0.925	MO-99	D
198.07	49.68	5970.	1007.	1.678	29.39	1.475	EU-155	s
318.18	79.66	935.	77.	0.129	114.10	0.974	TH-227	D
1108.05	277.26	472.	84.	0.139	76.61	1.128	TL-208	D
2605.93	651.44	312.	130.	0.216	70.37	0.305	-	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
Y-88	55.70	14.10	2566.	211.	0.352	69.13	0.922D
Y-88	55.94	14.16	2777.	0.	0.000	0.00	0.922D
CO-57	56.94	14.41	2397.	0.	0.000	0.00	0.922D
Y-88	62.62	15.83	2084.	0.	0.000	0.00	0.923D
Y-88	63.62	16.08	2046.	43.	0.072	295.70	0.923D
CD-109	87.26	21.99	38956.	0.	0.000	0.00	0.928D

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 3
4714781 Spectrum name: Win00280.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CD-109	87.94	22.16	4182.	34880.	58.133	1.19	0.928D
SN-113	95.31	24.00	25198.	1000.	1.667	45.34	0.930D
SN-113	96.15	24.21	20629.	0.	0.000	0.00	0.930D
CD-109	99.03	24.93	5926.	9001.	15.001	3.21	0.930D
CD-109	101.15	25.46	11057.	3642.	6.070	8.81	0.931D

WI07 - 0627 D1 Sandy Sludge Box #125 #1 072807

SN-113	108.39	27.27	3685.	251.	0.418	69.54	0.932D
SN-113	110.75	27.86	1278.	0.	0.000	0.00	0.933D
CS-137	126.60	31.82	1817.	170.	0.283	72.54	0.936D
CS-137	128.08	32.19	1213.	784.	1.306	14.46	0.936D
CE-139	131.44	33.03	1916.	155.	0.259	81.39	0.937D
CE-139	133.08	33.44	1842.	0.	0.000	0.00	0.937D
CS-137	144.92	36.40	1049.	191.	0.318	50.09	0.940D
CS-137	148.52	37.30	1414.	22.	0.037	482.35	0.940D
CE-139	150.52	37.80	1377.	66.	0.110	160.91	0.941D
CE-139	154.12	38.70	930.	4.	0.007	2116.39	0.941D
AM-241	237.74	59.60	6593.	37005.	61.674	1.42	0.988
CE-139	263.60	66.06	1510.	53.	0.088	208.91	0.963D
CE-139	265.24	66.47	1451.	0.	0.000	0.00	0.964D
CE-139	266.88	66.88	1194.	22.	0.036	456.31	0.964D
HG-203	282.56	70.80	876.	8.	0.014	989.00	0.967D
CE-139	282.68	70.83	1180.	0.	0.000	0.00	0.967D
CE-139	284.32	71.24	1455.	0.	0.000	0.00	0.968D
CE-139	286.28	71.73	1596.	0.	0.000	0.00	0.968D
CE-139	287.92	72.14	1739.	4.	0.006	3167.49	0.968D
HG-203	290.85	72.87	1742.	0.	0.000	0.00	0.969D
CE-139	301.77	75.60	1698.	55.	0.092	212.95	0.971D
HG-203	329.38	82.50	1507.	220.	0.367	51.60	0.977D
HG-203	338.98	84.90	1390.	330.	0.549	33.85	0.979D
CD-109	351.50	88.03	1396.	13854.	23.091	1.86	0.981D
CO-57	487.82	122.10	1360.	2460.	4.099	7.07	0.932
CO-57	546.04	136.65	991.	390.	0.650	34.49	1.010s
CE-139	663.35	165.97	836.	341.	0.569	34.90	0.994
CE-139	795.04	198.88	586.	13.	0.021	544.10	1.068D
CE-139	796.68	199.29	652.	76.	0.126	97.95	1.069D
CE-139	813.22	203.42	503.	0.	0.000	0.00	1.072
CE-139	815.71	204.05	482.	22.	0.036	325.61	0.426s
HG-203	1116.39	279.19	496.	24.	0.040	262.82	1.129D
CO-60	1392.68	348.24	392.	76.	0.126	91.08	0.549s
SN-113	1567.27	391.87	535.	104.	0.173	85.50	1.203
Y-88	2038.88	509.73	522.	92.	0.153	107.93	0.248s
CS-137	2647.62	661.85	546.	11672.	19.453	2.01	1.457
CO-57	2769.16	692.23	227.	60.	0.101	90.20	0.443s
Y-88	3394.89	848.59	561.	147.	0.246	79.36	0.556s
Y-88	3593.25	898.16	389.	119.	0.199	58.31	1.288
Y-88	3649.19	912.14	564.	0.	0.000	0.00	0.512D
Y-88	3649.43	912.20	402.	0.	0.000	0.00	0.230D
Y-88	3656.12	913.87	108.	0.	0.000	0.00	0.185D
Y-88	3655.77	913.78	162.	31.	0.051	141.64	0.249s

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4714781 Spectrum name: Win00280.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
CO-60	4695.14	1173.50	243.	9769.	16.282	2.23	1.734
CO-60	5332.57	1332.78	16.	8760.	14.600	2.15	1.730
Y-88	5532.33	1382.69	2.	3.	0.004	208.42	0.311s
Y-88	7330.56	1831.99	0.	50.	0.083	28.28	0.281s
Y-88	7403.37	1850.18	0.	0.	0.000	0.00	0.500D
Y-88	7403.61	1850.24	5.	0.	0.000	0.00	0.000D
Y-88	7410.29	1851.91	0.	0.	0.000	0.00	0.000D
Y-88	7412.67	1852.50	1.	2.	0.003	200.00	0.686s

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 - Average ---------- Peak ----------

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Name	Code	Activity microCi	Energy keV	Activity microCi	Code	MDA Value microCi	Comments
CD-109	R	2.1163E-01	22.16	2.155E-01	(	1.878E-03	G
			21.99	0.000E+00	!	1.077E-02	
			24.93	1.976E-01	(	7.934E-03	G
			88.03	3.087E-01	+	3.940E-03	G
			25.46	4.341E-01	+	5.873E-02	
CE-139	R	4.2114E-04	165.85	4.002E-04	(	1.612E-04	G
			33.44	0.000E+00	%	5.258E-04	
			33.03	7.421E-04	+	9.886E-04	
			37.80	5.585E-04	(	1.486E-03	
			38.70	0.000E+00	%	4.955E-03	
			199.29	6.085E-03	+	9.763E-03	C
			198.88	0.000E+00	%	1.709E-02	C
			203.65	0.000E+00		2.806E-02	C
			66.47	0.000E+00	%	1.345E-01	C
			66.88	0.000E+00	%	1.325E-01	C
			204.55	0.000E+00	%	1.111E-01	C
			71.24	0.000E+00	%	2.382E-01	C
			70.83	0.000E+00	%	3.962E-01	C
			66.06	0.000E+00	%	5.058E-01	
			72.14	0.000E+00	%	1.052E+00	C
			75.60	0.000E+00	%	1.677E+00	C
			71.73	0.000E+00	!	1.859E+00	C
CO-57	R	2.1628E-03	122.06	2.163E-03	(	1.535E-04	G
			136.47	2.835E-03	+	1.087E-03	G
			14.41	0.000E+00	!	3.301E-03	
			691.98	1.001E-01	+	1.209E-01	

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 5
4714781 Spectrum name: Win00280.An1

Nuclide	Ave	activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	R	4.0839E-02	1173.24	4.075E-02	(	3.142E-04	G
			1332.50	4.093E-02	(	9.976E-05	G
			2505.74	0.000E+00	=	0.000E+00	
			346.88	1.557E+00	&	1.956E+00	
CS-137	R	3.4696E-02	661.66	3.470E-02	(	3.317E-04	G
			32.19	2.198E-02	-	4.629E-03	
			31.82	8.811E-03	-	1.043E-02	
			36.40	1.754E-02	-	1.411E-02	
			37.30	0.000E+00	%	6.864E-02	
SN-113	R	2.7140E-04	391.69	2.714E-04	(	2.883E-04	G
			24.21	0.000E+00	!	8.874E-03	
			24.00	2.483E-02	+	1.844E-02	
			27.27	1.157E-02	+	1.316E-02	
			27.86	0.000E+00	%	3.993E-02	
Y-88	R	0.0000E+00	14.16	0.000E+00	!	9.001E-04	
			898.04	4.336E-04	?	3.441E-04	G
			1836.08	3.235E-04	&	4.768E-05	G
			14.10	1.476E-03	$	1.666E-03	
			15.83	0.000E+00	%	3.110E-03	
			16.08	0.000E+00	%	2.496E-02	
			912.20	0.000E+00	&	2.688E-02	C

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                          2734.12 0.000E+00 =   0.000E+00
                          1850.24 0.000E+00 ?   6.551E-03          C
                           912.14 0.000E+00 &   6.098E-02          C
                           511.00 5.561E-02 &   6.633E-02
                          1850.18 0.000E+00 ?   7.080E-03
                           913.87 0.000E+00 %   5.692E-02          C
                          1851.91 0.000E+00 ?   1.464E-02          C
                           850.64 7.165E-01 &   5.498E-01
                           914.12 2.780E-01 ?   5.595E-01          C
                          1852.16 0.000E+00 %   1.186E-01          C
                          1382.44 0.000E+00 %   1.885E-01
                          2748.28 0.000E+00 =   0.000E+00          C

HG-203    R   0.0000E+00   279.19 0.000E+00 %   1.705E-04          G
                            72.87 0.000E+00 !   2.636E-03
                            70.80 0.000E+00 %   3.210E-03
                            82.50 8.245E-03     6.869E-03
                            84.90 4.277E-02     2.291E-02

AM-241    R   9.2303E-02    59.53 9.230E-02  (  9.506E-04          G
   ( - This peak used in the nuclide activity average.

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

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 6
4714781 Spectrum name: Win00280.An1

```
   ! - 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
CD-109	3.8339E+02	4.571E+00	1.558E+01
CE-139	7.6293E-01	2.663E-01	2.680E-01

WI07 - 0627 D1 Sandy Sludge Box #125 #1 072807

CO-57		3.9181E+00	2.770E-01	3.207E-01
CO-60		7.3983E+01	1.146E+00	2.462E+00
CS-137		6.2856E+01	1.263E+00	2.290E+00
SN-113	A	4.9166E-01	4.203E-01	4.210E-01
Y-88	<	1.6306E+00		
HG-203	<	3.0889E-01		
AM-241		1.6722E+02	2.372E+00	6.627E+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) 6.9261462E+02 pCi/g

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:37:28 Page 7
4714781 Spectrum name: Win00280.An1

Laboratory: 4714781

WI07 - 0628 D1 Sludge Box #125 #2 072807

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     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:56:04 Page    1
4714781                         Spectrum name: WI07-0645  D2 Bag # S-070  Grid

Sample description
     WI07-0628  D1   Sandy Sludge  Box # 125  #2  072807


Spectrum Filename: C:\User\D2 Samples\WI07-0645  D2 Bag # S-070  Grid
                     C3-4  072807.An1

Acquisition information
       Start time:                 28-Jul-2007 09:45:47
       Live time:                600
       Real time:                605
       Dead time:                  0.85 %
       Detector ID:                    1

Detector system
     MCB 07044698


Calibration
       Filename:                   HD Petris Dish LeGe.Clb
     High Density Petris Dish; 1.8 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 08:58:53
            Knee Energy:         120.00 keV
            Above the Knee:        Quadratic        Uncertainty =   2.19 %
            Log(Eff):             -6.488241E-01 + ( 6.750725E-03*Log(E) ) +
                                   ( -6.935993E-02*Log(E)^2 )
            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:                4.9000E+00
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  4.9000E+00) =
                                   2.0408E+05
       Detection limit method:     Traditional ORTEC method

       Random error:               1.0000000E+00
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:56:04 Page    2
4714781                         Spectrum name: WI07-0645  D2 Bag # S-070  Grid
```

WI07 - 0628 D1 Sludge Box #125 #2 072807

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: 0.0789

********** 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	
29.06	7.44	289.	861.	1.435	10.31	1.994	CU-64	s
55.46	14.04	268.	791.	1.319	9.95	0.874	PU-239	
69.87	17.64	384.	3265.	5.442	4.24	1.114	MO-99	s
84.01	21.18	215.	1372.	2.286	6.83	1.252	TC-99M	s
105.15	26.46	153.	1316.	2.193	6.67	0.971	AM-241	s
131.40	33.02	101.	123.	0.204	36.25	0.839	CS-137	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	185.13	46.45	405.	19.	0.032	272.48	0.267s
AM-241	237.84	59.62	2365.	39429.	65.715	1.19	0.990
Th-234	254.31	63.74	24.	14.	0.023	132.48	0.542s
Pb-214	298.61	74.81	38.	13.	0.021	149.71	0.971D
Pb-212	298.63	74.81	32.	0.	0.000	545.69	0.240D
Pb-212	307.80	77.11	37.	54.	0.090	41.96	0.973D
Pb-214	307.80	77.11	61.	0.	0.000	905.54	0.214D
Pb-214	348.80	87.35	14.	20.	0.033	81.65	0.916
Th-234	361.21	90.46	16.	13.	0.022	120.16	0.608s
Ac-228	382.07	95.67	17.	0.	0.000	0.00	0.987

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:56:04 Page 3
4714781 Spectrum name: WI07-0645 D2 Bag # S-070 Grid

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	840.56	210.25	8.	4.	0.007	214.30	0.437s
Pb-212	954.39	238.70	9.	36.	0.061	43.96	0.314s
Pb-214	968.38	242.20	15.	0.	0.000	0.00	1.102
Ac-228	1081.89	270.57	1.	2.	0.004	177.42	0.229s
Pb-214	1180.50	295.21	0.	8.	0.013	70.71	0.375s

WI07 - 0628 D1 Sludge Box #125 #2 072807

Ac-228	1305.67	326.49	0.	8.	0.013	70.71	0.375s
Ac-228	1350.41	337.67	2.	16.	0.026	63.54	0.393s
Pb-214	1408.18	352.11	0.	28.	0.047	37.80	0.768s
Ac-228	1853.50	463.40	0.	3.	0.005	115.47	0.500s
Bi-214	2437.34	609.31	0.	29.	0.048	37.14	0.437s
CS-137	2647.50	661.82	0.	4.	0.007	100.00	0.500s
Bi-214	3072.00	767.91	0.	1.	0.002	200.00	0.250s
Ac-228	3180.67	795.06	1.	0.	0.001	240.37	0.197s
Ac-228	3649.00	912.09	0.	8.	0.013	70.71	0.250s
Bi-214	3737.50	934.21	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3876.86	969.03	0.	7.	0.012	75.59	0.375s
Bi-214	4484.00	1120.74	0.	4.	0.007	100.00	0.250s
Bi-214	4954.00	1238.18	0.	1.	0.002	200.00	0.250s
Bi-214	5510.33	1377.20	0.	3.	0.005	115.47	0.375s
K-40	5845.00	1460.82	1.	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	8.6247E-05	609.31	8.954E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	?	2.502E-05	G
			1120.29	6.652E-05	?(	1.663E-05	G
			1238.11	0.000E+00	%	9.320E-05	G
			768.36	0.000E+00	%	6.988E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.245E-04	+	2.245E-04	G
			934.06	1.315E-04	?(	6.576E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	6.114E-05	G
Ac-228	N	8.7639E-05	911.07	5.956E-05	&(	7.444E-06	G K
			969.11	9.217E-05	?(	1.317E-05	G
			338.32	1.184E-04	&(	2.133E-05	G
			964.60	0.000E+00	?	4.185E-05	G

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 09:56:04 Page 4
4714781 Spectrum name: WI07-0645 D2 Bag # S-070 Grid

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	0.000E+00	%	7.897E-05	G
		463.00	7.689E-05	?(	2.563E-05	G
		209.28	0.000E+00	&	7.427E-05	G
		270.23	4.394E-05	-	6.085E-05	G
		1588.00	0.000E+00	?	1.014E-04	G
		95.35	0.000E+00	%	7.192E-05	X
		327.64	2.123E-04	&(	2.653E-05	G
Pb-212	N 5.4107E-05	238.62	5.411E-05	@(	6.989E-06	G K
		77.11	1.215E-04	+	3.152E-05	Energy duplication
		74.81	0.000E+00	%	3.244E-05	Energy duplication
CS-137	7.2208E-06	661.66	7.221E-06	?(	1.805E-06	G

```
                    WI07 - 0628  D1 Sludge Box #125  #2  072807
Th-234    N   1.1990E-04     92.35 9.480E-05 &(  4.506E-05          G
                             63.29 1.556E-04 ?(  8.277E-05          G

Pb-214    N   6.9776E-05    351.92 6.768E-05 ?(  2.417E-06          G K
                            295.21 3.258E-05 -   1.846E-05          G
                             77.11 0.000E+00 %   4.468E-05Energy duplication
                            241.98 0.000E+00 %   5.299E-05          G
                             74.81 8.234E-05  (  6.046E-05Energy duplication
                             87.30 1.682E-04 +   7.369E-05          X

Pb-210    N   0.0000E+00     46.50 0.000E+00 %   3.262E-04          G

AM-241        4.6947E-02     59.54 4.695E-02  (  8.249E-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
```

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      ORTEC g v - i (  63) wan32  G53W2.06  28-JUL-2007 09:56:04 Page    5
 4714781                          Spectrum name: WI07-0645  D2 Bag # S-070  Grid

   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 #     1.7601E+01    6.537E+00     6.565E+00
 K-40    <    1.2478E+01
 Ac-228 #     1.7886E+01    6.507E+00     6.535E+00
 Pb-212       1.1042E+01    4.854E+00     4.869E+00
 CS-137 #     1.4736E+00    1.474E+00     1.475E+00
 Th-234 #     2.4469E+01    2.188E+01     2.189E+01
 Pb-214       1.4240E+01    5.382E+00     5.404E+00
 Pb-210  <    6.6568E+01
 AM-241       9.5811E+03    1.138E+02     3.720E+02
```

WI07 - 0628 D1 Sludge Box #125 #2 072807

- 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) 9.6677822E+03 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0629 D1 Sludge Box #125 #3 072807

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:11:40 Page 1
4714781 Spectrum name: Win00283.An1

Sample description
WI07-0629 D1 Sandy Sludge Box # 125 #3 072807

Spectrum Filename: C:\User\Win00283.An1

Acquisition information
Start time: 28-Jul-2007 10:01:20
Live time: 600
Real time: 606
Dead time: 1.07 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 8.6000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 8.6000E+00) = 1.1628E+05
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:11:40 Page 2
4714781 Spectrum name: Win00283.An1

WI07 - 0629 D1 Sludge Box #125 #3 072807

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: 0.1300

********** 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	
26.39	6.63	450.	514.	0.857	14.62	0.915	CU-64	D
31.65	7.94	895.	530.	0.884	18.16	0.916	ZN-65	D
55.50	14.05	364.	965.	1.608	9.40	0.924	PU-239	
70.03	17.68	544.	3906.	6.510	3.96	1.149	MO-99	s
84.12	21.20	363.	1938.	3.230	6.01	1.203	TC-99M	s
104.92	26.40	231.	1944.	3.240	5.62	1.007	AM-241	s
131.80	33.12	144.	232.	0.386	24.21	1.653	XE-138	s
197.51	49.63	4804.	2118.	3.530	10.23	0.950	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	185.33	46.50	2478.	118.	0.196	120.92	0.948D
AM-241	237.83	59.62	4605.	64287.	107.144	0.91	0.967
Th-234	254.18	63.71	38.	18.	0.030	127.66	0.453s
Pb-214	298.61	74.81	63.	20.	0.034	118.24	0.971D
Pb-212	298.63	74.81	22.	0.	0.000	393.70	0.265D
Pb-212	307.80	77.11	43.	72.	0.120	34.74	0.972D
Pb-214	307.80	77.11	97.	0.	0.000	648.28	0.000D
Pb-214	345.52	86.54	13.	8.	0.013	162.45	1.083
Th-234	368.79	92.35	33.	21.	0.034	91.25	0.985D

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:11:40 Page 3
4714781 Spectrum name: Win00283.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	380.79	95.35	17.	13.	0.021	109.82	0.987D
Ac-228	837.81	209.57	4.	17.	0.029	67.72	0.476s
Pb-212	954.08	238.62	5.	43.	0.072	33.84	1.099D
Pb-214	967.50	241.98	6.	13.	0.022	74.00	1.101D
Ac-228	1079.25	269.91	2.	1.	0.002	314.25	0.312s

WI07 - 0629 D1 Sludge Box #125 #3 072807

Pb-214	1180.03	295.09	4.	20.	0.033	58.76	0.584s
Ac-228	1304.08	326.10	3.	3.	0.004	254.95	0.347s
Ac-228	1347.44	336.93	5.	7.	0.012	130.48	0.312s
Pb-214	1407.96	352.06	0.	28.	0.047	37.80	1.291
Ac-228	1853.50	463.40	0.	3.	0.005	115.47	0.500s
Bi-214	2437.00	609.22	12.	0.	0.000	0.00	0.000s
CS-137	2648.00	661.95	1.	0.	0.000	260.34	0.000s
Bi-214	3072.00	767.91	0.	0.	0.000	0.00	0.000s
Ac-228	3178.33	794.48	1.	0.	0.001	240.37	0.197s
Ac-228	3648.00	911.84	0.	13.	0.022	55.47	0.250s
Bi-214	3734.00	933.33	0.	4.	0.007	100.00	0.250s
Ac-228	3859.13	964.60	0.	4.	0.006	116.21	1.589D
Ac-228	3877.18	969.11	1.	5.	0.008	120.23	1.591D
Bi-214	4482.00	1120.24	1.	0.	0.000	0.00	0.000s
Bi-214	4954.00	1238.18	0.	4.	0.007	100.00	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5846.95	1461.30	0.	20.	0.033	44.72	1.062s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.39	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	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	%	1.795E-05	G K
			1764.49	1.501E-04	?	1.001E-04	G
			1120.29	0.000E+00	?	3.326E-05	G
			1238.11	1.864E-04	?	1.571E-04	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	2.631E-04	?	2.218E-04	G
K-40	N	6.1142E-04	1460.81	6.114E-04	?(	3.057E-05	G
Ac-228	N	1.0542E-04	911.07	9.678E-05	?(	7.444E-06	G K
			969.11	5.982E-05	-	5.267E-05	G
			338.32	5.604E-05	&	4.145E-05	G

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:11:40 Page 4
4714781 Spectrum name: Win00283.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		964.60	1.510E-04	(	6.352E-05	G
		794.70	0.000E+00	%	7.897E-05	G
		463.00	7.689E-05	?(	2.563E-05	G
		209.28	2.373E-04	+	9.584E-05	G
		270.23	0.000E+00	%	6.085E-05	G
		1588.00	0.000E+00	?	1.014E-04	G
		95.35	1.420E-04	(	7.280E-05	X
		327.64	0.000E+00	&	1.061E-04	G
Pb-212	N 6.4064E-05	238.62	6.406E-05	(	5.503E-06	G K
		77.11	1.626E-04	+	3.525E-05	Energy duplication
		74.81	0.000E+00	%	2.706E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	3.610E-06	G

```
Th-234    N   1.7037E-04      92.35 1.495E-04  (  6.345E-05          G
                              63.29 2.001E-04 ?(  1.026E-04          G

Pb-214    N   7.1341E-05     351.92 6.768E-05  (  2.417E-06          G K
                             295.21 8.010E-05  (  1.420E-05          G
                              77.11 0.000E+00 %   5.571E-05Energy duplication
                             241.98 1.201E-04 +   5.990E-05          G
                              74.81 1.340E-04 +   8.793E-05Energy duplication
                              87.30 6.449E-05 &(  4.784E-05          X

Pb-210    N   1.2972E-03      46.50 1.297E-03  (  7.807E-04          G

AM-241        7.6545E-02      59.54 7.654E-02  (  1.149E-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
```

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:11:40 Page 5
4714781 Spectrum name: Win00283.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	B<	2.0878E+00		
K-40	#	7.1096E+01	3.179E+01	3.189E+01
Ac-228		1.2258E+01	6.279E+00	6.293E+00
Pb-212		7.4493E+00	2.521E+00	2.534E+00
CS-137	<	4.1981E-01		
Th-234		1.9811E+01	1.554E+01	1.555E+01
Pb-214		8.2954E+00	3.135E+00	3.148E+00
Pb-210		1.5084E+02	1.824E+02	1.824E+02

WI07 - 0629 D1 Sludge Box #125 #3 072807

AM-241	8.9005E+03	8.110E+01	3.389E+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) 9.1703018E+03 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0630 D1 Sludge Box #125 #4 072807

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:27:52 Page 1
4714781 Spectrum name: Win00284.An1

Sample description
WI07-0630 D1 Sandy Sludge Box # 125 #4 072807

Spectrum Filename: C:\User\Win00284.An1

Acquisition information
Start time: 28-Jul-2007 10:17:31
Live time: 600
Real time: 614
Dead time: 2.23 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: HD Petris Dish LeGe.Clb
High Density Petris Dish; 1.8 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 08:58:53
Knee Energy: 120.00 keV
Above the Knee: Quadratic Uncertainty = 2.19 %
Log(Eff): -6.488241E-01 + (6.750725E-03*Log(E)) + (-6.935993E-02*Log(E)^2)
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: 2.9700E+01
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9700E+01) = 3.3670E+04
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00
Systematic error: 1.0000000E+00

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:27:52 Page 2
4714781 Spectrum name: Win00284.An1

WI07 - 0630 D1 Sludge Box #125 #4 072807

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: 0.0863

********** 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	
26.14	6.69	1217.	955.	1.592	12.19	0.915	CU-64	D
31.15	7.95	1471.	1826.	3.044	7.56	0.916	ZN-65	D
43.93	11.14	1336.	708.	1.180	16.43	0.919	PB-214	D
55.64	14.07	1350.	4758.	7.930	3.63	0.921	PU-239	D
69.97	17.67	2048.	16294.	27.157	1.91	1.203	MO-99	s
84.01	21.18	1303.	6809.	11.348	3.19	1.228	TC-99M	s
105.09	26.44	675.	6235.	10.392	3.03	1.012	AM-241	
131.45	33.03	450.	581.	0.968	19.03	1.037	XE-138	s
198.35	49.75	16164.	5365.	8.941	9.67	1.709	EU-155	s
293.56	73.48	70.	69.	0.116	41.67	0.970	BI-207	D
395.37	98.98	25.	97.	0.161	25.11	0.990	AC-228	D
411.43	103.01	32.	114.	0.190	26.68	0.852	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	184.87	46.38	5454.	0.	0.000	0.00	0.948
AM-241	237.84	59.62	11537.	182185.	303.642	0.53	0.968
Th-234	253.50	63.54	52.	18.	0.031	136.30	0.533s
Pb-214	298.61	74.81	134.	10.	0.016	342.02	0.971D
Pb-212	298.63	74.81	17.	0.	0.000	0.00	0.000D

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:27:52 Page 3
4714781 Spectrum name: Win00284.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	307.80	77.11	73.	120.	0.200	27.19	0.972D
Pb-214	307.80	77.11	126.	0.	0.000	715.54	1.023D
Pb-214	347.58	87.05	5.	8.	0.013	106.07	0.269s
Th-234	368.79	92.35	30.	18.	0.030	97.81	0.985D
Ac-228	380.79	95.35	25.	0.	0.000	0.00	0.987D

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Ac-228	839.54	210.00	10.	3.	0.005	382.97	0.489s
Pb-212	954.08	238.62	2.	17.	0.029	53.06	1.099D
Pb-214	967.50	241.98	6.	7.	0.011	132.96	1.101D
Ac-228	1079.00	269.85	2.	2.	0.002	258.20	0.100s
Pb-214	1178.09	294.61	3.	17.	0.028	63.35	0.481s
Ac-228	1310.00	327.58	1.	0.	0.000	0.00	0.000s
Ac-228	1349.00	337.32	0.	4.	0.007	100.00	0.250s
Pb-214	1406.33	351.65	2.	1.	0.002	416.33	0.197s
Ac-228	1849.43	462.38	0.	8.	0.013	70.71	0.500s
Bi-214	2437.00	609.22	0.	12.	0.020	57.74	0.312s
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
Ac-228	3644.67	911.01	0.	3.	0.005	115.47	0.375s
Bi-214	3738.50	934.46	0.	2.	0.003	141.42	0.500s
Ac-228	3859.13	964.60	1.	5.	0.008	110.59	1.589D
Ac-228	3877.18	969.11	3.	1.	0.002	388.14	1.591D
Bi-214	4481.67	1120.16	0.	3.	0.005	115.47	0.375s
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	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	4.0209E-05	609.31	3.705E-05	?(	3.088E-06	G K
			1764.49	0.000E+00	%	5.004E-05	G
			1120.29	4.989E-05	?(	1.663E-05	G
			1238.11	0.000E+00	?	4.660E-05	G
			768.36	0.000E+00	?	3.494E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	7.485E-05	G
			934.06	1.315E-04	+	1.685E-04	G

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:27:52 Page 4
4714781 Spectrum name: Win00284.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
K-40	N	0.0000E+00	1460.81	0.000E+00	?	3.057E-05	G
Ac-228	N	6.0104E-05	911.07	2.233E-05	?(	7.444E-06	G K
			969.11	0.000E+00	%	4.620E-05	G
			338.32	3.057E-05	&(	7.641E-06	G
			964.60	2.034E-04	(	8.858E-05	G
			794.70	0.000E+00	?	3.948E-05	G
			463.00	2.050E-04	?(	2.563E-05	G
			209.28	0.000E+00	&	7.699E-05	G
			270.23	0.000E+00	%	6.085E-05	G
			1588.00	0.000E+00	?	1.014E-04	G
			95.35	0.000E+00	!	8.592E-05	X
			327.64	0.000E+00	?	5.307E-05	G
Pb-212	N	2.5603E-05	238.62	2.560E-05	(	3.672E-06	G K

```
                    WI07 - 0630  D1 Sludge Box #125  #4  072807
                              77.11 2.699E-04 +   4.533E-05Energy duplication
                              74.81 0.000E+00 ?   2.420E-05Energy duplication

CS-137        0.0000E+00    661.66 0.000E+00 %   3.610E-06          G

Th-234    N   1.6142E-04     92.35 1.316E-04  (  6.020E-05          G
                              63.29 2.038E-04 ?(  1.187E-04          G

Pb-214    N   0.0000E+00    351.92 0.000E+00 %   7.251E-06          G K
                             295.21 6.924E-05 &   2.788E-05          G
                              77.11 0.000E+00 %   6.317E-05Energy duplication
                             241.98 5.934E-05     5.039E-05          G
                              74.81 0.000E+00 %   1.147E-04Energy duplication
                              87.30 6.729E-05 ?   4.730E-05          X

Pb-210    N   0.0000E+00     46.50 0.000E+00     1.156E-03          G

AM-241        2.1692E-01     59.54 2.169E-01  (  1.815E-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
```

ORTEC g v - i (63) wan32 G53W2.06 28-JUL-2007 10:27:52 Page 5
4714781 Spectrum name: Win00284.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 #     1.3538E+00    7.816E-01     7.830E-01
K-40    <    1.0293E+00
Ac-228       2.0237E+00    1.019E+00     1.021E+00
Pb-212       8.6206E-01    4.574E-01     4.584E-01
```

WI07 - 0630 D1 Sludge Box #125 #4 072807

CS-137	<	1.2156E-01		
Th-234		5.4349E+00	4.559E+00	4.561E+00
Pb-214	B<	2.4415E-01		
Pb-210	<	3.8907E+01		
AM-241		7.3038E+03	3.863E+01	2.728E+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) 7.3135151E+03 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781