82A8008
Survey Cover Sheet

Survey No. WI07-0526

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 7/25/07 (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-047
PURPOSE: Contamination / Dose Rate

BAG # S-047

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	78.0	<MDC	
2	N/A	82.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	84.8	<MDC	
6	N/A	96.1	<MDC	

N A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0527

Surveyor: Carl Ingle (Print) — Sign — Date: 7/24/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date: 7/27/07

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-048
PURPOSE: Contamination / Dose Rate

BAG # S-048

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	91.6	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	84.8	<MDC	
6	N/A	96.1	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{e_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0528

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/24/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — Date: 7/27/05

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-049
PURPOSE: Contamination / Dose Rate

BAG # S-049

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	91.6	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	84.8	<MDC	
6	N/A	96.1	<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. WI07-0529

Surveyor: Carl Ingle (Print) — Carl Ingle (Sign) — 8/2/07 — 7/28/2007 (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 #	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)	34	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 #050
PURPOSE: Contamination / Dose Rate

Bag # 050

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	81.8	<MDC	
2	N/A	77.3	<MDC	
3	N/A	97.7	<MDC	
4	N/A	104.5	<MDC	
5	N/A	100.0	<MDC	
6	N/A	102.3	<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. WI07-0530

eyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — Date: 7/28/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — Date: 8/3/07

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)	34	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 #051
POSE: Contamination / Dose Rate

Bag # 051

Contact D/R – 60

#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	97.7	<MDC	
2	N/A	79.5	<MDC	
3	N/A	93.2	<MDC	
4	N/A	111.4	<MDC	
5	N/A	95.5	<MDC	
6	N/A	109.1	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0531

eyor: Carl Ingle (Print) — Sign — 8/2/07 — 7/28/2007 (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 #	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)	34	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 #052
OSE: Contamination / Dose Rate

Bag # 052

Contact D/R – 34

#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	127.3	<MDC	
2	N/A	90.9	<MDC	
3	N/A	79.5	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	100.0	<MDC	
6	N/A	122.7	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0539

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 8/2/07 7/29/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/5/07

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)	41	BKG (cpm)	0.23	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 #060
PURPOSE: Contamination / Dose Rate

Bag # 060

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	106.8	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	86.4	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	115.9	<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. WI07-0549

yor: Carl Ingle (Print) — Sign — 7/27/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign — 7/6/07 (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 #	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)	40	BKG (cpm)	0.17	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	43	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

ATION: External Surface of Bag # S-053
PURPOSE: Contamination / Dose Rate

BAG # S-053

Contact D/R – 11mr

#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	88.6	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0550

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 8/2/07 7/28/2007

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn Parkhurst — Date: 8/5/07

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)	34	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 #054
PURPOSE: Contamination / Dose Rate

Bag # 054

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	134.1	<MDC	
2	N/A	90.9	<MDC	
3	N/A	72.7	<MDC	
4	N/A	109.1	<MDC	
5	N/A	115.9	<MDC	
6	N/A	93.2	<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. WI07-0551

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — Date: 7/28/2007

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn Parkhurst — Date: 8/5/07

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)	34	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 #055
PURPOSE: Contamination / Dose Rate

Bag # 055

Contact D/R – 60

#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	86.4	<MDC	
2	N/A	97.7	<MDC	
3	N/A	93.2	<MDC	
4	N/A	104.5	<MDC	
5	N/A	93.2	<MDC	
6	N/A	122.7	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0552

yor: Carl Ingle (Print) — Sign — 8/2/07 7/28/2007 (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 #	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)	34	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 #056
POSE: Contamination / Dose Rate

Bag # 056

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	109.1	<MDC	
2	N/A	75.0	<MDC	
3	N/A	88.6	<MDC	
4	N/A	97.7	<MDC	
5	N/A	127.3	<MDC	
6	N/A	113.6	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0553

yor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/2/07 7/28/2007
Date

5/5/07
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)	34	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 #057
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	90.9	<MDC	
2	N/A	97.7	<MDC	
3	N/A	106.8	<MDC	
4	N/A	102.3	<MDC	
5	N/A	127.3	<MDC	
6	N/A	93.2	<MDC	

Bag # 057

Contact D/R – 15

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(1 + t_s/t_b)}}{t_s(t_b)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0554

yor: Carl Ingle (Print) — Carl Ingle (Sign) — 8/2/07 7/28/2007 (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 #	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)	34	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 #058
POSE: Contamination / Dose Rate

Bag # 058

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	102.3	<MDC	
2	N/A	113.6	<MDC	
3	N/A	77.3	<MDC	
4	N/A	122.7	<MDC	
5	N/A	88.6	<MDC	
6	N/A	131.8	<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. WI07-0555

yor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/2/07 7/29/2007
Date

8/5/07
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)	41	BKG (cpm)	0.23	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 #059
OSE: 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	
2	N/A	90.9	<MDC	
3	N/A	84.1	<MDC	
4	N/A	77.3	<MDC	
5	N/A	95.5	<MDC	
6	N/A	102.3	<MDC	

Bag # 059

Contact D/R – 12

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0560

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — Date: 7/29/2007

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn Parkhurst — Date: 8/5/07

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)	41	BKG (cpm)	0.23	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 #061
PURPOSE: Contamination / Dose Rate

Bag # 061

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	93.2	<MDC	
2	N/A	86.4	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	102.3	<MDC	
5	N/A	111.4	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(e_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 561

Surveyor: Jack Mugia (Print) — Sign — 7/24/07

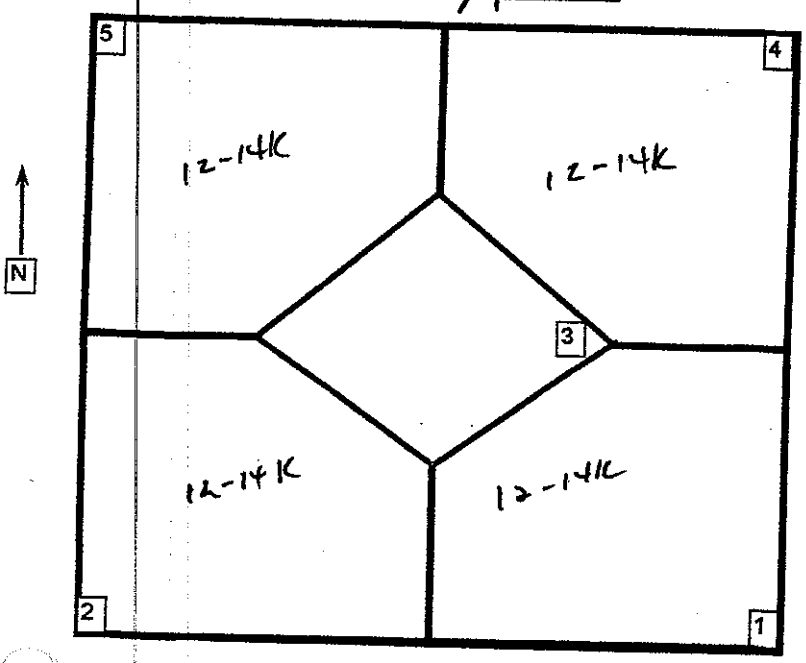
Reviewer: Glenn Parkhurst (Print) — Sign — 7/25/07 (Date)

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)	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-3



Locatio	cpm Direct			
		N	a	

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

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 56 L

Surveyor: Jack Nucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

Date: 7/24/07 — 7/27/07

Survey Meters

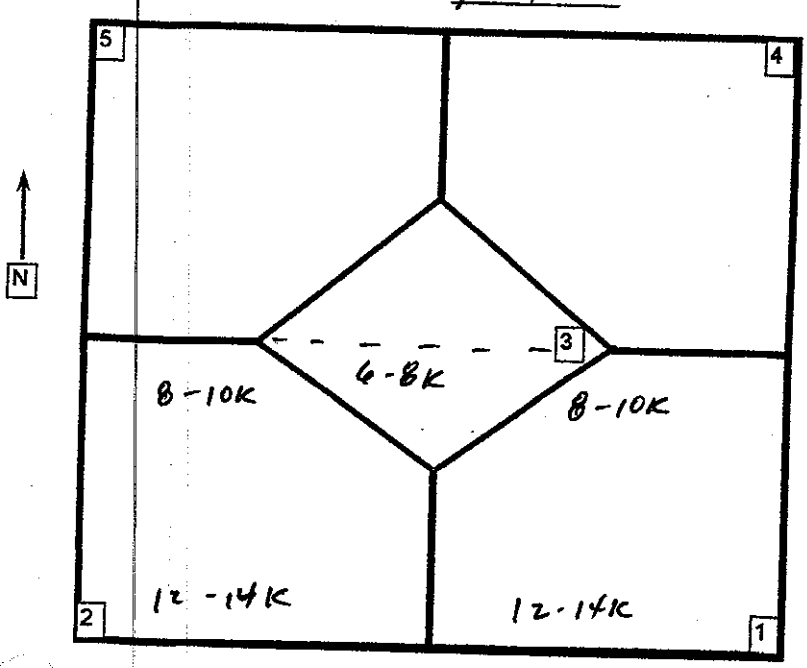
Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	76%	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 # A-4



Location	cpm Direct			

N/A

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(probe\ area/100cm^2)}$$

$$AI = Rb + ((guideline)(eff.))$$

$$dpm / 100cm^2 = \frac{gross\ cpm - bkg\ cpm}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0580

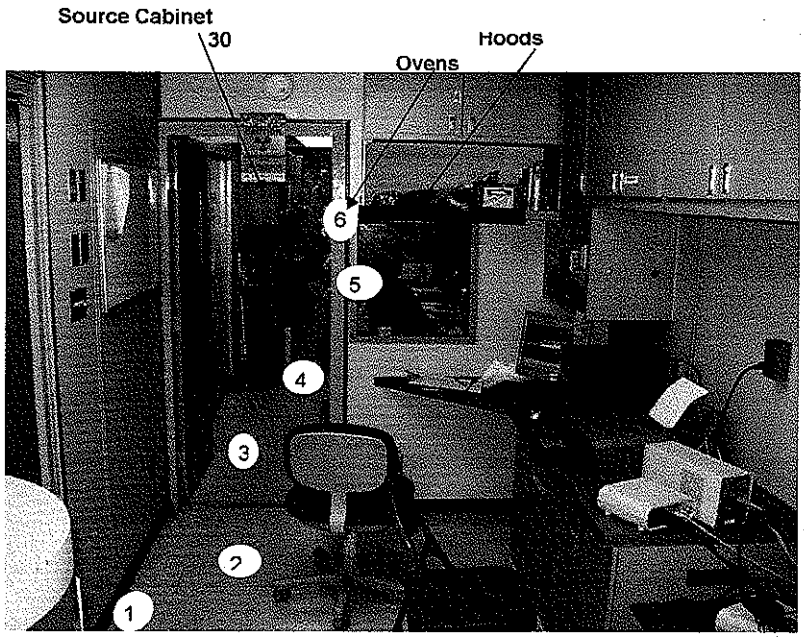
yor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/25/2007 (Date)

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 #	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)	39	BKG (cpm)	0.28	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	74	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: 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	86.8	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	102.7	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	86.8	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0583

eyor: Carl Ingle (Print) — Sign — 8/2/07 — 7/28/2007 (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 #	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)	34	BKG (cpm)	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 #001
POSE: Contamination / Dose Rate

Bag # 001

Contact D/R – 130

#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	100.0	<MDC	
2	N/A	97.7	<MDC	
3	N/A	102.3	<MDC	
4	N/A	113.6	<MDC	
5	N/A	81.8	<MDC	
6	N/A	127.3	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{gnideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0584

Surveyor: Carl Ingle (Print) — Sign — 8/2/07 — Date 7/29/2007

Reviewer: Glenn Parkhurst (Print) — Sign — Date 8/5/07

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)	41	BKG (cpm)	0.23	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 #062
PURPOSE: Contamination / Dose Rate

Bag # 062

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	81.8	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	88.6	<MDC	
6	N/A	79.5	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\tau_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0585

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — Date: 7/29/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/5/07

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)	41	BKG (cpm)	0.23	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 #063
PURPOSE: Contamination / Dose Rate

Bag # 063

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	77.3	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	95.5	<MDC	
5	N/A	81.8	<MDC	
6	N/A	125.0	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(e_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0586

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 8/2/07 7/29/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — Date: 8/5/07

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)	41	BKG (cpm)	0.23	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 #064
PURPOSE: Contamination / Dose Rate

Bag # 064

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	<MDC	<MDC	
2	N/A	86.4	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	88.6	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{Rb\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0587

Surveyor: Carl Ingle (Print) — Sign — Date: 7/27/2007

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 #	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)	40	BKG (cpm)	0.17	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-065
PURPOSE: Contamination / Dose Rate

BAG # S-065

Contact D/R – 12uR

#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	93.2	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	88.6	<MDC	
5	N/A	88.6	<MDC	
6	N/A	88.6	<MDC	

NG

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\epsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0588

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 7/27/2007

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 #	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)	40	BKG (cpm)	0.17	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-066
PURPOSE: Contamination / Dose Rate

BAG # S-066

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	106.8	<MDC	
2	N/A	93.2	<MDC	
3	N/A	93.2	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	97.7	<MDC	
6	N/A	75.0	<MDC	

N

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0604

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/26/2007 (Date)

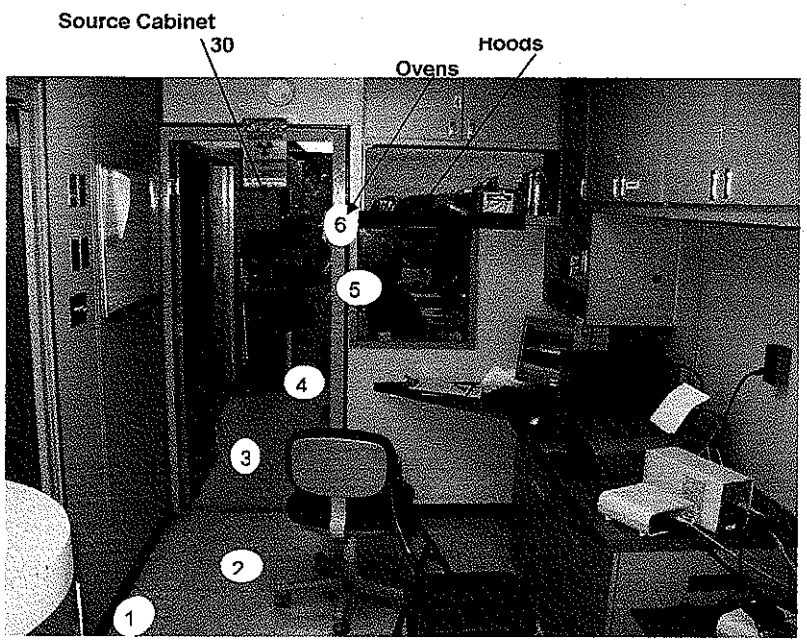
Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/26/07 (Date)

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	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	12%	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Effiency (surface)	25%		
Type	beta/gamma	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.3	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

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	86.1	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	88.4	<MDC	5
5	N/A	<MDC	<MDC	5
6	N/A	90.6	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0607

eyor: Carl Ingle (Print) — Sign — 8/2/07 — 7/29/2007 Date

Reviewer: Glenn Parkhurst (Print) — Sign — 8/8/07 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)	41	BKG (cpm)	0.23	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 #067
POSE: Contamination / Dose Rate

Bag # 067

Contact D/R -- 20

#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	111.4	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	93.2	<MDC	
5	N/A	86.4	<MDC	
6	N/A	131.8	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0608

eyor: Carl Ingle (Print) — Sign — 8/2/07 — 7/31/2007 (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 #	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)	0.13	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 #068
POSE: Contamination / Dose Rate

Bag # 068

Contact D/R – 800 mr/50

#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	78.4	<MDC	
2	N/A	121.6	<MDC	
3	N/A	103.4	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	83.0	<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. WI07-0616

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/26/2007 (Date)

7/27/07 (Date)

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/43-5	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	96784 / 127389	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	10.4	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.3	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Access to RCA
PURPOSE: Daily / Contamination

1 thru 4 - Floor boards
5 & 7 - Benches
8 & 10 - Storage boxes

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	97.49	<MDC	N/A
2	N/A	79.22	<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	106.62	<MDC	N/A
7	N/A	81.51	<MDC	N/A
8	N/A	<MDC	<MDC	N/A
9	N/A	<MDC	17.83	N/A
10	N/A	129.45	20.41	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

82A8008
Survey Cover Sheet

Survey No. WI07-0638

eyor: Carl Ingle
Print

Sign

8/2/07 7/31/2007
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 #	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)	0.13	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 #069
POSE: Contamination / Dose Rate

Bag # 069

Contact D/R -- 56

#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	105.7	<MDC	
3	N/A	98.9	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	92.0	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0639

eyor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Carl Ingle
Sign

Sign

8/2/07 7/29/2007
Date

8/5/07
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)	41	BKG (cpm)	0.23	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 #070
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	
2	N/A	81.8	<MDC	
3	N/A	81.8	<MDC	
4	N/A	95.5	<MDC	
5	N/A	88.6	<MDC	
6	N/A	106.8	<MDC	

Bag # 070

Contact D/R – 5 mr / 180

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0640

Surveyor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

7/27/2007
Date

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 #	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)	40	BKG (cpm)	0.17	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 Box # B0006 / 1
PURPOSE: Contamination / Dose Rate

Box # B0006 / 132

Contact D/R – 100 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	84.1	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	111.4	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0641

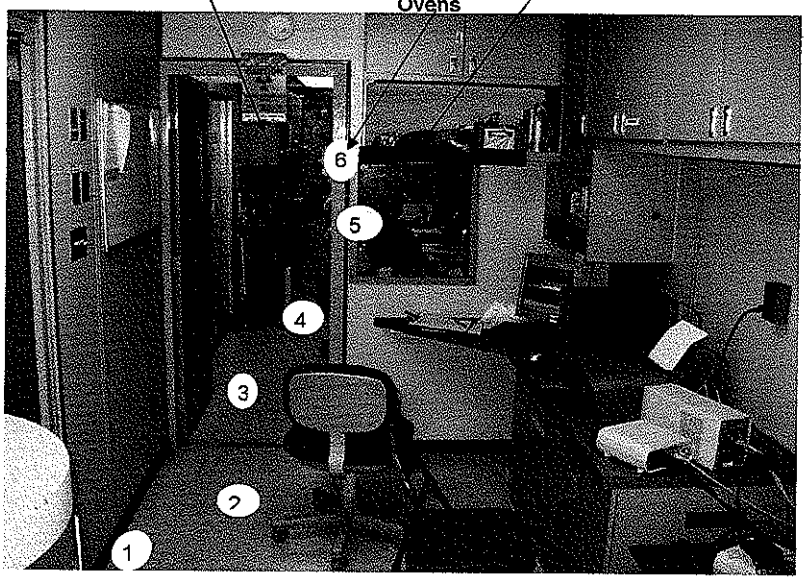
Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/27/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/27/07 (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)	40	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	75	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	93.6	<MDC	5
2	N/A	<MDC	<MDC	5
3	N/A	75.3	<MDC	5
4	N/A	89.0	<MDC	5
5	N/A	91.3	<MDC	5
6	N/A	84.5	<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. WI07-0642

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/27/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/27/07 (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)	40	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	75	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Energy Solutions Office/Break Trail
PURPOSE: Daily / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	Floor inRSO/PM Office	1	N/A	91.32	<MDC	N/A
2	Entrance to RSO Office	2	N/A	82.19	<MDC	N/A
3	Floor in break area under North table	3	N/A	<MDC	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	<MDC	<MDC	N/A
5	North table in break room	5	N/A	95.89	<MDC	N/A
6	HP desk (east)	6	N/A	79.91	<MDC	N/A
7	HP desk (on top)	7	N/A	75.34	<MDC	N/A
8	HP office floor	8	N/A	84.47	<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. WI07-0596

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

7/25/2007

7/27/07 Date

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M3 w/43-5	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	96784 / 127389	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	91491
Cal Due	5/14/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	10.4	Efficiency (%) (2Pi)	44%	Efficiency (%) (2Pi)	77%	Efficiency (%)	100%
		Efficiency (surface)	50%	Efficiency (surface)	25%		
Type	alpha	Type	beta	Type	alpha	Type	gamma
Sample Time (min)	NA	Sample Time (min)	2	Sample Time (min)	2	Sample Time (min)	NA
Background Time (min)	NA	Background Time (min)	60	Background Time (min)	60	Background Time (min)	NA
BKG (cpm)	NA	BKG (cpm)	42.3	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	77	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Access to RCA
PURPOSE: Daily / Contamination

1 thru 4 - Floor boards
5 & 7 - Benches
8 & 10 - Storage boxes

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	104.34	<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	99.77	<MDC	N/A
7	N/A	90.64	<MDC	N/A
8	N/A	129.45	16.54	N/A
9	N/A	<MDC	<MDC	N/A
10	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0642

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/27/2007

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/27/07 (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)	40	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	75	MDC (dpm/100cm2)	13	MDC (dpm/100cm2)	NA
Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA	Guideline (dpm/100cm^2)	NA
Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA	Action Level (dpm/100cm^2)	NA

LOCATION: Energy Solutions Office/Break Trail
PURPOSE: Daily / Contamination

		Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	Floor inRSO/PM Office	1	N/A	91.32	<MDC	N/A
2	Entrance to RSO Office	2	N/A	82.19	<MDC	N/A
3	Floor in break area under North table	3	N/A	<MDC	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	<MDC	<MDC	N/A
5	North table in break room	5	N/A	95.89	<MDC	N/A
6	HP desk (east)	6	N/A	79.91	<MDC	N/A
7	HP desk (on top)	7	N/A	75.34	<MDC	N/A
8	HP office floor	8	N/A	84.47	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0647

eyor: Jack Mucia
Print

Sign

Reviewer: Glenn Parkhurst
Print

Sign

7/27/2007
Date

7/27/07

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 #	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)	40	BKG (cpm)	0.2	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	75	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: Instruments Returned to TN.
OSE: 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	79.91	<MDC	N/A
2	N/A	89.04	<MDC	N/A

Instruments / Ser. Numbers

M-3 149584/172236
L2360 193692/199337
Ludlum-19 91491
M-3 96784

Smear # 1 - Instruments
Smear #2 O/S Package

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{r_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0650

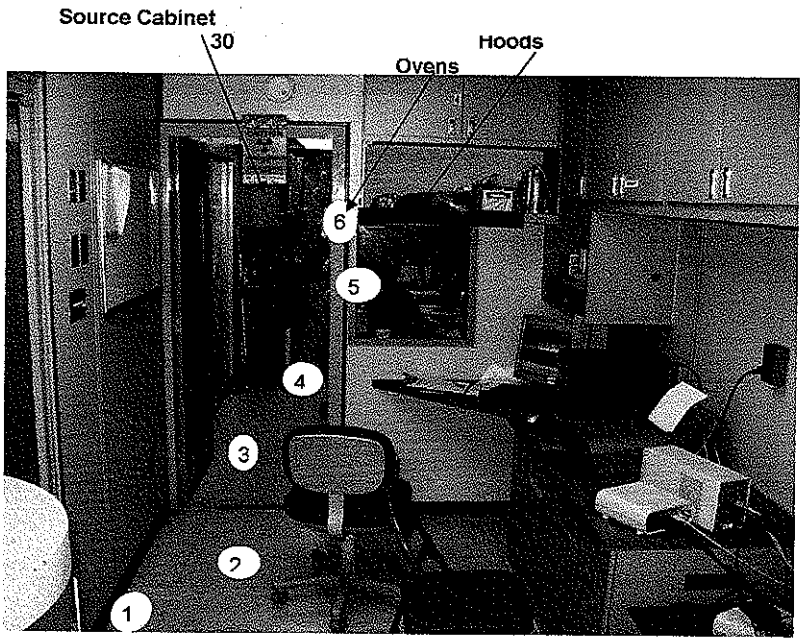
Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/28/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/28/07 (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)	0.2	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 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	89.0	<MDC	5
2	N/A	77.6	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	98.2	<MDC	5
5	N/A	146.1	<MDC	5
6	N/A	82.2	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0652

yor: Jack Mucia (Print) — Sign — 7/28/2007

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 #	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	BKG (cpm)	0.2	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
PURPOSE: Daily / Contamination

1 thru 4 - Floor boards
5 & 7 - Benches
8 & 10 - Storage boxes

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	102.74	<MDC	N/A
2	N/A	73.06	<MDC	N/A
3	N/A	<MDC	<MDC	N/A
4	N/A	82.19	<MDC	N/A
5	N/A	79.91	<MDC	N/A
6	N/A	86.76	<MDC	N/A
7	N/A	93.61	<MDC	N/A
8	N/A	105.02	<MDC	N/A
9	N/A	102.74	<MDC	N/A
10	N/A	132.42	<MDC	N/A

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. WI07-0676

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #071
PURPOSE: Contamination / Dose Rate

Bag # 071

Contact D/R – 440 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	72.0	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	92.5	<MDC	
4	N/A	99.3	<MDC	
5	N/A	78.9	<MDC	
6	N/A	76.6	<MDC	
				N/A

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1 + t_s/t_b)}}{\epsilon_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008

Survey Cover Sheet

Survey No. WI07-0677

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #072

PURPOSE: Contamination / Dose Rate

Bag # 072

Contact D/R – 1.2 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	88.0	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	83.4	<MDC	
4	N/A	101.6	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	78.9	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{grose cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate

Tb = background counting time

Ts = sample count time

AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0678

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #073
PURPOSE: Contamination / Dose Rate

Bag # 073

Contact D/R – 800 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	88.0	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	83.4	<MDC	
4	N/A	101.6	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	78.9	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0679

eyor: Jack Mucia
Print

Sign

8/3/2007
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)	36.3	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 #074
POSE: Contamination / Dose Rate

Bag # 074

Contact D/R – 2.6 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	90.2	<MDC	
2	N/A	83.4	<MDC	
3	N/A	74.3	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	74.3	<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

82A8008
Survey Cover Sheet

Survey No. WI07-0680

eyor: Jack Mucia
Print

Sign

8/3/2007
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)	36.3	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 #075
POSE: Contamination / Dose Rate

Bag # 075

Contact D/R – 400 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	97.0	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	72.0	<MDC	
6	N/A	83.4	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{e_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0681

Surveyor: Jack Mucia (Print) — Sign: Jack Mucia — Date: 8/3/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — 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)	36.3	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 #076
PURPOSE: Contamination / Dose Rate

Bag # 076

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	83.4	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	74.3	<MDC	
6	N/A	<MDC	<MDC	
				N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0682

Surveyor: Jack Mucia (Print) — Sign — 8/3/2007 (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)	36.3	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 #077
PURPOSE: Contamination / Dose Rate

Bag # 077

Contact D/R – 3.8 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	85.7	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	88.0	<MDC	
4	N/A	92.5	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	88.0	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(2 + t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0683

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #078
PURPOSE: Contamination / Dose Rate

Bag # 078

Contact D/R – 1.1 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	88.0	<MDC	
2	N/A	92.5	<MDC	
3	N/A	72.0	<MDC	
4	N/A	92.5	<MDC	
5	N/A	92.5	<MDC	
6	N/A	<MDC	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0684

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #079
PURPOSE: Contamination / Dose Rate

Bag # 079

Contact D/R – 400 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	74.3	<MDC	
2	N/A	72.0	<MDC	
3	N/A	85.7	<MDC	
4	N/A	76.6	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	72.0	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{s_i(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0685

yor: Jack Mucia (Print) — Sign — 8/3/2007 (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)	36.3	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 #080
POSE: Contamination / Dose Rate

Bag # 080

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	83.4	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	83.4	<MDC	
4	N/A	94.8	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(e_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0686

eyor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/3/2007
Date

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)	36.3	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 #081
OSE: Contamination / Dose Rate

Bag # 081

Contact D/R – 1mR

#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	92.5	<MDC	
2	N/A	76.6	<MDC	
3	N/A	74.3	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0687

yor: Jack Mucia
Print

Sign

8/3/2007
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)	36.3	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 #082
PURPOSE: Contamination / Dose Rate

Bag # 082

Contact D/R – 420 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	74.3	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	99.3	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	<MDC	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0688

yor: Jack Mucia
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/3/2007
Date

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)	36.3	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 #083
PURPOSE: Contamination / Dose Rate

Bag # 083

Contact D/R – 2 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	<MDC	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0689

Surveyor: Jack Mucia (Print) — Sign — Date: 8/3/2007

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)	36.3	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 #084
PURPOSE: Contamination / Dose Rate

Bag # 084

Contact D/R – 1.4 mR/HR

#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	85.7	<MDC	
4	N/A	85.7	<MDC	
5	N/A	106.1	<MDC	
6	N/A	<MDC	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0690

Surveyor: Jack Mucia (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)	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/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 #085
PURPOSE: Contamination / Dose Rate

Bag # 085

Contact D/R – 2.2 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	75.0	<MDC	
2	N/A	106.8	<MDC	
3	N/A	72.7	<MDC	
4	N/A	88.6	<MDC	
5	N/A	95.5	<MDC	
6	N/A	106.8	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0691

Surveyor: Jack Mucia (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)	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/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 #086
PURPOSE: Contamination / Dose Rate

Bag # 086

Contact D/R – 1 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	72.7	<MDC	
2	N/A	75.0	<MDC	
3	N/A	70.5	<MDC	
4	N/A	95.5	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	77.3	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0692

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — 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
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	6/14/2008	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 #087

PURPOSE: Contamination / Dose Rate

Bag # 087

Contact D/R – 3mR

#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	88.6	<MDC			73
2	N/A	<MDC	<MDC			59
3	N/A	72.7	<MDC			66
4	N/A	<MDC	<MDC			60
5	N/A	93.2	<MDC			75
6	N/A	77.3	<MDC			68
						N/A

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0693

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — 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!

N

a

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 #088
PURPOSE: Contamination / Dose Rate

Bag # 088

Contact D/R -- 1.8 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	84.1	<MDC			71
2	N/A	72.7	<MDC			66
3	N/A	86.4	<MDC			72
4	N/A	77.3	<MDC			68
5	N/A	97.7	<MDC			77
6	N/A	<MDC	<MDC			55

NA

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

82A8008
Survey Cover Sheet

Survey No. WI07-0694

eyor: Jack Mucia
Print

Sign

8/4/2007
Date

Reviewer: Glenn Parkhurst
Print

Sign

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 #089
PURPOSE: Contamination / Dose Rate

Bag # 089

Contact D/R – 3 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	90.9	<MDC			74
2	N/A	72.7	<MDC			66
3	N/A	109.1	<MDC			82
4	N/A	<MDC	<MDC			64
5	N/A	79.5	<MDC			69
6	N/A	<MDC	<MDC			61
						NA
				NA		

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_s)(\varepsilon_i)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0695

Surveyor: Jack Mucia (Print) — Sign: [signature] — Date: 8/4/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/6/07

Instrument	M3
S/N	72899/163405
R_e	NA
t_s	NA
t_b	NA
ε_s	0.5
ε_i	12%
probe area	15
MDC	#VALUE!

N

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 #090
PURPOSE: Contamination / Dose Rate

Bag # 090

Contact D/R – 100 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	CPM - Direct Beta/G	CPM Beta/G
1	N/A	<MDC	<MDC			62
2	N/A	88.6	<MDC			73
3	N/A	<MDC	<MDC			56
4	N/A	<MDC	<MDC			62
5	N/A	84.1	<MDC			71
6	N/A	93.2	<MDC			75
						NA

NA

$$MDC = \frac{3 + 3.29\sqrt{Rb\,t_s(1+t_s/t_b)}}{\varepsilon_s(t_s)(probe\ area/100cm^2)}$$

$$Al = Rb + ((guideline)(eff.))$$

$$dpm\ /\ 100cm^2 = \frac{gross\ cpm\ -\ bkg\ cpm}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0712

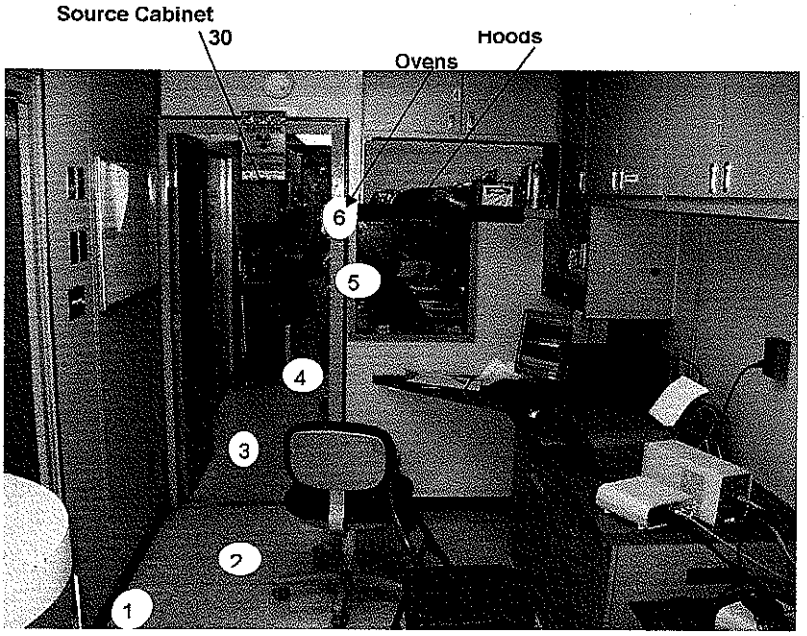
Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/29/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/29/07 (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)	41	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	76	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: 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	91.3	<MDC	5
5	N/A	82.2	<MDC	5
6	N/A	111.9	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{R_B t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0713

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 7/29/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — (Sign) — 7/29/07 (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)	41	BKG (cpm)	0.23	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	76	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 RSO/PM Office	1	N/A	84.47	<MDC	N/A
2	Floor under RSO Desk	2	N/A	<MDC	<MDC	N/A
3	Floor in break area	3	N/A	<MDC	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	89.04	<MDC	N/A
5	South table in break room	5	N/A	<MDC	<MDC	N/A
6	HP Desk	6	N/A	<MDC	<MDC	N/A
7	HP Desk	7	N/A	<MDC	<MDC	N/A
8	Entrance to HP Office	8	N/A	<MDC	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{Rb\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0724

Surveyor: Carl Ingle (Print) — Sign — 8/3/07 — 7/31/2007 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 #	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)	0.13	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 #091
PURPOSE: Contamination / Dose Rate

Bag # 091

Contact D/R – 1mR/110

#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	71.6	<MDC	
3	N/A	94.3	<MDC	
4	N/A	117.0	<MDC	
5	N/A	89.8	<MDC	
6	N/A	85.2	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(e_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0725

eyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — 7/31/2007 (Date)

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — 8/3/07 (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)	0.13	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 #092
PURPOSE: Contamination / Dose Rate

Bag # 092

Contact D/R – 3mR/320

#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	142.0	<MDC	
2	N/A	101.1	<MDC	
3	N/A	108.0	<MDC	
4	N/A	98.9	<MDC	
5	N/A	85.2	<MDC	
6	N/A	96.6	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(t_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0726

Surveyor: Carl Ingle (Print) — Sign — 8/2/07 — 7/31/2007 (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 #	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)	0.13	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 #093
PURPOSE: Contamination / Dose Rate

Bag # 093

Contact D/R – 3 mR / 320

#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	78.4	<MDC	
2	N/A	92.0	<MDC	
3	N/A	83.0	<MDC	
4	N/A	83.0	<MDC	
5	N/A	80.7	<MDC	
6	N/A	92.0	<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. WI07-0727

eyor: Carl Ingle
Print

Sign

8/2/07 7/31/2007
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 #	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)	0.13	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 #094
POSE: Contamination / Dose Rate

Bag # 094

Contact D/R -- 1.8mR/240

#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	80.7	<MDC	
2	N/A	87.5	<MDC	
3	N/A	83.0	<MDC	
4	N/A	105.7	<MDC	
5	N/A	89.8	<MDC	
6	N/A	87.5	<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. WI07-0733

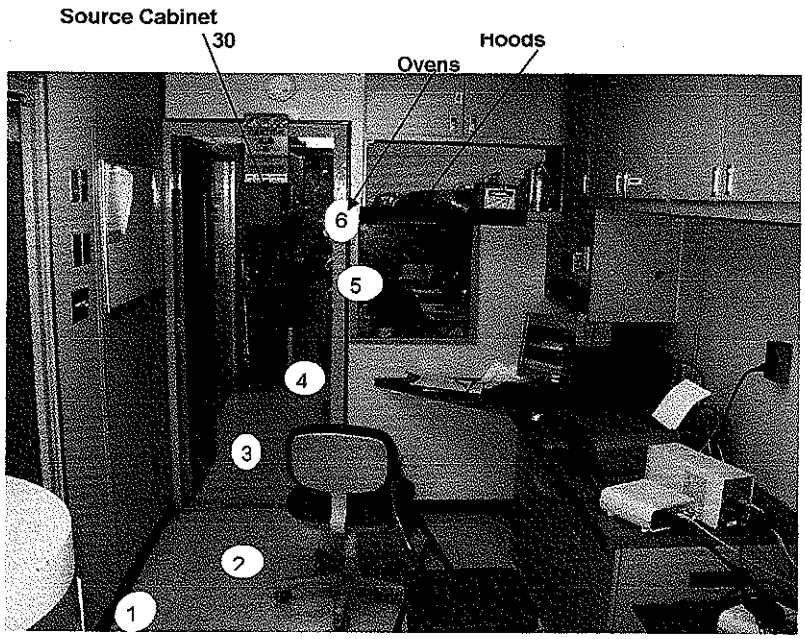
eyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/30/2007 (Date)

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%	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	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

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	95.9	<MDC	5
2	N/A	84.5	<MDC	5
3	N/A	75.3	<MDC	5
4	N/A	93.6	<MDC	5
5	N/A	121.0	<MDC	5
6	N/A	86.8	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0734

Surveyor: Linda C. Finn (Print) — L.C. Finn (Sign) — 7/30/2007

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 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)	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	Floor in RSO/PM Office	1	N/A	118.72	<MDC	N/A
2	Floor next to RSO Desk	2	N/A	82.19	<MDC	N/A
3	Floor in break area	3	N/A	<MDC	<MDC	N/A
4	Floor in break area (at entrance)	4	N/A	91.32	<MDC	N/A
5	North table in break room	5	N/A	91.32	<MDC	N/A
6	HP Desk	6	N/A	102.74	<MDC	N/A
7	HP Floor	7	N/A	84.47	<MDC	N/A
8	Entrance to HP Office	8	N/A	123.29	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(E)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0749

eyor: Carl Ingle
Print

Sign

8/4/07

8/1/2007
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 #	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)	33.9	BKG (cpm)	0.15	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 #095
OSE: Contamination / Dose Rate

Bag # 095

Contact D/R -- 4 mR/ 600

#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	77.5	<MDC	
2	N/A	77.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	95.7	<MDC	
5	N/A	88.9	<MDC	
6	N/A	70.7	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{E_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0750

Surveyor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/2/07

8/1/2007
Date

8/5/07
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)	33.9	BKG (cpm)	0.15	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 #096
POSE: Contamination / Dose Rate

Bag # 096

Contact D/R -- 4mR/600

#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	86.6	<MDC	
2	N/A	79.8	<MDC	
3	N/A	116.1	<MDC	
4	N/A	88.9	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	107.0	<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. WI07-0751

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — 8/2/07 — Date: 8/1/2007

Reviewer: Glenn Parkhurst (Print) — Sign: Glenn Parkhurst — Date: 8/5/07

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)	33.9	BKG (cpm)	0.15	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 #097
PURPOSE: Contamination / Dose Rate

Bag # 097

Contact D/R – 600/50

#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	113.9	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	84.3	<MDC	
4	N/A	109.3	<MDC	
5	N/A	102.5	<MDC	
6	N/A	75.2	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0752

Surveyor: Carl Ingle (Print) — Sign — 8/2/07 — 8/1/2007 (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 #	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)	33.9	BKG (cpm)	0.15	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 #098
OSE: Contamination / Dose Rate

Bag # 098

Contact D/R – 600/50

#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	77.5	<MDC	
2	N/A	77.5	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	95.7	<MDC	
5	N/A	88.9	<MDC	
6	N/A	70.7	<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

Survey No. WI07-0753

yor: Carl Ingle
Print

Reviewer: Glenn Parkhurst
Print

Sign

Sign

8/2/07 8/1/2007
Date

8/5/07
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)	33.9	BKG (cpm)	0.15	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 #099
POSE: Contamination / Dose Rate

Bag # 099

Contact D/R – 600 / 50

#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	77.5	<MDC	
2	N/A	93.4	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	88.9	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	82.0	<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. WI07-0754

Surveyor: Carl Ingle (Print) — Sign: Carl Ingle — Date: 8/2/07 8/1/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — Date: 8/3/07

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)	33.9	BKG (cpm)	0.15	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 #100
PURPOSE: Contamination / Dose Rate

Bag # 100

Contact D/R – 1.4 nR/200

#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	123.0	<MDC	
2	N/A	95.7	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	107.0	<MDC	
5	N/A	88.9	<MDC	
6	N/A	<MDC	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\epsilon_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0755

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — 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	6/14/2008	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)	6
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 #101
PURPOSE: Contamination / Dose Rate

Bag # 101

Contact D/R – 10 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	CPM - Direct Beta/G	CPM Beta/G
1	N/A	<MDC	<MDC			64
2	N/A	106.8	<MDC			81
3	N/A	<MDC	<MDC			58
4	N/A	75.0	<MDC			67
5	N/A	79.5	<MDC			69
6	N/A	81.8	<MDC			70
						NA

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_i)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

Survey No. WI07-0756

Surveyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — 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 #102
PURPOSE: Contamination / Dose Rate

Bag # 102

Contact D/R – 12 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

NA

$$MDC = \frac{3 + 3.29\sqrt{Rb\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0898

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

TION: External Surface of Bag #124
OSE: Contamination / Dose Rate

Bag # 124

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	99.1	<MDC	
2	N/A	85.5	<MDC	
3	N/A	121.8	<MDC	
4	N/A	110.5	<MDC	
5	N/A	121.8	<MDC	
6	N/A	76.4	<MDC	

N G

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008

Survey Cover Sheet

SurveyNo. WI07-0899

eyor: Jack Mucia (Print) — Sign — 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 #125

PPOSE: Contamination / Dose Rate

Bag # 125

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	128.6	<MDC	
2	N/A	151.4	<MDC	
3	N/A	133.2	<MDC	
4	N/A	121.8	<MDC	
5	N/A	149.1	<MDC	
6	N/A	94.5	<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. WI07-0900

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 #126
POSE: Contamination / Dose Rate

Bag # 126

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	128.6	<MDC	
2	N/A	151.4	<MDC	
3	N/A	133.2	<MDC	
4	N/A	121.8	<MDC	
5	N/A	149.1	<MDC	
6	N/A	94.5	<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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0901

Surveyor: Jack Mucia (Print) — Sign — 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

LOCATION: External Surface of Bag #127
PURPOSE: Contamination / Dose Rate

Bag # 127

Contact D/R – 15mr

#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	140.0	<MDC	
2	N/A	142.3	<MDC	
3	N/A	121.8	<MDC	
4	N/A	146.8	<MDC	
5	N/A	144.5	<MDC	
6	N/A	153.6	<MDC	
				5 uR

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0902

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

ITION: External Surface of Bag #128
PURPOSE: Contamination / Dose Rate

Bag # 128

Contact D/R -- 13 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	76.4	<MDC	
2	N/A	94.5	<MDC	
3	N/A	99.1	<MDC	
4	N/A	105.9	<MDC	
5	N/A	78.6	<MDC	
6	N/A	87.7	<MDC	
				N a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008

Survey Cover Sheet

SurveyNo. WI07-0903

Surveyor: Jack Mucia (Print) — Sign — 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

LOCATION: External Surface of Bag #129

PURPOSE: Contamination / Dose Rate

Bag # 129

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	151.4	<MDC	
2	N/A	130.9	<MDC	
3	N/A	133.2	<MDC	
4	N/A	94.5	<MDC	
5	N/A	119.5	<MDC	
6	N/A	121.8	<MDC	

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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0904

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 #130
PURPOSE: Contamination / Dose Rate

Bag # 130

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	<MDC	<MDC	
3	N/A	105.9	<MDC	
4	N/A	96.8	<MDC	
5	N/A	94.5	<MDC	
6	N/A	71.8	<MDC	
				N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s\,(1 + t_s/t_b)}}{t_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})\,(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0905

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

TION: External Surface of Bag #131
PURPOSE: Contamination / Dose Rate

Bag # 131

Contact D/R – 13 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	142.3	<MDC	
2	N/A	92.3	<MDC	
3	N/A	146.8	<MDC	
4	N/A	76.4	<MDC	
5	N/A	101.4	<MDC	
6	N/A	146.8	<MDC	
				NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0906

Surveyor: Jack Mucia (Print) — Sign — 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

LOCATION: External Surface of Bag #132
PURPOSE: Contamination / Dose Rate

Bag # 132

Contact D/R – 340mr

#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	144.5	<MDC	
3	N/A	94.5	<MDC	
4	N/A	92.3	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	108.2	<MDC	

N Cs.

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0907

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 #133
PURPOSE: Contamination / Dose Rate

Bag # 133

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	133.2	<MDC	
2	N/A	133.2	<MDC	
3	N/A	153.6	<MDC	
4	N/A	94.5	<MDC	
5	N/A	101.4	<MDC	
6	N/A	196.8	<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. WI07-0908

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 #134
PURPOSE: Contamination / Dose Rate

Bag # 134

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	99.1	<MDC	
2	N/A	101.4	<MDC	
3	N/A	90.0	<MDC	
4	N/A	96.8	<MDC	
5	N/A	105.9	<MDC	
6	N/A	92.3	<MDC	

Na

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0910

Surveyor: Jack Mucia (Print) — Sign — 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

LOCATION: External Surface of Bag #135
PURPOSE: Contamination / Dose Rate

Bag # 135

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	142.3	<MDC	
2	N/A	99.1	<MDC	
3	N/A	146.8	<MDC	
4	N/A	78.6	<MDC	
5	N/A	76.4	<MDC	
6	N/A	87.7	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{e_s(\varepsilon_s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008

Survey Cover Sheet

SurveyNo. WI07-0911

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 #145

PURPOSE: Contamination / Dose Rate

Bag # 145

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	162.3	<MDC	
2	N/A	130.5	<MDC	
3	N/A	148.6	<MDC	
4	N/A	128.2	<MDC	
5	N/A	160.0	<MDC	
6	N/A	125.9	<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. WI07-0912

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 #146
POSE: Contamination / Dose Rate

Bag # 146

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	96.4	<MDC	
2	N/A	78.2	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	82.7	<MDC	
5	N/A	116.8	<MDC	
6	N/A	110.0	<MDC	

$$MDC = \frac{3 + 3.29\sqrt{RB_b(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0913

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 #147
PURPOSE: Contamination / Dose Rate

Bag # 147

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	98.6	<MDC	
3	N/A	85.0	<MDC	
4	N/A	<MDC	<MDC	
5	N/A	121.4	<MDC	
6	N/A	80.5	<MDC	

N/a

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\epsilon_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0914

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 #148
RPOSE: 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	135.0	<MDC	
2	N/A	82.7	<MDC	
3	N/A	80.5	<MDC	
4	N/A	87.3	<MDC	
5	N/A	<MDC	<MDC	
6	N/A	98.6	<MDC	

Bag # 148

Contact D/R -- 14

#1 Front
#2 Left
#3 Right
#4 Back
#5 Top
#6 Bottom

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0915

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 #149
PPOSE: Contamination / Dose Rate

Bag # 149

Contact D/R – 40

#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	125.9	<MDC	
2	N/A	150.9	<MDC	
3	N/A	130.5	<MDC	
4	N/A	116.8	<MDC	
5	N/A	85.0	<MDC	
6	N/A	73.6	<MDC	

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0933

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 #150
PURPOSE: Contamination / Dose Rate

Bag # 150

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	89.5	<MDC	
2	N/A	116.8	<MDC	
3	N/A	96.4	<MDC	
4	N/A	82.7	<MDC	
5	N/A	105.5	<MDC	
6	N/A	98.6	<MDC	

NC

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0934

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 #151
PPOSE: Contamination / Dose Rate

Bag # 151

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	128.2	<MDC	
2	N/A	139.5	<MDC	
3	N/A	107.7	<MDC	
4	N/A	112.3	<MDC	
5	N/A	148.6	<MDC	
6	N/A	91.8	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0935

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 #152
PURPOSE: Contamination / Dose Rate

Bag # 152

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	85.0	<MDC	
2	N/A	98.6	<MDC	
3	N/A	119.1	<MDC	
4	N/A	82.7	<MDC	
5	N/A	78.2	<MDC	
6	N/A	82.7	<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
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0936

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

ATION: External Surface of Bag #153
PURPOSE: Contamination / Dose Rate

Bag # 153

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	171.4	<MDC	
2	N/A	82.7	<MDC	
3	N/A	103.2	<MDC	
4	N/A	91.8	<MDC	
5	N/A	100.9	<MDC	
6	N/A	73.6	<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. WI07-0937

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 #154
POSE: Contamination / Dose Rate

Bag # 154

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	87.3	<MDC	
2	N/A	82.7	<MDC	
3	N/A	94.1	<MDC	
4	N/A	82.7	<MDC	
5	N/A	91.8	<MDC	
6	N/A	82.7	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0938

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 #155
PURPOSE: Contamination / Dose Rate

Bag # 155

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	135.0	<MDC	
2	N/A	148.6	<MDC	
3	N/A	89.5	<MDC	
4	N/A	103.2	<MDC	
5	N/A	105.5	<MDC	
6	N/A	130.5	<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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0946

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 #156
POSE: Contamination / Dose Rate

Bag # 156

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	78.2	<MDC	
2	N/A	85.0	<MDC	
3	N/A	80.5	<MDC	
4	N/A	103.2	<MDC	
5	N/A	80.5	<MDC	
6	N/A	87.3	<MDC	

N/a

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(L_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0947

Surveyor: Jack Mucia (Print) — Sign: Jack Mucia — Date: 8/6/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [illegible] — 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 #157
PURPOSE: Contamination / Dose Rate

Bag # 157

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	144.1	<MDC	
2	N/A	125.9	<MDC	
3	N/A	103.2	<MDC	
4	N/A	146.4	<MDC	
5	N/A	116.8	<MDC	
6	N/A	89.5	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(e_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0948

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 #158
PURPOSE: Contamination / Dose Rate

Bag # 158

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	80.5	<MDC	
2	N/A	73.6	<MDC	
3	N/A	<MDC	<MDC	
4	N/A	96.4	<MDC	
5	N/A	85.0	<MDC	
6	N/A	80.5	<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

SurveyNo. WI07-0949

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 #159
PURPOSE: Contamination / Dose Rate

Bag # 159

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	132.7	<MDC	
2	N/A	116.8	<MDC	
3	N/A	96.4	<MDC	
4	N/A	89.5	<MDC	
5	N/A	121.4	<MDC	
6	N/A	148.6	<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. WI07-0950

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 #160
RPOSE: Contamination / Dose Rate

Bag # 160

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	73.6	<MDC	
2	N/A	75.9	<MDC	
3	N/A	87.3	<MDC	
4	N/A	75.9	<MDC	
5	N/A	80.5	<MDC	
6	N/A	85.0	<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

82A8008
Survey Cover Sheet

SurveyNo. WI07-0951

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 #161
RPOSE: Contamination / Dose Rate

Bag # 161

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	141.8	<MDC	
2	N/A	89.5	<MDC	
3	N/A	98.6	<MDC	
4	N/A	194.1	<MDC	
5	N/A	130.5	<MDC	
6	N/A	169.1	<MDC	

N/A

$$MDC = \frac{3 + 3.29\sqrt{RBt_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0952

Author: Linda C. Finn (Print) — L.C. Finn (Sign) — 8/5/2007 (Date)

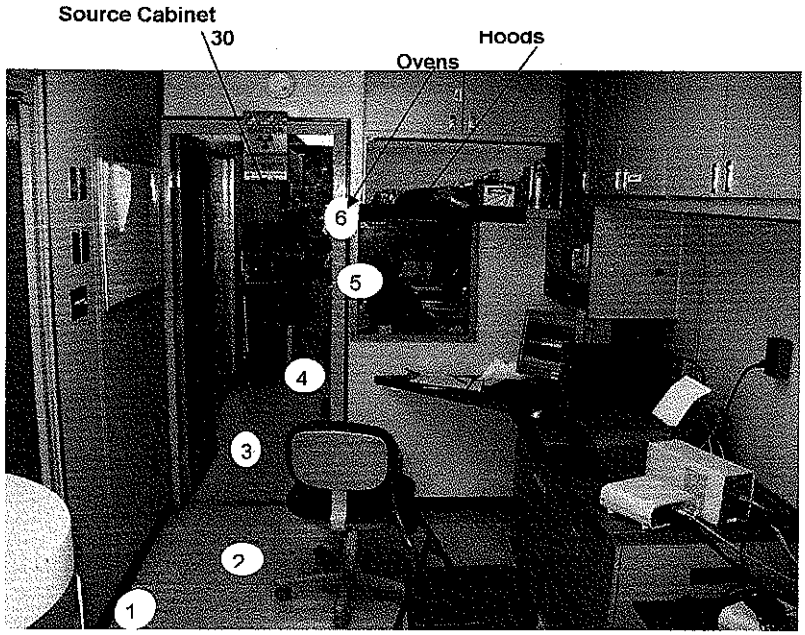
Reviewer: Glenn Parkhurst (Print) — [signature] (Sign) — 8/6/07 (Date)

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)	35.4	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	<MDC	<MDC	5
2	N/A	79.0	<MDC	5
3	N/A	106.4	17.82945736	5
4	N/A	95.0	<MDC	5
5	N/A	101.8	<MDC	5
6	N/A	95.0	<MDC	5

NA

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(s)(t_b)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm/100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0953

Surveyor: Linda C. Finn (Print) — LC. Finn (Sign) — 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 #	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)	35.4	BKG (cpm)	0.2	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

1 PM Desk
2 Underneath RSO Desk
3 Entrance to PM/RSO Office
4 Entrance to Break Area
5 Break Area Middle of Room
6 HP Desk
7 HP Floor
8 Entrance to office

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	99.54	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	101.83	<MDC	N/A
4	N/A	88.13	<MDC	N/A
5	N/A	120.09	<MDC	N/A
6	N/A	94.98	<MDC	N/A
7	N/A	<MDC	<MDC	N/A
8	N/A	124.66	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0956

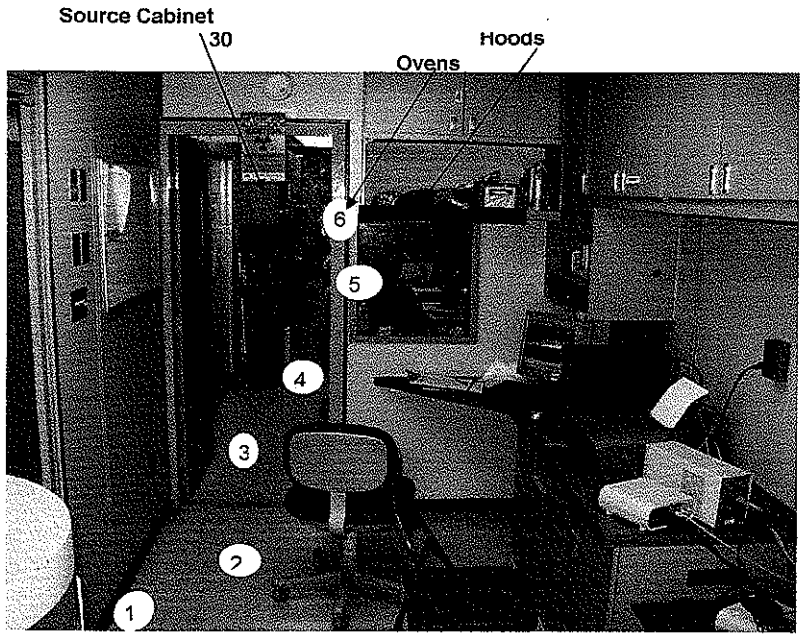
Surveyor: Linda C. Finn (Print) — LC Finn (Sign) — 8/6/2007 (Date)

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 #	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)	36.6	BKG (cpm)	0.27	BKG (uR)	5
MDC (dpm/100cm2)	NA	MDC (dpm/100cm2)	34	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: 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	92.2	<MDC	5
2	N/A	99.1	<MDC	5
3	N/A	<MDC	<MDC	5
4	N/A	121.9	<MDC	5
5	N/A	74.0	<MDC	5
6	N/A	94.5	<MDC	5

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm\ /\ 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0957

Surveyor: Linda C. Finn (Print) — LC Finn (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 #	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)	36.6	BKG (cpm)	0.27	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	RSO Desk	1	N/A	105.94	<MDC	N/A
2	Underneath PM Desk	2	N/A	73.97	<MDC	N/A
3	Entrance to PM/RSO Office	3	N/A	92.24	<MDC	N/A
4	Entrance to Break Area	4	N/A	94.52	<MDC	N/A
5	Break Area Middle of Room	5	N/A	108.22	<MDC	N/A
6	Underneath HP Desk	6	N/A	121.92	<MDC	N/A
7	HPOffice Floor	7	N/A	76.26	<MDC	N/A
8	Entrance to office	8	N/A	73.97	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\epsilon_s(\epsilon)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

82A8008
Survey Cover Sheet

SurveyNo. WI07-0971

veyor: 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 #163
RPOSE: Contamination / Dose Rate

Bag # 163

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	91.8	<MDC	
2	N/A	123.6	<MDC	
3	N/A	85.0	<MDC	
4	N/A	75.9	<MDC	
5	N/A	87.3	<MDC	
6	N/A	94.1	<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. WI07-0972

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 #164
PURPOSE: Contamination / Dose Rate

Bag # 164

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	116.8	<MDC	
2	N/A	<MDC	<MDC	
3	N/A	94.1	<MDC	
4	N/A	73.6	<MDC	
5	N/A	121.4	<MDC	
6	N/A	73.6	<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

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0973

Surveyor: Jack Mucia (Print) — Sign — 8/6/2007

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 w/43-5	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	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)	0.27	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: Sealand
PURPOSE: Free Release

Smear # 1-5 Underneath
Smear # 6-8 Walls
Smear # 9-13 Floor
Smear # 14 Inner Door
Smear # 15 Outer Door

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	78.54	<MDC	N/A
6	N/A	99.09	<MDC	N/A
7	N/A	131.05	<MDC	N/A
8	N/A	92.24	<MDC	N/A
9	N/A	73.97	<MDC	N/A
10	N/A	<MDC	<MDC	N/A
11	N/A	167.58	<MDC	N/A
12	N/A	103.65	<MDC	N/A
13	N/A	151.60	<MDC	N/A
14	N/A	<MDC	<MDC	N/A
15	N/A	85.39	<MDC	N/A

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(e)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1024

Surveyor: Jack Mucia (Print) — Sign — 8/7/2007 (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 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	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)	30-40	BKG (cpm)	35.2	BKG (cpm)	0.25	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: Flatbed Truck # 522
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	<MDC	<MDC	N/A
2	N/A	<MDC	<MDC	N/A
3	N/A	106.85	<MDC	N/A
4	N/A	90.87	<MDC	N/A
5	N/A	<MDC	<MDC	N/A
6	N/A	<MDC	<MDC	N/A

Smear # 1-3 Tires
Smear # 4-6 Flatbed

$$MDC = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{e_s(s)(t_s)(\text{probe area}/100cm^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1025

eyor: Jack Mucia (Print) — Sign

Reviewer: Glenn Parkhurst (Print) — Sign

8/7/2007 — 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 (%)		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)	30-40cpm	BKG (cpm)	36.6	BKG (cpm)	0.27	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 # 534
POSE: Incoming

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	153.88	<MDC	N/A
2	N/A	144.75	<MDC	N/A
3	N/A	140.18	<MDC	N/A
4	N/A	117.35	<MDC	N/A
5	N/A	78.54	<MDC	N/A
6	N/A	85.39	<MDC	N/A

Smear # 1-3 Tires
Smear # 4-6 Flatbed

$$MDC = \frac{3 + 3.29\sqrt{RB\, t_s (1 + t_s/t_b)}}{\varepsilon_s(\varepsilon_i)(t_s)(\text{probe area}/100cm^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$dpm / 100cm^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(efficiency)}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-1027

Surveyor: Jack Mucia (Print) — Sign: [signature] — 8/7/2007

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — Date: 8/11/07

Survey Meters

Scanning Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	M12 w 43-5	Meter Model #	L2929	Meter Model #	L2929	Meter Model #	M19
Meter Serial #	162121/192459	Meter Serial #	118407	Meter Serial #	118407	Meter Serial #	167145
Cal Due	7/27/2008	Cal Due	5/3/2008	Cal Due	5/3/2008	Cal Due	5/8/2008
Efficiency (%)	11.9	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)	35.2	BKG (cpm)	0.25	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: Excavator 314C
PURPOSE: Free Release

Smear #1 I/S Bucket
Smear #2 Bucket Blade
Smear #3 I/S Bucket
Smear #4 Arm
Smear #5 Windows
Smear #6 Arm
Smear #7 I/S Cab
Smear #8 Turn table
Smear #9 Turn table
Smear #10 (Left) Front Track
Smear #11 (Left) Back Track
Smear #12 I/S Hub
Smear #13 I/S Track
Smear #14 Right Front Track
Smear #15 Right Back Track
Smear #16 (Right) I/S Hub
Smear #17 (Right) I/S Track
Smear #18 (Front) I/S Bracket
Smear #19 (Back) I/S Bracket
Smear #20 Under Turn table

Location	dpm/100cm^2 Beta/G - Direct	dpm/100cm^2 Beta/G	dpm/100cm^2 Alpha	uR/hr Dose Rate
1	N/A	143.38	<MDC	N/A
2	N/A	77.17	<MDC	N/A
3	N/A	95.43	<MDC	N/A
4	N/A	<MDC	<MDC	N/A
5	N/A	93.15	<MDC	N/A
6	N/A	88.58	<MDC	N/A
7	N/A	102.28	<MDC	N/A
8	N/A	81.74	<MDC	N/A
9	N/A	97.72	<MDC	N/A
10	N/A	77.17	<MDC	N/A
11	N/A	97.72	<MDC	N/A
12	N/A	88.58	<MDC	N/A
13	N/A	150.23	<MDC	N/A
14	N/A	90.87	<MDC	N/A
15	N/A	88.58	<MDC	N/A
16	N/A	173.06	<MDC	N/A
17	N/A	111.42	<MDC	N/A
18	N/A	86.30	<MDC	N/A
19	N/A	109.13	<MDC	N/A
20	N/A	81.74	<MDC	N/A

all direct fresh
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. WI07-0 1050

Surveyor: Jack Mucia
Print

Reviewer: Coleman Lakhurst
Print

Sign

Sign

8/3/07

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	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		

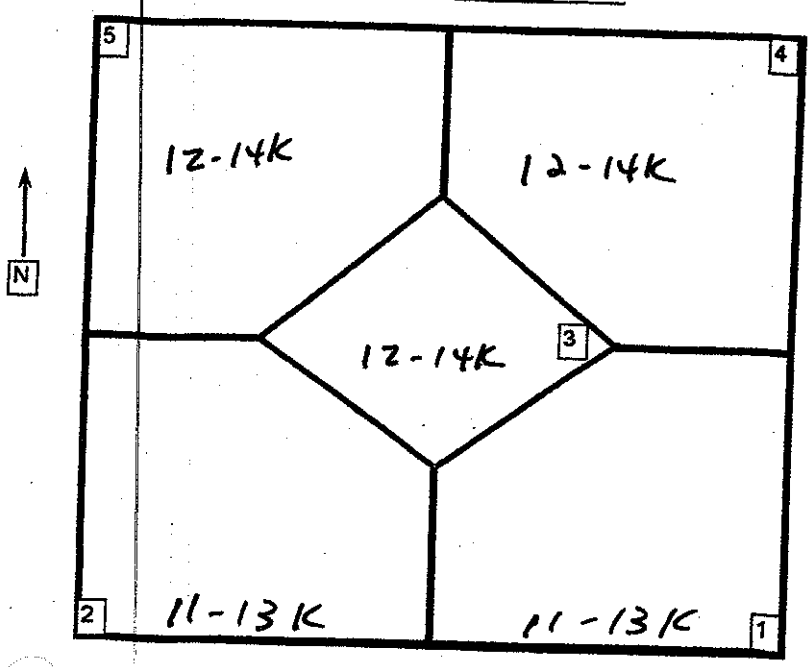
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-1



Location	cpm Direct			

N a

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{c_s(t_s)(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\textit{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-01051

Surveyor: Jack Mycia (Print) — Sign: [signature] — 8/3/07

Reviewer: Gleam Parkhurst (Print) — Sign: [signature] — 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)			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		

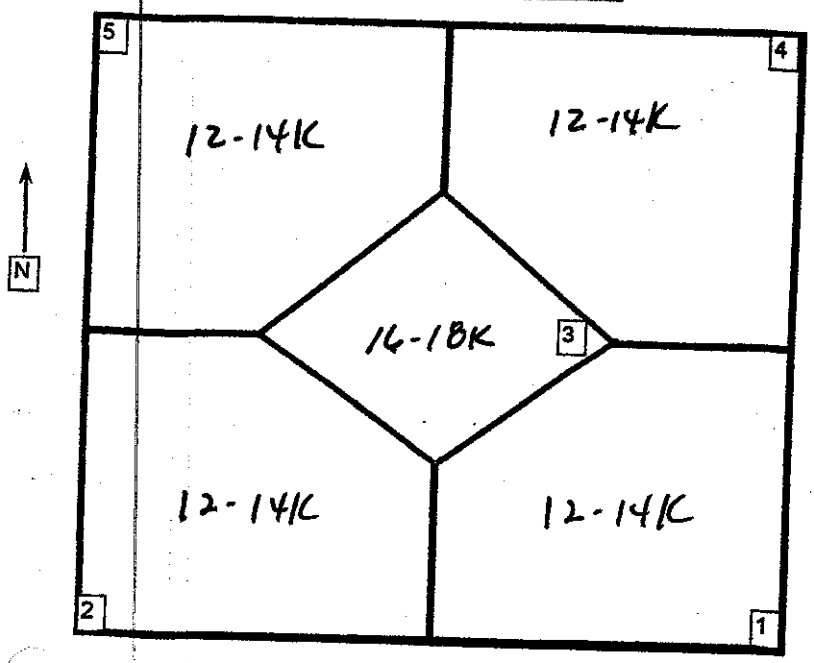
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-2



Locatio	cpm Direct			

N a

$$c = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{c_s(t_s)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

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 1053

Surveyor: Jack Myers
Print

Reviewer: Glenn Markhurst
Print

Sign

Sign

8/5/07

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	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		

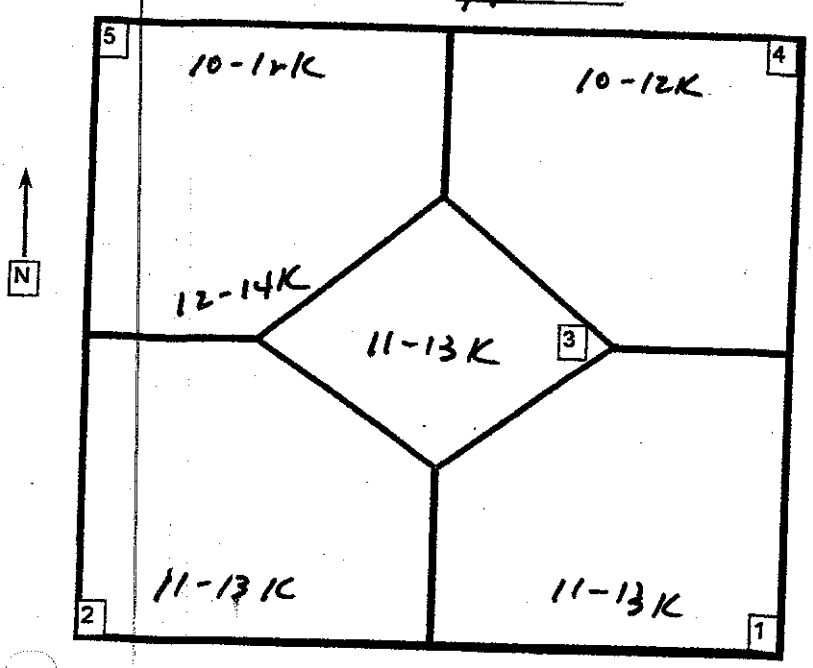
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # A-0



Location	cpm Direct			

N a

$$c = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{t_s(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm}/100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1054

Surveyor: Jack Mucia (Print) — Sign: [signature] — 8/5/07

Reviewer: Glenn Richards (Print) — Sign: [signature] — 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	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		

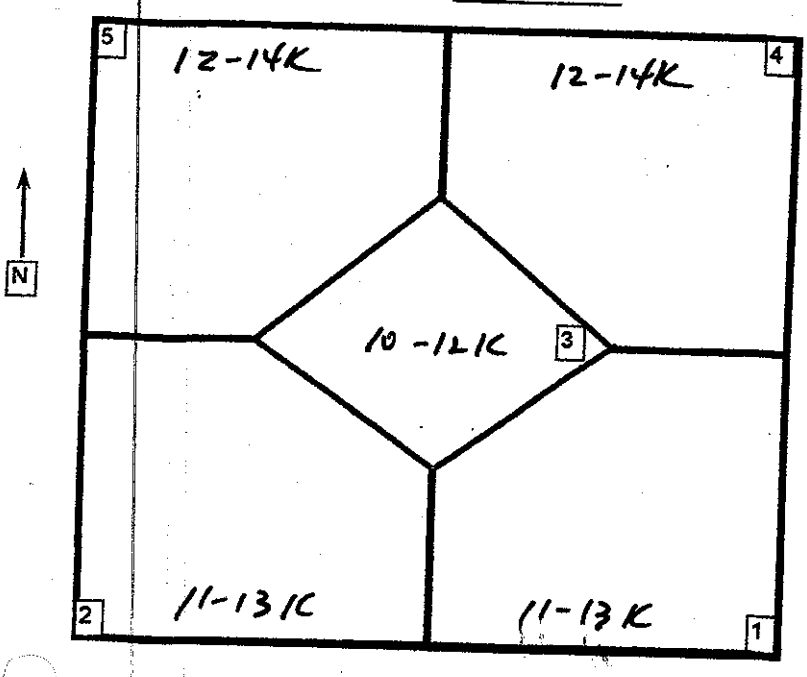
N a

N a

N a

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # B-0



Locatio	cpm Direct			

N a

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1 + t_s/t_b)}}{t_s(t_b)(\text{probe area}/100\text{cm}^2)}$$

$$AI = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
AI = action level

ENERGYSOLUTIONS

82A8008
Survey Cover Sheet

Survey No. WI07-0 1055

Surveyor: Jack Mucia (Print) — Sign: [signature] — 8/5/07

Reviewer: Glenn Parkhurst (Print) — Sign: [signature] — 8/5/07 Date

Survey Meters

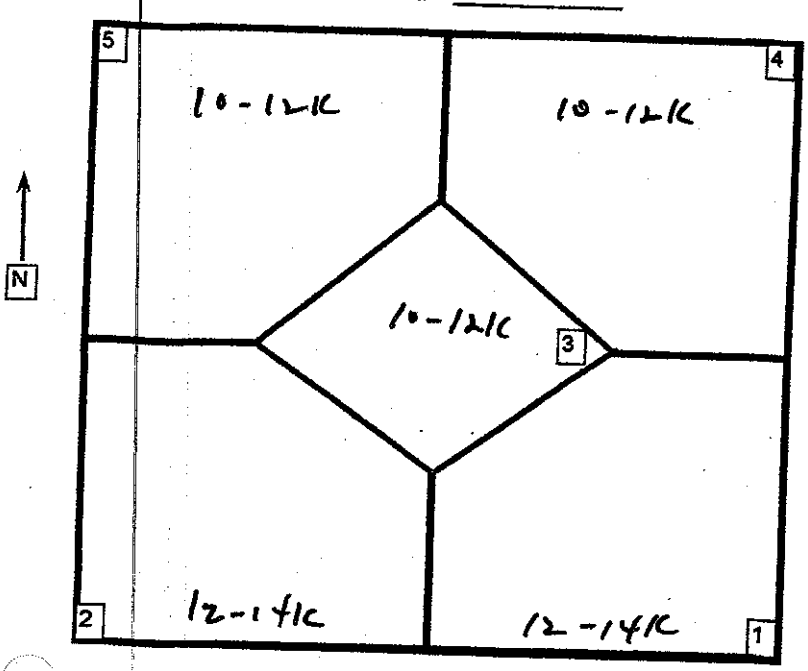
Scanning/Direct Counts Instrument		β γ Smear Results		α Smear Results		Dose Rate Results	
Meter Model #	Fiddler		BC-4	Meter Model #	SAC-4	Meter Model #	M19
Meter Serial #	126170/051707B		337	Meter Serial #	1163	Meter Serial #	91491
Cal Due	5/21/2008		11/14/2007	Cal Due	9/26/2007	Cal Due	5/8/2008
Efficiency (%)	100%		47%	Efficiency (%) (2Pi)	75%	Efficiency (%)	100%
Type	gamma		50% beta	Efficiency (Intrinsic)	25%	Type	gamma
Sample Time (min)	1	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

LOCATION: Winnie Well Site
PURPOSE: Direct Reading / Sample Loc.

GRID # C-0



Location	cpm Direct			

N a

$$C = \frac{3 + 3.29\sqrt{RB\,t_s(1+t_s/t_b)}}{\varepsilon_s(\varepsilon)(t_s)(\text{probe area}/100\text{cm}^2)}$$

$$Al = Rb + ((\text{guideline})(\text{eff.}))$$

$$\text{dpm} / 100\text{cm}^2 = \frac{\text{gross cpm} - \text{bkg cpm}}{(\text{efficiency})}$$

where: Rb = background counting rate
Tb = background counting time
Ts = sample count time
Al = action level

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Type / Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0005	QC CHECK #1				552		6/11@720	CH
1	0006	QC CHECK #2				552		6/11@735	CH
1	0007	QC CHECK #3				552		6/11@750	CH
1	0008	QC CHECK #4				552		6/11@807	CH
1	0009	QC CHECK #5				552		6/11@820	CH
1	0010	QC CHECK #6				552		6/11@830	CH
1	0011	QC CHECK #7				552		6/11@855	CH
1	0012	QC CHECK #8				552		6/11@908	CH
1	0013	QC CHECK #9				552		6/111@925	CH
1	0014	QC CHECK #10				552		6/11@940	CH
1	0015	O/S RCA (random)	0029	6/4/07	12:30	284.3	JM	6/11@1115	CH
1	0016	O/S RCA (random	0032	6/4/07	12:30	260.5	JM	6?11@1140	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Type / Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0017	O/S RCA (Random)	0034	6/4/07	12:30	281.0	JM	6/11@1150	CH
1	0018	O/S RCA (Random)	0036	6/4/07	12:30	261.9	JM	6/11@1205	CH
1	0019	O/S RCA (Random)	0038	6/4/07	12:30	299.8	JM	6/11@1230	CH
1	0020	O/S RCA (Random) (Recount)	0038R	6/4/07	12:30	299.8	JM	6/11@1250	CH
1	0021	O/S RCA (Random)	0039	6/4/07	12:30	193.6	JM	6/11@1340	CH
1	0022	Daily Background				491.3		6/12@1250	CH
1	0023	QC Check #11				552		6/12@700	CH
1	0024	QC Check #12				552		6/12@715	CH
1	0025	QC Check #13				552		6/12@730	CH
1	0026	QC Check #14				552		6/12@745	CH
1	0027	Work-Over Tank Sludge 35g to 1g	0121	6/12/07	12:30	35.1	CH	6/12@1300	CH
1	0028	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0029	QC Check #15				552		6/12@1500	CH
1	0030	QC Check #16				552		6/12@1510	CH
1	0031	QC Check #17				552		6/12@1600	CH
1	0032	QC Check #18				552		6/12@1600	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Type / Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0033	Pre-road under trailers (random)	0015	6/2/07	8:00	318.0	CI	6/10@1300	CH
2	0034	Pre-road under trailers (random)	0016	6/2/07	8:00	345.2	CI	6/10@1345	CH
2	0035	Daily Background		6/2/07	8:00		CI	6/11@555	CH
2	0036	Pre-road under trailers (random)	0017	6/2/07	8:00	252.2	CI	6/11@750	CH
2	0037	Pre-road under trailers (random)	0018	6/2/07	8:00	342.4	CI	6/11@805	CH
2	0038	Pre-road under trailers (random)	0019	6/2/07	8:00	304.3	CI	6/11@820	CH
2	0039	Pre-road under trailers (random)	0020	6/2/07	8:00	246.2	CI	6/11@835	CH
2	0040	Pre-road under trailers (random)	0021	6/2/07	8:00	337.0	CI	6/11@835	CH
2	0041	O/S RCA - Random	0027	6/4/07	8:00	279.6	JM	6/11@915	CH
2	0042	O/S RCA - Random	0028	6/4/07	12:30	236.8	JM	6/11@935	CH
2	0043	O/S RCA - Random (RECOUNT)	0028	6/4/07	12:30	236.8	JM	6/11@1000	CH
2	0044	O/S RCA - Random	0028QC	6/4/07	12:30	338.4	JM	6/11@1015	CH
2	0045	Daily Source Check						6/11@1115	CH
2	0046	O/S RCA - Random	0030	6/4/07	12:30	264.5	JM	6/11@1140	CH
2	0047	O/S RCA - Random	0031	6/4/07	12:30	292.5	JM	6/11@1140	CH
2	0048	O/S RCA - Random	0033	6/4/07	12:30	279.7	JM	6/11@1150	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Type / Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0049	I/S RCA	0100	6-5-07	11:00	273.7	JM	6/13@1320	CH
1	0050	I/S RCA	0102	6-5-07	11:00	290.5	JM	6/13@1400	CH
1	0051	I/S RCA	0104	6-5-07	11:00	286.4	JM	6/13@1410	CH
1	0052	I/S RCA	0105	6-5-07	11:00	258.6	JM	6/13@1420	CH
1	0053	I/S RCA	0106	6-5-07	11:00	309.4	JM	6/13@1440	CH
1	0054	Daily Source Check				552		6/14@0700	CH
1	0055	Daily Background				467.7		6/14@0800	CH
1	0056	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0057	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0058	I/S RCA	0109	6-5-07		296.9	JM	6/14@0940	CH
1	0059	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0060	I/S RCA	0111	6-5-07	11:00	284.7	JM	6/14@1000	CH
1	0061	I/S RCA	0113	6-5-07	11:00	227.3	JM	6/14@1015	CH
1	0062	I/S RCA	0114	6-5-07	11:00	260.6	JM	6/14@1030	CH
1	0063	I/S RCA	0116	6-5-07	11:00	282.4	JM	6/14@1045	CH
1	0064	Sludge Work-over Tank	0132	6/14/07	11:00	468.8	JM	6/14@1120	CH

WINNIE GAMMA SPEC LOG

Det #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0065	Poly #1 Redo	0133	6/14/07	13:00	223.3	JM	6/14@1300	CH
1	0066	Daily Qc Check						6/15@854	LCF
1	0067	Daily Background						6/15@915	LCF
1	0068	Sludge from Work Over Tank	0137			490.3	JM	6/15@1031	LCF
1	0069	Daily QC Check				552		6/18@705	LCF
1	0070	Daily Background				467.7		6/18@749	LCF
1	0071	H2O from poly tank #1	0148			257.9	JM	6/18@959	LCF
1	0072	H2O from poly tank #2	0149			272.4	JM	6/18@1015	LCF
1	0073	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0074	Daily QC Check				552		6/18@458	LCF
1	0075	Daily QC Check (recount)				552		6/19@522	LCF
1	0076	Daily Background				467.7		6/19@626	LCF
1	0077	Sludge from Work Over Tank	0153	6/19/07	06:30	282.1	JM	6/19@719	LCF
1	0078	Sludge from Work Over Tank	0153	6/19/07	06:30	282.1	JM	6/19@741	LCF
1	0079	Sludge from Work Over Tank(QC)	0158(qc)	6/19/07	10:30	638.5	GP	6/19@1052	LCF
1	0080	Mud from bobcat wheels used In RCA	0159	6/19/07	12:20	512.1	JM	6/19@1237	LCF

WINNIE GAMMA SPEC LOG

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0081	Daily Source Check				552		6/20@457	LCF
1	0082	Daily Background				467.7		6/20@615	LCF
1	0083	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0084	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0085	Background (recount)				467.7			LCF
1	0086	Soil from Grid C/D-3				32.6			LCF
1	0087	Soil I/S RCA (recount)				1.0			LCF
1	0088	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0089	Daily Source Check				552		6/21@507	LCF
1	0090	Daily Background				467.7		6/21@535	LCF
1	0091	Daily Source Check				552			LCF
1	0092	Background Check				467.7			LCF
1	0093	O/S RCA in trench (#3)	0174			468.6	JM		LCF
1	0094	O/S RCA in trench (#5)	0176			468.5	JM		LCF
1	0095	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	0096	Daily Background				467.7			LCF

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0097	Daily Source Check				552		6/25@710	LCF
1	0098	I/S RCA QC (recount)	0104QC	6/5/07	1100	284.7	JM	6/25/830	CH
1	0099	I/S RCA (recount)	0104	6/5/07	1100	286.4	JM	6/25@915	CH
1	0100	I/S RCA QC (recount)	0113QC	6/5/07	1100	216.2	JM	6/25@1125	LCF
1	0101	Daily Source Check				552		6/26@540	LCF
1	0102	Background Check				467.7		6/26@637	LCF
1	0103	OS RCA in Trench	0176	6/22/07	0900	239.9	JM	6/26@1145	CH
1	0104	W.O. Liquid Sludge	0185	6/26/07	1630	328.6	GP	6/26@1700	CH
1	0105	W.O. Sand Sludge	0186	6/26/07	1630	639.8	GP	6/26@1710	CH
1	0106	Background Empty						6/27@542	LCF
1	0107	Background Check				467.7		6/27@633	LCF
1	0108	Daily Source Check				552		6/27@736	LCF
1	0109	W/Z - cutting W.O. tank w/torch	0184			.4	JM	6/27@848	LCF
1	0110	W/Z - cutting W.O. tank w/saw sall	0170			1	JM	6/27@910	LCF
1	0111	Sludge from W.O.tank	0189	6/27/07	1100	358.1	GP	6/27@1122	LCF
1	0112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0113	Wet sand from W.O.tank(Petri)	0194	6/27/07	15:40	7g	JM	6/27@1550	LCF
1	0114	Recount (mix w/clean sand)	0194r	6/27/07	15:40	170.2	JM	6/27@1617	LCF
1	0115	Daily Source Check				552		6/28@521	LCF
1	0116	Background Check				467.7		6/28@552	LCF
1	0117	A/F - cut poly tank	0170	6/21/07	12:55	1	JM	6/28@755	LCF
1	0118	Sludge from B-12 #130	0199	6/28/07	16:00	36.9	JM	6?281637	LCF
1	0119	Daily Source Check				552		6/29@524	LCF
1	0120	Background Check				467.7		6/29@541	LCF
1	0121	Sludge from B-12 #129(to high deadtime)	0200	6/28/07	16:00	48.1	JM	N/A	N/A
1	0122	Sludge from B-12 #129	0200	6/28/07	16:00	17.3	JM	6/29@705	LCF
1	0123	Sludge from B-12 #125	0201	6/28/07	16:00	36.8	JM	6/29@724	LCF
1	0124	Sludge from B-12 #133	0202	6/28/07	16:00	28.2	JM	6/29@744	LCF
1	0125	Sludge from B-12 #123	0203	6/28/07	16:00	23.1	JM	6/29@803	LCF
1	0126	Sludge from B-12 #124	0204	6/28/07	16:00	31.2	JM	6/29@824	LCF
1	0127	Daily Source Check							LCF
1	0128	Background Check							LCF

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum #WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0129	Daily Source Check				552		7/1@556	LCF
1	0130	Background Check				467.7		7/1@656	LCF
1	0131	N/A							LCF
1	0132	N/A							LCF
1	0133	Drum #3 (from RCA)	0213	6/3/07	1030	242.1	GP	7/1@1000	LCF
1	0134	Drum #4 (from RCA)	0214	6/3/07	1030	255.7	GP	7/1@@1037	LCF
1	0135	Daily Source Check				552		7/2@451	LCF
1	0136	Background Check				467.7		7/2@511	LCF
1	0137	Drum #6 (from RCA)	0216	6/3/07	1030	268.9	GP	7/2@0616	LCF
1	0138	Drum #7 (from RCA)QC	0217	6/3/07	1030	300.9	GP	7/2@640	LCF
1	0139	Drum #9 (from RCA)	0219	6/3/07	1030	324.5	GP	7/2@701	LCF
1	0140	Daily Source Check				552		7/3@1432	LCF
1	0141	Background Check				467.7		7/3@1445	LCF
1	0142	Lapel A/F (D.Schult) for shipping	0232	6/26/07	1010	1	CI	7/3@1528	LCF
1	0143	N/A				N/A		7/5@649	LCF
1	0144	Background Check				467.7		7/5@657	LCF

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
1	0145	Daily Source Check				552		7/5@900	LCF
1	0146	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0147	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0148	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0149	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0150	Background Check				467.7		7/9@745	LCF
1	0151	Daily Source Check				552		7/9@800	LCF
1	0152	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	0153	Daily Source Check				552		7/10@615	LCF
1	0154	Background Check				467.7		7/10@629	LCF
1	0155	A/F -cut. w/o tank (vol) 12048884	0180	6/26/07	9:35	N/A	JM	7/10@718	LCF
1	0156	A/F -cut. w/o tank (vol) 10477290	0236	7/7/07	14:15	N/A	JM	7/10@735	LCF
1	0157	A/F -cut. Poly tank (vol) 13201385	0245	7/9/07	10:30	N/A	JM	7/10@754	LCF
1	0158	A/F -cut. w/o tank (vol) 4714781	0242	7/9/07	8:05	N/A	JM	7/10@842	LCF
1	0159	A/F -cut. w/o tank (vol) 4969634	0243	7/9/07	8:05	N/A	JM	7/10@920	LCF
1	0160	A/F -cut. Poly tank (vol) 9010469	0244	7/9/07	9:50	N/A	JM	7/10@936	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0161		A/F - Cut Work Over Tank (Volume 9429561 mls)	0250		7/10/07	0825	JM	7/10@956	LCF
0162		A/F - Cut Work Over Tank (Volume 9939267 mls)	0249		7/10/07	0926	JM	1030	LCF
0163		H2O (rain from inside bag holder)	0248	243.3	7/9/07	1405	JM	1046	LCF
0164		H2O (O/S rain H2O in clean area)	0234	301.2	7/10/07	1500	GP	1508	LCF
0165		Daily Source Check						7/11#631	LCF
0166		Clean Bottle H2O	0254			0635	JM	0755	LCF
0167		Daily Source Check						7/12@738	LCF
0168		BACKGROUND CHECK						752	LCF
0169		A/F - Cut Work Over Tank (Volume 37194380 mls)	0251		7/10/07	1625	JM	0906	LCF
0170		EMPTY SHIELD BACKGROUND						1520	LCF
0171		CLEAN Sand BACKGROUND CHECK						1601	LCF
0172		A/F - Cut Work Over Tank (Volume 11525019 mls)	0274		7/12/07	1620	JM	1652	LCF
0173		BACKGROUND CHECK (over nite)						1706	LCF
0174		Daily Source Check							LCF
0175	85.3	Bag #3 (QC Check) recount	0270QC	333.4	7/12/07	1635	GP		LCF
0176	49.1	14K Comparison QC Check	0281QC	217	7/13/07	0840	GP	1130	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0177		A/F -loading bags (volume)11420246	0290		7/13/07	1350	JM	7/13@ 1432	LCF
0178		A/F -loading bags (volume)2.68E8	0302		7/13/07	1600	JM	1637	LCF
0179		Empty Shielding						1655	LCF
0180		Daily Source Check		552				7/14@ 0633	LCF
0181		A/F - (G/A) No. @ RCA Boundary (volume)1.73E8	0256		7/11/07	0645	CI	0753	LCF
0182		Daily Source Check		552				7/15@ 0644	LCF
0183		Background Check		467.7				0712	LCF
0184	19.2	Bag S - 020 Grid D3-4, C3-5	0326	339.6	7/14/07	1435	LC	0819	LCF
0185		Daily Source Check		552				7/16@ 0646	LCF
0186		Background Check		467.7				0702	LCF
0187		Daily Source Check		552				7/17@ 0813	LCF
0188		Background Check		467.7				0850	LCF
0189		A/F - (G/A) Decon mimi Track hoe W/Z (volume)1.63E8	0381		7/17/07	0935	LC	1127	LCF
0190		Background Check		467.7				7/18@ 0652	LCF
0191		Daily Source Check		552				0719	LCF
0192		A/F - (G/A) Decon Excavator BZ (volume)2.148E7	0397		7/16/07	1110	JM	1012	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0193		A/F (w/z) Decon Loader Bucket	0385		7/17/07	1330	LC	7/18@ 1033	LCF
0194	1.057E5	Sludge from Box #127 Sample #1	0403	3.3	7/18/07	1600	JM	1626	LCF
0195		Background Check		467.7				7/19@ 0707	LCF
0196		Daily Source Check		552			JM	0729	LCF
0197	2.34E5	Sludge from Box #127 Sample #2	0404	2.9	7/18/07	1600	JM	0839	LCF
0198	2.03E5	Sludge from Box #127 Sample #3	0405	4.4	7/18/07	1600	JM	0909	LCF
0199	2.54E5	Sludge from Box #127 Sample #4	0406	3	7/18/07	1600	JM	0936	LCF
0200	3.64E5	Sludge from Box #127 Sample #5	0407	3	7/18/07	1600	JM	0959	LCF
0201		A/F - WZ Loading Bags	0325	3.7	7/14/07	1600	JM	1452	LCF
0202		Daily Source Check		552			JM	7/20@ 0816	LCF
0203		Background Check		467.7			JM	0836	LCF
0204		A/F - WZ Hammering on Pump head	0160		6/19/07	1230	JM	0902	LCF
0205		A/F - WZ Cutting poly tank	0170		6/21/07	1255	JM	0934	LCF
0206		A/F Cutting W.O. Tank	0180		6/26/07	0935	JM	1003	LCF
0207		A/F Cutting W.O. Tank	0238		7/7/07	1535	JM	1035	LCF
0208		A/F - disposing of drums in bagb	0233		7/3/07	1630	JM	1114	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0225		Background Check		467.7				7/21@ 0646	LCF
0226		Daily Source Check		552				0748	LCF
0227		A/F - WZ Decon Workover Tank	0227		7/2/07	1558	CI	1017	LCF
0228		A/F - WZ Remove sludge from W.O.Tank	0196		6/27/07	1713	JM	1035	LCF
0229		A/F - WZ Cut Workover Tank	0195		6/27/07	1455	JM	1121	LCF
0230		A/F - WZ Clean sludge from W.O. Tank	0190		6/29/07	1215	JM	1211	LCF
0231		A/F - WZ Decon Workover Tank	0184		6/24/07	1135	JM		LCF
0232		A/F - WZ Bagging Soil	0469		7/21/07	1500	GP	1603	LCF
0233		Background Check		467.7				7/22@ 0643	LCF
0234		Daily Source Check		552				0657	LCF
0235		Background Check		467.7				0612	LCF
0236		Daily Source Check		552				0631	LCF
0237		A/F - WZ Bagging Soil	0411		7/19/07	0950	LC	0711	LCF
0238		A/F - WZ Bagging Soil	0485		7/22/07	1300	JM	0750	LCF
0239		A/F - BZ Cut Workover Tank	0239		7/7/07	1103	JM	1103	LCF
0240		Daily Background		467.7				7/24@ 0611	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0241		Daily Source Check						7/24@ 0635	LCF
0242		A/F -B/Z Deconning Loader	0502		7/23/07	1000	JM	1039	LCF
0243		Background Check		467.7				0633	LCF
0244		Daily Source Check		552				0735	LCF
0245	2.09E5	Sludge from Box #133 #1	0563	8.6	7/24/07	1600	MP	0752	LCF
0246	1.88E5	Sludge from Box #133 #2	0564	3.5	7/24/07	1600	MP	0810	LCF
0247	1.95E5	Sludge from Box #133 #3	0565	2.9	7/24/07	1600	MP	0844	LCF
0248	1.81E5	Sludge from Box #133 #4	0566	2.7	7/24/07	1600	MP	0901	LCF
0249	1.89E5	Sludge from Box #133 #5	0567	3.4	7/24/07	1600	MP	0918	LCF
0250		A/F BZ Mixing Sludge w/cement	0420		7/19/07	1440	JM	0944	LCF
0251		A/F WZ Loading Bags (center)	0349		7/15/07	0720	JM	1014	LCF
0252		A/F G/A Loading Bags	0348		7/15/07	0725	JM	1050	LCF
0253		A/F WZ Cutting Poly Tank	0177		6/22/07	1300	JM	1115	LCF
0254		A/F WZ Cutting Poly Tank	0170		6/21/07	1255	JM	1133	LCF
0255		A/F WZ Hammering Pump Head	0160		6/19/07	1230	JM	1258	LCF
0256		A/F WZ Cutting Pipes	0128		6/12/07	1130	CI	1340	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0257		A/F - WZ _ Cutting Pipes	0091		6/8/07	1030	CI	7/25@ 1404	LCF
0258		A/F - WZ - cutting pipes	0087		6/7/07	1043	JM	1427	LCF
0259		A/F - WZ - cutting pipes	0094		6/11/07	0748	JM	1456	LCF
0260		A/F - WZ - cutting pipes	0088		6/7/07	1417	JM	1456	LCF
0261		Background Check		467.7				7/26@ 0630	LCF
0262		Daily Source Check		552				0653	LCF
0263		A/F - WZ - cutting pipes	088		6/7/07	1417	JM	0719	LCF
0264		A/F - BZ - Sampling Sludge	0582		7/25/07	1450	GP	0743	LCF
0265		A/F - WZ - Removing Concrete around Well	0597		7/26/07	0715	LC	0922	LCF
0266		A/F _ WZ Loading Bags	0558		7/24/07	1345	JM	0956	LCF
0267		Background Check		467.7				7/27@ 0636	LCF
0268		Daily Source Check		552				0657	LCF
0269	2.43E5	Sludge _ BOx #130 (#1)	0617	4.8	7/25/07	1400	GP	0817	LCF
0270	2.37E5	Sludge _ BOx #130 (#2)	0618	7.5	7/25/07	1400	GP	0839	LCF
0271	2.25E5	Sludge _ BOx #130 (#3)	0619	5.0	7/25/07	1400	GP	0904	LCF
0272	2.37E5	Sludge _ BOx #130 (#4)	0620	7.1	7/25/07	1400	GP	0921	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0273	2.55E5	Sludge - Box #130 #5	0621	7.8	7/25/07	1400	GP	7/27@ 0942	LCF
0274	2.83E5	Sludge - Box #123 #1	0622	10.2	7/25/07	1430	GP	1143	LCF
0275	2.75E5	Sludge - Box #123 #2	0623	8.3	7/25/07	1430	GP	1203	LCF
0276	3.30E5	Sludge - Box #123 #3	0624	6.7	7/25/07	1430	GP	1228	LCF
0277	3.10E5	Sludge - Box #123 #4	0625	7.9	7/25/07	1430	GP	1244	LCF
0278	3.3.E5	Sludge - Box #123 #5	0626	4.6	7/25/07	1430	GP	1302	LCF
0279		Background Check		467.7				7/28 0627	LCF
0280		Daily Source Check		552					LCF
0281	167.2	Sandy Sludge - Box #125 #1	0627	6.5	7/25/07	1500	GP	0732	LCF
0282	9,581.	Sandy Sludge - Box #125 #2	0628	4.9	7/25/07	1500	GP	0945	LCF
0283	8,901.	Sandy Sludge - Box #125 #3	0629	8.6	7/25/07	1500	GP	1001	LCF
0284	7,304.	Sandy Sludge - Box #125 #4	0630	29.7	7/25/07	1500	GP	1017	LCF
0285	4,586.	Sandy Sludge - Box #125 #5	0631	11.9	7/25/07	1500	GP	1030	LCF
0286	1.39E5	Sandy Sludge - Box #129 #1	0632	30.5	7/25/07	1530	GP	1044	LCF
0287	604.8	Sandy Sludge - Box #129 #2	0633	30.1	7/25/07	1530	GP	1108	LCF
0288	978.8	Sandy Sludge - Box #129 #3	0634	18.2	7/25/07	1530	GP	1142	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0289									LCF
0290									LCF
0291									LCF
0292									LCF
0293									LCF
0294									LCF
0295									LCF
0296									LCF
0297									LCF
0298									LCF
0299									LCF
0300									LCF
0301									LCF
0302									LCF
0303									LCF
0304									LCF

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Page ____ of ____

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0305	3.25E5	Sandy Sludge Box #129 #4	635	17.2	7/25/07	1530	GP	7/28@ 1227	LCF
0306	3.12E5	Sandy Sludge Box #129 #5	653	19.5	7/25/07	1530	GP	1255	LCF
0307		A/F – Bagging Sludge BZ	606		7/26/07	1030	GP	1533	LCF
0308		A/F – Bagging Sludge BZ	595		7/25/07	1540	JM	1555	LCF
0309		A/F – Bagging Sludge BZ	667		7/28/07	1555	GP	1609	LCF
0310		A/F – Bagging Sludge BZ	636		7/26/07	1400	GP	1630	LCF
0311		Background Check		467.7				7/29@ 0629	LCF
0312		Daily Source Check		552				0713	LCF
0313		A/F – Filling Sludge Bags	637		7/26/07	1400	LC	0742	LCF
0314		A/F - Loading Bags WZ	672		7/28/07	1607	JM	0801	LCF
0315		A/F - North @ RCA Boundary GA	568		7/25/07	0630	CI	0852	LCF
0316		G/A – North @ RCA Boundary						7/30@ 647	LCF
0317		Background Check						0705	LCF
0318		Daily Source Check	718		7/29/07	1430	JM	0728	LCF
0319		A/F BZ Moving Sludge	717		7/29/07	1417	GP	0809	LCF
0320		A/F WZ Moving Sludge	728		7/29/07	1014	GP	0824	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0321		Background Check		462.7				7/31@ 0615	LCF
0322		Daily Source Check		552				0656	LCF
0323		A/F - Filling Soil Bags WZ	735		7/30/07	1400	LC	1028	LCF
0324	3.96E4	B12 Box #125 - B0007 Sludge	759	13	7/31/07	1000	LC	1049	LCF
0325		A/F Filling Sludge Bags - WZ	736		7/30/07	1400	LC	1110	LCF
0326		Background Check		467.7				8/1@ 0654	LCF
0327		Daily Source Check		552				0840	LCF
0328		A/F - Digging Soil WZ	795		7/31/07	1305	JM	1412	LCF
0329		A/F - Decon Well-head WZ	794		7/31/07	1520	LC	1428	LCF
0330		Background Check		467.7				8/2@ 0701	LCF
0331		Daily Source Check		552				0729	LCF
0332		A/F - Moving Sludge(re-count) WZ	606		7/26/07	1022	GP	0802	LCF
0333	5318.	B12 Box #123 - Sludge H2O + Absorb	835	26.1	8/2/07	0745	LC	1216	LCF
0334	4935.	B12 Box #127 - Sludge H2O + Absorb	836	20.2	8/2/07	0745	LC	1236	LCF
0335	6211.	B12 Box #129 - Sludge H2O + Absorb	837	27.4	8/2/07	0745	LC	1255	LCF
0336	3533	B12 Box #130 - Sludge H2O + Absorb	838	24.2	8/2/07	0745	LC	1318	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0337	244.	B12 Box # 133 + absorb	839	20.9	8/2/07	0745	LC	8/2@ 1407	LCF
0338	15,147	B12 Box # 125 + absorb	845	32.6	8/2/07	1400	LC	1444	LCF
0339	1,995	B12 Box # 122 + crystal H2O	834	282.2	8/1/07	0745	LC	8/3 1444	LCF
0340		Daily Source Check		552				8/3 0715	LCF
0341		Background Check		490.2				1041	LCF
0342	.570	Grid C1-1 0-6' Free Release	840	356.4	8/2/07	1300	LC	830	LCF
0343	.229	Grid C1-2 0-6' Free Release	841	363.3	8/2/07	1300	LC	845	LCF
0344		Background Check		493.2				8/4@ 624	LCF
0345		Daily Source Check		552				0700	LCF
0346		A/F - WZ Digging Soil	846		8/2/07	1450	JM	1411	LCF
0347		A/F - WZ Bagging Soil	872		8/3/07	1415	JM	0815	LCF
0348		Background Check		467.7				8/5@ 0920	LCF
0349		Daily Source Check		552				1033	LCF
0350		Background Check		467.7				8/6@ 0623	LCF
0351		Daily Source Check		552				715	LCF
0352		A/F - WZ Filling Bags	945		8/5/07	1520	JM	830	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0353		A/A - WZ Filling Bags	916		8/4/07	1450	JM	8/6	LCF
0354	20.5	Bag # S-130 Grid E3-1,4	867	333.2	8/3/07	1200	LC	1008	LCF
0355	2.68	Bag # S-135 Grid D2-4	871	404.6	8/6/07	1400	LC	1027	LCF
0356	.348	Trench T3-4 0-6" Free Release	959	359.6	8/6/07	0725	JM	1107	LCF
0357	.219	Grid A0-4 0-6" Free Release	961	401.1	8/6/07	0725	JM	1126	LCF
0358	4.62	Grid E2-2 0-6" Free Release	967	336.1	8/6/07	0900	JM	1531	LCF
0359	3.71	Grid E2-5 0-6" Free Release	970	285.2	8/6/07	0900	JM	1548	LCF
0360	.497	Grid D3-3 0-6" Free Release	930	393.5	8/4/07	1300	JM	1605	LCF
0361	1.70	Grid D3-1 0-6" Free Release	965	404.5	8/6/07	0815	LC	1621	LCF
0362	.057	Grid D1-1 0-6" Free Release	974	424.1	8/6/07	1100	JM	1643	LCF
0363	.037	Grid D1-3 0-6" Free Release	976	422.6	8/6/07	1100	JM	1659	LCF
0364	.600	Grid D1-5 0-6" Free Release	978	406.5	8/6/07	1100	JM	1719	LCF
0365		Background Check		467.7				8/7@ 0608	LCF
0366		Daily Source Check		552				0644	LCF
0367	.401	Grid D2-2 0-6" Free Release	980	435	8/6/07	1100	JM	0817	LCF
0368		Grid D2-5 0-6" Free Release	983	404.8	8/6/07	1115	JM	0833	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0369	1.76	Grid E3-3 0-6" Free Release	985	387.1	8/6/07	1115	JM	8/7@ 906	LCF
0370	.203	Grid C0-1 0-6" Free Release	987	323.6	8/6/07	1115	JM	924	LCF
0371	.282	Grid E0-4 0-6" Free Release	989	346.0	8/6/07	1300	LC	955	LCF
0372	10.3	Grid D0-2 0-6" Free Release	991	256.0	8/6/07	1330	JM	1045	LCF
0373	1.50	Grid D0-4 0-6" Free Release	993	299.6	8/6/07	1330	JM	1059	LCF
0374	.872	Grid D0-5 0-6" Free Release	994	362.2	8/6/07	1330	JM	1126	LCF
0375	6.52	Bag # S-141 Grid D1-4	997	414.8	8/6/07	1645	CI	1329	LCF
0376	1.88	Bag # S-142 Grid D1-4	998	353.3	8/6/07	1645	CI	1351	LCF
0377	2.02	Bag # S-143 Grid D1-4	999	379.7	8/6/07	1645	CI	1408	LCF
0378	1.63	Bag # S-145 Grid D1-4	1001	354.4	8/6/07	1645	CI	1426	LCF
0379	.881	Bag # S-146 Grid D1-4	1005	353.6	8/6/07	1645	CI	1444	LCF
0380		Background Check		467.7				8/8@ 736	LCF
0381		Daily Source Check		552				802	LCF
0382	4.07	Bag # S-152 Ditch 2,3	1011	267.1	8/6/07	1730	LC	1029	LCF
0383	8.25	Bag # S-153 Ditch 1,2,3	1012	419.8	8/6/07	1730	LC	1055	LCF
0384	9.30	Bag # S-158 Grid D2-2	1017	405.2	8/6/07	1730	LC	1158	LCF

GAMMA SPEC LOG
Winnie Site

Det.1

Spectrum # WI -	pCi/g Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0385	2.15	Bag # S-161 Grid D1-3	1020	410.7	8/6/07	1730	LC	1224	LCF
0386	.194	Bag # S-162 Grid D0-4	1021	374.2	8/6/07	1730	LC	1242	LCF
0387	3.32	Bag # S-155 Ditch-1	1014	315.3	8/6/07	1730	LC	1303	LCF
0388	2.92	Bag # S-154 Ditch 3-2	1013	297.5	8/6/07	1730	LC	1318	LCF
0389	.260	Out Side Area #2 - 0-6" Free Release	1029	396.9	8/7/07	1415	LC	1339	LCF
0390		Background Check		467.7				8/9@ 0757	LCF
0391		Daily Source Check		552				0910	LCF
0392		A/F - WZ Mixing concrete w/sludge h2o	1061		8/9/07	0920	LC	1518	LCF
0393									
0394									
0395									
0396									
0397									
0398									
0399									
0400									

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
	0001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	0002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	0003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	0004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0005	Qc #1						6/8@1710	CH
2	0006	QC #2						6/6@1735	CH
2	0007	QC #3						6/8@17:50	CH
2	0008	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0009	QC #4						6/9@925	CH
2	0010	QC #5						6/9@9:40	CH
2	0011	QC #6						6/9@957	CH
2	0012	QC #7						6/9@1010	CH
2	0013	QC #8						6/9@1020	CH
2	0014	QC #9						6/9@1030	CH
2	0015	QC #10						6/9@1048	CH
2	0016	QC #11						6/10@822	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0017	QC #11	N/A	N/A	N/A	N/A	N/A	6/10@820	CH
2	0018	Daily Background	N/A	N/A	N/A	N/A	N/A	6/10@835	CH
2	0019	QC #12	N/A	N/A	N/A	N/A	N/A	6/10@900	CH
2	0020	QC #13	N/A	N/A	N/A	N/A	N/A	6/10@915	CH
2	0021	QC #14	N/A	N/A	N/A	N/A	N/A	6/10@930	CH
2	0022	QC #15	N/A	N/A	N/A	N/A	N/A	6/10@945	CH
2	0023	QC #16	N/A	N/A	N/A	N/A	N/A	6/10@955	CH
2	0024	Qc #17	N/A	N/A	N/A	N/A	N/A	6/10@1015	CH
2	0025	QC #18	N/A	N/A	N/A	N/A	N/A	6/10@1030	CH
2	0026	QC #19	N/A	N/A	N/A	N/A	N/A	6/10@1050	CH
2	0027	QC #20	N/A	N/A	N/A	N/A	N/A	6/10@12:00	CH
2	0028	Pre-road under trailers(random)	0010	6/2/07	8:00	207.0	CI	6-10-07	CH
2	0029	Pre-road under trailers(random)	0011	6/2/07	8:00	293.8	CI	6-10-07	CH
2	0030	Pre-road under trailers(random)	0012	6/2/07	8:00	277.1	CI	6-10-07	CH
2	0031	Pre-road under trailers(random)	0013	6/2/07	8:00	255.0	CI	6-10-07	CH
2	0032	Pre-road under trailers(random)	0014	6/2/07	8:00	320.1	CI	6-10-07	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Type / Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0033	Pre-road under trailers (random)	0015	6/2/07	8:00	318.0	CI	6/10@1300	CH
2	0034	Pre-road under trailers (random)	0016	6/2/07	8:00	345.2	CI	6/10@1345	CH
2	0035	Daily Background		6/2/07	8:00		CI	6/11@555	CH
2	0036	Pre-road under trailers (random)	0017	6/2/07	8:00	252.2	CI	6/11@750	CH
2	0037	Pre-road under trailers (random)	0018	6/2/07	8:00	342.4	CI	6/11@805	CH
2	0038	Pre-road under trailers (random)	0019	6/2/07	8:00	304.3	CI	6/11@820	CH
2	0039	Pre-road under trailers (random)	0020	6/2/07	8:00	246.2	CI	6/11@835	CH
2	0040	Pre-road under trailers (random)	0021	6/2/07	8:00	337.0	CI	6/11@835	CH
2	0041	O/S RCA - Random	0027	6/4/07	8:00	279.6	JM	6/11@915	CH
2	0042	O/S RCA - Random	0028	6/4/07	12:30	236.8	JM	6/11@935	CH
2	0043	O/S RCA - Random (RECOUNT)	0028	6/4/07	12:30	236.8	JM	6/11@1000	CH
2	0044	O/S RCA - Random	0028QC	6/4/07	12:30	338.4	JM	6/11@1015	CH
2	0045	Daily Source Check						6/11@1115	CH
2	0046	O/S RCA - Random	0030	6/4/07	12:30	264.5	JM	6/11@1140	CH
2	0047	O/S RCA - Random	0031	6/4/07	12:30	292.5	JM	6/11@1140	CH
2	0048	O/S RCA - Random	0033	6/4/07	12:30	279.7	JM	6/11@1150	CH

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0049	O/S RCA (Random)	0035	6/4/07	12:30	279.9	JM	6/11@1200	CH
2	0050	O/S RCA (Random)	0037	6/4/07	12:30	303.6	JM	6/11@1225	CH
2	0051	O/S RCA (Random)	0038QC	6/4/07	12:30	287.1	JM	6/11@1240	CH
2	0052	Daily Source Check				552		6/12@0610	CH
2	0053	Daily Background				481.1		6/12@0750	CH
2	0054	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0056	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0057	Sludge mixed w/clean sand249g to 1g -from work-over tank	0122	6/12/07	12:30	250	GP	6/12@1240	CH
2	0058	Sludge from work-over tank	0123	6/12/7	12:30	333.1	GP	6/12@1250	CH
2	0059	O/S RCA (Random)	0040	6/4/07	12:30	268.0	JM	6/12@1525	CH
2	0060	Daily Background				491.8		6/13@0610	CH
2	0061	Daily Source Check				552		6/13@620	CH
2	0062	O/S RCA (Random)	0042	6/4/07	12:30	262.4	JM	6/12@0755	CH
2	0063	O/S RCA (Random)	0044	6/4/07	12:30	295.4	JM	6/13@820	CH
2	0064	O/S RCA (Random)	0046	6/4/07	12:30	262.8	JM	6/13@	CH

WINNIE GAMMA SPEC LOG

Det #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0065	O/S RCA (random)	0048	6/4/07	12:30	276.2	JM	6/13@845	CH
2	0066	O/S RCA (random)	0050	6/4/07	12:30	262.7	JM	6/13@920	CH
2	0067	O/S RCA (random)	0052	6/4/07	12:30	304.4	JM	6/13@940	CH
2	0068	O/S RCA (random)	0054	6/4/07	12:30	269.9	JM	6/13@1100	CH
2	0069	O/S RCA (random)	0056	6/4/07	12:30	283.9	JM	6/13@1110	CH
2	0070	I/S RCA	0096	6/5/07	11:00	263.8	JM	6/13@1120	CH
2	0071	O/S RCA (recount)	0055R	6/4/07	12:30	244.9	JM	6/13@1145	CH
2	0072	I/S RCA (recount)	0097R	6/5/07	11:00	302.9	JM	6/13@1215	CH
2	0073	I/S RCA	0099	6/5/07	11:00	353.6	JM	6/13@1310	CH
2	0074	I/S RCA	0101	6/5/07	11:00	297.4	JM	6/13@1320	CH
2	0075	I/S RCA	0103	6/5/07	11:00	329.7	JM	6/13@1405	CH
2	0076	I/S (QC)	0104QC	6/5/07	11:00	284.8	JM	6/13@1415	CH
2	0077	Daily Background Check						6/14@0700	CH
2	0078	Daily Source Check						6/14@735	CH
2	0079	I/S RCA	0107	6/5/07	11:00	301.6	JM	6/14@850	CH
2	0080	I/S RCA	0108	6/5/07	11:00	286.6	JM	6/14@925	CH

WINNIE GAMMA SPEC LOG

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0081	I/S RCA	0110	6/5/07	11:00	290	JM	6/14@094	CH
2	0082	I/S RCA	0112	6/5/07	11:00	289.5	JM	6/14@1000	CH
2	0083	I/S RCA QC	0113QC	6/5/07	11:00	215.2	JM	6/14@1020	CH
2	0084	I/S RCA	0115	6/5/07	11:00	297.5	JM	6/14@1035	CH
2	0085	I/S RCA	0117	6/5/07	11:00	296.5	JM	6/14@1050	CH
2	0086	Daily Source Check				552		6/15@540	LCF
2	0087	Daily Background				467.7		6/15@600	LCF
2	0088	Sludge from W-O Tank	0134	6/14/07	8:30	294.1	JM	6/15@829	LCF
2	0089	Sludge from W-O Tank	0135	6/14/07	8:30	476.8	JM	6/15@900	LCF
2	0090	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0091	Sludge from W-O Tank	0136	6/18/07	8:30	527.2	JM	6/15@1028	LCF
2	0092	Sludge from W-O Tank	0138	6/18/07	8:30	528.5	JM	6/15@1051	LCF
2	0093	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0094	Daily Source Check				552		6/18@745	LCF
2	0095	Daily Background Check				467.7		6/18@834	LCF
2	0096	Daily Background Check				467.7		6/19@501	LCF

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0097	Daily Source Check				552		6/19@549	LCF
2	0098	Sludge from Work Over Tank	0152	6/19/07	)6:50	298.0	JM	6/19@714	LCF
2	0099	Concrete dust from around well head	0157	6/19/07	09:50	350.5	JM	6/19@1002	LCF
2	0100	Sludge from W. end of work over tank	0158	6/19/07	10:50	638.5	GP	6/19@1035	LCF
2	0101	Daily Background				467.7		6/20@459	LCF
2	0102	Daily Source Check				552		6/20@615	LCF
2	0103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0104	Daily Background				467.7		6/21@503	LCF
2	0105	Daily Source Check				552		6/21@537	LCF
2	0106	Daily Background				467.7		6/21@1211	LCF
2	0107	Daily Background				467.7		6/22@545	LCF
2	0108	Daily Source Check				552		6/22@732	LCF
2	0109	O/S RCA in trench (#2)	0173	6/22/07	8:30	421.3	JM	6/22@951	LCF
2	0110	O/S RCA in trench (#4)	0175	6/22/07	8:30	379.9	JM	6/22@1005	LCF
2	0111	Daily Background				467.7		6/25@539	LCF
2	0112	Daily Source Check				552		6/25@624	LCF

GAMMA SPEC LOG

Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0113	I/S RCA	0104	6/5/07	1100	286.4	JM	6/25@830	CH
2	0114	I/S RCA Q/C	0104QC	6/5/07	1100	286.7	JM	6/25@905	CH
2	0115	O/S RCA (split) after drying	0173R	6/20/07	1100	216.2	JM	6/25@945	CH
2	0116	I/S RCA	0113	6/5/07	1100	227.0	JM	6/25@1125	CH
2	0117	I/S RCA	113	6/5/07	1100	227.3	JM	6/25@1201	CH
2	0118	Background Check				467.7		6/26@543	LCF
2	0119	Daily Source Check				552		6/26@630	LCF
2	0120	O/S RCA (in trench) after drying (split)	0175	6/22/07	0900	295.9	JM	6/26@1150	CH
2	0121	O/S RCA (in trench) after drying (split	0174	6/22/07	0900	256.1	JM	6/26@1230	CH
2	0122	Background Check (empty shield)				1		6/27@545	LCF
2	0123	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0124	Daily Source Check				552		0545	LCF
2	0125	Adjusting Gain for CO-60				552			LCF
2	0126	Adjusting Gain for CO-60				552			LCF
2	0127	Adjusting Gain for CO-60				552			LCF
2	0128	Daily Source Check				552			LCF

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0129	Sand from bottom of W.O. tank (mixed w/clean sand)QC check/recount	0194	6/27/07	15:40	170.2	JM	6/27@1642	LCF
2	0130	N/A				467.7		6/28@523	LCF
2	0131	Background Check				467.7		6/28@524	LCF
2	0132	Daily Source Check				552		6/28@550	LCF
2	0133	Background Check				467.7			LCF
2	0134	Daily Source Check				552			LCF
2	0135	Background Check				467.7			LCF
2	0136	Drum #1 (from RCA)	0211	6/30/07	10:30	288.8	GP	6/30@1459	LCF
2	0137	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LCF
2	0138	Daily Source Check				552		7/1@634	GP
2	0139	Background Check				467.7			LCF
2	0140	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2	0141	Drum #2	0212	6/30/07	10:30	319.0	GP	7/1@1001	LCF
2	0142	Drum #5	0215	6/30/07	10:30	310.8	GP	7/1@1036	LCF
2	0143	Daily Source Check				552		7/2@513	LCF
2	0144	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

GAMMA SPEC LOG
Winnie Site

Det. #	Spectrum # WI -	Description	WI07-XXXX	Sample Date	Sample Time	Wgt.	Sample Tech	Count Date/ Time	Counted by:
2	0145	Background Check				467.7		7/2@528	LCF
2	0146	Drum #7 from RCA	0217	6/3/07	10:30	300.9	GP	7/2@618	LCF
2	0147	Drum #8 from RCA	0218	6/3/07	10:30	215.9	GP	7/2@643	LCF
2	0148	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	0149	Background Check				467.7		7/3@1503	LCF
2	0150	Daily Source Check				552		7/5@912	LCF
2	0151	Background Check				467.7		7/5@926	LCF
2	0152	Daily Source Check				552		7/6@627	LCF
2	0153	Background Check				467.7		7/6@647	LCF
2	0154	Daily Source Check				552		7/7@755	LCF
2	0155	Background Check				467.7		7/7@810	LCF
2	0156	Daily Source Check				552		7/9@738	LCF
2	0157	Background Check				467.7		7/9@845	LCF
2	0158	Daily Source Check				552		7/10@1232	LCF
2	0159	Background Check				467.7		7/10@1240	LCF
2	0160	Daily Source Check				552		7/11@752	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0161		Background Check		467.7				7/11@818	LCF
0162		Background Check		467.7				7/12@708	LCF
0163		Daily Source Check		552				7/12@740	LCF
0164	178.4	Test Sample #2-(35K) Grid D1-2	0264	229.8	7/12/07	0800	CI	1000	LCF
0165	93.6	Test Sample #1- (20K) Grid B-2	0263	282.2	7/12/07	0800	CI	1042	LCF
0166	3.86	Test Sample #3- (12K) Grid D4-3	0265	304.1	7/12/07	0800	CI	1101	LCF
0167	1.4	Test Sample #4 (12K) E1-2	0266	273.8	7/12/07	1100	CI	11251	LCF
0168	1,321.	Soil from under Work Over Tank	0267	347.9	7/12/07	1235	GP	1359	LCF
0169		Empty Shield						1527	LCF
0170		Clean Sand Background Check		493.2				1616	LCF
0171		Clean Sand Background Check(overnite)		493.2				1659	LCF
0172		Daily Source Check		552				7/13@630	LCF
0173	90.0	Bag #S-003 (grid D1-2,3)	0270	333.4	7/12/07	1635	GP	752	LCF
0174	2,410.	Bag #S-004 (grid D1-2,3)	0271	387.0	7/12/07	1635	GP	806	LCF
0175	54.2	14K Test Comparison	0281	217.0	7/13/07	0840	GP	1111	LCF
0176	324.4	Bag # S-005 (Grid D1-2,3,5)	0279	360.1	7/13/07	0840	GP	1136	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0177	1,111.2	Bag # S-006 Grid D1-5	0280	376.7	7/13/07	0800	GP	7/13@ 1205	LCF
0178	1,360.0	Bag # S-007 Grid D1-1,2,3	0286	388.9	7/13/07	1130	GP		LCF
0179		EMPTY SHIELD						7/13@ 1654	LCF
0180		Daily Source Check		552				7/14@ 648	LCF
0181	100.3	Bag # S-008 Grid D1-1,4	0287	365	7/13/07	1130	GP	0750	LCF
0182	200.4	Bag # S-009 Grid D1-1 C1-2,5	0288	365	7/13/07	1130	GP	0808	LCF
0183	113.2	Bag # S-010 Grid D1-2,4, C1-5	0298	338.3	7/13/07	1630	GP	0839	LCF
0184	61.3	Bag # S-011 Grid C1-3,5	0299	327.7	7/13/07	1630	GP	0853	LCF
0185	55.2	Bag # S-012 Grid D1-1,2,4	0300	318.5	7/13/07	1630	GP	0907	LCF
0186	32.6	Bag # S-013 Grid C1-3,4,5	0301	281.8	7/13/07	1630	GP	0932	LCF
0187	89.0	Bag # S-014 Grid D3 - 4	0307	298.4	7/14/07	0900	GP	1241	LCF
0188	37.4	Bag # S-015 Grid D3 - 2,5	0308	348	7/14/07	0900	GP	1256	LCF
0189	37.6	Bag # S-016 Grid D3 - 2,5	0309	308.4	7/14/07	0900	GP	1315	LCF
0190	86.3	Bag # S-017 Grid D3-2,3,5	0312	298.2	7/14/07	1030	GP	1330	LCF
0191	119.7	Bag # S-018 Grid D3-1,3,5	0313	321.3	7/14/07	1030	GP	1344	LCF
0192	6.14	Grid C1 - 1 @ 6"	0314	344.1	7/14/07	1030	GP	1358	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0193	57.4	Grid C 1-2 @ 6"	0315	317.9	7/14/07	1100	GP	7/14@ 1358	LCF
0194	131.9	Grid C 1 - 3 @ 6"	0316	301.8	7/14/07	1100	GP	1415	LCF
0195	641.2	Grid D 1 - 1 @ 6"	0317	317.8	7/14/07	1100	GP	1428	LCF
0196	47.5	Grid D 1 - 2 @ 6"	0318	359.4	7/14/07	1100	GP	1507	LCF
0197	132.2	Grid D 1 - 3 @ 6"	0319	389.6	7/14/07	1100	GP	1529	LCF
0198	99.6	Grid D 1 - 4 @ 6"	0320	356.5	7/14/07	1100	GP	1554	LCF
0199	74.2	Grid D 1 - 5 @ 6"	0321	347.0	7/14/07	1100	GP	1624	LCF
0200		Daily Source Check		552				7/15 @ 0619	LCF
0201		Background Check		493.2				0641	LCF
0202	100.7	Bag # S-019 Grid C 3-1, D 3-2	0327	298.4	7/14/07	1435	LC	0831	LCF
0203	22.2	Bag # S-021 Grid C 3-4, C 1-3	0328	313.6	7/14/07	1435	LC	0903	LCF
0204		Daily Source Check		552				7/16 @ 0701	LCF
0205		Background Check		493.2				0723	LCF
0206	41.6	Bag # S-022 Grid C3 - 1,2	0329	357.6	7/14/07	1435	LC	0900	LCF
0207	11.3	Grid E 1 - 4	0334	325.6	7/14/07	1540	JM	0914	LCF
0208	32.9	Grid E 1 - 3	0335	217.3	7/14/07	1540	JM	0930	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0209	15.7	Grid E1-1	0336	240.0	7/14/07	1540	JM	7/16@ 0944	LCF
0210	1.54	Grid E1-5	0337	348.7	7/14/07	1600	JM	1015	LCF
0211	5.19E-1	Grid E1-2	0338	335.1	7/14/07	1600	JM	1030	LCF
0212	3.87	Grid E2-2	0339	382.9	7/14/07	1600	JM	1053	LCF
0213	3.42	Grid E2-5	0340	287.2	7/14/07	1600	JM	1120	LCF
0214	11.1	Grid E3-2	0341	296.4	7/14/07	1600	JM	1140	LCF
0215	17.9	Grid E3-5	0342	226.6	7/14/07	1600	JM	1258	LCF
0216	4.53	Grid E4-2	0343	304.5	7/14/07	1600	JM	1316	LCF
0217	15.4	Bag S - 023 Grid E1-4, E2-1	0346	327.0	7/15/07	0730	LC	1346	LCF
0218	1.00	Bag S - 024 Grid E1-4, E2-1	0347	331.7	7/15/07	0730	LC	1401	LCF
0219		Mid-day Source Check		552				1428	LCF
0220	10.7	Grid E2-3	0353	284.8	7/16/06	0700	LC	1456	LCF
0221	159.5	Grid E2-4	0354	244	7/16/07	0700	LC	1510	LCF
0222	93.2	Grid E3 - 1						1531	LCF
0223		Daily Source Check		552				7/17@ 0634	LCF
0224		Background Check		493.2				0708	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0225	41.9	Grid E3 - 3	0356	241.7	7/16/07	0700	LC	7/17@ 0718	LCF
0226	55.8	Grid E3 - 4	0357	274.7	7/16/07	0700	LC	0735	LCF
0227	22.7	Grid E4 - 1	0358	301.8	7/16/07	0700	LC	0800	LCF
0228	7.3	Grid E4 - 3	0359	279.4	7/16/07	0700	LC	0906	LCF
0229	86.8	Grid D4 - 1	0360	243.3	7/16/07	0700	LC	0922	LCF
0230	13.4	Grid D4 - 2	0361	279.2	7/16/07	0700	LC	0939	LCF
0231	1.7	Grid D4 - 3	0362	276.6	7/16/07	0700	LC	0956	LCF
0232	2.3	Grid C4 - 1	0363	332.6	7/16/07	0700	LC	1035	LCF
0233	5.5	Grid C4 - 2	0364	299.1	7/16/07	0700	LC	1111	LCF
0234	2.1	Grid C4 - 3	0365	287.9	7/16/07	0700	LC	1125	LCF
0235	15.6	Grid B4 - 1	0366	268.8	7/16/07	0700	LC	1145	LCF
0236	2.3	Grid B4 - 2	0367	318.3	7/16/07	0700	LC	1158	LCF
0237	3.9	Grid B4 - 3	0368	337.1	7/16/07	0700	LC	1211	LCF
0238		Daily Source Check		552				7/18@ 0659	LCF
0239		Background Check		493.2				0718	LCF
0240	.225	Pre RSA South	0388	234.9	7/17/07	1540	LC	0741	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0241	0.205	Pre RSA Laydown (south)	0389	244.8	7/17/07	1540	LC	7/18@ 0755	LCF
0242	0.126	Pre RSA Laydown (south)	0390	269.3	7/17/07	1540	LC	0821	LCF
0243	0.08	Pre RSA Laydown (south)	0391	189.2	7/17/07	1540	LC	0833	LCF
0244	0.06	Pre RSA Laydown (south)	0392	242.6	7/17/07	1540	LC	0857	LCF
0245		Daily Source Check		552				7/19@ 0704	LCF
0246		Background Check		467.7				0728	LCF
0247	8.88	Chesapeak - 500 Comparison	0399	370.4	7/18/07	1600	BB/JM	1336	LCF
0248	16.6	Chesapeak - 600 Comparison	0400	354.1	7/18/07	1600	BB/JM	1400	LCF
0249	33.2	Chesapeak - 700 Comparison	0401	307.7	7/18/07	1600	BB/JM	1414	LCF
0250	72.7	Chesapeak - 800 Comparison	0402	263.3	7/18/07	1600	BB/JM	1431	LCF
0251		Daily Source Check		552				7/20@ 0717	LCF
0252		Background Check		493.2				0731	LCF
0253	201.2	Bag #S-025 Grid D1-5, D2-2	0421	196.0	7/19/07	1500	GP	0905	LCF
0254	228.6	Bag #S-026 Grid D1-5, D2-2	0422	201.0	7/19/07	1500	GP	0937	LCF
0255		Daily Source Check		552				7/21@ 0644	LCF
0256		Background Check		493.2				0704	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0257	37.3	Bag # S-028 Grid C2-2, D2-3	0424	344.4	7/19/07	1500	GP	7/21@ 0755	LCF
0258	40.1	RCA east Access	0425	206.4	7/19/07	1500	GP	0810	LCF
0259	27.4	Bag # S-029 Grid D2-1, C2-2	0426	352	7/19/07	1600	GP	0826	LCF
0260	49.6	Bag # S-030 Grid C1-4, C2-2	0427	355.5	7/19/07	1600	GP	0840	LCF
0261	65.8	Bag # S-027 Grid D2-1,3	0423	375.2	7/19/07	1500	GP	0856	LCF
0262	13.2	Free Release-Grid A2-1 0 - 6 "	0436	280.9	7/20/07	0940	JM	0911	LCF
0263	21.3	Free Release-Grid A2-4 0 - 6 "	0437	321.4	7/20/07	0940	JM	0927	LCF
0264	30.6	Free Release-Grid A2-3 0 - 6 "	0438	298.0	7/20/07	0940	JM	0942	LCF
0265	4.13	Free Release-Grid A1-1 0 - 6 "	0439	250.8	7/20/07	1115	JM	1115	LCF
0266	16.3	Free Release-Grid A1-3 0 - 6 "	0440	239.1	7/20/07	1115	JM	1214	LCF
0267	2.80	Free Release-Grid A1-4 0 - 6 "	0441	281.9	7/20/07	1115	JM	1202	LCF
0268	8.68	Free Release-Grid A3-1 0 - 6 "	0442	300.8	7/20/07	1115	JM	1228	LCF
0269	4.97	Free Release-Grid A3-3 0 - 6 "	0443	255.9	7/20/07	1115	JM	1242	LCF
0270	5.38	Free Release-Grid A3-4 0 - 6 "	0444	321.4	7/20/07	1115	JM	1254	LCF
0271	1.28	Free Release-Grid A4-1 0 - 6 "	0445	283.8	7/20/07	1115	JM	1307	LCF
0272	2.84	Free Release-Grid A4-3 0 - 6	0446	217.1	7/20/07	1115	JM	1320	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0273	8.96	Grid A1-3 Re-sample 0-6" Free Release	0457	296	7/21/07	1330	CI	7/21@ 1532	LCF
0274	2.89	Grid A1-5 6-12" Free Release	0458	380.9	7/21/07	1330	CI	1554	LCF
0275	.251	Grid A1-2 6-12" Free Release	0459	331.4	7/21/07	1330	CI	1612	LCF
0276		Daily Source Check		552	7/21/07			0639	LCF
0277		Background Check		493.2	7/21/07			0658	LCF
0278	65.4	Bag # S-031 Grid A1-2	0451	137.6	7/21/07	1000	LC	0742	LCF
0279	32.7	Bag # S0321 Grid A1-2	0452	180.4	7/21/07	1000	LC	0757	LCF
0280	18.9	Bag # S-033 Grid A1-5	0453	270.1	7/21/07	1000	LC	0825	LCF
0281	106.1	Bag # S-034 Grid A1-5	0454	194	7/21/07	1000	LC	0838	LCF
0282	30.5	Bag # S-035 Grid A1-5	0455	334.6	7/21/07	1000	LC	0853	LCF
0283	4.31	Bag # S-036 Grid A2-2	0456	237.9	7/21/07	1000	LC	0906	LCF
0284	4.1E-2	Grid A1-5 2 ft. Free Release	0462	300.7	7/21/07	1500	LC	0923	LCF
0285	1.46	Grid A2-2 4" Free Release	0463	328.3	7/21/07	1500	LC	0943	LCF
0286	6.7E-2	Grid A2-1 4" Free Release	0464	383.8	7/21/07	1500	LC	0958	LCF
0287	1.79	Grid A1-2 12" Free Release	0465	352.2	7/21/07	1500	LC	1018	LCF
0288	1.06	Walkway between trailers	0449	283.6	7/21/07	1000	GP		LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0289	3.1E-1	Bag # S-037 Grid A1-2	0460	325.4	7/21/07	1330	CI	7/22@ 1235	LCF
0290	4.22	Grid A2-3 4" down Free Release	0466	301.9	7/21/07	1500	LC	1250	LCF
0291	4.14	Grid A2-4 4" down Free Release	0467	309.9	7/21/07	1500	LC	1304	LCF
0292	.327	Grid A2-5 4" down Free Release	0468	321.5	7/21/07	1500	LC	1325	LCF
0293		Daily Source Check		552	7/21/07	1500		0609	LCF
0294		Background Check		493.2	7/21/07	1500		0632	LCF
0295	0.44	Bag # S-038 Grid A1-2	0461	346.2	7/21/07	1550	CI	0714	LCF
0296	5.29	Bag # S-039	0473	308.2	7/22/07	0700	LC	0917	LCF
0297	4.44	Bag # S-040	0474	279.8	7/22/07	0730	LC	0951	LCF
0298	7.81	Bag # S-041	0475	340.5	7/22/07	0800	LC	1015	LCF
0299	5.15	Bag # S-042	0476	365.5	7/22/07	0900	LC	1109	LCF
0300	84.1	Bag # S-043	0481	299.9	7/22/07	1230	LC	1242	LCF
0301	204.6	Bag # S-044	0482	225.9	7/22/07	1230	LC	1319	LCF
0302	291.1	Bag # S-045	0483	294.5	7/22/07	1230	LC	1333	LCF
0303	111.2	Bag # S-046	0484	312.7	7/22/07	1230	LC	1407	LCF
0304		Daily Source Check		552				7/24@ 0612	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0305		Background Check		493.2	7/24/07			7/24@ 0643	LCF
0306	4.74	Grid A3-2 0-6" Free Release	0532	385	7/24/07	0700	LC	1304	LCF
0307	1.05	Grid A3-5 0-6" Free Release	0533	356.6	7/24/07	0700	LC	1322	LCF
0308	4.39	Grid A4-2 0-6" Free Release	0534	282.1	7/24/07	0700	LC	1342	LCF
0309	.159	Grid A3-1 0-6" Free Release	0541	356.5	7/24/07	0700	LC	1357	LCF
0310		Daily Source Check		552				7/25@ 0844	LCF
0311		Background Check		493.2				0903	LCF
0312	2.25	Bag # S-047 Grid A3-1	0535	357.6	7/24/07	0700	LC	1055	LCF
0313	1.89	Bag # S-048 Grid A3-1	0536	392.7	7/24/07	0700	LC	1116	LCF
0314	1.10	Bag # S-049 Grid A3-1	0537	455.7	7/24/07	0700	LC	1130	LCF
0315	.399	Bag # S-050 Grid A3-1,2	0538	429.8	7/24/07	0700	LC	1230	LCF
0316	3.59	Bag # S-051 Grid A3-2	0539	406.6	7/24/07	0700	LC	1256	LCF
0317	1.54E-3	Bag # S-051 Grid A3-2,5	0540	351.1	7/24/07	0700	LC	1334	LCF
0318	18.6	Bag # S-051 Grid A3-1	0542	302	7/24/07	0700	LC	1356	LCF
0319	65.2	Bag # S-051 Grid C2-5	0543	333.7	7/24/07	0700	LC	1410	LCF
0330	88.3	Bag # S-051 Grid C2-5	0544	340.2	7/24/07	0700	LC	1425	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0331	55.2	Bag # S-056 Grid C2-1,5	0545	287.6	7/24/07	0800	LC	1437	LCF
0332	254.9	Bag # S-057 Grid C2-3,4,5	0546	354.6	7/24/07	0800	LC	1459	LCF
0333	.456	Grid E0-1 0-6" Free Release	0571	341	7/25/07	0830	CI	1538	LCF
0334	.032	Grid E0-2 0-6" Free Release	0572	309.5	7/25/07	0830	CI	1607	LCF
0335	.592	Grid E0-3 0-6" Free Release	0573	293.8	7/25/07	0830	CI	1620	LCF
0336		Daily Source Check		552					LCF
0337		Background Check		493.2				0654	LCF
0338	.111	Grid E0-5 0-6" Free Release	0574	320.8	7/25/07	0830	CI	0815	LCF
0339	.168	Grid A0-1 0-6" Free Release	0576	284.	7/25/07	0930	CI	0834	LCF
0340	4.58	Grid A0-12 0-6" Free Release	0577	301.7	7/25/07		CI	0856	LCF
0341	.995	Grid A0-3 0-6" Free Release	0578	317.2	7/25/07		CI	0913	LCF
0342	.663	Grid A0-5 0-6" Free Release	0579	290.3	7/25/07		CI	0925	LCF
0343	7.39	Bag # S-058 Grid C2-4	0547	312	7/24/07		LC	0948	LCF
0344	3.77	Bag # S-059 Grid C2-1,4	0548	363.3	7/24/07		LC	1015	LCF
0345	39.1	Bag # S-060 Grid C2-4	0556	333.7	7/24/07		LC	1029	LCF
0346	28.1	Bag # S-061 Grid C2-4	0557	350.0	7/24/07		LC	1042	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum #WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0347	3.7E-2	around well head 32" down	575	298.6	7/25	905	GP	7/26	L
0348		N/A							
0349		mid-day SC	—	552	—	—	—	1257	L
0350		SC	—	552	—	—	—	648	L
0351		Bach	—	493.2	—	—	—	658	L
0352	2.45	GRID C4-1 0-6" F.R.	601	308.6	7/25	1600	LC	821	L
0353	1.23	C4-2	602	340.7	"	"	"	835	L
0354	.474	C4-3	603	325.7	"	"	"	857	L
0355	.638	C3-1	609	430.9	7/26	1130	JM	917	L
0356	2.63	C3-2	610	386	"	"	JM	944	L
0357	6.78	C3-3	611	349.1	"	"	JM	1000	L
0358	3.77	C3-5	612	365.5	"	"	JM	1030	L
0359	.826	Bag# S-001 - Grid C4-2	589	339.0	7/25	1530	JM	1044	L
0360	1.25	062 C4-2	590	350.1	"	"	"	1119	L
0361	2.79	063 C4-2	591	334.6	"	"	"	1135	L
0362	3.35	064 C4-1,2,3	592	351.5	"	"	"	1153	L

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0363	3.39	Bag # S-065 Grid C4-1,2,3	593	314.8	7/25/07	1530	JM	7/27@ 1206	LCF
0364	1.69	Bag # S-066 Grid C4-1,2	594	312.5	7/25/07	1530	JM	1229	LCF
0365	6385.5	Box #132 / #0006 #1	600	297.2	7/26/06	0800	CI	1247	LCF
0366		Daily Source Check		552				7/28@ 0625	LCF
0367		Background Check		493.2				733	LCF
0368	23.2	Bag # S-067 Grid C3-1,2,3,5	613	355.9	7/26/07	1130	JM	850	LCF
0369	55.2	Bag # S-068 Grid C3-1,2,3,5	614	330.2	7/26/07	1130	JM	0908	LCF
0370	39.0	Box B-12 #132 #0006 #2	615	302.1	7/26/07	1300	JM	0924	LCF
0371	15.4	Bag # S-070 Grid C3-4	645	361.5	7/27/07	0730	LC	0941	LCF
0372	7.31	Bag # S-069 Grid C3-4	646	347.5	7/27/07	0730	LC	0959	LCF
0373		Daily Source Check		552				7/19@ 0627	LCF
0374		Background Check		493.2				0658	LCF
0375	54.5	Bag # S-052 Grid A3-2,5	540	351.1		0700	LC	0711	LCF
0376	18.2	Bag # S-071 Grid C4-1	654	318.8	7/24/07	1330	JM	0915	LCF
0377	15.2	Bag # S-072 Grid C4-2	655	342.9	7/28/07	1330	JM	0937	LCF
0378	38.5	Bag # S-073 Grid C4-2 B3-1	656	364.3	7/28/07	1330	JM	0951	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0379	13.2	Bag S-074 Grid B3-1,2	657	344.5	7/28/07	1330	JM	7/29@ 1008	LCF
0380	20.0	Bag S-075 Grid B3-1,2	658	296.2	7/28/07	1330	JM	1023	LCF
0381	16.5	Bag S-076 Grid B3-4	659	351.1	7/28/07	1330	JM	1044	LCF
0382	6.2	Bag S-077 Grid B1-2	660	297.2	7/28/07	1330	JM	1104	LCF
0383	93.6	Bag S-078 Grid B1-1,2	661	280.2	7/28/07	1330	JM	1122	LCF
0384	55.1	Bag S-079 Grid B1-2,3	662	280.7	7/28/07	1330	JM	1141	LCF
0385	18.5	Bag S-080 Grid B2-2,4,5	663	324	7/28/07	1330	JM	1201	LCF
0386	39.5	Bag S-081 Grid B1-4,5	664	295.6	7/28/07	1330	JM	1219	LCF
0387	26.4	Bag S-082 Grid B2-3,4,5	665	304.4	7/28/07	1330	JM	1237	LCF
0388	20.0	Bag S-083 Grid B2-3,4	666	347.3	7/28/07	1330	JM	1252	LCF
0389	12.5	Bag S-084 Grid B2-3,4,5	667	323.1	7/28/07	1600	JM	1306	LCF
0390	21.1	Bag S-085 Grid B2-1 B1-4	668	291.	7/28/07	1600	JM	1319	LCF
0391	2.10	Bag S-086 Grid B2-3 B4-1	669	313.7	7/28/07	1600	JM	1356	LCF
0392	8.70	Bag S-087 Grid B2-1,3	670	296	7/28/07	1600	JM	1412	LCF
0393	18.8	Bag S-088 Grid B2-1,3	673	359.1	7/28/07	1600	JM	1432	LCF
0394		Daily Source Check		552				7/30@ 0623	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum #WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0395		Background Check		493.2				7/30@ 0646	LCF
0396	11.4	Bag # S-089 Grid B1-4,5 B2-1,2	696	457.5	7/29/07	1030	JM	0710	LCF
0397	13.3	Bag # S-090 Grid B2-1,3	697	362.7	7/29/07	1030	JM	0808	LCF
0398	2.14	Grid C3-4 Free Release 0-6"	698	352.9	7/29/07	1115	LC	0823	LCF
0399	2.96	Grid B4-3 Free Release (topsoil)	699	293.6	7/29/07	1115	LC	0838	LCF
0400	3.54	Grid B4-2 Free Release (topsoil)	700	279.9	7/29/07	1115	LC	0854	LCF
0401	6.42	Grid B4-1 Free Release (topsoil)	701	288.6	7/29/07	1115	LC	0907	LCF
0402	21.8	Grid B3-2 Free Release 0-6"	702	337.4	7/29/07	1115	LC	0921	LCF
0403	13.1	Grid B3-4 Free Release 0-6"	703	309.2	7/29/07	1115	LC	1009	LCF
0404	4.36	Grid B3-5 Free Release 0-6"	704	353.5	7/29/07	1115	LC	1022	LCF
0405	27.0	Grid B2-1 Free Release 0-6"	705	372	7/29/07	1115	LC	1034	LCF
0406	33.5	Grid B2-2 Free Release 0-6"	706	314	7/29/07	1115	LC	1047	LCF
0407	1.0	Grid B2-3 Free Release 0-6"	707	303.8	7/29/07	1115	LC	1104	LCF
0408	5.19	Grid B2-4 Free Release 0-6"	708	313.2	7/29/07	1115	LC	1130	LCF
0409	.826	Grid B2-5 Free Release 0-6"	709	340	7/29/07	1115	LC	1143	LCF
0410	37.3	Grid B1-5 Free Release 0-6"	710	359.3	7/29/07	1115	LC	1156	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0411	38.6	Grid B1-4 0-6" Free Release	0711	283.8	7/29/07	1115	LC	7/30@ 1232	LCF
0422	13.5	Grid B1-2 0-6" Free Release	0719	271.7	7/29/07	1500	LC	1245	LCF
0423	132.4	Grid B1-1 0-6" Free Release	0720	281.9	7/29/07	1500	LC	1301	LCF
0424	48.9	Grid B1-3 0-6" Free Release	0721	282.3	7/29/07	1500	LC	1314	LCF
0425	6.14	Grid B3-1 0-6" Free Release	0715	335.8	7/29/07	1400	JM		LCF
0426	.651	Grid B3-3 0-6" Free Release	0716	284.6	7/29/07	1400	JM	1338	LCF
0427	9.65	Grid B3-4 re-sample Free Release	0744	360.8	7/30/07	1430	JM	1445	LCF
0428		Daily Source Check		552				7/31@ 0611	LCF
0429		Background Check		493.2				0633	LCF
0430	9.2	Grid B3-2 re-sample 0-3: Free Release	0743	312.4	7/30/07	1430	LC	0700	LCF
0431	8.2	Grid B3-2 re-sample 0-3: Free Release	0745	377	7/30/07	1430	LC	0749	LCF
0434	.202	Grid B3-2 re-sample 0-3: Free Release	0746	388.2	7/30/07	1430	LC	0812	LCF
0435	3.16	Grid B3-2 0-6" resample Free Rel.	0757	353.3	7/31/07	0915	LC	1313	LCF
0436	1.14	Grid B3-4 0-6" resample Free Rel.	0758	375.2	7/31/07	0915	LC	1329	LCF
0437	14.5	Bag S-091 Grid B3-3	0714	431.1	7/29/07	1330	JM	1408	LCF
0438	3.80	Bag S-093 Grid C2-4	0729	370.5	7/30/07	1040	JM	223	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum #WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0439	16.3	Bag # S-094 Grid C2-4	730	364.9	7/30/07	1040	JM	7/31@ 1458	LCF
0440	8.10	Bag # S-095 Grid C2-5	731	386.7	7/30/07	1040	JM	1512	LCF
0441	11.6	Bag # S-096 Grid C2-3,5	732	386.5	7/30/07	1040	JM	1526	LCF
0442	31.6	Bag # S-097 Grid C2-1,3,5	737	367.9	7/30/07	1410	JM	1541	LCF
0443	22.1	Bag # S-098 Grid C2-1,3,5	738	406.6	7/30/07	1410	JM	1556	LCF
0444	18.2	Bag # S-099 Grid C2-1,3,5	739	410.8	7/30/07	1410	JM	1611	LCF
0445	13.3	Bag # S-100 Grid C2-1,2	740	449.5	7/30/07	1410	JM	1626	LCF
0446	26.2	Bag # S-101 Grid C2-1,2	741	433.6	7/30/07	1410	JM	1642	LCF
0447	23.0	Bag # S-102 Grid C2-1,2	742	404.5	7/30/07	1410	JM	1704	LCF
0448	.202	Grid B2-2 0-6" Free Release	763	378	7/31/07	1230	LC	1730	LCF
0449	.060	Grid B2-1 0-6" Free Release	767	383.9	7/31/07	1230	LC	1743	LCF
0450		Daily Source Check						8/1@ 630	LCF
0451		Background Check						653	LCF
0452	.176	Grid B1-5 0-6" Free Release	762	379.3	7/31/07	1230	LC	0711	LCF
0453	0.083	Grid B1-4 0-6" Free Release	764	379.7	7/31/07	1230	LC	0725	LCF
0454	0.122	Grid B1-3 0-6" Free Release	765	389.2	7/31/07	1230	LC	0742	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0455	0.11	Grid B1-1 0-6" Free Release	0766	371.1	7/31/07	1230	LC	8/1@ 0757	LCF
0456	0.074	Grid B1-2 0-6" Free Release	0768	389.7	7/31/07	1230	LC	0812	LCF
0457	22.9	Bag # S-092 Grid C4-2	0769	352	7/31/07	1230	JM	1047	LCF
0458	796.2	Wellhead (center) (Chesapeak)	0803	310.3	8/1/07	0830	JM	1208	LCF
0459	223.0	Wellhead SE I/S Concrete	0800	311.5	8/1/07	0750	JM	1240	LCF
0460	22.1	Wellhead NW I/S Concrete	0801	296.1	8/1/07	0750	LC	1253	LCF
0461	5.5	Bag # S-109 Grid B2-2	0776	319.1	7/31/07	1415	LC	1321	LCF
0462	.628	Grid C2-1 0-6" Free Release	0804	334.7	8/1/07	1100	JM	1340	LCF
0463	.080	Grid C2-2 0-6" Free Release	0805	296.4	8/1/07	1100	JM	1406	LCF
0464	10.1	Grid C2-3 0-6" Free Release	0806	355.2	8/1/07	1100	JM	1421	LCF
0465	7.26	Grid C2-4 0-6" Free Release	0807	288.6	8/1/07	1100	JM	1433	LCF
0466	3.04	Grid C2-5 0-6" Free Release	0808	338.7	8/1/07	1100	JM	1451	LCF
0467	1.05	Bag # S-110 Grid B2-2	0777	296.4	7/31/07	1415	LC	1509	LCF
0468	3.52	Bag # S-103 Grid B1-4,5	0770	398.1	7/31/07	1415	LC	1523	LCF
0469		Daily Source Check		552				8/2@ 0608	LCF
0470		Background Check		493.2				0640	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0471	1.26	Bag # S-104 Grid E1-4,5	771	368.7	7/31/07	1415	JM	8/2@ 0704	LCF
0472	1.13	Bag # S-105 Grid B1-1	772	377.4	7/31/07	1415	JM	0731	LCF
0473	.890	Bag # S-106 Grid B1-2	773	359.5	7/31/07	1415	JM	0821	LCF
0474	.334	Grid B0-1 0-6" Free Release	817	309.2	8/1/07	1300	CI	0909	LCF
0475	.433	Grid B0-2 0-6" Free Release	818	359.2	8/1/07	1300	CI	0925	LCF
0476	.248	Grid B0-3 0-6" Free Release	819	340.7	8/1/07	1300	CI	0939	LCF
0477	.454	Grid B0-4 0-6" Free Release	820	345.1	8/1/07	1300	CI	0952	LCF
0478	.460	Grid B0-5 0-6" Free Release	821	319.8	8/1/07	1300	CI	1015	LCF
0479	3.85	Bag # S-107 Grid B2-1	774	361.4	7/31/07	1415	JM	1042	LCF
0480	21.2	Bag # S-108 Grid B2-1	775	361.5	7/31/07	1415	JM	1103	LCF
0481	7.60	Bag # S-111 Grid B2-1	778	392.8	7/31/07	1415	JM	1116	LCF
0482	5.23	Bag # S-112 Grid B1-2,3,5	779	379.5	7/31/07	1415	JM	1132	LCF
0483	26.6	Bag # S-113 Grid B1-2,3,5	780	368.3	7/31/07	1415	JM	1221	LCF
0484	.763	Bag # S-114 Grid B1-2,5	781	362.7	7/31/07	1415	JM	1234	LCF
0485	.891	Grid C0-3 0-6" Free Release	824	323.5	8/1/07	1400	CI	1259	LCF
0486	.677	Grid C0-4 0-6" Free Release	825	334.8	8/1/07	1400	CI	1317	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0487	2.40	Free Release Grid C0-5 0-6 "	826	258.2	8/1/07	1400	CI	1340	LCF
0488	.869	Free Release Grid C0-5a (under concrete)	827	338.8	8/1/07	1400	CI	1358	LCF
0489		N/A						0826	LCF
0490		Daily Source Check		552				0946	LCF
0491	.497	Free Release Grid C1-1 0-6 "	840	356.4	8/2/07	1300	LC	1005	LCF
0492	.281	Free Release Grid C1-2 0-6 "	841	363.3	8/2/07	1300	LC	1019	LCF
0493	.057	Free Release Grid C1-3 0-6 "	842	309.9	8/2/07	1300	LC	1031	LCF
0494	.503	Free Release Grid C1-4 0-6 "	843	366.1	8/2/07	1300	LC	1125	LCF
0495	1.67	Free Release Grid C1-5 0-6 "	844	381.4	8/2/07	1300	LC	1204	LCF
0496		Daily Source Check		552	8/2/07			8/4@ 0615	LCF
0497		Background Check		493.2	8/2/07			0711	LCF
0498	2.36	Bag # S-115 - Grid B1-4,5	823	358.2	7/31/07	1400	JM	0754	LCF
0499	.133	Bag # S-120 - Grid C1-3,5	850	396.1	8/3/07	1000	LC	0808	LCF
0500	4.08	Bag # S-121 - Grid C1-2,5	851	347	8/3/07	1000	LC	0826	LCF
0501	2.00	Bag # S-122 - Grid C1-2,4	852	338.4	8/3/07	1000	LC	0851	LCF
0502	2.06	Bag # S-123 - Grid C1-2,4,5	853	311.4	8/3/07	1000	LC	0918	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0503	3.76	Bag # S-124 - Grid C1-1,3,4	854	356	8/3/07	1000	LC	8/4@ 1044	LCF
0504	3.89	Bag # S-116 - Grid C1-1,3,4	855	356.1	8/3/07	1000	LC	1054	LCF
0505	16.7	Bag # S-117 - Grid C1-1,3,4	856	310.5	8/3/07	1000	LC	1128	LCF
0506	14.6	Bag # S-118 - Grid C1-2,5	857	355.6	8/3/07	1000	LC	1212	LCF
0507	18.6	Bag # S-119 - Grid C1-2,5	858	356.8	8/3/07	1000	LC	1226	LCF
0508	18.0	Bag # S-129 - Grid C1-1,3,5	859	274.1	8/3/07	1000	LC	1319	LCF
0509	1.38	Well #1	878	376.5	8/4/07	0800	LC	1345	LCF
0510	63.3	Bag # S-127 - Grid D3-5, E3	860	342.2	8/3/07	1200	LC	1350	LCF
0511	3.38	Bag # S-125 - Grid D3-1	861	313.6	8/3/07	1200	LC	1405	LCF
0512	41.3	Bag # S-132 - Grid E2 E3	862	345.8	8/3/07	1200	LC	1419	LCF
0513	2.24	Bag # S-133 - Grid D2-3	863	325.9	8/3/07	1200	LC	1446	LCF
0514		Daily Source Check		552				8/5@ 0617	LCF
0515		Background Check		493.2				641	LCF
0516	56.5	Well #2	879	358.1	8/4/07	0800	LC	743	LCF
0517	52.	Bag # S-131 - Grid E2-4	864	271.0	8/3/07	1200	LC	1124	LCF
0518	3.21	Grid E3-4 0-6" Free Release	920	281.5	8/4/07	1500	LC	1309	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum #WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0519	14.0	Bag # S-126 Grid E4-1	865	312.6	8/3/07	1200	LC	8/5@ 1348	LCF
0520	1.84	Grid E3-1 0-6' Free Release	917	353.3	8/4/07	1500	LC	1425	LCF
0521	17.7	Grid E3-2 0-6' Free Release	918	342.9	8/4/07	1500	LC	1445	LCF
0522	15.6	Grid E3-3 0-6' Free Release	919	327.2	8/4/07	1500	LC	1503	LCF
0523	1.33	Grid E3-5 0-6' Free Release	921	341.6	8/4/07	1500	LC	1518	LCF
0524	4.08	Grid E4-1 0-6' Free Release	922	370.3	8/4/07	1500	LC	1540	LCF
0525	10.9	Grid E4-2 0-6' Free Release	923	351.6	8/4/07	1500	LC	1558	LCF
0526	.695	Grid E4-3 0-6' Free Release	924	339.5	8/4/07	1500	LC	1632	LCF
0527		Daily Source Check		552				8/6@ 0610	LCF
0528		Background Check		493.2				0632	LCF
0529	26.8	Grid E1-1 0-6' Free Release	940	326.4	8/5/07	1120	LC	0836	LCF
0530	.86	Grid E-2 0-6' Free Release	941	321.6	8/5/07	1120	LC	0852	LCF
0531	.497	Grid E1-3 0-6' Free Release	942	381.1	8/5/07	1120	LC	0905	LCF
0532	0.056	Grid E1-4 0-6' Free Release	943	398.1	8/5/07	1120	LC	0920	LCF
0533	4.04	Grid E1-5 0-6' Free Release	944	324.0	8/5/07	1120	LC	0933	LCF
0534	24.0	Wellhead Cellar 18"	939	378.1	8/5/07	1120	LC	0950	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0535	12.5	Bag S-128 Grid E4-1,3	866	267.1	8/3/07	1200	LC	8/6@ 1005	LCF
0536	40.1	Bag S-134 Grid D2-4,5	870	363.4	8/3/07	1400	LC	1025	LCF
0537	.275	Free Release (trench) T5-6 0-6"	958	382.2	8/6/07	0725	JM	1106	LCF
0538	1.55	Free Release (trench) T1-2 0-6"	960	437.2	8/6/07	0725	JM	1124	LCF
0539	.356	Free Release - Grid D4-1 0-6"	962	374.3	8/6/07	0815	JM	1314	LCF
0540	.489	Free Release - Grid D3-2 0-6"	929	395.7	8/4/07	1500	LC	1330	LCF
0541	1.99	Free Release - Grid D3-4 0-6"	931	412.1	8/4/07	1500	LC	1349	LCF
0543	8.25	Free Release - Grid D3-5 0-6"	932	325.4	8/6/07	1500	JM	1411	LCF
0544	.378	Free Release - Grid E2-1 0-6"	966	303.0	8/6/07	0900	JM	1527	LCF
0545	.451	Free Release - Grid E2-3 0-6"	968	311.9	8/6/07	0900	JM	1546	LCF
0546	.821	Free Release - Grid E2-4 0-6"	969	309.4	8/6/07	0900	JM	1602	LCF
0547	1.07	Free Release - Grid D4-3 0-6"	964	361.9	8/6/07	0815	JM	1619	LCF
0548	.308	Free Release - Grid D4-2 0-6"	963	372.3	8/6/07	0815	JM	1641	LCF
0549	4.36	Free Release - Grid D1-2 0-6"	975	368.5	8/6/07	1100	JM	1657	LCF
0550	.421	Free Release - Grid D1-4 0-6"	977	386.6	8/6/07	1100	JM	1717	LCF
0551		Daily Source Check		552				8/7@ 0603	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0552		Background Check		492.2				8/7@ 644	LCF
0553	3.76	Grid D2-1 0-6" Free Release	979	433.2	8/1/07	1100	JM	815	LCF
0554	7.61	Grid D2-3 0-6" Free Release	981	391.2	8/1/07	1115	JM	834	LCF
0555	,622	Grid D2-4 0-6" Free Release	982	413.6	8/1/07	1115	JM	850	LCF
0556	.816	Grid E3-2 0-6" Free Release	984	386.9	8/1/07	1115	JM	904	LCF
0557	.160	Grid C0-2 0-6" Free Release	988	405.4	8/1/07	1115	JM	953	LCF
0558	1.21	Grid D0-1 0-6" Free Release	990	354.7	8/1/07	1115	JM	1042	LCF
0559	6.84	Grid D0-3 0-6" Free Release	992	398.9	8/1/07	1115	JM	1112	LCF
0560	38.7	Bag S-139 Grid D1-2	995	371.3	8/6/07	1300	LC	1314	LCF
0561	13.0	Bag S-137 Grid D1-3	1003	401.2	8/6/07	1300	LC	1330	LCF
0562	12.1	Bag S-140 Grid D1-2	996	394.2	8/6/07	1330	LC	1349	LCF
0563	3.95	Grid E1-1 (re-sample) Free Release	1026	400.9	8/7/07	1645	JM	1406	LCF
0564	14.6	Bag S-144 Grid D1-5	1000	360.9	8/6/07	1645	CI	1426	LCF
0565	18.5	Bag S-136 Grid D1-3	1002	410.8	8/6/07	1645	CI	1442	LCF
0566	17.0	Bag S-138 Grid D1-3,4	1004	396.6	8/6/07	1645	CI	1521	LCF
0567		Daily Source Check		552				8/8@ 734	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi/g Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0568		Background Check		493.2				8/8@ 0755	LCF
0569	23.3	Bag # S-147 Grid D2-1,2	1006	401.9	8/6/07	1730	LC	0820	LCF
0570	27.0	Bag # S-148 Grid D2-1,2	1007	397.9	8/6/07	1730	LC	0901	LCF
0571	31.3	Bag # S-149 Grid D2-3,4	1008	382.4	8/6/07	1730	LC	0951	LCF
0572	3.50	Bag # S-150 Ditch 4-5-6	1009	387.5	8/6/07	1730	LC	1013	LCF
0573	1.63	Bag # S-151 Ditch 4-5-6	1010	405.1	8/6/07	1730	LC	1030	LCF
0574	2.80	Bag # S-156 Ditch 4-5-6	1015	409.4	8/6/07	1730	LC	1054	LCF
0575	9.92	Bag # S-157 Ditch 1,5	1016	315.7	8/6/07	1730	LC	1117	LCF
0576	6.41	Bag # S-159 Grid D2-1	1018	396.5	8/6/07	1730	LC	1200	LCF
0577	5.74	Bag # S-160 Grid D1-3	1019	426.7	8/6/07	1730	LC	1223	LCF
0578	.452	Bag # S-163 Grid D3-2,3	1022	343.	8/6/07	1730	LC	1241	LCF
0579	.434	Bag # S-164 Grid D3-2,3	1023	406.2	8/6/07	1730	LC	1302	LCF
0580	33.0	Bag # S-162 Grid D1-1,2	1052	368.1	8/8/07	0850	CI	1317	LCF
0581	.989	Out Side Area #1 0-6" Free Release	1028	339.4	8/7/07	1415	LC	1337	LCF
0582		Daily Source Check		552				8/9@ 0832	LCF
0583		Background Check		493.2				0905	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0584	0.57	Out side Area #3 o-6" Free Release	1030	357.8	8/7/07	1415	LC	8/9/07@ 0943	LCF
0585	.310	Out side Area #4 o-6" Free Release	1031	356.9	8/7/07	1415	LC	1007	LCF
0586	.080	Out side Area #5 o-6" Free Release	1032	380.4	8/7/07	1415	LC	1020	LCF
0587	.148	Out side Area #6 o-6" Free Release	1033	388.5	8/7/07	1415	LC	1102	LCF
0588	.082	Out side Area #7 o-6" Free Release	1034	358.9	8/7/07	1415	LC	1115	LCF
0589	5.21	Out side Area #8 o-6" Free Release	1035	350.0	8/7/07	1415	LC	1216	LCF
0590	.424	Out side Area #9 o-6" Free Release	1036	377.6	8/7/07	1415	LC	1255	LCF
0591	.173	Out side Area #10 o-6" Free Release	1037	380.4	8/7/07	1415	LC	1308	LCF
0592	.270	Out side Area #11 o-6" Free Release	1038	348.8	8/7/07	1415	LC	1330	LCF
0593	.098	Out side Area #12 o-6" Free Release	1039	374.6	8/7/07	1415	LC	1348	LCF
0594	.157	Out side Area #13 o-6" Free Release	1040	367.7	8/7/07	1415	LC	1417	LCF
0595	.052	Out side Area #14 o-6" Free Release	1041	413.8	8/7/07	1415	LC	1515	LCF
0596	.287	Out side Area #15 o-6" Free Release	1042	403.8	8/7/07	1415	LC	1546	LCF
0597	.092	Out side Area #16 o-6" Free Release	1043	402.1	8/7/07	1415	LC	1624	LCF
0598	0.085	Out side Area #17 o-6" Free Release	1044	405.5	8/7/07	1415	LC	1655	LCF
0599	.066	Out side Area #18 o-6" Free Release	1045		8/7/07	1415	LC	1707	LCF

GAMMA SPEC LOG
Winnie Site

Det.2

Spectrum # WI -	pCi Am-241	Description	WI07-XXXX	Wgt.	Sample Date	Sample Time	Sample Tech	Date/ Time	Counted by:
0600	0.044	Out side area #19 0-6" Free Release	1046	406.2	8/7/07	1415	LC	8/9@ 1719	LCF
0601	0.028	Out side area #19 0-6" Free Release	1047	370.6	8/7/07	1415	LC	1733	LCF
0602									
0603									
0604									
0605									
0606									
0607									
0608									
0609									
0610									
0611									
0612									
0613									
0614									
0615									

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

Project ID: Winnie

Monthly ✓ Annual _____

MODEL XE3000 _____ MODEL XE4100 ✓

S/N: mobile Lab #074688 Cal Due Date: DAILY

Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	N/A
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	
10 g	9.9 - 10.1	
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	
100 g	99.9 - 100.1	
200 g	199.9 - 200.1	199.9
500 g	499.7 - 500.3	499.7
1 kg	999.5 - 1000.5	999.6
1.5 kg	1499.2 - 1500.8	1499.3
2 kg	1999.0 - 2001.0	N/A
2.5 kg	2498.7 - 2501.3	
3 kg	2998.5 - 3001.5	
3.5 kg*	3498.3 - 3501.8	
4 kg*	3998.0 - 4002.0	

Weight Set SN, calibration date, and calibration due date: #28629 11-8-06/11-8-07

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

Performed By: RC. Lopez Date: 6-5-07

Reviewed By: [signature] Date: 6-12-07

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

Project ID: Winnie, Tx. Project

Monthly ✓ Annual _____

MODEL XE3000 _____ MODEL XE4100 ✓

S/N: Mobile Lab #074688 Cal Due Date: _____

Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	A
10 g	9.9 - 10.1	N
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	
100 g	99.9 - 100.1	
200 g	199.9 - 200.1	199.9
500 g	499.7 - 500.3	499.8
1 kg	999.5 - 1000.5	999.6
1.5 kg	1499.2 - 1500.8	
2 kg	1999.0 - 2001.0	
2.5 kg	2498.7 - 2501.3	A
3 kg	2998.5 - 3001.5	N
3.5 kg*	3498.3 - 3501.8	
4 kg*	3998.0 - 4002.0	

Weight Set SN, calibration date, and calibration due date: #28629 / 11-8-06 / 11-8-07

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

Performed By: LC. Fenn Date: 7-1-07

Reviewed By: [signature] Date: 7-2-07

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

Project ID: Winnie, Tx. Project

Monthly ✓ Annual _____

MODEL XE3000 _____ MODEL XE4100 ✓

S/N: #074688 Cal Due Date: Daily

Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	N/A
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	
10 g	9.9 - 10.1	
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	
100 g	99.9 - 100.1	✓
200 g	199.9 - 200.1	199.9
500 g	499.7 - 500.3	499.8
1 kg	999.5 - 1000.5	999.6
1.5 kg	1499.2 - 1500.8	1499.2
2 kg	1999.0 - 2001.0	N/A
2.5 kg	2498.7 - 2501.3	
3 kg	2998.5 - 3001.5	
3.5 kg*	3498.3 - 3501.8	
4 kg*	3998.0 - 4002.0	✓

Weight Set SN, calibration date, and calibration due date: # 28629 11/8/06 - 11-8-07

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

Performed By: RC. Ferri Date: 8-1-07

Reviewed By: [signature] Date: 8-6-07

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN #074688

Date/Time		Sample Number/Description	Weight	Tech
6-6-07	1130	Daily QC Check - 500g	499.8	KC7
6-7-07	0800	Daily QC Check - 500g	499.7	KC7
6-8-07	0800	Daily QC Check - 500g	499.8	KC7
6-8-07	0930	WI07-0010- Random Pre-road soil	207.0	KC7
		11	293.8	KC7
		12	277.1	KC7
		13	255.0	KC7
		14	320.1	KC7
		15	318.0	KC7
		16	345.2	KC7
		17	252.2	KC7
		18	342.4	KC7
		19	304.3	KC7
		20	246.2	KC7
		21	337.0	KC7
6-8-07	1600	WI07-0027- O/S Random RCA	279.6	KC7
		28	236.8	KC7
		29	284.3	KC7
		30	264.5	KC7
		31	292.5	KC7
		32	260.5	KC7
		33	270.7	KC7
		34	281.0	KC7
		35	279.9	KC7
		36	261.9	KC7
		37	303.6	KC7

ATTACHMENT A
DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # Denver XE-4100 SN #074688 Mobile Lab

Date/Time		Sample Number/Description	Weight	Tech
6/9/07	0830	QC Check - 500g	499.7	SC7
		WI07-0038 - Random	299.8	SC7
		38-QC 0/5 RCA	287.1	SC7
		39	193.6	SC7
		40	268.0	SC7
		28-QC	338.4	SC7
		41	238.5	SC7
		42	262.4	SC7
		43	303.2	SC7
		44	295.7	SC7
6/10/07	830	QC Check - 500g	499.8	CSH
		WI07-0045	288.9	CSH
		-0046	262.8	CSH
		-0047	297.9	CSH
		-0048	276.2	CSH
		-0049	302.7	CSH
		-0050	262.7	SC7
		-0051	289.3	SC7
6/11/07	0730	QC Check - 500g	499.7	SC7
		WI07-0052 - Random	304.4	SC7
		53 0/5 RCA	300.3	SC7
		54	269.9	SC7
		55	244.9	SC7
		56	283.9	SC7
6/12/07	0615	QC Check - 500g	499.8	SC7
6/12/07	1500	WI0700 96-1/5 RCA	263.8	SC7

Page 2 of

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # DENVER XE-4100 SN Mobile Lab #074688

Date/Time		Sample Number/Description	Weight	Tech
6/12/07	1505	WI070097 I/S RCA	302.9	RC7
		98	289.4	RC7
		99	353.6	RC7
		100	329.7	RC7
		101	297.4	RC7
		102	290.4	RC7
		103	329.7	RC7
		104	286.4	RC7
		104 QC	284.7	RC7
6/13/07	0620	QC check 500g	499.8	RC7
6/13/07	0830	WI070105 I/S RCA	258.6	RC7
	0915	106	309.4	RC7
		107	301.6	RC7
		108	286.6	RC7
		109	296.9	RC7
		110	290.0	RC7
		111	284.7	RC7
		112	280.5	RC7
6/13/07	1400	WI070113 I/S RCA	227.2	RC7
		113 QC	215.2	RC7
		114	260.6	RC7
		115	297.5	RC7
		116	282.4	RC7
		117	~~227.2~~	RC7
			296.5	RC7
				RC7

Page 3 of

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # Denver XE-4100 SN mobile lab #074688

Date/Time		Sample Number/Description	Weight	Tech
6-14-07	0615	Daily QC. 500 g	499.8	RC7
6-14-07	0907	Sludge w/o WI07-0132	468.8	RC7
6-14	0830	Sludge w/o tank (0134) (#2)	294.1	RC7
6-14	0830	WI070135 (#3)	476.8	RC7
		136 (#4)	527.2	RC7
		137 (#5)	490.3	RC7
		138 (#6)	528.5	RC7
6/15	0700	QC 500 g	499.7	RC7
6/18	0600	QC Check 500 g	499.8	RC7
	1000	H_2O Tank #1	257.9	RC7
	1000	#2	272.4	RC7
6/19	0530	QC Check 500 g	499.7	RC7
	0700	W107-0152 w/o T. sludge	298.0	RC7
	0700	0153	282.1	RC7
	0951	0157 - concrete dust o row well head	350.5	RC7
	1032	0158 - sludge from w-end	638.5	RC7
	1230	0159 - mud from B.cat	512.1	RC7
6/20	0520	QC Check 500 g	499.8	RC7
	0730	W107-0163 (not dried) bottle of C/D-3	492.4	RC7
	0745	31.6 g Sand 1 g	32.6	RC7
6/21	0600	QC Check 500 g	499.8	RC7
6/22	0900	QC Check 500 g	499.7	RC7
6/22	0915	W107-0173 - O/S in blend #2	421.3	RC7
		0174 3	468.5	RC7
		0175 4	379.9	RC7
		0176 5	427.7	RC7

Page 24 of

RC 6/22/07

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE - 4100 SN Mobile Lab # ~~28629~~ 74688

Date/Time		Sample Number/Description	Weight	Tech LCF 7/1/07
6-25-07	0700	Daily QC - 500 g	449.8	LCF
6/25/07	0950	WI07-0173 - D/S recount after drying	216.2	LCF
6/26/07	0800	Daily QC - 500 g	499.7	LCF
6/26/07	1130	WI07-0176 - recount O/S in trench	239.9	LCF
↓	↓	0175 (after drying)	295.9	LCF
		0174 ↓	256.1	LCF
6/26/07	1640	0185 - leg from W/O tank	328.6	CH
↓	↓	0186 - sludge	639.8	LCF
6/27/07	0630	Daily QC - 500 g	499.8	LCF
	0840	WI07-0184 - A/S cut W.O. tank	.4	LCF
	0905	0170 - A/S cut poly tank	1	LCF
	~~105~~ 1100	0189 - sludge	358.7	Lcf
	1550	0194 - sand w/ (mud)	7.0	LCF
	1600	↓ recount	170.2	LCF
6/28/07	0640	Daily QC 500 g	499.8	LCF
	1615	WI07-0199 Box # 130	36.9	LCF
6/29	0630	Daily QC 500 g	499.7	LCF
		W107-0200 - B12 #129	48.0	LCF
		↓ (cut sample)	17.3	LCF
		W107-0201-B12 #125	36.8	LCF
		0202-B12 #133	28.2	LCF
		0203-B12 # 123	23.1	LCF
		0204-B12 #	31.1	LCF
6/30	0800	Daily QC 500 g	499.7	LCF
	1450	W107-0211-Drm #1	288.8	LCF
←		N/A		→

Page 5 of

ATTACHMENT A
DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN #28629
Mobile Lab

Date/Time		Sample Number/Description	Weight	Tech
7-1-07	1000	W1070212 - Drum # 2	319.0	RC7
		213 - #3	242.1	RC7
		214 #4	255.7	RC7
		215 #5	310.8	RC7
		216 #6	268.9	RC7
		217 #7	300.9	RC7
7-2-07	0450	Daily QC Check 500g	499.7	RC7
	0618	W1-07-0218 - Drum #8	251.9	RC7
	0618	0219 - " #9	324.5	RC7
7-3-07	0640	Daily QC Check 500g	499.7	RC7
7-5-07	0700	Daily QC Check 500g	499.8	RC7
	0905	H_2O (0/5 RCA)	301.2	RC7
7-9-07	0730	Daily QC Check 500g	499.7	RC7
7-10-07	0800	Daily QC Check 500g	499.8	RC7
7-10-07	1000	H_2O - W107-0248	243.3 ~~302.2~~	RC7
7-11-07	0615	Daily QC Check 500g	499.8	RC7
7-11-07	0830	H_2O - Clean Drubber, H_2O	266.6	RC7
7-12-07	0830	Daily QC Check 500g	499.7	RC7
7/12/07	0900	W1-0265 - #1 (20K) Grid B2 surface	288.2	RC7
		264 #2 (35K) D1-2	229.8	RC7
		265 #3 (12K) D4.3	304.1	RC7
	1105	266 #4 (12K) E1-2	273.8	RC7
7/12/07	1255	267 from under W/O Tank	347.9	RC7
7/13/07	0700	Daily QC 500g	499.8	RC7
	0740	W1-07-0270 - Bag S-003	333.4	RC7
		271 004	387.0	RC7

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # _____ SN _____

Date/Time		Sample Number/Description	Weight	Tech
7/13/07	1000	W107-0281	217.0	RC7
		0279	360.1	RC7
		0280	376.7	RC7
		0286	288.9	RC7
7/14/07	0700	~~W107-0287~~ QC Check	499.7	RC7
	0715	W107-0287	365.0	RC7
		0288	365.0	RC7
		0298	338.3	RC7
		0299	327.7	RC7
		0300	318.5	RC7
		0301	281.8	RC7
	1130	W107 0307	298.4	RC7
		308	348.0	RC7
		309	308.4	RC7
		312	298.2	RC7
		313	321.3	RC7
		314	344.1	RC7
		315	317.9	RC7
		316	301.8	RC7
		317	307.8	RC7
		318	359.4	RC7
		319	389.6	RC7
		320	356.5	RC7
		321	347.0	RC7
7/15	0815	~~W107~~ Daily QC 499.8	~~339.6~~	RC7
		W107-0326	339.6	RC7

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE - 4100 SN 28629

Date/Time		Sample Number/Description	Weight	Tech
7/5/07	0800	W107-0327	298.4	SC7
↓	0850	0328	313.6	SC7
7/16/07	0630	Daily QC Check 500g	499.7	SC7
	0730	W107-0329	357.6	SC7
	0745	0334	325.6	SC7
	0755	0335	271.3	SC7
	0900	0336	240.0	SC7
	0910	0337	348.7	SC7
	0925	0338	335.1	SC7
	0940	0339	282.9	SC7
	1010	0340	287.2	SC7
	1100	0341	296.4	SC7
	1230	0342	226.6	SC7
	1300	0343	304.5	SC7
	1330	0344 SC7 7/16/06	327.0	SC7
	1400	0347	331.7	SC7
	1440	0353	284.0	SC7
	1445	0354	244.0	SC7
	1500	0355	266.5	SC7
7/17/07	0630	0356	241.7	SC7
	0700	Daily QC Check 500g	499.8	SC7
	0730	W107-0357	274.7	SC7
		0358	301.8	SC7
		0359	279.4	SC7
		0360	243.3	SC7
		0361	279.2	SC7

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN 28629

Date/Time		Sample Number/Description	Weight	Tech
7-17-07	0930	WI070362	276.6	RC7
		363	332.6	RC7
		364	299.1	RC7
		365	287.9	RC7
		366	268.8	RC7
		367	318.3	RC7
		368	337.1	RC7
7-18-07	0700	Daily QC Check 500 g	499.8	RC7
		WI07- 0388	234.9	RC7
		0389	244.8	RC7
		0390	269.3	RC7
		0391	189.2	RC7
		0392	242.6	RC7
		0403 + 2 bags	502.2	RC7
		0403 #1	3.3	RC7
		N/A	—	—
7/19/07	0730	Daily QC Check 500 g	499.8	RC7
		WI07- 0404 #2	2.9	RC7
		0405 #3	4.4	RC7
		0406 #4	3.3	RC7
		0407 #5	3.7	RC7
		0399	370.4	RC7
		0400	354.1	RC7
		0401	307.7	RC7
		0402	263.3	RC7
7/20/07	0630	Daily QC Check 500 g	499.8	RC7

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN #28629

Date/Time		Sample Number/Description	Weight	Tech
7/20/07	0830	W107-0422 RC7 7/20/07	196.0	RC7
↓	↓	0422	201.0	RC7
7/21/07	0740	Daily QC Check 500g	499.9	RC7
	0745	W107-0424	344.4	RC7
	↓	↓ 0425	206.4	RC7
	↓	0426	352.0	RC7
	0800	W107-0427	355.5	RC7
		0423	375.2	RC7
	0900	W107-0436 - Free Ref 0-6" A2-1	280.9	RC7
	0917	↓ 0437- A2-4	321.4	RC7
	0934	↓ 0438- A2-3	298.0	RC7
	1108	W107-0439 A1-1	250.8	RC7
	↓	↓ 0440 A1-3	239.1	RC7
		0441 A1-4	281.9	RC7
		0442 A3-1	300.8	RC7
		0443 A3-3	255.9	RC7
		0444 A3-4	321.4	RC7
		0445 A4-1	283.8	RC7
		0446 A4-3	217.1	RC7
		0457 A1-3	296.0	RC7
		0458 A1-5	380.9	RC7
↓	↓	↓ 0459 A1-2	331.4	RC7
7/22/07	0630	Daily QC Check 500g	499.7	RC7
		W107-0451 (Bag-31)	137.6	RC7
		452 32	180.4	RC7
		453 33	270.1	RC7

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN #28629

Date/Time		Sample Number/Description	Weight	Tech
7/22/07	0750	WI07-0454 Bag 34	194.0	RC7
		0455 35	334.6	RC7
		0456 36	237.9	RC7
	0915	WI07-0462-GA1-5 (2 ft)	300.7	RC7
		0463-A2-2 4"	328.3	RC7
		0464-A2-1 4"	383.8	RC7
		0465-A1-2 (12")	352.2	RC7
	1115	WI07-0449 ~~Ba~~	283.6	RC7
		460 Bag # 37	325.4	RC7
		461 Bag # 38	346.2	RC7
	1230	WI07-466 Grid A2-3 4"	301.9	RC7
		467 4" A2-4	309.9	RC7
		468 4" A2-5	321.5	RC7
7/23/07	0700	Daily QC Check 500g	499.8	RC7
	0900	WI07-0473-Bag # 39	308.2	RC7
		474 40	279.8	RC7
		475 41	340.5	RC7
		476 42	365.5	RC7
	1200	WI07-481 Bag 43	299.9	RC7
		482 44	225.9	RC7
		483 45	294.5	RC7
		484 46	312.7	RC7
7/24/07	0640	Daily QC Check 500g	499.9	RC7
	1200	WI07-0532 A3-2	385.0	RC7
		0533 A3-5	356.6	RC7
		0534 A4-2	282.1	RC7

ATTACHMENT A
DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN # 28629

Date/Time		Sample Number/Description		Weight	Tech
7/24/07	1230	W107-0541	(A3-1)	356.5	SCF
		0563 (sludge)	#1	8.6	
		0564	#2	3.5	
		0566	#3	2.9	
		0567	#4	2.7	
		0567		3.4	
7/25/07	0630	Daily QC Check 500g		499.8	SCF
	0930	W107-0535 - Bag	47	357.6	
		536	48	392.7	
		537	49	455.7	
		538	50	429.8	
		539	51	406.6	
		540	52	414.8	
	1200	W107542	53	365.9	SCF
		543	54	333.7	SCF
		544	55	340.2	
		545	56	287.6	
		546	57	354.1	
		547	58	312.0	
	1400	W107548	59	363.3	SCF
		556	60	333.7	SCF
		557	61	350.0	SCF
	1520	W107-0571 - Grid	E0-1	341.0	SCF
		572	E0-2	309.5	
		573	E0-3	293.8	
		574	E0-5	320.8	

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE4100 SN #28629

Date/Time		Sample Number/Description	Weight	Tech
7/25/07	1520	W107-0576- Grid A0-1	284.0	LC7
7/26/07	0700	Daily QC Check - 500.g	499.8	LC7
	0815	W107-0577- Grid A0-2	301.7	LC7
		578 A0-3	317.2	
		579 A0-5	290.3	
	1000	W1070575- well head	298.6	LC7
	1300	W1070617-Box#130 #1	4.8	LC7
		618 2	7.5	
		619 3	5.0	
		620 4	7.1	
		621 5	7.8	
7/27/07	0700	Daily QC Check 500 g	499.8	LC7
	0800	W107-0601 - C4-1	308.6	LC7
		602 - C4-2	340.7	LC7
		603 C4-3	325.7	LC7
		609 C3-1	430.9	LC7
		610 C3-2	386.0	LC7
		611 C3-3	349.1	LC7
		612 C3-5	365.5	LC7
		589 Bag.001	339.0	LC7
		590 Bag.062	350.1	LC7
		591 Bag-063	334.6	LC7
		592 Bag.064	351.5	LC7
		593 Bag-065	314.8	LC7
		594 Bag-066	312.5	LC7
		600 Box#132	297.2	LC7

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE 4100 SN #28629

Date/Time		Sample Number/Description		Weight	Tech
7/27/07	1200	WI07-0622	Box 130 #1	10.2	LC7
		623 Sludge	#2	8.3	LC7
		624	#3	6.7	LC7
		625	#4	7.9	LC7
		626	#5	4.6	LC7
7/28/07	0700	Daily QC Check	500 g	499.8	LC7
		" "	200 g	199.9	LC7
	0830	WI07-0645	Bag 070	425.5	LC7
		646	Bag 069	411.4	LC7
		613	Bag-067	419.9	LC7
		614	Bag-068	394.0	LC7
		615	Box #132 # 0006	366.1	LC7
	0900	WI07-0627 (sludge)	Box 125 #1	6.5	LC7
		628	#2	4.9	LC7
		629	#3	8.6	LC7
		630	#4	29.7	LC7
		631	#5	11.9	LC7
		632	Box 129 #1	30.5	LC7
		634	#3	18.2	LC7
		633	#2	30.1	LC7
		634	#4	37.4	LC7
		653	#5	24.1	LC7
		634	#4	17.2	LC7
		653	#5	19.5	LC7
7/29/07	0700	Daily QC Check	=500g	499.8	LC7

N/A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE-4100 SN #28629

Date/Time		Sample Number/Description		Weight	Tech
7/29/07	0830	W107-0654-Bag	S-071	318.8	RC7
		655-	S-072	342.9	
		656-	S-073	364.3	
		657-	S-074	344.5	
		658-	S-075	296.2	
		659-	S-076	351.1	
		660-	S-077	297.2	
7/29/07	0945	W107-0661 Bag	S-078	280.2	RC7
		662	S-079	280.7	
		663	S-080	324.0	
		664	S-081	295.6	
		665	S-082	304.4	
		666 Bag	S-083	347.3	RC7
		668	S-084	323.1	RC7
7/29/07	1300	W107-0669 Bag	S-085	291.0	RC7
		670	S-086	313.7	
		671	S-087	296.0	
		673	S-088	359.1	RC7
7/30/07	0630	Daily QC Check (500g)		499.9	RC7
	0700	W107-0696 Bag	S-089	457.5	RC7
		697	S-090	362.7	RC7
7/30/07	0750	W107-0698-Grid	C3-4	352.9	RC7
		699	B4-3	293.6	
		700	B4-2	279.9	
		701	B4-1	288.6	
		702	B2-2	337.4	

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE 4100 SN # 28629

Date/Time		Sample Number/Description		Weight	Tech
7/30/07	1000	W107-0703	B3-4	309.2	RCF
		704	B3-5	353.5	
		705	B2-1	372.0	
		706	B2-2	314.0	
		707	B2-3	303.8	
7/30/07	1100	W107-708	B2-4	313.2	RCF
		709	B2-5	340.0	
		710	B1-5	359.3	
		711	B1-4	283.8	
		719	B1-2	281.7	
		720	B1-1	281.9	
		721	B1-3	282.3	
		715	B3-1	335.8	
		716	B3-3	284.6	
		743	B3-2 re-samp	312.4	
		744	B3-4 re-samp	360.8	
7/31/07	0700	Daily QC Check	500 g	499.8	RCF
		W107-0745- re-sample B2-1		377.0	RCF
		0746-	B2-2	388.2	RCF
		0721-	B1-3	336.0	RCF
	1045	B0007-	sludge	13.0	RCF
	1230	W107-0714-	SO-91	431.1	RCF
		729-	S-093	370.5	
		730-	S-094	364.9	
		731-	S-095	386.7	
		732	S-096	386.5	

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE 4100 SN # 28629

Date/Time		Sample Number/Description	Weight	Tech
7/31/07	915	W107-0758 - B3-4	375.2	KC7
		757 - B2-2	353.3	KC7
		737 ~~738~~ - S-0~~98~~ 97	367.9	KC7
		738 - 98	406.6	KC7
		739 - 99	410.8	KC7
		740 - 100	449.5	KC7
		741 - 101	433.6	KC7
		742 - 102	404.5	KC7
7/31/07	1200	W107-0763 - B2-2	~~437.1~~ 338.0	KC7
		767 B2-1	~~442.9~~ 383.9	KC7
		762 B1-5	~~438.5~~ 379.3	KC7
		764 B1-4	379.7	KC7
		765 B1-3	389.2	KC7
		766 B1-1	371.1	KC7
8-1-07	0615	Daily QC Check 500g	499.8	KC7
	730	W107-0768 Grid B1-2	389.7	KC7
		770 Bag 103	398.1	KC7
		771 104	368.7	KC7
		772 105	377.4	KC7
	1100	773 106	359.5	KC7
		774 107	361.4	KC7
		775 108	361.4	KC7
		803 w.head (ctr)	310.3	KC7
		800 wellhead SE	311.5	KC7
		801 wellhead NW	296.1	KC7
		776 Bag 109 (B2-2)	319.1	KC7

ATTACHMENT A
DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE 4100 SN # 28629

Date/Time		Sample Number/Description	Weight	Tech
8-1-07	1300	W107-0777 (Bag 110)	296.4	LCF
		804 - Grid C2-1 FR	334.7	LCF
		805 C2-2	296.4	LCF
		806 C2-3	355.2	LCF
		807 C2-4	288.6	LCF
		808 C2-5	338.7	LCF
8-1-07	1530	W107-0778 Bag 111	392.8	LCF
		0779 " 112	379.5	LCF
		0780 113	368.3	LCF
		0781 114	362.7	LCF
8-2-07	0630	Daily QC Check 500.g	499.9	LCF
	0900	W107-0817 - Grid BØ-1	309.2	LCF
		818 - " BØ-2	359.2	LCF
		819 " BO-3	340.7	LCF
		820 " BO-4	345.1	LCF
		821 " BO5	319.8	LCF
	1100	W107-0824 " CØ-3	323.5	LCF
		825 " CØ-4	334.8	LCF
		826 " CØ-5	258.2	LCF
		827 " CØ-5 under cc.	338.8	LCF
	1200	W107-0835 - Bot# 123 +	26.1	LCF
		836 " 127 absent	20.2	LCF
		837 " 129	27.4	LCF
		838 " 130	24.2	LCF
		839 " 133	20.9	LCF
		~~834~~ ~~Leg. Crystg~~ 848 Bot 125	32.6	LCF

ATTACHMENT A

DENVER BALANCE WEIGHING LOG (example)

INSTRUMENT MODEL # XE 4100 SN # 28629

Date/Time		Sample Number/Description		Weight	Tech
8/2/07	1420	W107-0834 -	Bot 122 + crystal H_2O	282.2	RC7
8/3/07	0630	Daily QC -	500 g	499.8	RC7
	0635	W107-0840-	C1-1	356.4	RC7
		841	C1-2	363.3	RC7
		842	C1-3	309.9	RC7
		843	C1-4	366.1	RC7
		844	C1-5	381.4	RC7
8-4-07	0630	Daily QC -	500g	498.0	RC7
	0750	W107-0823 -	Bag 15	358.2	RC7
	0800	W107-850 -	120	396.1	RC7
		851	121	347.0	RC7
		852	122	338.4	
		853	123	311.4	
		854	124	356.0	
		855	116	358.6	
		856	117	310.5	
		857	118	355.6	
		858	119	356.8	
		859	129	274.1	
		860	127	342.2	
		861	125	313.6	
		862	132	345.8	
		863	133	325.9	
		864	131	271.0	
		865	126	312.6	
		866	128	267.1	

Model XE 4100 S/N # 28629

8/4/07	1300	W107-0878	#1 well		376.5	RC7
8/5/07	0700	Daily QC - 500g			499.9	RC7
8/5/07	0714	W107-0879	#2 well		358.1	RC7
		867	Bag	130	333.2	
		870		134	363.4	
8-5-07	1100	871		135	404.6	
		W107-0920	Grid	E3-4	281.5	RC7
		917		E3-1	353.3	
		918		E3-2	342.9	
		919		E3-3	327.2	
		921		E3-5	341.6	
		922		E4-1	390.3	
		923		E4-2	351.6	
		~~924~~		~~D4~~ RC7	8/5/07	
8-5-07	1630	W107 924		E4-3	339.8	RC7
8-6-07	0610	Daily QC - 500g			499.8	"
8-6-07	0830	W107-0941 -	Grid	E1-2	321.6	RC7
		940 -		E1-1	326.4	RC7
		942 -		E1-3	381.1	RC7
		943		E1-4	398.1	RC7
		944		E1-5	324.0	RC7
		939 - well head 18"			378.1	RC7
		958	Trench	T5-6	382.2	RC7
		959		T3-4	359.6	RC7
		960		T1-2	437.2	RC7
		961	Grid	A0-4	401.1	RC7
		962	Grid	D4-1	374.3	RC7
		929		D3-2	395.7	RC7
		931		D3-4	412.1	RC7
		932		D3-5	325.4	RC7

Model XE-4100 SN. # 28629

8/13/07	1520	W107-0966	Grid E2-1	303.0	KC7
		967	E2-2	336.1	KC7
		968	E2-3	311.9	KC7
		969	E2-4	309.4	KC7
		970	E2-5	285.2	KC7
		930	D3-3	393.5	KC7
		965	D3-1	404.5	KC7
		964	D4-3	361.9	KC7
		963	D4-2	372.3	KC7
		974	D1-1	424.1	KC7
		975	D1-2	368.5	KC7
		976	D1-3	422.6	KC7
		977	D1-4	386.6	KC7
		978	D1-5	406.5	KC7
8-7-07	0700	Daily QC	500g	499.7	KC7
		W107-979	D2-1	433.2	
		980	D2-2	435.0	
		981	D2-3	391.2	
	0820	W107 982	D2-4	413.6	
		983	D2-5	404.8	
		987	Cø-1	323.6	
		988	Cø-2	405.4	
		989	Cø-4	346.0	
		990	Dø-1	354.7	
		984	E3-2	386.9	
		985	E3-3	387.1	

Model XE4100 SN-#28629

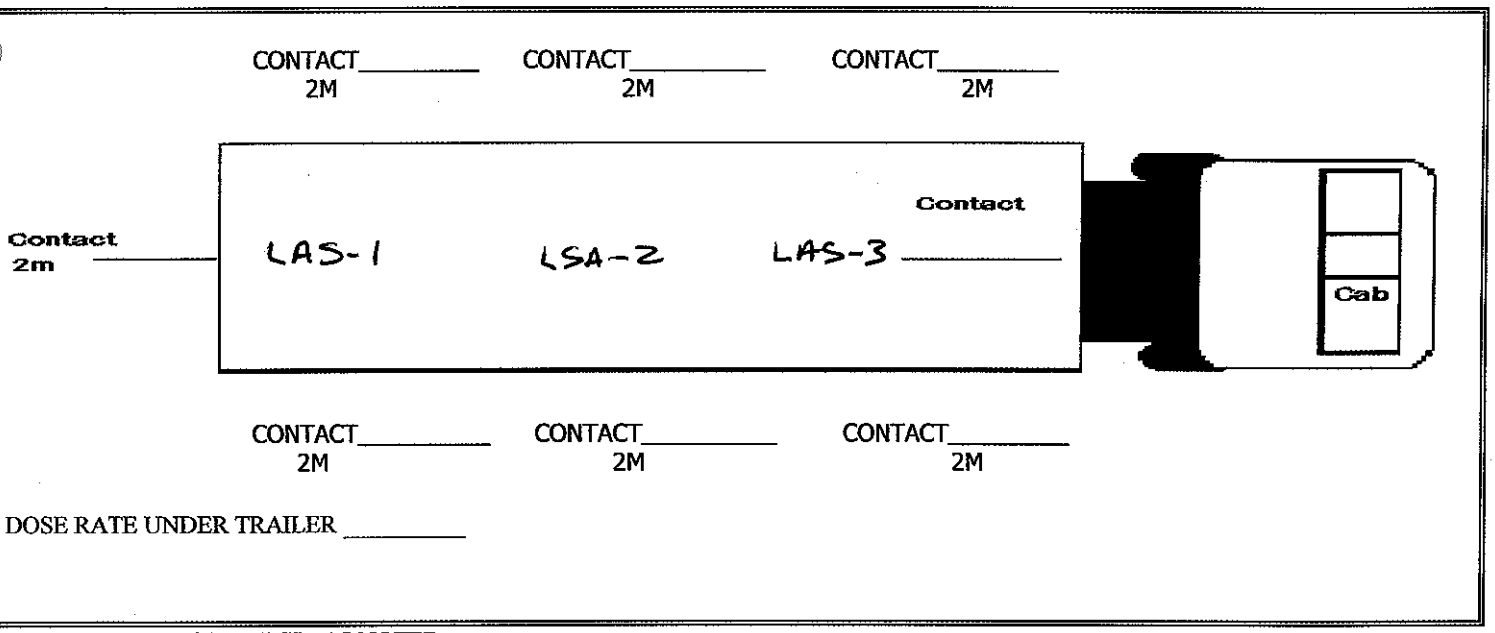
8-07	1030	W107-1021	Bag	162	374.2	LC7
		1022		163	343.0	
		1023		164	406.2	
		1014		155	315.3	
		1028	0/5	#1	339.4	
		1029		#2	396.9	
	1200	1030		#3	357.8	
		1031		#4	356.9	
		1032		#5	380.4	
		1033		#6	388.5	
		1013	Bag	154	297.5	
		1052		162	368.1	
8-9-07	0730	Daily ~~Source Check~~ QC Check RC7500 8-9-07			499.8	LC7
		W107-01034	-0/5	#7	358.9	
		1035		#8	359.0	
		1036		#9	357.6	
		1037		#10	380.4	
		1038		#11	348.8	
		1039		#12	374.6	
	1000	W107-1040		#13	367.7	LC7
		1041		#14	418.8	
		1042		#15	403.8	
		1043		#16	402.1	
		1044		#17	405.5	
		1045		#18	403.3	
		1046		#19	416.2	
		1047		#20	378.6	

Model XE-4100 SN- # 28629

8/7/07	1000	W107-0991	Grnd	DO-2	256.0	KC7
		992		DO-3	398.9	
		994	KC7 8/7/07	DO-4	299.6	
		994		DO-5	362.2	
		995	Bag	S-~~140~~ 139	371.3	
	1300	W107-997		141	414.8	
		1003		137	401.2	
		996	Bag	140	394.2	
		998		142	353.3	
		999		143	399.7	
		1000		144	360.9	
		1001		145	354.4	
		1002		136	410.6	
		1026	E1-1		400.9	
		1004	Bag	S-138	396.6	
		1005		146	353.6	
8-8-07	0730	Daily QC Check Soog			499.9	KC7
	0800	W107-01006	Bag	S-147	401.9	
		1007		148	397.9	
		1008		149	382.4	
		1009		150	387.5	
		1010		151	405.1	
		1011		152	267.1	
		1012		153	419.8	
		1015		156	409.4	
		1016		157	315.7	
		1017		158	405.2	
		1018		159	396.5	
		1019		160	426.7	
		1020		161	410.7	

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/10/07 TIME: 1700

SHIPMENT NUMBER: 0603-02-0001-A

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

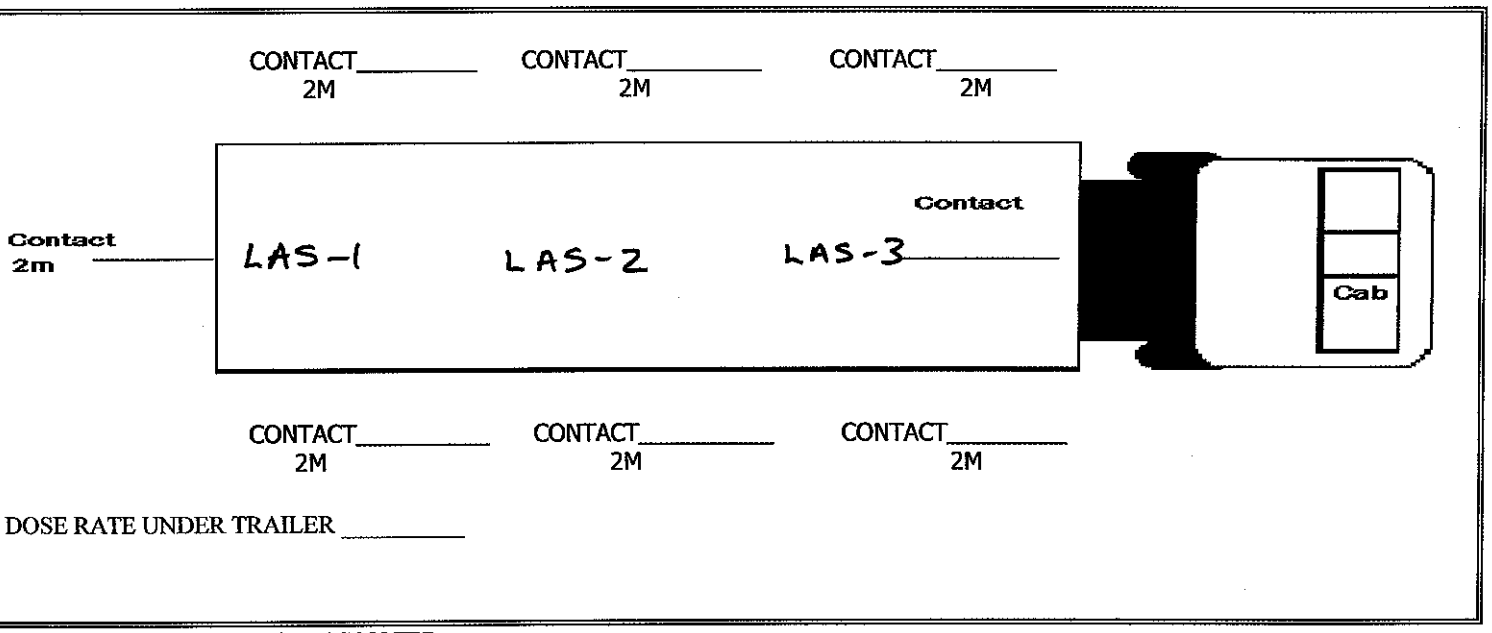
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2

LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/10/07 TIME: 1900

SHIPMENT NUMBER: 0603-02-0001-C

TRACTOR # : _____ TRAILER # : 515

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ___
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

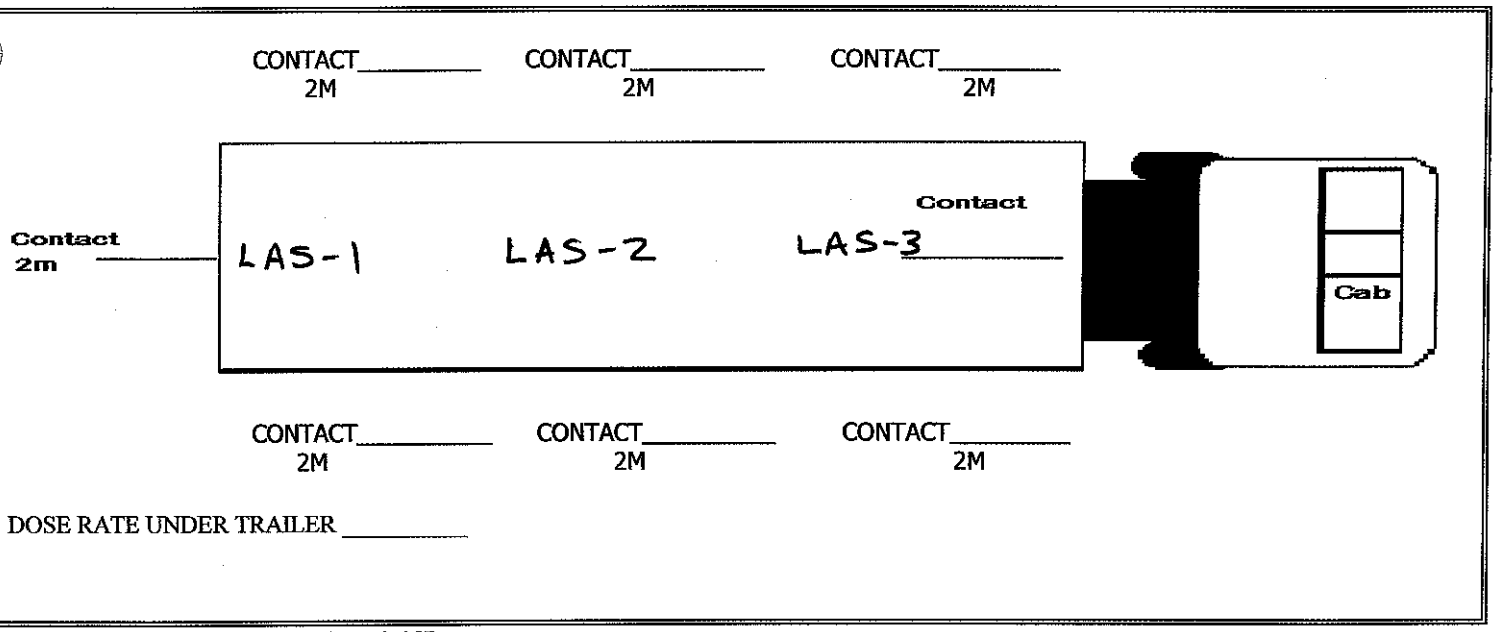
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 0900

SHIPMENT NUMBER: 0603-02-0001-D

TRACTOR # : _____ TRAILER # : 512

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

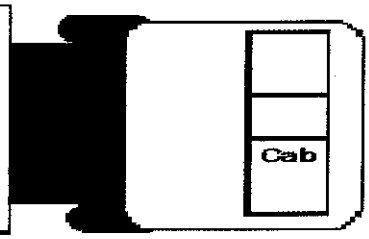
EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3 _____ Contact



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1000

SHIPMENT NUMBER: 0603-02-0001-E

TRACTOR # : _____ TRAILER # : 534

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____ CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

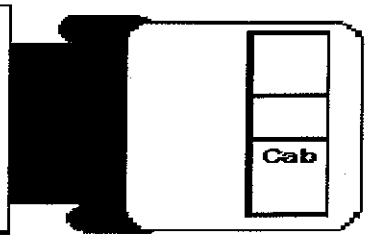
SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LSA-3

Contact _____



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1100

SHIPMENT NUMBER: 0603-02-0002-A

TRACTOR # : _____ TRAILER # : 530

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY _____ X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS - 1 LAS - 2 LAS-3 Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1300

SHIPMENT NUMBER: 0603-02-0002-B

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: ~~FULL~~ EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

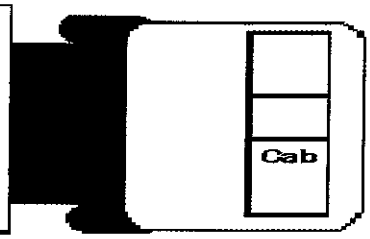
SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3 _____

Contact



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1400

SHIPMENT NUMBER: 0603-02-0002-C

TRACTOR # : _____ TRAILER # : 521

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

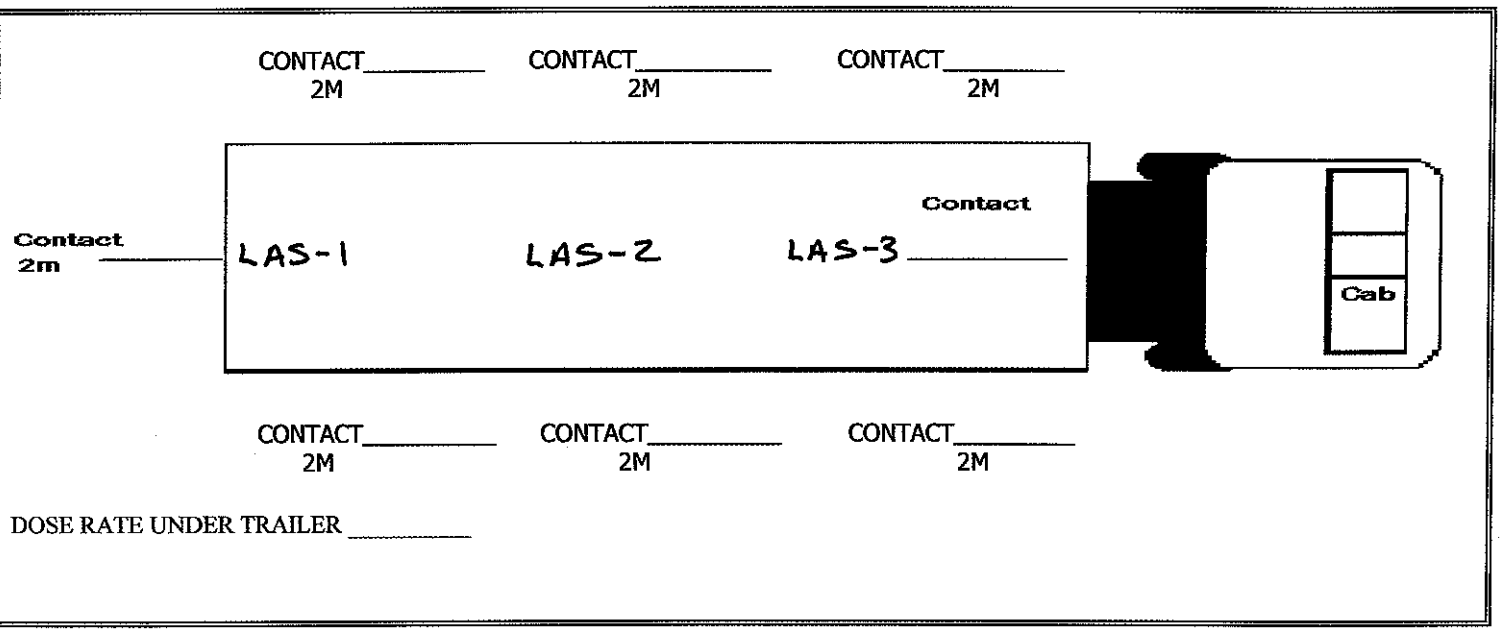
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1600

SHIPMENT NUMBER: 0603-02-0002-D

TRACTOR # : _____ TRAILER # : 515

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

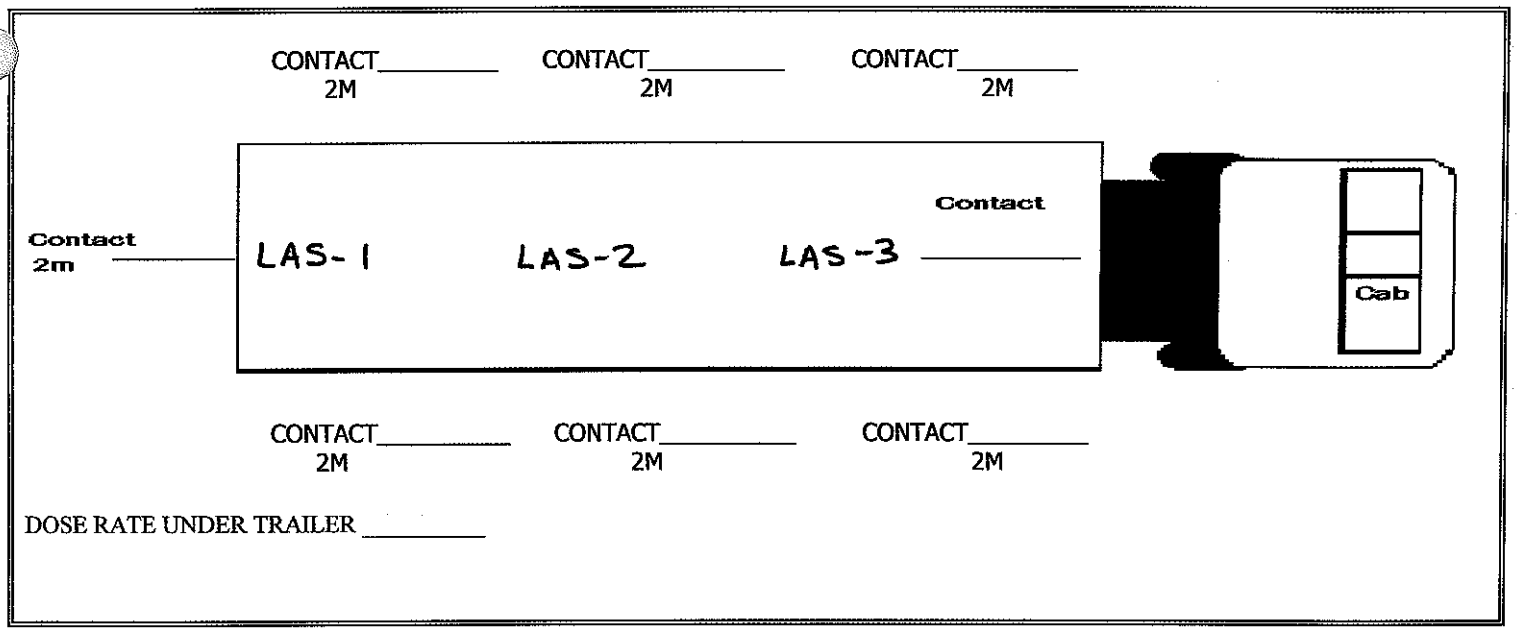
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/11/07 TIME: 1700

SHIPMENT NUMBER: 0603-02-0002-E

TRACTOR # : _____ TRAILER # : 534

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 0900

SHIPMENT NUMBER: 0603-02-0003-A

TRACTOR # : _____ TRAILER # : 530

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2

LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1000

SHIPMENT NUMBER: 0603-02-0003-B

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

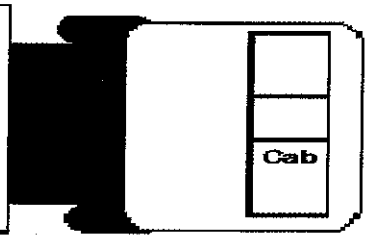
EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3 Contact _____



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1030

SHIPMENT NUMBER: 0603-02-0003-C

TRACTOR # : _____ TRAILER # : 521

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1130

SHIPMENT NUMBER: 0603-02-0003-D

TRACTOR # : _____ TRAILER # : 534

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2

LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1300

SHIPMENT NUMBER: 0603-02-0003-E

TRACTOR # : _____ TRAILER # : 512

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____ LAS-1 LAS-2 LAS-3 _____ Contact

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1330

SHIPMENT NUMBER: 0603-02-0004-A

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

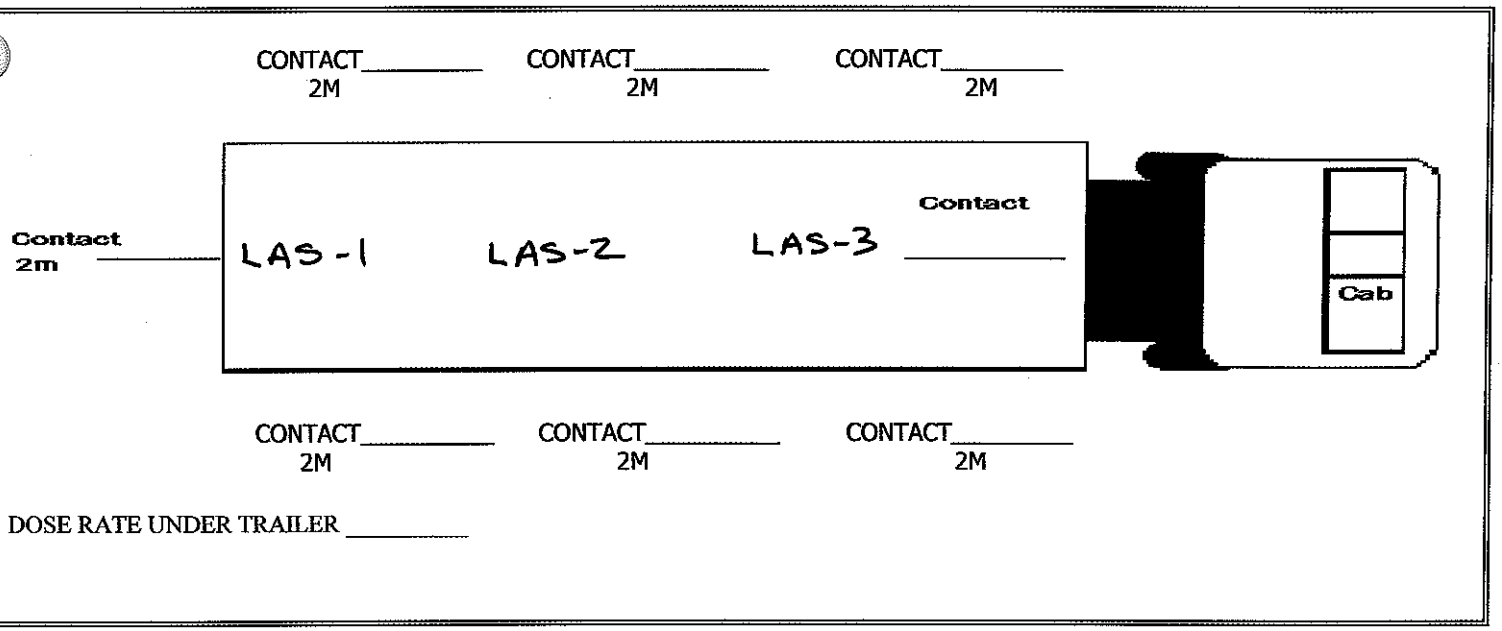
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1430

SHIPMENT NUMBER: 0603-02-0004-B

TRACTOR # : _____ TRAILER # : 530

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

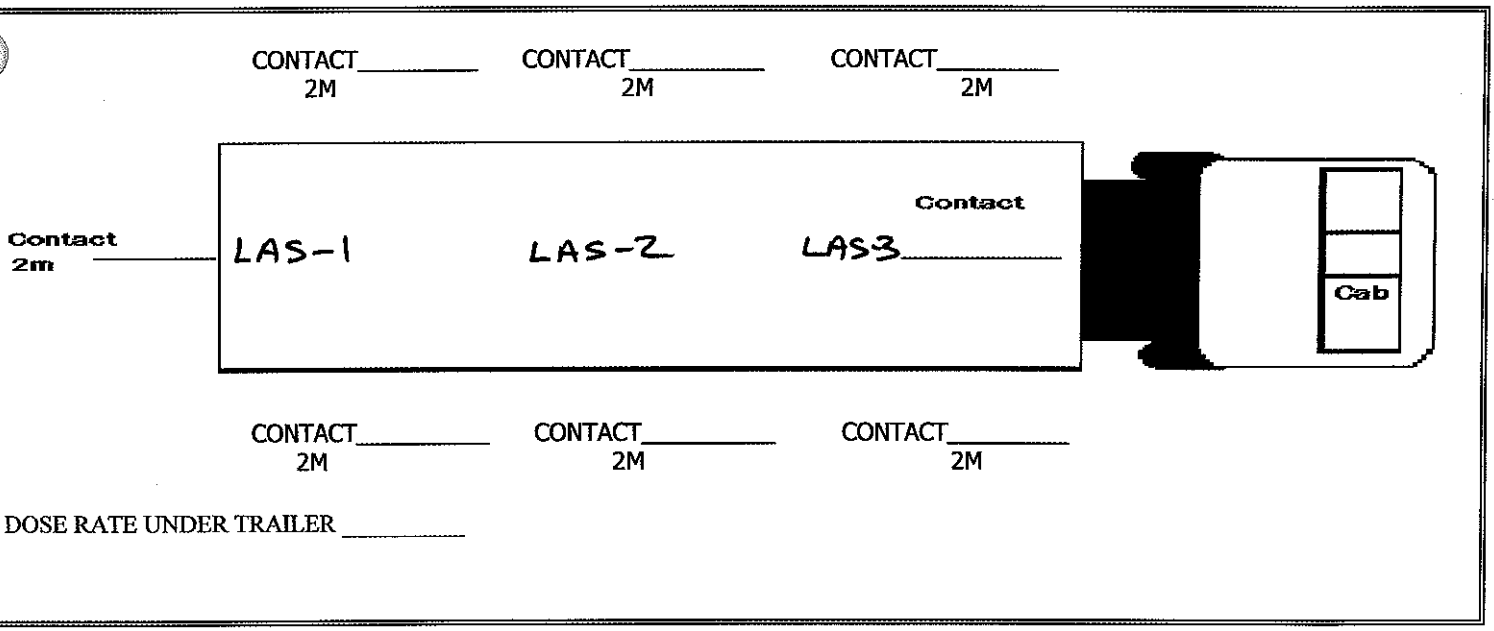
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1500

SHIPMENT NUMBER: 0603-02-0004-C

TRACTOR # : _____ TRAILER # : 515

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1530

SHIPMENT NUMBER: 0603-02-0004-D

TRACTOR # : _____ TRAILER # : 521

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/12/07 TIME: 1630

SHIPMENT NUMBER: 0603-02-0004-E

TRACTOR # : _____ TRAILER # : 534

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ___ CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2

LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/13/07 TIME: 0830

SHIPMENT NUMBER: 0603-02-0005-B

TRACTOR # : _____ TRAILER # : 530

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____

Cab

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/13/07 TIME: 1130

SHIPMENT NUMBER: 0603-02-0005-A

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

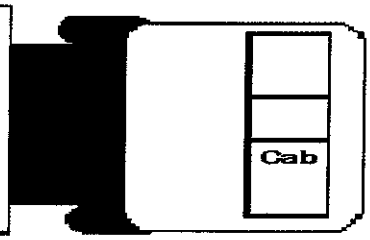
EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3 _____ Contact



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/13/07 TIME: 1300

SHIPMENT NUMBER: 0603-02-0005-C

TRACTOR # : _____ TRAILER # : 534

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____ CASK ____ DROPDECK ____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

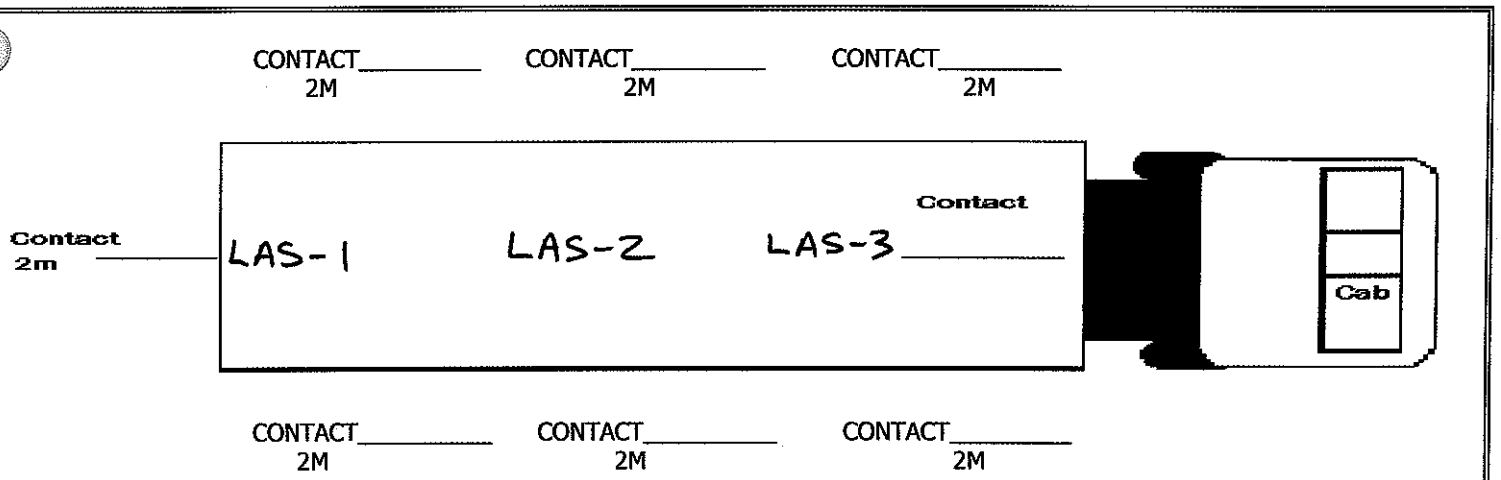
CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

SURVEY NUMBER _____



DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2		
LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/13/07 TIME: 1400

SHIPMENT NUMBER: 0603-02-0005-D

TRACTOR # : _____ TRAILER # : 521

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN: LRD
Initials

REVIEWED BY : _____

EMPTY VEHICLE SURVEY FORM

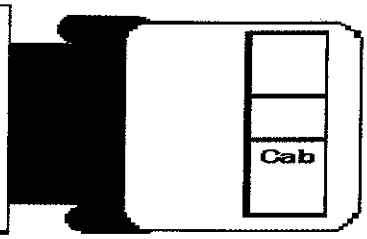
SURVEY NUMBER _____

CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

Contact 2m _____

LAS-1 LAS-2 LAS-3

Contact _____



CONTACT_____ 2M CONTACT_____ 2M CONTACT_____ 2M

DOSE RATE UNDER TRAILER _____

ALL DOSE RATES IN mR/Hr AS NOTED

SMEAR RESULTS @ DPM/100CM2

LOC	BETA / GAMMA	ALPHA
1	NDA	NDA
2	NDA	NDA
3	NDA	NDA
4	N/A	N/A
5	N/A	N/A
6	N/A	N/A
7	N/A	N/A
8	N/A	N/A
9	N/A	N/A
10	N/A	N/A
11	N/A	N/A
12	N/A	N/A
13	N/A	N/A

CIRCLED NUMBER ON THE ABOVE DRAWING INDICATES SWIPED LOCATION. Las = Large Area Swipes

RWP # N/A

DATE: 8/13/07 TIME: 1715

SHIPMENT NUMBER: 0603-02-0006-A

TRACTOR # : _____ TRAILER # : 522

INCOMING: FULL _____

OUTGOING: EMPTY X

TRUCKING COMPANY : TRIAD

TRAILER TYPE : FLAT X RAGTOP ____ VAN ____
CASK _____ DROPDECK _____

DOSE RATE INSTRUMENT
TYPE: N/A
SERIAL NUMBER: N/A
CAL. DUE DATE: N/A

CONTAMINATION SURVEY INST. - BETA / GAMMA
TYPE: MOD-3
SERIAL NUMBER: 92977
CAL. DUE DATE: 12/12/07

CONTAMINATION SURVEY INST. - ALPHA
TYPE: MOD-12
SERIAL NUMBER: 162121
CAL. DUE DATE: 7/27/08

SHIPPING & RECEIVING TECHNICIAN LRD
Initials

REVIEWED BY : _____

WI07 - 0959 D1 T3-4 (trench) 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:20:11 Page 1
8905696 Spectrum name: Win00356.An1

Sample description
WI07-0959 D1 T3-4 (trench) 0-6" FR 080607

Spectrum Filename: C:\User\Win00356.An1

Acquisition information
Start time: 06-Aug-2007 11:07:37
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: 3.5960E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5960E+02) = 2.7809E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:20:11 Page 2
8905696 Spectrum name: Win00356.An1

WI07 - 0959 D1 T3-4 (trench) 0-6in Free. R. 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: 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	
28.94	7.41	568.	398.	0.664	24.51	2.193	CU-64	s
231.29	58.15	95.	87.	0.145	38.40	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	186.45	46.78	51.	33.	0.055	91.61	0.312s
AM-241	237.51	59.54	169.	50.	0.084	78.02	0.958D
Th-234	254.00	63.66	9.	0.	0.000	0.00	0.125s
Pb-214	298.61	74.81	143.	0.	0.000	0.00	0.575D
Pb-212	298.63	74.81	133.	0.	0.000	245.96	0.274D
Pb-212	313.62	78.56	94.	34.	0.057	104.57	0.400s
Pb-214	307.80	77.11	113.	0.	0.000	90.35	0.427D
Pb-214	342.82	85.86	62.	30.	0.049	106.82	0.318s
Th-234	369.00	92.40	23.	5.	0.008	285.66	0.000s
Ac-228	380.79	95.35	16.	0.	0.000	0.00	0.000D
Ac-228	839.62	210.02	22.	45.	0.075	54.01	0.789s
Pb-212	948.62	237.26	87.	33.	0.055	118.30	0.249s
Pb-214	967.50	241.98	40.	0.	0.000	0.00	0.000D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:20:11 Page 3
8905696 Spectrum name: Win00356.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.00	270.60	3.	0.	0.000	0.00	0.000s
Pb-214	1178.67	294.75	11.	2.	0.003	489.90	0.437s
Ac-228	1308.24	327.14	14.	3.	0.005	447.21	0.183s
Ac-228	1348.83	337.28	10.	20.	0.032	78.84	0.442s
Pb-214	1408.00	352.07	13.	2.	0.003	586.52	0.000s

WI07 - 0959 D1 T3-4 (trench) 0-6in Free. R. 080607

Ac-228	1851.00	462.78	1.	0.	0.000	0.00	0.000s
Bi-214	2428.83	607.18	24.	2.	0.003	860.23	0.321s
CS-137	2643.25	660.76	3.	1.	0.002	529.15	0.385s
Bi-214	3075.83	768.86	1.	1.	0.001	339.93	0.339s
Ac-228	3178.67	794.56	1.	1.	0.001	366.67	0.181s
Ac-228	3641.58	910.24	0.	39.	0.065	32.03	0.375s
Bi-214	3735.33	933.67	1.	0.	0.001	240.37	0.197s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.440D
Ac-228	3882.92	970.54	1.	4.	0.007	122.47	0.295s
Bi-214	4481.33	1120.08	1.	0.	0.001	240.37	0.197s
Bi-214	4953.00	1237.93	0.	1.	0.002	200.00	0.250s
Bi-214	5511.50	1377.49	0.	7.	0.012	75.59	0.375s
K-40	5845.00	1460.82	3.	0.	0.000	0.00	0.000s
Ac-228	6350.00	1587.00	0.	2.	0.003	141.42	0.250s
Bi-214	7059.00	1764.14	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	&	3.955E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	0.000E+00	%	5.247E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	%	1.457E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.112E-04	?	4.954E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	1.412E-04	G
Ac-228	N	4.6622E-04	911.07	4.662E-04	&(	1.195E-05	G K
			969.11	8.414E-05	&	7.786E-05	G
			338.32	2.569E-04	&	1.071E-04	G
			964.60	0.000E+00	%	1.260E-04	G
			794.70	0.000E+00	%	1.642E-04	G
			463.00	0.000E+00	?	8.662E-05	G
			209.28	1.090E-03	&	2.928E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:20:11 Page 4
8905696 Spectrum name: Win00356.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	1.063E-04	G
		1588.00	3.098E-04	&	3.968E-04	G
		95.35	0.000E+00	%	1.385E-04	X
		327.64	0.000E+00	%	2.911E-04	G
Pb-212	N 1.0676E-04	238.62	8.639E-05	&(	3.587E-05	G K
		77.11	1.573E-04	&(	6.577E-05	X
		74.81	0.000E+00	&	1.320E-04	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	%	1.175E-04	G
		63.29	0.000E+00	?	1.100E-04	G

```
                WI07 - 0959  D1  T3-4 (trench)  0-6in Free. R.  080607
Pb-214    N   0.0000E+00     351.92 0.000E+00 %   2.494E-05         G K
                             295.21 0.000E+00 %   3.980E-05         G
                              77.11 0.000E+00 &   1.230E-04Energy duplication
                             241.98 0.000E+00 %   1.483E-04         G
                              74.81 0.000E+00 !   2.356E-04Energy duplication
                              87.30 5.093E-04 &   2.430E-04         X

Pb-210    N   7.7304E-04      46.50 7.730E-04  (  2.486E-04         G

AM-241        1.2511E-04      59.54 1.251E-04  (  4.677E-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  06-AUG-2007 11:20:11 Page    5
8905696                          Spectrum name: Win00356.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<    1.0998E-01
K-40    <    3.9272E-01
Ac-228       1.2965E+00    4.152E-01    4.170E-01
Pb-212 #     2.9690E-01    2.344E-01    2.345E-01
CS-137  <    2.7885E-02
Th-234  <    3.2675E-01
Pb-214 B<    6.9360E-02
Pb-210 #     2.1497E+00    1.969E+00    1.970E+00
AM-241       3.4791E-01    2.714E-01    2.717E-01

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

WI07 - 0959 D1 T3-4 (trench) 0-6in Free. R. 080607

& - 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) 4.0910292E+00 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0960 D2 T1-2 (trench) 0-6in FR 080607

Sample description
WI07-0960 D2 T1-2 (trench) 0-6" FR 080607

Spectrum Filename: C:\User\Win00538.An1

Acquisition information

Start time:	06-Aug-2007 11:24:39
Live time:	600
Real time:	602
Dead time:	0.28 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

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

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	4.3720E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.3720E+02) = 2.2873E+03
Detection limit method:	Traditional ORTEC method

WI07-0960 D2 T1-2 (trench) 0-6in FR 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: 0.1343

********** U N I D E N T I F I E D P E A K S U 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	5794.	10269.	17.114	2.88	0.854	-	D
16.86	4.19	14889.	9263.	15.438	4.27	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.30	46.50	58.	36.	0.061	84.49	1.346s
AM-241	237.60	59.58	126.	330.	0.550	17.50	0.868
Th-234	252.58	63.32	83.	52.	0.087	72.05	0.376s
Pb-214	298.54	74.81	74.	85.	0.142	35.89	0.917D
Pb-212	298.56	74.81	101.	0.	0.000	362.28	0.381D
Pb-212	307.74	77.11	63.	188.	0.313	18.88	0.919D
Pb-214	307.74	77.11	182.	0.	0.000	501.46	0.268D
Pb-214	347.64	87.08	56.	71.	0.118	45.22	1.280s
Th-234	368.72	92.35	59.	41.	0.068	61.38	0.933D
Ac-228	380.72	95.35	37.	5.	0.008	352.04	0.935D
Ac-228	837.95	209.63	32.	54.	0.091	51.41	0.365s
Pb-212	953.94	238.62	34.	238.	0.397	14.67	1.057D
Pb-214	967.37	241.98	35.	42.	0.071	49.85	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:34:50 Page 3
8905696 Spectrum name: Win00538.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.56	270.27	20.	33.	0.055	66.30	1.000s
Pb-214	1179.60	295.03	7.	85.	0.142	25.05	0.642s
Ac-228	1312.39	328.21	15.	16.	0.026	100.94	0.585s
Ac-228	1352.30	338.19	7.	71.	0.118	28.99	0.984s
Pb-214	1406.77	351.80	11.	111.	0.185	22.96	0.803s

WI07-0960 D2 T1-2 (trench) 0-6in FR 080607

Ac-228	1853.81	463.53	5.	14.	0.024	76.28	0.278s
Bi-214	2438.59	609.68	4.	74.	0.124	25.96	0.688s
CS-137	2648.70	662.19	2.	14.	0.024	66.51	0.245s
Bi-214	3071.71	767.91	0.	7.	0.012	75.59	0.500s
Ac-228	3179.00	794.72	1.	0.	0.000	0.00	0.000s
Ac-228	3645.38	911.26	0.	56.	0.093	26.73	0.875s
Bi-214	3735.60	933.81	0.	10.	0.017	63.25	0.375s
Ac-228	3858.81	964.60	4.	7.	0.012	102.10	1.595D
Ac-228	3876.86	969.11	3.	27.	0.045	42.88	1.598D
Bi-214	4482.64	1120.48	0.	22.	0.037	42.64	0.625s
Bi-214	4952.00	1237.77	0.	7.	0.012	75.59	0.250s
Bi-214	5508.83	1376.90	1.	1.	0.001	366.67	0.223s
K-40	5845.05	1460.91	0.	58.	0.097	26.26	0.583s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7058.58	1764.11	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	3.8226E-04	609.31	3.449E-04	@(	1.541E-05	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	5.353E-04	+	1.740E-04	G
			1238.11	4.746E-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	0.000E+00	%	2.771E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	2.5536E-03	1460.81	2.554E-03	?(	4.403E-05	G
Ac-228	N	5.7194E-04	911.07	6.167E-04	?(	1.101E-05	G K
			969.11	5.214E-04	(	5.937E-05	G
			338.32	8.282E-04	+	1.524E-04	G
			964.60	4.609E-04	(	1.978E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	5.587E-04	(	1.402E-04	G
			209.28	1.153E-03	+	2.883E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:34:50 Page 4
8905696 Spectrum name: Win00538.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.031E-03	+	3.377E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.864E-04	X
		327.64	6.448E-04	&(	2.456E-04	G
Pb-212	N 5.4781E-04	238.62	5.478E-04	(	2.003E-05	G K
		77.11	7.199E-04	+	8.780E-05	Energy duplication
		74.81	0.000E+00	%	9.535E-05	Energy duplication
CS-137	3.9293E-05	661.66	3.929E-05	?(	7.564E-06	G
Th-234	N 7.1243E-04	92.35	5.125E-04	(	1.418E-04	G
		63.29	9.970E-04	@(	2.547E-04	G

WI07-0960 D2 T1-2 (trench) 0-6in FR 080607

Pb-214	N	4.6872E-04	351.92	4.111E-04	@(	1.932E-05	G K
			295.21	5.346E-04	*(	2.622E-05	G
			77.11	0.000E+00	%	1.285E-04	Energy duplication
			241.98	5.860E-04	(	1.222E-04	G
			74.81	9.491E-04	+	2.047E-04	Energy duplication
			87.30	1.030E-03	+	2.386E-04	X
Pb-210	N	7.4510E-04	46.50	7.451E-04	*(	2.294E-04	G
AM-241		6.7952E-04	59.54	6.795E-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:
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 06-AUG-2007 11:34:50 Page 5
8905696 Spectrum name: Win00538.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	8.7433E-01	2.270E-01	2.294E-01
K-40 #	5.8408E+00	1.534E+00	1.549E+00
Ac-228	1.3082E+00	3.496E-01	3.530E-01
Pb-212	1.2530E+00	1.838E-01	1.897E-01
CS-137 #	8.9875E-02	5.977E-02	5.987E-02
Th-234	1.6295E+00	7.712E-01	7.721E-01
Pb-214	1.0721E+00	2.156E-01	2.193E-01
Pb-210 #	1.7043E+00	1.440E+00	1.440E+00
AM-241	1.5542E+00	2.720E-01	2.780E-01

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

WI07-0960 D2 T1-2 (trench) 0-6in FR 080607

& - 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) 1.5326325E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Ferrel
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0958 D2 T5-6 (trench) 0-6in 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:16:42 Page 1
8905696 Spectrum name: Win00537.An1

Sample description
WI07-0958 D2 T5-6 (trench) 0-6" FR 080607

Spectrum Filename: C:\User\Win00537.An1

Acquisition information
Start time: 06-Aug-2007 11:06:31
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: 3.8220E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8220E+02) = 2.6164E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:16:42 Page 2
8905696 Spectrum name: Win00537.An1

WI07-0958 D2 T5-6 (trench) 0-6in 0-6 in. F.R. 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: 0.0698

********** U N I D E N T I F I E D P E A K S U 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	2.93	5075.	10933.	18.221	2.66	0.854	-	D
17.64	4.38	13589.	8457.	14.095	4.46	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	185.67	46.60	28.	42.	0.071	51.64	0.479s
AM-241	236.12	59.21	55.	51.	0.085	61.19	0.797
Th-234	251.54	63.06	72.	86.	0.143	44.97	1.101s
Pb-214	298.54	74.81	95.	124.	0.206	28.70	0.917D
Pb-212	298.56	74.81	148.	0.	0.000	619.86	0.480D
Pb-212	307.74	77.11	76.	196.	0.326	19.09	0.919D
Pb-214	307.74	77.11	224.	0.	0.000	420.02	0.000D
Pb-214	348.33	87.25	50.	76.	0.127	38.07	0.972
Th-234	368.72	92.35	66.	37.	0.062	70.01	0.933D
Ac-228	380.72	95.35	30.	1.	0.002	1154.28	0.935D
Ac-228	837.64	209.56	22.	38.	0.063	60.32	1.116s
Pb-212	953.94	238.62	27.	255.	0.424	13.78	1.057D
Pb-214	967.37	241.98	30.	32.	0.053	60.17	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:16:42 Page 3
8905696 Spectrum name: Win00537.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.72	270.81	20.	29.	0.048	74.17	1.073s
Pb-214	1180.58	295.27	12.	70.	0.117	29.72	1.184
Ac-228	1311.33	327.95	7.	3.	0.004	289.40	0.318s
Ac-228	1353.10	338.39	11.	42.	0.071	42.64	0.494s
Pb-214	1407.65	352.02	11.	102.	0.169	23.70	0.915

WI07-0958 D2 T5-6 (trench) 0-6in 0-6 in. F.R. 080607

Ac-228	1852.28	463.15	2.	20.	0.034	52.76	0.718s
Bi-214	2437.17	609.33	0.	76.	0.127	22.94	0.634s
CS-137	2646.58	661.66	2.	10.	0.018	83.57	0.476s
Bi-214	3073.70	768.40	3.	16.	0.027	62.57	0.356s
Ac-228	3179.89	794.94	0.	19.	0.032	45.88	0.483s
Ac-228	3646.00	911.42	0.	46.	0.077	29.49	1.291
Bi-214	3738.38	934.50	0.	8.	0.013	70.71	0.375s
Ac-228	3858.81	964.60	1.	10.	0.016	71.23	1.595D
Ac-228	3876.86	969.11	0.	38.	0.064	32.27	1.598D
Bi-214	4480.27	1119.89	10.	0.	0.001	1034.41	0.262s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5511.75	1377.63	0.	5.	0.008	89.44	0.375s
K-40	5846.17	1461.19	0.	40.	0.067	31.62	0.850s
Ac-228	6352.33	1587.65	0.	9.	0.015	66.67	0.375s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5343E-04	609.31	3.534E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	0.000E+00	%	1.269E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	8.511E-04	+	3.483E-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	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	5.1549E-04	911.07	5.066E-04	?(	1.101E-05	G K
			969.11	7.459E-04	+	1.802E-04	G
			338.32	4.961E-04	(	6.031E-05	G
			964.60	6.053E-04	(	1.311E-04	G
			794.70	1.117E-03	+	3.930E-04	G
			463.00	7.990E-04	+	2.846E-04	G
			209.28	8.005E-04	+	2.426E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 11:16:42 Page 4
8905696 Spectrum name: Win00537.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.060E-04	&	3.253E-04	G
		1588.00	1.307E-03	+	6.931E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	0.000E+00	%	2.036E-04	G
Pb-212	N 5.8525E-04	238.62	5.853E-04	(	1.796E-05	G K
		77.11	7.488E-04	+	9.122E-05	Energy duplication
		74.81	0.000E+00	%	1.148E-04	Energy duplication
CS-137	2.8454E-05	661.66	2.845E-05	?(	7.564E-06	G
Th-234	N 4.6318E-04	92.35	4.632E-04	(	1.496E-04	G
		63.29	1.638E-03	+	3.483E-04	G

```
                WI07-0958  D2  T5-6 (trench) 0-6in   0-6 in.   F.R. 080607
Pb-214    N     4.0336E-04     351.92 3.765E-04  (  1.958E-05          G K
                               295.21 4.406E-04  (  3.355E-05          G
                                77.11 0.000E+00 %   1.422E-04Energy duplication
                               241.98 4.411E-04  (  1.144E-04          G
                                74.81 1.379E-03 +   2.392E-04Energy duplication
                                87.30 1.103E-03 +   2.377E-04          X

Pb-210    N     8.6759E-04      46.50 8.676E-04  (  1.619E-04          G

AM-241          1.0502E-04      59.54 1.050E-04 ?(  2.265E-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 11:16:42 Page    5
8905696                          Spectrum name: Win00537.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        9.2473E-01    2.121E-01    2.150E-01
K-40    #     4.6078E+00    1.457E+00    1.467E+00
Ac-228        1.3487E+00    3.961E-01    3.993E-01
Pb-212        1.5313E+00    2.110E-01    2.187E-01
CS-137  #     7.4448E-02    6.222E-02    6.228E-02
Th-234        1.2119E+00    8.485E-01    8.489E-01
Pb-214        1.0554E+00    2.501E-01    2.532E-01
Pb-210        2.2700E+00    1.172E+00    1.173E+00
AM-241  #     2.7477E-01    1.681E-01    1.684E-01

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

WI07-0958 D2 T5-6 (trench) 0-6in 0-6 in. F.R. 080607

& - 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) 1.3298992E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fern
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0457 D2 Grid A1-3 0-6 in.(resample)Free Rel. 072107

Sample description
WI07- 0457 D2 Grid (A1-3) 0-6in.Re-sample Free Rel. 072107

Spectrum Filename: C:\User\Win00273.An1

Acquisition information
Start time: 21-Jul-2007 15:32:41
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: 2.9600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9600E+02) = 3.3784E+03
Detection limit method: Traditional ORTEC method

WI07-0457 D2 Grid A1-3 0-6 in.(resample)Free Rel. 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1898

********** U N I D E N T I F I E D P E A K S U 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	5361.	25246.	42.077	1.71	2.133	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.54	46.56	64.	42.	0.070	71.50	0.248s
AM-241	237.47	59.54	112.	1288.	2.148	6.37	0.910
Th-234	253.98	63.67	26.	17.	0.029	109.50	0.741
Pb-214	298.54	74.81	34.	70.	0.117	33.52	0.917D
Pb-212	298.56	74.81	74.	0.	0.000	819.21	0.267D
Pb-212	307.74	77.11	37.	84.	0.140	29.99	0.919D
Pb-214	307.74	77.11	88.	0.	0.000	374.36	0.865D
Pb-214	348.69	87.34	28.	29.	0.048	73.31	0.336s
Th-234	368.72	92.35	28.	28.	0.047	65.74	0.933D
Ac-228	380.72	95.35	22.	1.	0.001	1806.20	0.936D
Ac-228	837.64	209.56	8.	19.	0.031	68.51	0.429s
Pb-212	953.94	238.62	5.	125.	0.209	18.49	1.057D
Pb-214	967.37	241.98	20.	17.	0.029	87.94	1.060D
Ac-228	1082.06	270.65	5.	2.	0.004	302.37	0.224s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1182.14	295.66	10.	32.	0.053	54.25	0.674s
Ac-228	1310.65	327.78	2.	15.	0.025	61.10	0.510s
Ac-228	1352.65	338.28	3.	20.	0.033	52.44	0.463s
Pb-214	1407.35	351.95	2.	48.	0.079	31.24	0.900
Ac-228	1850.74	462.76	2.	8.	0.013	93.54	0.329s

WI07-0457 D2 Grid A1-3 0-6 in.(resample)Free Rel. 072107

Bi-214	2437.55	609.42	0.	33.	0.055	34.82	0.562s
CS-137	2646.95	661.75	3.	27.	0.045	45.40	0.401s
Bi-214	3072.81	768.18	2.	4.	0.006	153.86	0.335s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3646.08	911.44	0.	24.	0.040	40.82	0.364s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3859.43	964.75	9.	0.	0.000	0.00	1.595
Ac-228	3876.58	969.04	0.	20.	0.033	44.72	0.750s
Bi-214	4477.75	1119.26	1.	3.	0.004	180.28	0.441s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5845.44	1461.01	0.	25.	0.042	40.00	0.312s
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	1.5630E-04	609.31	1.535E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	6.489E-05	&	8.206E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	1.824E-04	?(	1.200E-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	1.1007E-03	1460.81	1.101E-03	?(	4.403E-05	G
Ac-228	N	3.0310E-04	911.07	2.643E-04	?(	1.101E-05	G K
			969.11	3.884E-04	?(	1.942E-05	G
			338.32	2.344E-04	?(	3.516E-05	G
			964.60	0.000E+00	%	2.917E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	3.118E-04	?(	9.984E-05	G
			209.28	3.950E-04	?(	9.761E-05	G
			270.23	0.000E+00	%	1.336E-04	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 15:42:53 Page 4
EnergySolutions Spectrum name: Win00273.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	0.000E+00	%	1.390E-04	X
			327.64	6.109E-04	+	2.587E-04	G
Pb-212	N	2.9776E-04	238.62	2.884E-04	(	8.149E-06	G K
			77.11	3.210E-04	(	3.497E-05	Energy duplication
			74.81	0.000E+00	%	8.210E-05	Energy duplication
CS-137		7.3619E-05	661.66	7.362E-05	(	7.947E-06	G
Th-234	N	3.4073E-04	92.35	3.481E-04	(	9.998E-05	G
			63.29	3.302E-04	(	1.464E-04	G
Pb-214	N	1.9083E-04	351.92	1.765E-04	?(	1.006E-05	G K

```
          WI07-0457  D2  Grid A1-3  0-6 in.(resample)Free Rel.  072107
                         295.21 2.005E-04  (  3.132E-05         G
                          77.11 0.000E+00 %   9.016E-05Energy duplication
                         241.98 2.371E-04  (  9.431E-05         G
                          74.81 7.829E-04 +   1.668E-04Energy duplication
                          87.30 4.208E-04 +   1.624E-04         X

Pb-210   N   8.5398E-04     46.50 8.540E-04 ?(  2.417E-04         G

AM-241       2.6532E-03     59.54 2.653E-03  (  3.193E-05         G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```



```
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
          Time of Count   Uncertainty  2 Sigma
Nuclide     Activity        Counting     Total
                pCi/g         pCi/g        pCi/g

Bi-214 #     5.2805E-01    1.838E-01    1.849E-01
K-40   #     3.7186E+00    1.487E+00    1.494E+00
Ac-228 #     1.0240E+00    2.886E-01    2.912E-01
Pb-212       1.0060E+00    1.772E-01    1.812E-01
CS-137       2.4871E-01    1.129E-01    1.133E-01
Th-234       1.1511E+00    7.351E-01    7.355E-01
Pb-214       6.4470E-01    2.014E-01    2.029E-01
Pb-210 #     2.8851E+00    2.063E+00    2.064E+00
AM-241       8.9635E+00    5.706E-01    6.601E-01

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

WI07-0457 D2 Grid A1-3 0-6 in.(resample)Free Rel. 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 2.0169647E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0436 D2 Grid A2-1 0-6 in. Free Release 072107

Sample description
WI07- 0436 D2 Grid (A2-1) 0"-6" Free Release 072107

Spectrum Filename: C:\User\Win00262.An1

Acquisition information
Start time: 21-Jul-2007 09:11:23
Live time: 600
Real time: 602
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8090E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8090E+02) = 3.5600E+03
Detection limit method: Traditional ORTEC method

WI07-0436 D2 Grid A2-1 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0929

********** U N I D E N T I F I E D P E A K S U 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	5573.	11738.	19.564	2.58	0.854	-	D
16.92	4.21	16142.	8772.	14.621	4.62	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	185.22	46.49	60.	47.	0.078	61.22	1.218s
AM-241	237.56	59.57	138.	1801.	3.002	5.39	0.993
Th-234	252.95	63.41	30.	41.	0.068	61.90	0.426s
Pb-214	298.54	74.81	25.	31.	0.051	58.91	0.917D
Pb-212	298.56	74.81	31.	0.	0.000	406.20	0.724D
Pb-212	307.74	77.11	33.	50.	0.083	43.24	0.919D
Pb-214	307.74	77.11	49.	0.	0.000	215.56	0.481D
Pb-214	348.49	87.29	26.	29.	0.049	68.88	0.775
Th-234	368.72	92.35	21.	24.	0.041	66.49	0.933D
Ac-228	380.72	95.35	20.	1.	0.002	976.02	0.935D
Ac-228	837.00	209.40	4.	0.	0.000	0.00	0.000s
Pb-212	953.94	238.62	7.	79.	0.132	24.22	1.057D
Pb-214	967.37	241.98	9.	22.	0.036	58.87	1.060D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 09:21:33 Page 3
EnergySolutions Spectrum name: Win00262.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.63	270.04	3.	12.	0.019	77.72	0.458s
Pb-214	1179.78	295.07	8.	42.	0.069	39.67	0.530s
Ac-228	1309.88	327.59	0.	24.	0.040	40.82	0.375s
Ac-228	1353.36	338.45	7.	31.	0.052	49.53	0.994
Pb-214	1406.74	351.80	4.	66.	0.111	27.54	1.418s

WI07-0436 D2 Grid A2-1 0-6 in. Free Release 072107

Ac-228	1853.00	463.33	2.	0.	0.001	450.92	0.000s
Bi-214	2437.38	609.38	0.	34.	0.057	34.30	0.473s
CS-137	2646.07	661.53	0.	20.	0.033	44.72	0.666s
Bi-214	3073.00	768.23	0.	7.	0.012	75.59	0.250s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3644.81	911.12	0.	16.	0.027	50.00	0.562s
Bi-214	3737.00	934.16	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	3.	2.	0.004	248.95	1.595D
Ac-228	3876.86	969.11	5.	8.	0.013	108.00	1.598D
Bi-214	4482.00	1120.33	4.	2.	0.003	336.65	0.000s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.44	1461.01	0.	28.	0.047	37.80	0.999s
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	0.500s

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	1.5410E-04	609.31	1.581E-04	?(	4.650E-06	G K
			1764.49	1.423E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	9.733E-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	?	1.082E-04	G
			934.06	2.915E-04	+	2.915E-04	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	1.6753E-04	911.07	1.762E-04	?(	1.101E-05	G K
			969.11	1.531E-04	(	7.259E-05	G
			338.32	3.672E-04	+	1.082E-04	G
			964.60	0.000E+00	%	2.397E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	1.169E-04	G
			209.28	0.000E+00	?	7.136E-05	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 09:21:33 Page 4
EnergySolutions Spectrum name: Win00262.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	3.645E-04	+	1.875E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.348E-04	X
		327.64	9.774E-04	+	3.032E-04	G
Pb-212	N 1.8495E-04	238.62	1.826E-04	(	9.548E-06	G K
		77.11	1.908E-04	(	3.315E-05	Energy duplication
		74.81	0.000E+00	%	5.434E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 5.0088E-04	92.35	3.041E-04	(	8.662E-05	G
		63.29	7.811E-04	(	1.574E-04	G

WI07-0436 D2 Grid A2-1 0-6 in. Free Release 072107

Pb-214	N	2.6376E-04	351.92	2.457E-04	*(	1.205E-05	G K
			295.21	2.600E-04	@(	2.760E-05	G
			77.11	0.000E+00	%	6.833E-05	Energy duplication
			241.98	2.986E-04	(	6.727E-05	G
			74.81	3.418E-04	(	8.528E-05	Energy duplication
			87.30	4.257E-04	+	1.596E-04	X
Pb-210	N	9.5945E-04	46.50	9.594E-04	(	2.341E-04	G
AM-241		3.7085E-03	59.54	3.709E-03	(	3.525E-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 21-JUL-2007 09:21:33 Page 5
EnergySolutions Spectrum name: Win00262.An1

R - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.4859E-01	1.882E-01	1.893E-01
K-40 #	4.3887E+00	1.659E+00	1.667E+00
Ac-228	5.9641E-01	2.982E-01	2.990E-01
Pb-212	6.5842E-01	1.595E-01	1.614E-01
CS-137 #	1.9294E-01	8.629E-02	8.660E-02
Th-234	1.7831E+00	8.099E-01	8.109E-01
Pb-214	9.3899E-01	2.260E-01	2.287E-01
Pb-210	3.4156E+00	2.091E+00	2.093E+00
AM-241	1.3202E+01	7.112E-01	8.629E-01

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

WI07-0436 D2 Grid A2-1 0-6 in. Free Release 072107

& - 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) 2.5724998E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: GMC
Supervisor

Laboratory: EnergySolutions

WI07-0438 D2 Grid A2-3 0-6 in. Free Release 072107

Sample description
WI07- 0438 D2 Grid (A2-3) 0"-6" Free Release 072107

Spectrum Filename: C:\User\Win00264.An1

Acquisition information
Start time: 21-Jul-2007 09:42:41
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9800E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9800E+02) = 3.3557E+03
Detection limit method: Traditional ORTEC method

WI07-0438 D2 Grid A2-3 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1657

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.74	2.92	6202.	8958.	14.930	3.26	0.854	-	D
15.86	3.95	13036.	8430.	14.051	4.41	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	115.	45.	0.075	83.35	0.776
AM-241	237.55	59.56	322.	4435.	7.392	3.46	0.979
Th-234	253.10	63.45	24.	23.	0.038	84.75	0.734s
Pb-214	298.54	74.81	36.	44.	0.074	48.42	0.917D
Pb-212	298.56	74.81	40.	0.	0.000	439.70	0.222D
Pb-212	307.74	77.11	37.	60.	0.100	38.71	0.919D
Pb-214	307.74	77.11	97.	0.	0.000	149.15	0.261D
Pb-214	349.79	87.62	30.	26.	0.043	82.85	0.348s
Th-234	368.72	92.35	17.	39.	0.066	43.33	0.933D
Ac-228	380.72	95.35	19.	8.	0.013	175.36	0.936D
Ac-228	837.29	209.47	7.	26.	0.044	56.44	0.565s
Pb-212	953.94	238.62	5.	77.	0.128	24.39	1.057D
Pb-214	967.37	241.98	16.	17.	0.028	83.08	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.00	269.88	4.	13.	0.022	76.92	0.507s
Pb-214	1181.74	295.56	8.	40.	0.067	41.63	0.659s
Ac-228	1309.17	327.41	4.	9.	0.014	109.19	0.226s
Ac-228	1342.81	335.82	4.	26.	0.044	49.06	0.270s
Pb-214	1408.12	352.14	0.	59.	0.098	26.04	0.677s

Ac-228	1844.89	461.30	2.	13.	0.021	71.39	0.483s
Bi-214	2437.58	609.43	0.	33.	0.055	34.82	0.893s
CS-137	2647.61	661.92	0.	19.	0.032	45.88	0.312s
Bi-214	3073.50	768.35	0.	7.	0.012	75.59	0.500s
Ac-228	3177.83	794.42	0.	7.	0.012	75.59	0.500s
Ac-228	3646.60	911.57	0.	22.	0.037	42.64	0.364s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	6.	0.009	113.56	1.595D
Ac-228	3876.86	969.11	3.	10.	0.016	82.47	1.598D
Bi-214	4481.80	1120.28	0.	7.	0.012	75.59	0.625s
Bi-214	4951.50	1237.64	0.	3.	0.005	115.47	0.500s
Bi-214	5513.50	1378.07	0.	2.	0.003	141.42	0.500s
K-40	5841.00	1459.90	0.	18.	0.030	47.14	0.500s
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	1.6480E-04	609.31	1.535E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	2.034E-04	?(	6.779E-05	G
			768.36	3.648E-04	+	2.228E-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	7.9250E-04	1460.81	7.925E-04	?(	4.403E-05	G
Ac-228	N	2.7252E-04	911.07	2.423E-04	?(	1.101E-05	G K
			969.11	1.897E-04	(	6.000E-05	G
			338.32	3.106E-04	&(	3.742E-05	G
			964.60	3.495E-04	(	1.679E-04	G
			794.70	4.116E-04	?(	5.880E-05	G
			463.00	4.937E-04	&	2.339E-04	G
			209.28	5.572E-04	+	1.828E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.062E-04	(	1.054E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.494E-04	-	1.515E-04	X
		327.64	3.529E-04	?(	1.420E-04	G
Pb-212	N 1.9136E-04	238.62	1.761E-04	(	8.758E-06	G K
		77.11	2.291E-04	(	3.497E-05	Energy duplication
		74.81	0.000E+00	%	6.126E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	(	2.710E-06	G
Th-234	N 4.6912E-04	92.35	4.909E-04	(	7.852E-05	G
		63.29	4.382E-04	(	1.419E-04	G

```
                WI07-0438  D2  Grid  A2-3  0-6 in. Free Release  072107
Pb-214    N   2.2988E-04    351.92 2.185E-04  (  3.704E-06          G K
                           295.21 2.506E-04 @(  2.838E-05          G
                            77.11 0.000E+00 ?   9.483E-05Energy duplication
                           241.98 2.333E-04  (  8.574E-05          G
                            74.81 4.956E-04 +   1.469E-04Energy duplication
                            87.30 3.773E-04 +   1.610E-04          X

Pb-210    N   9.1862E-04     46.50 9.186E-04 ?(  3.200E-04          G

AM-241        9.1323E-03     59.54 9.132E-03  (  5.329E-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  21-JUL-2007 09:52:52 Page    5
EnergySolutions                    Spectrum name: Win00264.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 #     5.5301E-01    1.925E-01    1.936E-01
K-40   #     2.6594E+00    1.254E+00    1.258E+00
Ac-228       9.1451E-01    2.847E-01    2.867E-01
Pb-212       6.4215E-01    1.469E-01    1.489E-01
CS-137       1.7278E-01    7.928E-02    7.955E-02
Th-234       1.5742E+00    6.822E-01    6.831E-01
Pb-214       7.7142E-01    2.009E-01    2.029E-01
Pb-210 #     3.0826E+00    2.569E+00    2.570E+00
AM-241       3.0645E+01    1.060E+00    1.553E+00

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

WI07-0438 D2 Grid A2-3 0-6 in. Free Release 072107

& - 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) 4.1015350E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Funn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0437 D2 Grid A2-4 0-6 in. Free Release 072107

Sample description
WI07- 0437 D2 Grid (A2-4) 0"-6" Free Release 072107

Spectrum Filename: C:\User\Win00263.An1

Acquisition information

Start time:	21-Jul-2007 09:27:29
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:	3.2140E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.2140E+02) = 3.1114E+03
Detection limit method:	Traditional ORTEC method

WI07-0437 D2 Grid A2-4 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0495

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.77	2.93	5695.	10341.	17.235	2.85	0.854	-	D
16.66	4.15	13946.	8679.	14.466	4.41	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	186.07	46.70	100.	36.	0.059	95.40	0.354s
AM-241	237.55	59.56	339.	3323.	5.538	4.12	0.908
Th-234	254.72	63.86	26.	24.	0.040	84.16	0.702
Pb-214	298.54	74.81	31.	41.	0.068	50.20	0.917D
Pb-212	298.56	74.81	40.	0.	0.000	296.90	0.251D
Pb-212	307.74	77.11	37.	59.	0.098	39.38	0.919D
Pb-214	307.74	77.11	84.	0.	0.000	328.86	0.213D
Pb-214	347.24	86.98	21.	38.	0.063	54.70	1.307s
Th-234	368.72	92.35	23.	28.	0.046	62.29	0.933D
Ac-228	380.72	95.35	31.	7.	0.012	239.91	0.935D
Ac-228	834.43	208.75	11.	16.	0.027	87.89	0.320s
Pb-212	953.94	238.62	15.	86.	0.144	24.88	1.057D
Pb-214	967.37	241.98	18.	21.	0.035	70.85	1.060D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 09:37:40 Page 3
EnergySolutions Spectrum name: Win00263.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.59	270.78	13.	7.	0.012	184.12	0.362s
Pb-214	1179.90	295.10	6.	29.	0.049	48.72	0.550s
Ac-228	1312.75	328.30	0.	12.	0.020	57.74	0.875
Ac-228	1353.33	338.45	3.	29.	0.048	42.76	0.618s
Pb-214	1407.17	351.90	3.	64.	0.107	27.24	0.548s

WI07-0437 D2 Grid A2-4 0-6 in. Free Release 072107

Ac-228	1852.10	463.10	0.	21.	0.035	43.64	0.625s
Bi-214	2437.45	609.40	0.	29.	0.048	37.14	0.604s
CS-137	2647.25	661.83	0.	12.	0.020	57.74	0.375s
Bi-214	3073.00	768.23	0.	1.	0.002	200.00	0.250s
Ac-228	3177.71	794.40	0.	11.	0.018	60.30	0.375s
Ac-228	3646.33	911.50	0.	33.	0.055	34.82	0.312s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	6.	2.	0.003	410.64	1.595D
Ac-228	3876.86	969.11	3.	6.	0.010	117.14	1.598D
Bi-214	4481.00	1120.08	0.	2.	0.003	141.42	0.250s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5506.00	1376.19	0.	4.	0.007	100.00	0.250s
K-40	5844.94	1460.88	0.	17.	0.028	48.51	0.300s
Ac-228	6353.00	1587.82	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.3486E-04	609.31	1.349E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.867E-05	-	6.233E-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	4.328E-04	&	3.649E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	7.4847E-04	1460.81	7.485E-04	?(	4.403E-05	G
Ac-228	N	3.6329E-04	911.07	3.634E-04	?(	1.101E-05	G K
			969.11	1.152E-04	-	9.266E-05	G
			338.32	3.360E-04	?(	3.668E-05	G
			964.60	0.000E+00	%	2.797E-04	G
			794.70	6.468E-04	+	3.067E-04	G
			463.00	8.185E-04	+	2.728E-04	G
			209.28	3.421E-04	&(	1.096E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	2.239E-04	&	2.138E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	4.887E-04	&(	4.072E-05	G
Pb-212	N 2.0603E-04	238.62	1.986E-04	(	1.362E-05	G K
		77.11	2.245E-04	(	3.506E-05	Energy duplication
		74.81	0.000E+00	%	6.126E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 3.9150E-04	92.35	3.453E-04	(	9.168E-05	G
		63.29	4.572E-04	&(	1.472E-04	G

WI07-0437 D2 Grid A2-4 0-6 in. Free Release 072107

Pb-214	N	2.4658E-04	351.92	2.370E-04	@(	1.111E-05	G K
			295.21	1.838E-04	-	5.564E-05	G
			77.11	0.000E+00	%	8.841E-05	Energy duplication
			241.98	2.940E-04	(	8.956E-05	G
			74.81	4.523E-04	+	1.396E-04	Energy duplication
			87.30	5.514E-04	+	1.651E-04	X
Pb-210	N	7.2469E-04	46.50	7.247E-04	?(	2.998E-04	G
AM-241		6.8425E-03	59.54	6.843E-03	(	5.466E-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 21-JUL-2007 09:37:40 Page 5
EnergySolutions Spectrum name: Win00263.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 #	4.1961E-01	1.558E-01	1.566E-01
K-40 #	2.3288E+00	1.130E+00	1.133E+00
Ac-228	1.1303E+00	3.355E-01	3.382E-01
Pb-212	6.4105E-01	1.493E-01	1.512E-01
CS-137 #	1.0118E-01	5.842E-02	5.854E-02
Th-234	1.2181E+00	6.377E-01	6.384E-01
Pb-214	7.6721E-01	2.090E-01	2.110E-01
Pb-210 #	2.2548E+00	2.151E+00	2.152E+00
AM-241	2.1290E+01	8.765E-01	1.179E+00

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

WI07-0437 D2 Grid A2-4 0-6 in. Free Release 072107

& - 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) 3.0150814E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0442 D2 Grid A3-1 0-6 in. Free Release 072107

Sample description
WI07- 0442 D2 Grid (A3 -1) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00268.An1

Acquisition information
Start time: 21-Jul-2007 12:28:04
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: 3.0080E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0080E+02) = 3.3245E+03
Detection limit method: Traditional ORTEC method

WI07-0442 D2 Grid A3-1 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1348

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.95	3.92	5862.	24001.	40.002	1.82	2.360	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	185.90	46.65	58.	40.	0.067	73.14	0.542s
AM-241	237.64	59.59	102.	1268.	2.112	6.36	1.027
Th-234	253.94	63.66	25.	24.	0.040	79.35	1.013
Pb-214	298.54	74.81	33.	45.	0.075	46.48	0.917D
Pb-212	298.56	74.81	56.	0.	0.000	2212.09	0.274D
Pb-212	307.74	77.11	33.	60.	0.100	37.46	0.919D
Pb-214	307.74	77.11	67.	0.	0.000	1878.83	0.292D
Pb-214	347.28	86.99	18.	40.	0.067	48.48	1.279s
Th-234	368.72	92.35	32.	20.	0.033	92.18	0.933D
Ac-228	380.72	95.35	24.	4.	0.007	365.79	0.935D
Ac-228	836.57	209.29	4.	26.	0.044	46.02	0.399s
Pb-212	953.94	238.62	24.	103.	0.171	23.90	1.057D
Pb-214	967.37	241.98	16.	20.	0.033	72.68	1.060D
Ac-228	1080.07	270.15	12.	28.	0.046	69.79	0.471s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.84	295.34	7.	48.	0.079	37.97	1.214s
Ac-228	1309.65	327.53	2.	14.	0.023	69.88	0.481s
Ac-228	1352.73	338.30	3.	35.	0.059	38.58	1.111s
Pb-214	1408.18	352.16	0.	65.	0.108	24.81	0.872
Ac-228	1852.55	463.22	0.	19.	0.032	45.88	0.333s

WI07-0442 D2 Grid A3-1 0-6 in. Free Release 072107

Bi-214	2437.49	609.41	0.	41.	0.068	31.23	0.833s
CS-137	2646.99	661.76	2.	24.	0.039	48.33	0.553s
Bi-214	3075.00	768.73	1.	0.	0.000	0.00	0.000s
Ac-228	3178.50	794.59	0.	4.	0.007	100.00	0.500s
Ac-228	3644.23	910.98	0.	23.	0.038	41.70	0.466s
Bi-214	3736.40	934.01	0.	5.	0.008	89.44	0.500s
Ac-228	3858.81	964.60	2.	4.	0.007	129.36	1.595D
Ac-228	3876.86	969.11	1.	11.	0.018	64.88	1.598D
Bi-214	4482.00	1120.33	1.	0.	0.000	0.00	0.000s
Bi-214	4953.00	1238.02	0.	4.	0.007	100.00	0.750s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.00	1460.90	0.	27.	0.045	38.49	0.394s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7059.50	1764.33	0.	3.	0.005	115.47	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.9982E-04	609.31	1.907E-04	(	4.650E-06	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	0.000E+00	?	4.867E-05	G
			1238.11	2.712E-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	?	1.082E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	1.1887E-03	1460.81	1.189E-03	?(	4.403E-05	G
Ac-228	N	2.4117E-04	911.07	2.533E-04	?(	1.101E-05	G K
			969.11	2.152E-04	(	3.778E-05	G
			338.32	4.121E-04	+	1.082E-04	G
			964.60	2.650E-04	(	1.490E-04	G
			794.70	2.352E-04	?(	5.880E-05	G
			463.00	7.406E-04	+	2.606E-04	G
			209.28	5.572E-04	+	1.748E-04	G
			270.23	8.592E-04	+	2.955E-04	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:38:16 Page 4
EnergySolutions Spectrum name: Win00268.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.541E-04	X
		327.64	5.498E-04	+	2.516E-04	G
Pb-212	N 2.3445E-04	238.62	2.364E-04	(	1.715E-05	G K
		77.11	2.295E-04	(	3.310E-05	Energy duplication
		74.81	0.000E+00	%	7.186E-05	Energy duplication
CS-137	6.3682E-05	661.66	6.368E-05	(	7.564E-06	G
Th-234	N 3.3448E-04	92.35	2.483E-04	(	1.064E-04	G
		63.29	4.572E-04	$(	1.446E-04	G
Pb-214	N 2.6211E-04	351.92	2.407E-04	(	3.704E-06	G K

WI07-0442 D2 Grid A3-1 0-6 in. Free Release 072107

			295.21	2.986E-04	*(	2.733E-05	G
			77.11	0.000E+00	&	7.913E-05	Energy duplication
			241.98	2.747E-04	(	8.575E-05	G
			74.81	5.053E-04	+	1.451E-04	Energy duplication
			87.30	5.804E-04	+	1.637E-04	X
Pb-210	N	8.1655E-04	46.50	8.166E-04	(	2.303E-04	G
AM-241		2.6100E-03	59.54	2.610E-03	(	3.053E-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		6.6430E-01	2.075E-01	2.090E-01
K-40	#	3.9520E+00	1.521E+00	1.528E+00
Ac-228		8.0178E-01	3.344E-01	3.357E-01
Pb-212		7.7942E-01	1.731E-01	1.756E-01
CS-137		2.1171E-01	1.023E-01	1.026E-01
Th-234		1.1120E+00	6.762E-01	6.767E-01
Pb-214		8.7138E-01	2.162E-01	2.186E-01
Pb-210		2.7146E+00	1.986E+00	1.987E+00
AM-241		8.6767E+00	5.521E-01	6.387E-01

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

WI07-0442 D2 Grid A3-1 0-6 in. Free Release 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.9783842E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0720 D2 Grid B1-1 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:11:44 Page 1
4714781 Spectrum name: Win00413.An1

Sample description
WI07-0720 D2 Grid B1-1 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00413.An1

Acquisition information
Start time: 30-Jul-2007 13:01:31
Live time: 600
Real time: 603
Dead time: 0.45 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8190E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8190E+02) = 3.5474E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:11:44 Page 2
4714781 Spectrum name: Win00413.An1

WI07-0720 D2 Grid B1-1 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1040

********** U N I D E N T I F I E D P E A K S U 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	3895.	10809.	18.015	2.52	0.854	-	D
16.67	4.15	14936.	8737.	14.562	4.50	0.855	-	D
69.02	17.44	88.	138.	0.230	31.54	0.835	MO-99	s
104.69	26.36	45.	230.	0.383	17.61	0.903	AM-241	s
128.38	32.28	80.	294.	0.490	17.22	0.876	XE-138	s
144.43	36.29	78.	63.	0.105	54.71	0.540	CE-144	s
197.51	49.48	1389.	325.	0.542	34.29	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	533.	35.	0.058	190.43	0.893D
AM-241	237.38	59.52	1736.	18129.	30.215	1.78	0.919
Th-234	252.73	63.36	35.	48.	0.080	50.32	0.860
Pb-214	298.54	74.81	54.	79.	0.132	34.60	0.917D
Pb-212	298.56	74.81	81.	0.	0.000	262.30	0.363D
Pb-212	307.74	77.11	49.	121.	0.202	24.45	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	170.69	0.426D
Pb-214	348.57	87.31	41.	46.	0.076	57.92	0.660s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:11:44 Page 3
4714781 Spectrum name: Win00413.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Th-234	368.72	92.35	47.	56.	0.094	43.28	0.933D
Ac-228	380.72	95.35	42.	4.	0.007	420.21	0.936D
Ac-228	834.71	208.82	28.	30.	0.051	80.11	0.980
Pb-212	953.94	238.62	7.	165.	0.275	16.18	1.057D
Pb-214	967.37	241.98	25.	32.	0.053	56.63	1.060D

WI07-0720 D2 Grid B1-1 0-6 in. F.R. 073007

Ac-228	1080.09	270.16	7.	29.	0.048	53.64	0.823s
Pb-214	1180.39	295.22	5.	59.	0.098	30.15	0.679s
Ac-228	1310.77	327.81	5.	19.	0.032	63.59	0.722s
Ac-228	1353.04	338.38	4.	65.	0.108	28.37	1.526s
Pb-214	1407.46	351.98	6.	76.	0.127	25.94	1.246s
Ac-228	1851.47	462.95	3.	28.	0.046	46.03	0.363s
Bi-214	2436.77	609.23	0.	56.	0.093	26.73	0.722s
CS-137	2644.50	661.14	0.	12.	0.020	57.74	0.312s
Bi-214	3076.20	769.03	0.	7.	0.012	75.59	0.375s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3646.69	911.59	0.	42.	0.070	30.86	1.093s
Bi-214	3738.25	934.47	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	1.	2.	0.003	226.46	1.595D
Ac-228	3876.86	969.11	0.	17.	0.028	49.06	1.598D
Bi-214	4482.00	1120.33	6.	1.	0.002	800.00	0.000s
Bi-214	4954.50	1238.39	0.	2.	0.003	141.42	0.500s
Bi-214	5511.50	1377.57	0.	3.	0.005	115.47	0.500s
K-40	5845.70	1461.07	0.	56.	0.093	26.73	1.479
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7053.00	1762.71	0.	8.	0.013	70.71	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.7688E-04	609.31	2.604E-04	(	4.650E-06	G K
			1764.49	2.847E-04	&(	3.558E-05	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	3.648E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	3.887E-04	+	3.277E-04	G
K-40	N	2.4656E-03	1460.81	2.466E-03	(	4.403E-05	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:11:44 Page 4
4714781 Spectrum name: Win00413.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
Ac-228	N	4.8760E-04	911.07	4.625E-04	(	1.101E-05	G K
			969.11	3.226E-04	-	1.221E-04	G
			338.32	7.618E-04	+	1.437E-04	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	1.085E-03	+	3.270E-04	G
			209.28	6.454E-04	(	1.707E-04	G
			270.23	9.060E-04	+	2.812E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.946E-04	X
			327.64	7.737E-04	+	3.032E-04	G
Pb-212	N	3.7973E-04	238.62	3.797E-04	(	9.681E-06	G K
			77.11	4.642E-04	+	7.263E-05	Energy duplication
			74.81	0.000E+00	%	8.574E-05	Energy duplication

WI07-0720 D2 Grid B1-1 0-6 in. F.R. 073007

CS-137		3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N	7.9266E-04	92.35	7.049E-04	(	1.267E-04	G
			63.29	9.176E-04	(	1.688E-04	G
Pb-214	N	3.1158E-04	351.92	2.827E-04	(	1.446E-05	G K
			295.21	3.675E-04	(	2.383E-05	G
			77.11	0.000E+00	?	1.176E-04	Energy duplication
			241.98	4.422E-04	+	1.547E-04	G
			74.81	8.821E-04	+	1.877E-04	Energy duplication
			87.30	6.651E-04	+	1.988E-04	X
Pb-210	N	7.1143E-04	46.50	7.114E-04	(	6.769E-04	G
AM-241		3.7330E-02	59.54	3.733E-02	(	1.224E-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 30-JUL-2007 13:11:44 Page 5
4714781 Spectrum name: Win00413.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	9.8220E-01	2.625E-01	2.651E-01
K-40	8.7462E+00	2.338E+00	2.360E+00
Ac-228	1.7297E+00	5.338E-01	5.377E-01
Pb-212	1.3470E+00	2.180E-01	2.238E-01
CS-137 #	1.1536E-01	6.660E-02	6.675E-02
Th-234	2.8119E+00	9.332E-01	9.355E-01
Pb-214	1.1053E+00	2.198E-01	2.237E-01

WI07-0720 D2 Grid B1-1 0-6 in. F.R. 073007

Pb-210	C	2.5237E+00	4.806E+00	4.806E+00
AM-241		1.3242E+02	2.353E+00	5.437E+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) 1.5178459E+02 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0719 D2 Grid B1-2 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:55:42 Page 1
4714781 Spectrum name: Win00412.An1

Sample description
WI07-0719 D2 Grid B1-2 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00412.An1

Acquisition information
Start time: 30-Jul-2007 12:45:32
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: 2.8170E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8170E+02) = 3.5499E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:55:42 Page 2
4714781 Spectrum name: Win00412.An1

WI07-0719 D2 Grid B1-2 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1191

********** U N I D E N T I F I E D P E A K S U 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	3.88	4929.	25781.	42.968	1.65	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	185.44	46.54	75.	39.	0.065	81.73	0.703
AM-241	237.56	59.57	124.	1846.	3.077	5.15	0.883
Th-234	252.30	63.25	63.	53.	0.088	65.90	0.367s
Pb-214	298.54	74.81	76.	113.	0.189	28.66	0.917D
Pb-212	298.56	74.81	119.	0.	0.000	520.68	0.488D
Pb-212	307.74	77.11	74.	145.	0.242	23.52	0.919D
Pb-214	307.74	77.11	240.	0.	0.000	75.19	0.377D
Pb-214	347.73	87.10	32.	57.	0.095	43.40	1.067
Th-234	368.72	92.35	59.	47.	0.079	54.30	0.933D
Ac-228	380.72	95.35	36.	11.	0.018	171.51	0.935D
Ac-228	836.17	209.19	16.	33.	0.055	58.03	0.667s
Pb-212	953.94	238.62	18.	193.	0.321	15.74	1.057D
Pb-214	967.37	241.98	26.	33.	0.055	56.10	1.060D
Ac-228	1082.03	270.64	14.	41.	0.068	49.75	0.396s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:55:42 Page 3
4714781 Spectrum name: Win00412.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.70	295.05	4.	42.	0.069	35.72	1.232
Ac-228	1310.63	327.78	16.	19.	0.032	104.74	0.347s
Ac-228	1352.50	338.24	3.	63.	0.105	27.75	0.979s
Pb-214	1406.89	351.83	3.	89.	0.148	22.74	0.879s
Ac-228	1852.00	463.08	13.	2.	0.004	572.96	0.000s

WI07-0719 D2 Grid B1-2 0-6 in. F.R. 073007

Bi-214	2437.02	609.29	2.	48.	0.079	31.58	1.162
CS-137	2646.40	661.62	0.	30.	0.050	36.51	0.541s
Bi-214	3074.25	768.54	0.	7.	0.012	75.59	0.375s
Ac-228	3179.00	794.72	6.	0.	0.001	802.08	0.000s
Ac-228	3645.84	911.38	0.	49.	0.082	28.57	0.625s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	7.	0.012	91.08	1.595D
Ac-228	3876.86	969.11	4.	26.	0.044	43.73	1.598D
Bi-214	4480.50	1119.95	0.	11.	0.018	60.30	0.375s
Bi-214	4950.00	1237.27	0.	4.	0.007	100.00	0.250s
Bi-214	5508.00	1376.69	0.	6.	0.010	81.65	0.250s
K-40	5844.77	1460.84	0.	39.	0.065	32.03	1.062s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7058.00	1763.96	2.	0.	0.001	450.92	0.278s

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

***** S U M M A R Y O F L 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 microCi	Value Comments
Bi-214	N	2.3582E-04	609.31	2.209E-04	?(	1.298E-05	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	3.648E-04	+	2.228E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	&	4.328E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	5.8015E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	5.141E-04	(	6.215E-05	G
			338.32	7.364E-04	@(	3.593E-05	G
			964.60	4.452E-04	(	1.516E-04	G
			794.70	0.000E+00	%	2.352E-04	G
			463.00	0.000E+00	%	2.339E-04	G
			209.28	6.983E-04	?(	1.307E-04	G
			270.23	1.281E-03	+	3.437E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	2.051E-04	-	1.966E-04	X
		327.64	7.737E-04	@(	2.516E-04	G
Pb-212	N 4.4248E-04	238.62	4.425E-04	(	1.516E-05	G K
		77.11	5.569E-04	+	8.206E-05	Energy duplication
		74.81	0.000E+00	%	1.032E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	(	2.710E-06	G
Th-234	N 7.6306E-04	92.35	5.898E-04	(	1.416E-04	G
		63.29	1.010E-03	*(	2.236E-04	G
Pb-214	N 3.2901E-04	351.92	3.290E-04	@(	1.135E-05	G K

WI07-0719 D2 Grid B1-2 0-6 in. F.R. 073007

			295.21	2.610E-04	-	6.330E-05	G
			77.11	0.000E+00	?	1.471E-04	Energy duplication
			241.98	4.548E-04	+	1.573E-04	G
			74.81	1.266E-03	+	2.226E-04	Energy duplication
			87.30	8.271E-04	+	2.010E-04	X
Pb-210	N	7.9274E-04	46.50	7.927E-04	?(	2.607E-04	G
AM-241		3.8019E-03	59.54	3.802E-03	(	3.343E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:55:42 Page 5
4714781 Spectrum name: Win00412.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 #	8.3712E-01	2.644E-01	2.662E-01
K-40 #	6.0954E+00	1.952E+00	1.965E+00
Ac-228	2.0595E+00	5.549E-01	5.602E-01
Pb-212	1.5707E+00	2.472E-01	2.541E-01
CS-137	2.8859E-01	1.054E-01	1.060E-01
Th-234	2.7088E+00	1.157E+00	1.158E+00
Pb-214	1.1680E+00	2.656E-01	2.692E-01
Pb-210 #	2.8141E+00	2.300E+00	2.301E+00
AM-241	1.3496E+01	6.948E-01	8.557E-01

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

WI07-0719 D2 Grid B1-2 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 3.1038307E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0721 D2 Grid B1-3 0-6 in. F.R. 073007

Sample description
WI07-0721 D2 Grid B1-3 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00414.An1

Acquisition information
Start time: 30-Jul-2007 13:14:23
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: 2.8230E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8230E+02) = 3.5423E+03
Detection limit method: Traditional ORTEC method

WI07-0721 D2 Grid B1-3 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1163

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.63	3.84	4362.	22581.	37.635	1.77	2.205	CU-64	s
104.06	26.20	44.	91.	0.151	36.61	0.380	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	181.50	45.56	198.	7.	0.012	700.44	0.245s
AM-241	237.37	59.52	570.	6698.	11.163	2.84	0.932
Th-234	252.97	63.42	32.	22.	0.037	92.54	0.734
Pb-214	298.54	74.81	51.	82.	0.136	33.26	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	364.78	0.250D
Pb-212	307.74	77.11	53.	145.	0.242	21.80	0.919D
Pb-214	307.74	77.11	126.	0.	0.000	260.18	0.309D
Pb-214	347.56	87.06	29.	47.	0.078	48.82	1.090s
Th-234	368.72	92.35	33.	48.	0.080	44.28	0.933D
Ac-228	380.72	95.35	27.	3.	0.006	432.20	0.935D
Ac-228	836.46	209.26	16.	19.	0.032	86.16	0.572s
Pb-212	953.94	238.62	19.	130.	0.216	19.91	1.057D
Pb-214	967.37	241.98	29.	23.	0.039	76.83	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:24:35 Page 3
4714781 Spectrum name: Win00414.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.88	269.60	13.	30.	0.051	60.11	0.937s
Pb-214	1180.73	295.31	5.	63.	0.104	28.94	0.630s
Ac-228	1311.24	327.93	2.	16.	0.026	63.54	0.785s
Ac-228	1353.11	338.39	0.	46.	0.077	29.49	0.500s
Pb-214	1407.06	351.88	4.	98.	0.163	22.17	0.441s

WI07-0721 D2 Grid B1-3 0-6 in. F.R. 073007

Ac-228	1853.33	463.41	3.	1.	0.002	529.15	0.937s
Bi-214	2437.29	609.36	0.	69.	0.115	24.08	1.225
CS-137	2646.41	661.62	0.	27.	0.045	38.49	1.031s
Bi-214	3075.77	768.92	0.	13.	0.022	55.47	0.375s
Ac-228	3177.25	794.28	0.	12.	0.020	57.74	0.750s
Ac-228	3645.46	911.28	0.	35.	0.058	33.81	0.567s
Bi-214	3742.59	935.56	3.	2.	0.003	389.87	0.232s
Ac-228	3858.81	964.60	9.	2.	0.003	529.44	1.595D
Ac-228	3876.86	969.11	5.	23.	0.039	48.89	1.598D
Bi-214	4481.75	1120.26	0.	9.	0.015	66.67	0.625s
Bi-214	4956.33	1238.85	0.	6.	0.010	81.65	0.250s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5844.66	1460.81	0.	45.	0.075	29.81	1.343s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7055.00	1763.21	0.	10.	0.017	63.25	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	3.3650E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.558E-04	&(	3.558E-05	G
			1120.29	2.190E-04	-	1.161E-04	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	&	3.597E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	?(	4.403E-05	G
Ac-228	N	4.4461E-04	911.07	3.855E-04	?(	1.101E-05	G K
			969.11	4.537E-04	(	6.960E-05	G
			338.32	5.391E-04	(	1.172E-05	G
			964.60	0.000E+00	%	3.220E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	0.000E+00	%	1.314E-04	G
			209.28	4.020E-04	(	1.307E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:24:35 Page 4
4714781 Spectrum name: Win00414.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.477E-04	&	3.058E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	6.312E-04	(	1.137E-04	G
Pb-212	N 2.9817E-04	238.62	2.982E-04	(	1.518E-05	G K
		77.11	5.562E-04	+	7.812E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	7.3167E-05	661.66	7.317E-05	?(	2.710E-06	G
Th-234	N 5.2873E-04	92.35	6.013E-04	(	1.075E-04	G
		63.29	4.255E-04	(	1.614E-04	G

WI07-0721 D2 Grid B1-3 0-6 in. F.R. 073007

Pb-214	N	3.6719E-04	351.92	3.630E-04	(	1.249E-05		G K
			295.21	3.926E-04	(	2.383E-05		G
			77.11	0.000E+00	%	1.075E-04	Energy duplication	
			241.98	3.232E-04	(	1.118E-04		G
			74.81	9.112E-04	+	1.877E-04	Energy duplication	
			87.30	6.772E-04	+	1.863E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	4.237E-04		G
AM-241		1.3792E-02	59.54	1.379E-02	(	7.056E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:
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 30-JUL-2007 13:24:35 Page 5
4714781 Spectrum name: Win00414.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		1.1920E+00	2.870E-01	2.905E-01
K-40	#	7.0182E+00	2.092E+00	2.109E+00
Ac-228		1.5750E+00	3.967E-01	4.011E-01
Pb-212		1.0562E+00	2.102E-01	2.139E-01
CS-137	#	2.5918E-01	9.976E-02	1.003E-01
Th-234		1.8729E+00	8.293E-01	8.304E-01
Pb-214		1.3007E+00	2.884E-01	2.925E-01
Pb-210	<	1.5008E+00		
AM-241		4.8856E+01	1.390E+00	2.281E+00

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

WI07-0721 D2 Grid B1-3 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 6.3130424E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenx
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0711 D2 Grid B1-4 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:42:57 Page 1
4714781 Spectrum name: Win00411.An1

Sample description
WI07-0711 D2 Grid B1-4 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00411.An1

Acquisition information
Start time: 30-Jul-2007 12:32:46
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: 2.8380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8380E+02) = 3.5236E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:42:57 Page 2
4714781 Spectrum name: Win00411.An1

WI07-0711 D2 Grid B1-4 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1070

********** 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	
14.63	3.84	3684.	23364.	38.940	1.67	2.238	CU-64	s
104.07	26.20	20.	75.	0.125	32.11	0.745	U-237	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.23	46.49	132.	22.	0.037	173.06	0.283s
AM-241	237.62	59.58	365.	5326.	8.877	3.05	0.863
Th-234	253.18	63.47	22.	25.	0.042	71.97	0.721
Pb-214	298.54	74.81	28.	70.	0.117	31.96	0.917D
Pb-212	298.56	74.81	70.	0.	0.000	2374.87	0.571D
Pb-212	307.74	77.11	34.	92.	0.154	27.40	0.919D
Pb-214	307.74	77.11	103.	0.	0.000	410.17	0.000D
Pb-214	347.82	87.13	48.	31.	0.052	92.82	0.719
Th-234	368.72	92.35	37.	30.	0.050	68.51	0.933D
Ac-228	380.72	95.35	17.	7.	0.011	196.61	0.935D
Ac-228	837.10	209.42	8.	12.	0.019	99.80	1.057
Pb-212	953.94	238.62	17.	120.	0.201	20.57	1.057D
Pb-214	967.37	241.98	28.	14.	0.024	116.96	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:42:57 Page 3
4714781 Spectrum name: Win00411.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.00	269.88	3.	0.	0.000	0.00	0.000s
Pb-214	1181.53	295.51	10.	48.	0.081	38.70	1.028s
Ac-228	1310.21	327.67	6.	1.	0.002	721.11	0.186s
Ac-228	1354.06	338.63	0.	34.	0.057	34.30	1.239s
Pb-214	1407.33	351.94	0.	60.	0.100	25.82	1.033

WI07-0711 D2 Grid B1-4 0-6 in. F.R. 073007

Ac-228	1852.00	463.08	3.	0.	0.000	0.00	0.000s
Bi-214	2438.43	609.64	0.	44.	0.073	30.15	1.437s
CS-137	2647.76	661.96	0.	21.	0.035	43.64	0.500s
Bi-214	3072.75	768.16	1.	2.	0.003	262.30	0.441s
Ac-228	3178.57	794.61	0.	11.	0.018	60.30	0.312s
Ac-228	3647.22	911.72	0.	18.	0.030	47.14	0.656s
Bi-214	3737.50	934.28	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	3.	5.	0.008	146.41	1.595D
Ac-228	3876.86	969.11	0.	18.	0.029	47.64	1.598D
Bi-214	4482.00	1120.33	0.	7.	0.012	75.59	0.250s
Bi-214	4954.00	1238.27	0.	4.	0.007	100.00	0.250s
Bi-214	5512.00	1377.69	0.	1.	0.002	200.00	0.250s
K-40	5845.54	1461.03	0.	39.	0.065	32.03	1.333s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7061.90	1764.93	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	2.0280E-04	609.31	2.046E-04	*(	4.650E-06	G K
			1764.49	3.558E-04	+	1.779E-04	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	2.712E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	2.915E-04	+	2.915E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	2.7995E-04	911.07	1.982E-04	?(	1.101E-05	G K
			969.11	3.422E-04	(	1.942E-05	G
			338.32	3.985E-04	(	1.172E-05	G
			964.60	2.846E-04	(	1.945E-04	G
			794.70	6.468E-04	+	3.067E-04	G
			463.00	0.000E+00	?	1.169E-04	G
			209.28	2.469E-04	?(	9.761E-05	G

D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:42:57 Page 4
4714781 Spectrum name: Win00411.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	9.373E-05	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.262E-04	-	1.434E-04	X
		327.64	0.000E+00	%	1.741E-04	G
Pb-212	N 2.7677E-04	238.62	2.768E-04	(	1.441E-05	G K
		77.11	3.532E-04	+	6.272E-05	Energy duplication
		74.81	0.000E+00	%	7.995E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 4.1752E-04	92.35	3.718E-04	(	1.140E-04	G
		63.29	4.826E-04	$(	1.353E-04	G

WI07-0711 D2 Grid B1-4 0-6 in. F.R. 073007

Pb-214	N	2.1807E-04	351.92	2.222E-04	(	3.704E-06	G K	
			295.21	3.038E-04	+	7.067E-05	G	
			77.11	0.000E+00	%	9.738E-05	Energy duplication	
			241.98	1.974E-04	(	1.101E-04	G	
			74.81	7.834E-04	+	1.619E-04	Energy duplication	
			87.30	4.498E-04	+	1.898E-04	X	
Pb-210	N	4.5591E-04	46.50	4.559E-04	?(	3.416E-04	G	
AM-241		1.0967E-02	59.54	1.097E-02	(	5.667E-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 30-JUL-2007 12:42:57 Page 5
4714781 Spectrum name: Win00411.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 #	7.1459E-01	2.155E-01	2.171E-01
K-40 #	6.0503E+00	1.938E+00	1.951E+00
Ac-228	9.8644E-01	3.383E-01	3.404E-01
Pb-212	9.7523E-01	2.006E-01	2.039E-01
CS-137 #	2.0052E-01	8.751E-02	8.785E-02
Th-234	1.4712E+00	7.309E-01	7.317E-01
Pb-214	7.6838E-01	1.984E-01	2.005E-01
Pb-210 #C	1.6064E+00	2.780E+00	2.780E+00
AM-241	3.8643E+01	1.179E+00	1.854E+00

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

WI07-0711 D2 Grid B1-4 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 5.1416420E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0710 D2 Grid B1-5 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:06:46 Page 1
4714781 Spectrum name: Win00410.An1

Sample description
WI07-0710 D2 Grid B1-5 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00410.An1

Acquisition information
Start time: 30-Jul-2007 11:56:34
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: 3.5930E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5930E+02) = 2.7832E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:06:46 Page 2
4714781 Spectrum name: Win00410.An1

WI07-0710 D2 Grid B1-5 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1022

********** U N I D E N T I F I E D P E A K S U 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	5540.	11247.	18.744	2.66	0.854	-	D
16.87	4.21	15173.	8856.	14.761	4.47	0.855	-	D
104.86	26.40	60.	98.	0.164	38.86	0.663	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	185.61	46.58	236.	60.	0.100	92.38	1.097s
AM-241	237.61	59.58	528.	6501.	10.835	2.83	0.848
Th-234	250.92	62.91	72.	32.	0.052	107.23	0.342s
Pb-214	298.54	74.81	44.	117.	0.194	24.58	0.917D
Pb-212	298.56	74.81	102.	0.	0.000	266.60	0.285D
Pb-212	307.74	77.11	59.	110.	0.184	27.31	0.919D
Pb-214	307.74	77.11	127.	0.	0.000	943.53	0.434D
Pb-214	348.04	87.18	38.	49.	0.081	50.48	0.515s
Th-234	368.72	92.35	39.	38.	0.063	56.73	0.933D
Ac-228	380.72	95.35	28.	0.	0.000	13056.50	0.935D
Ac-228	834.38	208.74	21.	24.	0.040	80.79	0.539s
Pb-212	953.94	238.62	23.	184.	0.306	16.53	1.057D

D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:06:46 Page 3
4714781 Spectrum name: Win00410.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	31.	21.	0.036	85.10	1.060D
Ac-228	1077.80	269.58	10.	14.	0.023	91.10	0.229s
Pb-214	1180.75	295.31	13.	62.	0.103	36.97	0.558s
Ac-228	1310.57	327.76	8.	10.	0.018	115.47	0.249s
Ac-228	1353.31	338.44	6.	35.	0.058	43.89	0.944s

WI07-0710 D2 Grid B1-5 0-6 in. F.R. 073007

Pb-214	1407.51	351.99	6.	111.	0.185	20.94	1.014
Ac-228	1851.65	462.99	0.	23.	0.038	41.70	0.525s
Bi-214	2437.52	609.41	0.	67.	0.112	24.43	0.500s
CS-137	2645.45	661.38	3.	21.	0.036	52.29	0.398s
Bi-214	3077.75	769.41	0.	12.	0.020	57.74	0.312s
Ac-228	3170.95	792.71	9.	3.	0.006	332.87	0.333s
Ac-228	3645.54	911.30	0.	41.	0.068	31.23	0.896s
Bi-214	3737.33	934.24	0.	7.	0.012	75.59	0.250s
Ac-228	3858.81	964.60	2.	14.	0.023	61.78	1.595D
Ac-228	3876.86	969.11	1.	36.	0.060	34.11	1.598D
Bi-214	4479.00	1119.58	6.	2.	0.002	626.57	0.000s
Bi-214	4953.00	1238.02	0.	6.	0.010	81.65	0.500s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.00	1460.90	0.	40.	0.067	31.62	0.750s
Ac-228	6351.33	1587.40	0.	6.	0.010	81.65	0.375s
Bi-214	7059.83	1764.42	0.	16.	0.027	50.00	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.2240E-04	609.31	3.116E-04	(	4.650E-06	G K
			1764.49	5.693E-04	+	2.199E-04	G
			1120.29	0.000E+00	%	1.103E-04	G
			1238.11	4.068E-04	?(	6.779E-05	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	6.802E-04	+	4.154E-04	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	4.4455E-04	911.07	4.515E-04	(	1.101E-05	G K
			969.11	7.009E-04	+	1.770E-04	G
			338.32	4.102E-04	*(	4.688E-05	G
			964.60	8.523E-04	+	3.814E-04	G
			794.70	0.000E+00	&	3.189E-04	G
			463.00	8.965E-04	+	2.846E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 12:06:46 Page 4
4714781 Spectrum name: Win00410.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	5.078E-04	&(	1.481E-04	G
		270.23	4.374E-04	&(	1.562E-04	G
		1588.00	8.715E-04	+	5.810E-04	G
		95.35	0.000E+00	%	1.541E-04	X
		327.64	4.276E-04	?(	1.794E-04	G
Pb-212	N 4.2228E-04	238.62	4.220E-04	(	1.689E-05	G K
		77.11	4.229E-04	(	4.338E-05	Energy duplication
		74.81	0.000E+00	%	9.581E-05	Energy duplication
CS-137	5.7811E-05	661.66	5.781E-05	?(	7.758E-06	G
Th-234	N 5.2589E-04	92.35	4.738E-04	(	1.166E-04	G
		63.29	6.001E-04	?(	2.391E-04	G

```
Pb-214   N   4.0338E-04    351.92 4.111E-04  (  1.481E-05          G K
                           295.21 3.884E-04  (  3.523E-05          G
                            77.11 0.000E+00 %   1.078E-04Energy duplication
                           241.98 2.954E-04 -   1.481E-04          G
                            74.81 1.301E-03 +   2.059E-04Energy duplication
                            87.30 7.062E-04 +   1.988E-04          X

Pb-210   N   1.2248E-03     46.50 1.225E-03 *(  4.538E-04          G

AM-241       1.3386E-02     59.54 1.339E-02  (  6.795E-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  30-JUL-2007 12:06:46 Page    5
 4714781                          Spectrum name: Win00410.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	8.9731E-01	2.192E-01	2.218E-01
K-40 #	4.9015E+00	1.550E+00	1.561E+00
Ac-228	1.2373E+00	3.865E-01	3.892E-01
Pb-212	1.1753E+00	1.876E-01	1.927E-01
CS-137 #	1.6090E-01	8.414E-02	8.436E-02
Th-234	1.4637E+00	8.304E-01	8.311E-01
Pb-214	1.1227E+00	2.350E-01	2.388E-01
Pb-210 #	3.4089E+00	3.149E+00	3.150E+00
AM-241	3.7257E+01	1.053E+00	1.735E+00

- All peaks for activity calculation had bad shape.

WI07-0710 D2 Grid B1-5 0-6 in. F.R. 073007

* - 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) 5.1624588E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0705 D2 Grid B2-1 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:44:39 Page 1
4714781 Spectrum name: Win00405.An1

Sample description
WI07-0705 D2 Grid B2-1 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00405.An1

Acquisition information
Start time: 30-Jul-2007 10:34:27
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: 3.7200E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7200E+02) = 2.6882E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:44:39 Page 2
4714781 Spectrum name: Win00405.An1

WI07-0705 D2 Grid B2-1 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0912

********** 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	
14.52	3.82	4293.	22765.	37.942	1.76	2.115	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	185.04	46.44	107.	31.	0.052	106.85	0.784
AM-241	237.69	59.60	328.	4872.	8.121	3.18	0.865
Th-234	250.21	62.73	42.	25.	0.042	98.31	0.522s
Pb-214	298.54	74.81	68.	102.	0.170	30.23	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	299.33	0.245D
Pb-212	307.74	77.11	77.	149.	0.249	23.28	0.919D
Pb-214	307.74	77.11	242.	0.	0.000	98.18	0.268D
Pb-214	348.55	87.31	40.	52.	0.087	50.44	0.850
Th-234	368.72	92.35	50.	51.	0.085	48.24	0.933D
Ac-228	380.72	95.35	35.	5.	0.008	350.49	0.935D
Ac-228	835.05	208.91	19.	38.	0.064	52.32	0.961
Pb-212	953.94	238.62	14.	212.	0.353	14.62	1.057D
Pb-214	967.37	241.98	23.	27.	0.045	64.05	1.060D
Ac-228	1077.28	269.45	24.	18.	0.030	118.63	0.267s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:44:39 Page 3
4714781 Spectrum name: Win00405.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.76	295.07	15.	61.	0.102	36.07	0.830s
Ac-228	1310.00	327.62	13.	5.	0.008	271.80	0.000s
Ac-228	1352.85	338.33	11.	46.	0.077	39.90	0.552s
Pb-214	1407.44	351.97	8.	84.	0.141	24.91	0.718s
Ac-228	1854.81	463.78	6.	22.	0.036	63.99	0.350s

WI07-0705 D2 Grid B2-1 0-6 in. F.R. 073007

Bi-214	2437.85	609.50	0.	66.	0.110	24.62	0.413s
CS-137	2646.52	661.65	0.	25.	0.042	40.00	0.393s
Bi-214	3075.00	768.73	1.	0.	0.000	0.00	0.000s
Ac-228	3179.25	794.78	0.	5.	0.008	89.44	0.375s
Ac-228	3645.65	911.33	0.	49.	0.082	28.57	0.933s
Bi-214	3737.00	934.16	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	0.	11.	0.019	59.96	1.595D
Ac-228	3876.86	969.11	0.	35.	0.058	33.94	1.598D
Bi-214	4481.31	1120.15	0.	13.	0.022	55.47	0.364s
Bi-214	4957.33	1239.10	0.	7.	0.012	75.59	0.250s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.65	33.	0.	0.000	0.00	0.000s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7060.10	1764.48	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	3.1319E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	4.270E-04	+	1.930E-04	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	4.746E-04	&	2.898E-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	3.887E-04	?(	9.716E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.910E-04	G
Ac-228	N	6.0228E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	6.743E-04	(	1.942E-05	G
			338.32	5.430E-04	(	6.031E-05	G
			964.60	6.869E-04	(	6.173E-05	G
			794.70	2.940E-04	-	2.176E-04	G
			463.00	8.445E-04	&	3.118E-04	G
			209.28	8.111E-04	?(	1.403E-04	G
			270.23	5.624E-04	&(	2.326E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:44:39 Page 4
4714781 Spectrum name: Win00405.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	0.000E+00	%	2.655E-04	G
Pb-212	N 5.1145E-04	238.62	4.870E-04	(	1.336E-05	G K
		77.11	5.720E-04	(	4.933E-05	Energy duplication
		74.81	0.000E+00	%	9.805E-05	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	(	2.710E-06	G
Th-234	N 5.6992E-04	92.35	6.357E-04	(	1.312E-04	G
		63.29	4.763E-04	&(	1.844E-04	G
Pb-214	N 3.4038E-04	351.92	3.130E-04	(	1.632E-05	G K

WI07-0705 D2 Grid B2-1 0-6 in. F.R. 073007

			295.21	3.821E-04	(	3.759E-05	G
			77.11	0.000E+00	?	1.477E-04	Energy duplication
			241.98	3.695E-04	(	1.015E-04	G
			74.81	1.139E-03	+	2.114E-04	Energy duplication
			87.30	7.546E-04	+	2.042E-04	X
Pb-210	N	6.3963E-04	46.50	6.396E-04	?(	3.085E-04	G
AM-241		1.0033E-02	59.54	1.003E-02	(	5.374E-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 30-JUL-2007 10:44:39 Page 5
4714781 Spectrum name: Win00405.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		8.4190E-01	2.073E-01	2.097E-01
K-40	<	1.0512E+00		
Ac-228		1.6190E+00	4.177E-01	4.221E-01
Pb-212		1.3749E+00	1.890E-01	1.959E-01
CS-137		1.8212E-01	7.285E-02	7.318E-02
Th-234		1.5320E+00	7.391E-01	7.400E-01
Pb-214		9.1500E-01	2.279E-01	2.305E-01
Pb-210	#	1.7194E+00	1.837E+00	1.838E+00
AM-241		2.6971E+01	8.589E-01	1.317E+00

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

WI07-0705 D2 Grid B2-1 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 3.5155247E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0706 D2 Grid B2-2 0-6 in. F.R. 073007

Sample description
WI07-0706 D2 Grid B2-2 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00406.An1

Acquisition information
Start time: 30-Jul-2007 10:47:42
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: 3.1400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1400E+02) = 3.1847E+03
Detection limit method: Traditional ORTEC method

WI07-0706 D2 Grid B2-2 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1060

********** U N I D E N T I F I E D P E A K S U 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	6368.	14352.	23.920	2.29	0.854	-	D
17.71	4.39	17165.	10446.	17.410	4.05	0.855	-	D
104.68	26.35	34.	85.	0.142	34.53	0.714	U-237	
128.13	32.21	42.	60.	0.100	52.60	0.562	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	186.62	46.83	91.	4.	0.007	681.91	0.341s
AM-241	237.61	59.58	366.	5102.	8.504	3.16	0.895
Th-234	252.88	63.40	42.	34.	0.058	78.48	0.740
Pb-214	298.54	74.81	60.	65.	0.109	41.75	0.917D
Pb-212	298.56	74.81	67.	0.	0.000	173.79	0.771D
Pb-212	307.74	77.11	40.	112.	0.186	24.85	0.919D
Pb-214	307.74	77.11	157.	0.	0.000	110.51	0.000D
Pb-214	348.39	87.27	30.	50.	0.083	47.33	1.034s
Th-234	368.72	92.35	51.	29.	0.049	78.19	0.933D
Ac-228	380.72	95.35	39.	12.	0.020	157.58	0.935D
Ac-228	835.38	208.99	7.	28.	0.047	51.18	0.529s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:57:52 Page 3
4714781 Spectrum name: Win00406.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	18.	149.	0.248	18.32	1.057D
Pb-214	967.37	241.98	30.	29.	0.048	66.36	1.060D
Ac-228	1081.08	270.40	3.	34.	0.056	41.21	0.534s
Pb-214	1180.23	295.18	11.	57.	0.095	36.52	1.224
Ac-228	1304.08	326.14	13.	3.	0.005	397.08	0.219s

WI07-0706 D2 Grid B2-2 0-6 in. F.R. 073007

Ac-228	1351.92	338.09	4.	32.	0.053	42.55	0.433s
Pb-214	1407.35	351.95	16.	71.	0.119	32.91	1.028
Ac-228	1854.11	463.61	0.	9.	0.015	66.67	0.562s
Bi-214	2437.68	609.45	0.	60.	0.100	25.82	1.166
CS-137	2645.95	661.50	0.	21.	0.035	43.64	0.365s
Bi-214	3071.00	767.73	0.	4.	0.007	100.00	0.250s
Ac-228	3177.64	794.38	0.	15.	0.025	51.64	0.750s
Ac-228	3646.21	911.47	0.	39.	0.065	32.03	0.367s
Bi-214	3737.00	934.16	0.	3.	0.005	115.47	0.750s
Ac-228	3858.81	964.60	0.	5.	0.008	102.24	1.595D
Ac-228	3876.86	969.11	2.	22.	0.037	45.98	1.598D
Bi-214	4482.41	1120.43	0.	23.	0.038	41.70	1.166s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.64	1461.06	0.	42.	0.070	30.86	0.594s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7054.96	1763.20	2.	4.	0.007	136.74	0.241s

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

***** S U M M A R Y O F L 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	2.7983E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	1.542E-04	&	1.423E-04	G
			1120.29	5.596E-04	+	1.776E-04	G
			1238.11	0.000E+00	?	1.356E-04	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	2.915E-04	?(	9.716E-05	G
K-40	N	1.8492E-03	1460.81	1.849E-03	(	4.403E-05	G
Ac-228	N	4.2496E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	4.296E-04	(	4.855E-05	G
			338.32	3.711E-04	(	4.086E-05	G
			964.60	2.816E-04	-	2.285E-04	G
			794.70	8.820E-04	+	3.528E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:57:52 Page 4
4714781 Spectrum name: Win00406.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	3.508E-04	?(	3.898E-05	G
		209.28	5.925E-04	(	9.046E-05	G
		270.23	1.052E-03	+	2.848E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.319E-04	-	2.044E-04	X
		327.64	0.000E+00	&	2.516E-04	G
Pb-212	N 3.4154E-04	238.62	3.415E-04	(	1.513E-05	G K
		77.11	4.274E-04	+	6.869E-05	Energy duplication
		74.81	0.000E+00	?	7.829E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 4.8553E-04	92.35	3.649E-04	(	1.321E-04	G

```
                                63.29 6.573E-04 ?(  1.854E-04          G

Pb-214    N   3.0699E-04      351.92 2.636E-04  (  2.278E-05          G K
                              295.21 3.571E-04  (  3.268E-05          G
                               77.11 0.000E+00 ?   1.195E-04Energy duplication
                              241.98 3.942E-04  (  1.151E-04          G
                               74.81 7.269E-04 +   1.821E-04Energy duplication
                               87.30 7.255E-04 +   1.909E-04          X

Pb-210    N   0.0000E+00       46.50 0.000E+00 %   2.918E-04          G

AM-241        1.0507E-02       59.54 1.051E-02  (  5.671E-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  30-JUL-2007 10:57:52 Page    5
 4714781                          Spectrum name: Win00406.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	8.9119E-01	2.301E-01	2.325E-01
K-40	5.8891E+00	1.817E+00	1.831E+00
Ac-228	1.3534E+00	2.967E-01	3.010E-01
Pb-212	1.0877E+00	1.993E-01	2.034E-01
CS-137 #	1.8123E-01	7.910E-02	7.940E-02
Th-234	1.5463E+00	8.565E-01	8.572E-01
Pb-214	9.7767E-01	2.691E-01	2.716E-01
Pb-210 <	9.2923E-01		
AM-241	3.3461E+01	1.058E+00	1.629E+00

WI07-0706 D2 Grid B2-2 0-6 in. F.R. 073007

- 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) 4.5387505E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Ferr
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0702 D2 Grid B3-2 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:31:31 Page 1
4714781 Spectrum name: Win00402.An1

Sample description
WI07-0702 D2 Grid B3-2 0-6" F.Rel.073007

Spectrum Filename: C:\User\Win00402.An1

Acquisition information
Start time: 30-Jul-2007 09:21:21
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: 3.3740E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3740E+02) = 2.9638E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:31:31 Page 2
4714781 Spectrum name: Win00402.An1

WI07-0702 D2 Grid B3-2 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1329

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.53	2.91	6647.	9733.	16.221	3.12	0.854	-	D
15.46	3.89	12531.	8464.	14.106	4.33	0.855	-	D
197.56	49.40	312.	106.	0.176	51.05	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	116.	50.	0.083	67.68	0.893D
AM-241	237.61	59.58	427.	3565.	5.942	4.13	0.886
Th-234	253.46	63.54	85.	46.	0.077	80.58	0.599s
Pb-214	298.54	74.81	73.	91.	0.152	33.86	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	234.52	0.267D
Pb-212	307.74	77.11	75.	143.	0.238	24.03	0.919D
Pb-214	307.74	77.11	155.	0.	0.000	340.47	0.278D
Pb-214	348.41	87.27	47.	45.	0.076	57.48	1.211s
Th-234	368.72	92.35	49.	35.	0.058	66.05	0.933D
Ac-228	380.72	95.35	37.	7.	0.012	253.08	0.935D
Ac-228	834.45	208.76	15.	35.	0.058	60.17	0.708s
Pb-212	953.94	238.62	30.	182.	0.304	17.04	1.057D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:31:31 Page 3
4714781 Spectrum name: Win00402.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	30.	28.	0.047	66.91	1.060D
Ac-228	1077.75	269.57	9.	20.	0.033	74.83	0.482s
Pb-214	1179.52	295.00	3.	75.	0.125	25.08	1.204s
Ac-228	1311.00	327.87	2.	17.	0.028	57.83	0.446s
Ac-228	1352.70	338.29	10.	58.	0.096	34.27	0.889

WI07-0702 D2 Grid B3-2 0-6 in. F.R. 073007

Pb-214	1407.18	351.91	4.	91.	0.152	23.16	1.619s
Ac-228	1852.58	463.23	0.	13.	0.022	55.47	0.375s
Bi-214	2437.74	609.47	0.	58.	0.097	26.26	0.788s
CS-137	2645.90	661.49	12.	2.	0.004	495.70	0.418s
Bi-214	3073.00	768.23	0.	9.	0.015	66.67	0.375s
Ac-228	3180.15	795.00	0.	13.	0.022	55.47	0.500s
Ac-228	3646.48	911.54	0.	40.	0.067	31.62	0.552s
Bi-214	3733.00	933.16	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	3.	14.	0.023	63.43	1.595D
Ac-228	3876.86	969.11	1.	23.	0.039	42.42	1.598D
Bi-214	4482.00	1120.33	0.	20.	0.033	44.72	0.375s
Bi-214	4949.50	1237.14	0.	4.	0.007	100.00	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.22	1460.95	0.	27.	0.045	38.49	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	10.	0.017	63.25	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	2.8985E-04	609.31	2.697E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	4.867E-04	+	1.665E-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	0.000E+00	?	1.082E-04	G
			934.06	1.943E-04	&	2.489E-04	G
K-40	N	1.1887E-03	1460.81	1.189E-03	?(	4.403E-05	G
Ac-228	N	4.6310E-04	911.07	4.405E-04	(	1.101E-05	G K
			969.11	4.541E-04	(	3.328E-05	G
			338.32	6.739E-04	+	1.416E-04	G
			964.60	8.688E-04	+	3.921E-04	G
			794.70	7.644E-04	+	3.306E-04	G
			463.00	5.067E-04	?(	3.898E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.335E-04	&	2.224E-04	G
		270.23	6.248E-04	&(	1.491E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.906E-04	X
		327.64	6.855E-04	+	2.722E-04	G
Pb-212	N 4.1923E-04	238.62	4.192E-04	(	1.886E-05	G K
		77.11	5.457E-04	+	8.187E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.576E-05	G
Th-234	N 6.1758E-04	92.35	4.358E-04	(	1.300E-04	G
		63.29	8.763E-04	$(	2.581E-04	G

```
Pb-214   N   3.4551E-04    351.92 3.370E-04 @(  1.249E-05          G K
                           295.21 4.688E-04 +   8.144E-05          G
                            77.11 0.000E+00 %   1.188E-04Energy duplication
                           241.98 3.876E-04  (  1.142E-04          G
                            74.81 1.015E-03 +   2.078E-04Energy duplication
                            87.30 6.578E-04 +   2.042E-04          X

Pb-210   N   1.0114E-03     46.50 1.011E-03  (  3.210E-04          G

AM-241       7.3415E-03     59.54 7.342E-03  (  6.119E-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 30-JUL-2007 09:31:31 Page 5
4714781 Spectrum name: Win00402.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		8.5906E-01	2.256E-01	2.279E-01
K-40	#	3.5233E+00	1.356E+00	1.363E+00
Ac-228		1.3726E+00	3.676E-01	3.712E-01
Pb-212		1.2425E+00	2.117E-01	2.168E-01
CS-137	<	4.6705E-02		
Th-234		1.8304E+00	9.536E-01	9.545E-01
Pb-214		1.0240E+00	2.371E-01	2.402E-01
Pb-210		2.9976E+00	2.029E+00	2.030E+00
AM-241		2.1759E+01	8.981E-01	1.206E+00

\# - All peaks for activity calculation had bad shape.

WI07-0702 D2 Grid B3-2 0-6 in. F.R. 073007

* - 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) 3.4608559E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0703 D2 Grid B3-4 0-6 in. F.R. 073007

Sample description
WI07-0703 D2 Grid B3-4 0-6" Free Rel. 073007

Spectrum Filename: C:\User\D1 Samples\WI07-0728 D1 A-F (BZ) Movin
g Sludge 073007.An1

Acquisition information
Start time: 30-Jul-2007 10:09:39
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) +
(-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) +
(-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0920E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0920E+02) =
3.2342E+03

Detection limit method: Traditional ORTEC method

WI07-0703 D2 Grid B3-4 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1129

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.68	3.86	4530.	22887.	38.145	1.77	2.243	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.58	46.57	57.	29.	0.049	94.57	0.375s
AM-241	237.65	59.59	126.	1971.	3.285	5.05	0.963
Th-234	254.28	63.75	25.	51.	0.085	46.15	0.889s
Pb-214	298.54	74.81	39.	74.	0.123	33.57	0.917D
Pb-212	298.56	74.81	75.	0.	0.000	824.62	0.561D
Pb-212	307.74	77.11	41.	112.	0.187	24.88	0.919D
Pb-214	307.74	77.11	94.	0.	0.000	235.70	0.381D
Pb-214	346.96	86.91	26.	44.	0.073	51.09	0.400s
Th-234	368.72	92.35	48.	33.	0.054	69.88	0.933D
Ac-228	380.72	95.35	26.	7.	0.012	221.21	0.935D
Ac-228	835.09	208.92	14.	25.	0.042	65.48	0.575s
Pb-212	953.94	238.62	14.	125.	0.209	19.75	1.057D
Pb-214	967.37	241.98	28.	21.	0.036	82.07	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:19:51 Page 3
4714781 Spectrum name: WI07-0728 D1 A-F (BZ) Moving

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.72	269.81	4.	30.	0.049	45.61	0.642s
Pb-214	1180.74	295.31	0.	55.	0.092	26.97	0.857
Ac-228	1309.00	327.37	2.	0.	0.000	0.00	0.000s
Ac-228	1352.62	338.27	7.	27.	0.045	52.55	0.497s
Pb-214	1407.44	351.97	3.	74.	0.124	24.68	0.495s

WI07-0703 D2 Grid B3-4 0-6 in. F.R. 073007

Ac-228	1851.93	463.06	8.	19.	0.032	80.85	0.278s
Bi-214	2437.38	609.38	0.	51.	0.085	28.01	0.517s
CS-137	2647.28	661.84	0.	32.	0.053	35.36	1.083
Bi-214	3073.33	768.31	2.	1.	0.002	416.33	0.225s
Ac-228	3178.00	794.47	2.	0.	0.001	450.92	0.333s
Ac-228	3646.00	911.42	0.	26.	0.043	39.22	1.000s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	1.	0.002	459.28	1.595D
Ac-228	3876.86	969.11	0.	18.	0.029	47.57	1.598D
Bi-214	4482.18	1120.37	0.	11.	0.018	60.30	0.375s
Bi-214	4952.67	1237.93	1.	1.	0.001	366.67	0.181s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.97	1461.14	0.	31.	0.052	35.92	0.899s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7059.00	1764.21	0.	1.	0.002	200.00	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4467E-04	609.31	2.372E-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	%	1.737E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	3.0943E-04	911.07	2.863E-04	?(	1.101E-05	G K
			969.11	3.432E-04	(	1.942E-05	G
			338.32	3.164E-04	(	5.010E-05	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	7.406E-04	+	3.066E-04	G
			209.28	5.290E-04	+	1.978E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:19:51 Page 4
4714781 Spectrum name: WI07-0728 D1 A-F (BZ) Moving

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.217E-04	+	2.699E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.664E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 2.8822E-04	238.62	2.882E-04	(	1.336E-05	G K
		77.11	4.287E-04	+	6.891E-05	Energy duplication
		74.81	0.000E+00	%	8.263E-05	Energy duplication
CS-137	8.6716E-05	661.66	8.672E-05	(	2.710E-06	G
Th-234	N 6.3951E-04	92.35	4.063E-04	(	1.292E-04	G
		63.29	9.716E-04	(	1.446E-04	G

WI07-0703 D2 Grid B3-4 0-6 in. F.R. 073007

Pb-214	N	2.9842E-04	351.92	2.753E-04	(	1.060E-05		G K
			295.21	3.445E-04	(	6.264E-06		G
			77.11	0.000E+00	%	9.333E-05	Energy duplication	
			241.98	2.950E-04	(	1.100E-04		G
			74.81	8.209E-04	+	1.735E-04	Energy duplication	
			87.30	6.385E-04	+	1.791E-04		X
Pb-210	N	5.9540E-04	46.50	5.954E-04	(	2.281E-04		G
AM-241		4.0586E-03	59.54	4.059E-03	(	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:
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 30-JUL-2007 10:19:51 Page 5
4714781 Spectrum name: WI07-0728 D1 A-F (BZ) Moving

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		7.9130E-01	2.216E-01	2.236E-01
K-40	#	4.4142E+00	1.586E+00	1.594E+00
Ac-228		1.0007E+00	2.703E-01	2.728E-01
Pb-212		9.3213E-01	1.841E-01	1.874E-01
CS-137		2.8045E-01	9.916E-02	9.973E-02
Th-234		2.0683E+00	8.661E-01	8.674E-01
Pb-214		9.6515E-01	2.382E-01	2.409E-01
Pb-210		1.9256E+00	1.821E+00	1.822E+00
AM-241		1.3126E+01	6.626E-01	8.217E-01

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

WI07-0703 D2 Grid B3-4 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 2.5503868E+01 pCi/g

The library has energies which are not separable.

Analyzed by: S.C. Funk
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0940 D2 Grid E1-1 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 08:46:44 Page 1
8905696 Spectrum name: Win00529.An1

Sample description
WI07-0940 D2 Grid E1-1 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00529.An1

Acquisition information
Start time: 06-Aug-2007 08:36:32
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: 3.2640E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2640E+02) = 3.0637E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 08:46:44 Page 2
8905696 Spectrum name: Win00529.An1

WI07-0940 D2 Grid E1-1 0-6 in. F.R. 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: 0.0917

********** U N I D E N T I F I E D P E A K S U 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	3451.	9823.	16.372	2.63	0.854	-	D
17.83	4.41	15518.	7905.	13.176	4.99	0.855	-	D
359.11	89.89	41.	59.	0.098	40.32	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	182.70	45.85	184.	40.	0.066	128.95	0.546s
AM-241	237.61	59.58	441.	4250.	7.083	3.65	0.974
Th-234	252.51	63.30	69.	38.	0.063	85.16	0.761
Pb-214	298.54	74.81	70.	64.	0.107	44.71	0.917D
Pb-212	298.56	74.81	74.	0.	0.000	494.77	0.270D
Pb-212	307.74	77.11	65.	140.	0.233	23.53	0.919D
Pb-214	307.74	77.11	187.	0.	0.000	586.49	0.299D
Pb-214	348.51	87.30	62.	34.	0.057	73.79	0.928D
Th-234	368.72	92.35	66.	33.	0.055	78.37	0.933D
Ac-228	380.72	95.35	43.	12.	0.019	170.88	0.935D
Ac-228	836.55	209.28	24.	36.	0.060	61.86	0.367s
Pb-212	953.94	238.62	35.	206.	0.344	16.09	1.057D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 08:46:44 Page 3
8905696 Spectrum name: Win00529.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	33.	29.	0.049	66.07	1.060D
Ac-228	1081.40	270.48	27.	42.	0.070	62.18	1.089s
Pb-214	1181.14	295.41	10.	57.	0.095	35.15	0.877
Ac-228	1313.06	328.38	9.	17.	0.028	73.94	0.333s
Ac-228	1353.01	338.37	5.	60.	0.101	28.88	1.302

WI07-0940 D2 Grid E1-1 0-6 in. F.R. 080607

Pb-214	1407.91	352.09	5.	90.	0.149	23.31	1.091s
Ac-228	1852.52	463.21	0.	29.	0.048	37.14	0.781s
Bi-214	2438.03	609.54	3.	60.	0.100	28.28	0.643s
CS-137	2647.51	661.89	2.	25.	0.041	46.18	0.624s
Bi-214	3074.60	768.63	0.	13.	0.022	55.47	0.333s
Ac-228	3178.00	794.47	1.	0.	0.000	0.00	0.000s
Ac-228	3645.11	911.20	12.	3.	0.006	320.94	0.356s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3859.54	964.78	0.	13.	0.022	55.47	0.541s
Ac-228	3877.19	969.19	12.	0.	0.000	0.00	1.598
Bi-214	4482.73	1120.51	0.	12.	0.020	57.74	0.292s
Bi-214	4952.33	1237.85	1.	1.	0.001	339.93	0.197s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.00	1461.15	0.	28.	0.047	37.80	0.625s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.75	1764.65	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	2.8221E-04	609.31	2.790E-04	(	1.395E-05	G K
			1764.49	3.914E-04	+	1.856E-04	G
			1120.29	2.920E-04	?(	2.433E-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	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	6.608E-05	G K
			969.11	0.000E+00	%	1.053E-04	G
			338.32	7.071E-04		1.396E-04	G
			964.60	8.025E-04	?	3.471E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	1.130E-03		3.170E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 08:46:44 Page 4
8905696 Spectrum name: Win00529.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.617E-04	?	2.426E-04	G
		270.23	1.317E-03		3.830E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.236E-04		2.119E-04	X
		327.64	6.923E-04	&	3.147E-04	G
Pb-212	N 4.9163E-04	238.62	4.742E-04	(	2.032E-05	G K
		77.11	5.349E-04	(	4.570E-05	Energy duplication
		74.81	0.000E+00	%	8.210E-05	Energy duplication
CS-137	6.6844E-05	661.66	6.684E-05	(	7.364E-06	G
Th-234	N 5.3646E-04	92.35	4.092E-04	(	1.499E-04	G
		63.29	7.176E-04	$(	2.341E-04	G

WI07-0940 D2 Grid E1-1 0-6 in. F.R. 080607

Pb-214	N	3.4839E-04	351.92	3.321E-04	@(	1.409E-05		G K
			295.21	3.571E-04	(	3.132E-05		G
			77.11	0.000E+00	%	1.301E-04	Energy duplication	
			241.98	4.070E-04	(	1.187E-04		G
			74.81	7.142E-04	+	1.886E-04	Energy duplication	
			87.30	4.943E-04	+	2.085E-04		X
Pb-210	N	8.0975E-04	46.50	8.097E-04	&(	4.023E-04		G
AM-241		8.7513E-03	59.54	8.751E-03	(	6.219E-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 06-AUG-2007 08:46:44 Page 5
8905696 Spectrum name: Win00529.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		8.6463E-01	2.446E-01	2.467E-01
K-40	#	3.7769E+00	1.428E+00	1.435E+00
Ac-228	B<	2.0244E-01		
Pb-212		1.5062E+00	2.147E-01	2.220E-01
CS-137		2.0479E-01	9.458E-02	9.490E-02
Th-234		1.6436E+00	9.511E-01	9.518E-01
Pb-214		1.0674E+00	2.488E-01	2.520E-01
Pb-210		2.4808E+00	3.199E+00	3.200E+00
AM-241		2.6812E+01	9.785E-01	1.394E+00

- All peaks for activity calculation had bad shape.

WI07-0940 D2 Grid E1-1 0-6 in. F.R. 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) 3.8355976E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0918 D2 Grid E3-2 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:55:21 Page 1
8905696 Spectrum name: Win00521.An1

Sample description
WI07-0918 D2 Grid E3-2 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00521.An1

Acquisition information
Start time: 05-Aug-2007 14:45:09
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: 3.4290E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4290E+02) = 2.9163E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:55:21 Page 2
8905696 Spectrum name: Win00521.An1

WI07-0918 D2 Grid E3-2 0-6 in. F.R. 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: 0.1197

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.80	3.89	3927.	24048.	40.080	1.66	2.304	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	165.	29.	0.048	153.67	0.684
AM-241	237.41	59.53	368.	2952.	4.921	4.60	0.909
Th-234	253.05	63.44	52.	33.	0.056	78.49	0.431s
Pb-214	298.54	74.81	89.	140.	0.234	25.40	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	217.87	0.281D
Pb-212	307.74	77.11	52.	205.	0.341	17.20	0.919D
Pb-214	307.74	77.11	182.	0.	0.000	501.46	0.000D
Pb-214	348.55	87.31	48.	76.	0.127	39.50	1.307s
Th-234	368.72	92.35	59.	35.	0.059	70.41	0.933D
Ac-228	380.72	95.35	49.	6.	0.011	321.01	0.935D
Ac-228	839.39	209.99	25.	49.	0.081	51.04	1.255s
Pb-212	953.94	238.62	20.	269.	0.449	13.07	1.057D
Pb-214	967.37	241.98	39.	49.	0.082	45.71	1.060D
Ac-228	1078.63	269.79	33.	29.	0.048	91.79	0.547s

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:55:21 Page 3
8905696 Spectrum name: Win00521.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.13	295.16	19.	60.	0.100	39.32	1.076
Ac-228	1313.32	328.45	6.	17.	0.028	69.60	0.343s
Ac-228	1352.95	338.35	5.	55.	0.092	30.43	1.406s
Pb-214	1407.49	351.98	13.	107.	0.178	23.39	1.138
Ac-228	1851.45	462.94	5.	15.	0.024	79.77	0.555s

WI07-0918 D2 Grid E3-2 0-6 in. F.R. 080507

Bi-214	2437.65	609.45	4.	83.	0.139	24.05	1.042
CS-137	2645.67	661.43	0.	18.	0.030	47.14	0.729s
Bi-214	3074.67	768.64	1.	0.	0.001	240.37	0.197s
Ac-228	3178.00	794.47	0.	7.	0.012	75.59	0.250s
Ac-228	3644.07	910.94	0.	57.	0.095	26.49	0.687s
Bi-214	3735.50	933.78	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	1.	12.	0.020	64.39	1.595D
Ac-228	3876.86	969.11	1.	22.	0.037	44.73	1.598D
Bi-214	4475.00	1118.58	0.	16.	0.027	50.00	0.250s
Bi-214	4952.33	1237.85	0.	8.	0.013	70.71	0.250s
Bi-214	5507.00	1376.44	0.	8.	0.013	70.71	0.250s
K-40	5845.11	1460.92	0.	38.	0.063	32.44	0.275s
Ac-228	6353.00	1587.82	0.	12.	0.020	57.74	0.312s
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 microCi	Value Comments
Bi-214	N	3.8798E-04	609.31	3.875E-04	(	1.513E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	3.893E-04	&(	2.433E-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	8.655E-04	&	4.902E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	?(	4.403E-05	G
Ac-228	N	6.4119E-04	911.07	6.277E-04	?(	1.101E-05	G K
			969.11	4.259E-04	-	1.418E-04	G
			338.32	6.485E-04	(	4.214E-05	G
			964.60	7.243E-04	(	1.339E-04	G
			794.70	4.116E-04	-	2.514E-04	G
			463.00	5.717E-04	?(	1.483E-04	G
			209.28	1.030E-03	&	2.682E-04	G
			270.23	8.956E-04	+	3.639E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:55:21 Page 4
8905696 Spectrum name: Win00521.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.743E-03	+	7.879E-04	G
		95.35	0.000E+00	%	2.119E-04	X
		327.64	6.923E-04	&(	1.629E-04	G
Pb-212	N 6.1857E-04	238.62	6.186E-04	(	1.576E-05	G K
		77.11	7.832E-04	+	8.873E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G
Th-234	N 5.1940E-04	92.35	4.382E-04	(	1.418E-04	G
		63.29	6.350E-04	$(	2.034E-04	G
Pb-214	N 3.8852E-04	351.92	3.951E-04	(	2.107E-05	G K

WI07-0918 D2 Grid E3-2 0-6 in. F.R. 080507

			295.21	3.759E-04	(	4.187E-05		G
			77.11	0.000E+00	%	1.285E-04	Energy duplication	
			241.98	6.810E-04	+	1.905E-04		G
			74.81	1.566E-03	+	2.445E-04	Energy duplication	
			87.30	1.108E-03	+	2.359E-04		X
Pb-210	N	5.9200E-04	46.50	5.920E-04	?(	3.812E-04		G
AM-241		6.0796E-03	59.54	6.080E-03	(	5.686E-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 05-AUG-2007 14:55:21 Page 5
8905696 Spectrum name: Win00521.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	1.1315E+00	2.722E-01	2.754E-01
K-40 #	4.8791E+00	1.583E+00	1.594E+00
Ac-228	1.8699E+00	4.873E-01	4.924E-01
Pb-212	1.8039E+00	2.357E-01	2.453E-01
CS-137 #	1.4225E-01	6.706E-02	6.728E-02
Th-234	1.5147E+00	7.986E-01	7.994E-01
Pb-214	1.1331E+00	2.592E-01	2.627E-01
Pb-210 #C	1.7265E+00	2.653E+00	2.653E+00
AM-241	1.7730E+01	8.151E-01	1.047E+00

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

WI07-0918 D2 Grid E3-2 0-6 in. F.R. 080507

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 3.1930878E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0919 D2 Grid E3-3 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:13:32 Page 1
8905696 Spectrum name: Win00522.An1

Sample description
WI07-0919 D2 Grid E3-3 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00522.An1

Acquisition information
Start time: 05-Aug-2007 15:03:20
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: 3.2720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2720E+02) = 3.0562E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:13:32 Page 2
8905696 Spectrum name: Win00522.An1

WI07-0919 D2 Grid E3-3 0-6 in. F.R. 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: 0.0988

********** U N I D E N T I F I E D P E A K S U 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	3660.	22582.	37.637	1.71	2.173	CU-64	s
104.89	26.41	23.	70.	0.116	34.86	0.842	AM-241	
336.03	84.07	45.	46.	0.076	51.15	0.926	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	184.93	46.41	108.	43.	0.071	87.27	0.818
AM-241	237.38	59.52	264.	2484.	4.140	4.79	0.916
Th-234	252.75	63.36	81.	47.	0.078	81.96	0.434s
Pb-214	298.54	74.81	78.	119.	0.198	27.90	0.917D
Pb-212	298.56	74.81	123.	0.	0.000	529.15	0.408D
Pb-212	307.74	77.11	64.	185.	0.308	19.12	0.919D
Pb-214	307.74	77.11	166.	0.	0.000	1142.02	0.286D
Pb-214	348.51	87.30	45.	56.	0.093	43.27	0.928D
Th-234	368.72	92.35	73.	44.	0.074	62.41	0.933D
Ac-228	380.72	95.35	24.	9.	0.014	175.14	0.935D
Ac-228	836.53	209.28	19.	47.	0.079	45.46	0.676s
Pb-212	953.94	238.62	28.	233.	0.389	14.55	1.057D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:13:32 Page 3
8905696 Spectrum name: Win00522.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	33.	34.	0.056	59.04	1.060D
Ac-228	1080.46	270.25	17.	45.	0.076	50.58	0.355s
Pb-214	1179.70	295.05	3.	51.	0.086	30.46	0.790s
Ac-228	1306.17	326.66	7.	22.	0.037	66.49	0.434s
Ac-228	1353.27	338.43	11.	52.	0.087	36.55	1.222

WI07-0919 D2 Grid E3-3 0-6 in. F.R. 080507

Pb-214	1407.58	352.01	8.	92.	0.154	23.56	1.027
Ac-228	1853.23	463.39	0.	22.	0.037	42.64	1.416
Bi-214	2437.92	609.51	0.	48.	0.080	28.87	1.250
CS-137	2648.08	662.04	0.	39.	0.065	32.03	1.250
Bi-214	3073.39	768.32	3.	14.	0.024	68.52	0.307s
Ac-228	3180.00	794.97	0.	12.	0.020	57.74	0.500s
Ac-228	3645.51	911.30	0.	61.	0.102	25.61	1.000s
Bi-214	3737.33	934.24	0.	9.	0.015	66.67	0.312s
Ac-228	3857.81	964.35	10.	0.	0.000	0.00	1.595
Ac-228	3876.16	968.93	3.	33.	0.055	41.33	0.393s
Bi-214	4484.00	1120.82	0.	13.	0.022	55.47	0.562s
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	5845.24	1460.96	0.	41.	0.068	31.23	0.500s
Ac-228	6353.57	1587.96	2.	1.	0.001	478.42	0.328s
Bi-214	7052.97	1762.70	2.	4.	0.007	158.11	0.242s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.2322E-04	609.31	2.232E-04	(	4.650E-06	G K
			1764.49	1.423E-04	&	1.423E-04	G
			1120.29	3.163E-04	+	1.368E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	7.469E-04	+	3.310E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-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	6.7849E-04	911.07	6.718E-04	(	1.101E-05	G K
			969.11	6.375E-04	(	5.953E-05	G
			338.32	6.133E-04	(	6.031E-05	G
			964.60	0.000E+00		3.086E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	8.575E-04	?(	3.898E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.002E-03	+	2.539E-04	G
		270.23	1.416E-03	+	3.639E-04	G
		1588.00	0.000E+00	%	4.357E-04	G
		95.35	1.666E-04	-	1.664E-04	X
		327.64	8.959E-04	&(	1.741E-04	G
Pb-212	N 5.3645E-04	238.62	5.365E-04	(	1.825E-05	G K
		77.11	7.083E-04	+	8.737E-05	Energy duplication
		74.81	0.000E+00	&	1.049E-04	Energy duplication
CS-137	1.0569E-04	661.66	1.057E-04	(	2.710E-06	G
Th-234	N 6.9306E-04	92.35	5.509E-04	(	1.570E-04	G
		63.29	8.954E-04	$(	2.522E-04	G

WI07-0919 D2 Grid E3-3 0-6 in. F.R. 080507

Pb-214	N	3.3544E-04	351.92	3.426E-04	(	1.632E-05		G K
			295.21	3.216E-04	(	1.793E-05		G
			77.11	0.000E+00	%	1.228E-04	Energy duplication	
			241.98	4.686E-04	+	1.671E-04		G
			74.81	1.327E-03	+	2.272E-04	Energy duplication	
			87.30	8.108E-04	+	2.136E-04		X
Pb-210	N	8.7439E-04	46.50	8.744E-04	(	3.106E-04		G
AM-241		5.1149E-03	59.54	5.115E-03	(	4.836E-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 15:13:32 Page 5
8905696 Spectrum name: Win00522.An1

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

- -

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

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		6.8222E-01	1.969E-01	1.986E-01
K-40	#	5.5169E+00	1.723E+00	1.736E+00
Ac-228		2.0736E+00	3.982E-01	4.057E-01
Pb-212		1.6395E+00	2.386E-01	2.464E-01
CS-137		3.2300E-01	1.034E-01	1.042E-01
Th-234		2.1182E+00	1.091E+00	1.092E+00
Pb-214		1.0252E+00	1.974E-01	2.011E-01
Pb-210		2.6723E+00	2.332E+00	2.333E+00
AM-241		1.5632E+01	7.489E-01	9.464E-01

\# - All peaks for activity calculation had bad shape.

WI07-0919 D2 Grid E3-3 0-6 in. F.R. 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) 3.1683296E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fuka
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0866 D2 Well Head Cellar 18in. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:00:30 Page 1
8905696 Spectrum name: Win00534.An1

Sample description
WI07-0939 D2 Wellhead cellar 28". 080607

Spectrum Filename: C:\User\Win00534.An1

Acquisition information
Start time: 06-Aug-2007 09:50:19
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: 3.7810E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7810E+02) = 2.6448E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:00:30 Page 2
8905696 Spectrum name: Win00534.An1

WI07-0866 D2 Well Head Cellar 18in. 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: 0.1083

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.87	2.91	4515.	10672.	17.787	2.63	0.854	-	D
18.40	4.55	11914.	7621.	12.701	4.65	0.856	-	D
104.22	26.24	32.	100.	0.167	29.48	0.677	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	186.47	46.80	250.	28.	0.047	199.23	0.557s
AM-241	237.62	59.58	413.	4407.	7.344	3.49	0.940
Th-234	253.88	63.65	91.	52.	0.087	74.96	0.846s
Pb-214	298.54	74.81	73.	94.	0.156	33.14	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	135.27	0.506D
Pb-212	307.74	77.11	65.	205.	0.342	17.86	0.919D
Pb-214	307.74	77.11	277.	0.	0.000	81.58	0.142D
Pb-214	347.86	87.14	47.	69.	0.116	40.16	0.797
Th-234	368.72	92.35	68.	56.	0.093	49.65	0.933D
Ac-228	380.72	95.35	42.	8.	0.014	229.62	0.935D
Ac-228	835.68	209.07	21.	41.	0.068	54.54	1.114s
Pb-212	953.94	238.62	28.	225.	0.376	14.86	1.057D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:00:30 Page 3
8905696 Spectrum name: Win00534.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	28.	20.	0.034	85.31	1.060D
Ac-228	1077.82	269.59	8.	32.	0.054	49.65	0.402s
Pb-214	1182.05	295.64	10.	70.	0.116	31.09	0.927s
Ac-228	1311.64	328.03	6.	33.	0.055	45.76	0.808s
Ac-228	1352.35	338.20	3.	71.	0.118	26.11	1.028

WI07-0866 D2 Well Head Cellar 18in. 080607

Pb-214	1407.21	351.91	9.	94.	0.157	24.26	1.498s
Ac-228	1851.56	462.97	4.	0.	0.001	479.58	0.318s
Bi-214	2438.07	609.55	0.	58.	0.097	26.26	1.075
CS-137	2645.00	661.27	1.	1.	0.002	316.23	0.100s
Bi-214	3073.00	768.23	0.	7.	0.012	75.59	0.500s
Ac-228	3178.67	794.63	0.	7.	0.012	75.59	0.375s
Ac-228	3645.13	911.20	0.	62.	0.103	25.40	0.666s
Bi-214	3735.75	933.85	0.	4.	0.007	100.00	0.312s
Ac-228	3858.81	964.60	0.	15.	0.026	51.05	1.595D
Ac-228	3876.86	969.11	4.	36.	0.060	36.64	1.598D
Bi-214	4482.47	1120.44	0.	20.	0.033	44.72	0.875s
Bi-214	4952.20	1237.82	0.	11.	0.018	60.30	0.292s
Bi-214	5510.60	1377.34	0.	8.	0.013	70.71	0.437s
K-40	5846.30	1461.22	0.	33.	0.055	34.82	0.437s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.50	1764.33	2.	0.	0.000	0.00	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	2.7906E-04	609.31	2.697E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	7.457E-04	+	3.537E-04	G
			768.36	3.648E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	+	4.902E-04	G
			934.06	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	7.4657E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	7.019E-04	(	6.446E-05	G
			338.32	8.282E-04	(	3.668E-05	G
			964.60	9.475E-04	(	6.173E-05	G
			794.70	4.116E-04	-	2.514E-04	G
			463.00	0.000E+00	%	1.314E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 10:00:30 Page 4
8905696 Spectrum name: Win00534.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.675E-04	(	1.481E-04	G
		270.23	1.015E-03	&	2.990E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.025E-04	X
		327.64	1.344E-03	+	3.806E-04	G
Pb-212	N 5.1810E-04	238.62	5.181E-04	(	1.825E-05	G K
		77.11	7.853E-04	+	9.094E-05	Energy duplication
		74.81	0.000E+00	?	9.819E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	6.942E-06	G
Th-234	N 8.2060E-04	92.35	6.967E-04	(	1.520E-04	G
		63.29	9.970E-04	@(	2.662E-04	G

WI07-0866 D2 Well Head Cellar 18in. 080607

Pb-214	N	3.7784E-04	351.92	3.481E-04	(	1.767E-05	G	K
			295.21	4.354E-04	@(	3.201E-05	G	
			77.11	0.000E+00	?	1.577E-04	Energy duplication	
			241.98	2.819E-04	-	1.426E-04	G	
			74.81	1.044E-03	+	2.096E-04	Energy duplication	
			87.30	1.006E-03	+	2.284E-04	X	
Pb-210	N	5.7159E-04	46.50	5.716E-04	?(	4.668E-04	G	
AM-241		9.0739E-03	59.54	9.074E-03	(	6.024E-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 06-AUG-2007 10:00:30 Page 5
8905696 Spectrum name: Win00534.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		7.3805E-01	1.938E-01	1.958E-01
K-40	#	3.8427E+00	1.338E+00	1.346E+00
Ac-228		1.9745E+00	3.587E-01	3.662E-01
Pb-212		1.3703E+00	2.036E-01	2.100E-01
CS-137	<	1.8359E-02		
Th-234		2.1703E+00	9.757E-01	9.770E-01
Pb-214		9.9931E-01	1.971E-01	2.006E-01
Pb-210	#C	1.5117E+00	3.012E+00	3.012E+00
AM-241		2.3999E+01	8.382E-01	1.221E+00

\# - All peaks for activity calculation had bad shape.

WI07-0866 D2 Well Head Cellar 18in. 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) 3.6605682E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Funk
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1028 D2 O-S. #1 Free Release 0-6in 080807

Sample description
WI07-1028 D2 O/S #1 -Free Release 0-6" 080807

Spectrum Filename: C:\User\Win00581.An1

Acquisition information
Start time: 08-Aug-2007 13:37:29
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: 3.3940E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3940E+02) = 2.9464E+03
Detection limit method: Traditional ORTEC method

WI07-1028 D2 O-S. #1 Free Release 0-6in 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: 0.1209

********** U N I D E N T I F I E D P E A K S U 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	6860.	13114.	21.857	2.50	0.854	-	D
16.77	4.18	18401.	9973.	16.621	4.34	0.855	-	D
370.74	92.86	65.	62.	0.104	44.49	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	186.21	46.73	94.	72.	0.119	58.00	0.999s
AM-241	236.88	59.40	85.	163.	0.272	26.33	0.877
Th-234	254.44	63.79	105.	58.	0.097	73.75	0.406s
Pb-214	298.54	74.81	88.	121.	0.202	28.37	0.917D
Pb-212	298.56	74.81	128.	0.	0.000	1606.24	0.262D
Pb-212	307.74	77.11	81.	163.	0.272	22.10	0.919D
Pb-214	307.74	77.11	222.	0.	0.000	131.52	0.000D
Pb-214	348.21	87.22	60.	76.	0.127	44.50	1.069s
Th-234	368.72	92.35	111.	7.	0.011	442.04	0.933D
Ac-228	380.72	95.35	38.	1.	0.002	1692.12	0.935D
Ac-228	835.32	208.98	16.	38.	0.063	51.75	0.487s
Pb-212	953.94	238.62	26.	198.	0.330	15.99	1.057D

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:47:41 Page 3
8905696 Spectrum name: Win00581.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	34.	28.	0.047	69.28	1.060D
Ac-228	1080.54	270.27	15.	40.	0.066	53.78	0.384s
Pb-214	1180.05	295.14	6.	39.	0.065	38.72	0.760s
Ac-228	1309.00	327.37	4.	0.	0.001	538.52	0.096s
Ac-228	1352.82	338.32	3.	68.	0.113	26.54	1.102

WI07-1028 D2 O-S. #1 Free Release 0-6in 080807

Pb-214	1407.39	351.96	4.	85.	0.141	23.43	1.200
Ac-228	1852.62	463.24	0.	24.	0.040	40.82	0.364s
Bi-214	2436.91	609.26	4.	63.	0.105	28.62	1.556
CS-137	2646.70	661.69	6.	33.	0.056	44.52	1.399
Bi-214	3066.00	766.48	0.	11.	0.018	60.30	0.250s
Ac-228	3180.08	794.99	0.	15.	0.025	51.64	0.333s
Ac-228	3644.89	911.14	0.	55.	0.092	26.97	0.808s
Bi-214	3736.67	934.08	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	3.	11.	0.018	77.47	1.595D
Ac-228	3876.86	969.11	0.	27.	0.045	38.79	1.598D
Bi-214	4480.57	1119.97	0.	12.	0.020	57.74	0.500s
Bi-214	4952.50	1237.89	0.	7.	0.012	75.59	0.500s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.79	1461.09	0.	48.	0.080	28.87	0.625s
Ac-228	6349.00	1586.82	0.	3.	0.005	115.47	0.250s
Bi-214	7061.00	1764.71	1.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9332E-04	609.31	2.938E-04	(	1.541E-05	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	4.746E-04	+	2.898E-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	2.1133E-03	1460.81	2.113E-03	?(	4.403E-05	G
Ac-228	N	5.8345E-04	911.07	6.057E-04	(	1.101E-05	G K
			969.11	5.216E-04	(	2.378E-05	G
			338.32	7.950E-04	+	1.456E-04	G
			964.60	6.623E-04	(	1.917E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	9.355E-04	+	2.902E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 13:47:41 Page 4
8905696 Spectrum name: Win00581.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.041E-04	+	2.307E-04	G
		270.23	1.239E-03	+	3.437E-04	G
		1588.00	4.357E-04	&	4.357E-04	G
		95.35	0.000E+00	%	1.800E-04	X
		327.64	0.000E+00	%	1.507E-04	G
Pb-212	N 4.5469E-04	238.62	4.547E-04	(	1.781E-05	G K
		77.11	6.246E-04	+	8.651E-05	Energy duplication
		74.81	0.000E+00	%	1.069E-04	Energy duplication
CS-137	9.0330E-05	661.66	9.033E-05	?(	1.058E-05	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.980E-04	G
		63.29	1.108E-03		3.536E-04	G

WI07-1028 D2 O-S. #1 Free Release 0-6in 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) 1.6667137E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R. C. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 1029 D1 O-S #2 Free Release 0-6in 080807

Sample description
WI07-1029 D1 O/S #2 Free Release 0-6" 080807

Spectrum Filename: C:\User\Win00389.An1

Acquisition information
Start time: 08-Aug-2007 13:39:05
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: 3.9690E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9690E+02) = 2.5195E+03
Detection limit method: Traditional ORTEC method

WI07 - 1029 D1 O-S #2 Free Release 0-6in 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	
29.74	7.61	512.	666.	1.110	15.14	2.228	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	183.78	46.11	20.	7.	0.012	197.61	0.674s
AM-241	243.69	61.08	107.	42.	0.069	113.63	0.464s
Th-234	253.20	63.46	26.	7.	0.012	219.46	0.577s
Pb-214	298.61	74.81	140.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	49.	0.	0.000	0.00	0.000D
Pb-212	311.81	78.11	126.	24.	0.041	159.74	0.343s
Pb-214	307.80	77.11	162.	0.	0.000	175.56	0.339D
Pb-214	352.62	88.31	82.	37.	0.062	94.25	0.527s
Th-234	368.79	92.35	92.	45.	0.076	66.64	0.985D
Ac-228	380.79	95.35	53.	15.	0.025	147.76	0.987D
Ac-228	837.00	209.37	4.	0.	0.001	538.52	0.000s
Pb-212	954.00	238.61	44.	1.	0.002	1724.34	0.000s
Pb-214	967.50	241.98	117.	0.	0.000	0.00	1.101
Ac-228	1086.61	271.75	16.	22.	0.037	81.65	0.364s

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 14:02:39 Page 3
8905696 Spectrum name: Win00389.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.00	295.34	14.	0.	0.000	0.00	0.000s
Ac-228	1309.86	327.54	2.	7.	0.011	102.71	0.573s
Ac-228	1347.09	336.85	27.	34.	0.057	70.10	0.399s
Pb-214	1402.21	350.62	35.	29.	0.048	83.24	0.297s
Ac-228	1856.00	464.03	3.	22.	0.037	53.01	1.638s

WI07 - 1029 D1 O-S #2 Free Release 0-6in 080807

Bi-214	2432.81	608.17	34.	46.	0.078	62.81	0.384s
CS-137	2646.67	661.62	1.	1.	0.001	366.67	0.181s
Bi-214	3072.55	768.04	3.	1.	0.001	618.24	0.315s
Ac-228	3179.00	794.64	3.	1.	0.001	520.68	0.000s
Ac-228	3647.27	911.66	4.	42.	0.071	38.59	0.268s
Bi-214	3734.50	933.46	1.	5.	0.008	119.52	0.349s
Ac-228	3859.13	964.60	6.	2.	0.004	330.39	1.589D
Ac-228	3877.18	969.11	23.	13.	0.022	114.33	1.591D
Bi-214	4475.29	1118.57	3.	11.	0.018	90.50	0.217s
Bi-214	4952.00	1237.68	0.	2.	0.003	141.42	0.250s
Bi-214	5508.00	1376.61	1.	2.	0.003	200.00	0.089s
K-40	5854.97	1463.31	5.	34.	0.057	46.23	0.393s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	0.250s
Bi-214	7059.33	1764.22	1.	0.	0.001	240.37	0.197s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6138E-04	609.31	2.380E-04	&(	4.514E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	2.842E-04	&(	8.043E-05	G
			1238.11	1.457E-04	-	1.866E-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	&	3.477E-04	G
			934.06	4.918E-04	?(	2.327E-04	G
K-40	N	1.6084E-03	1460.81	1.608E-03	&(	1.718E-04	G
Ac-228	N	5.1485E-04	911.07	5.081E-04	?(	4.233E-05	G K
			969.11	2.817E-04	-	1.893E-04	G
			338.32	4.479E-04	&(	1.036E-04	G
			964.60	0.000E+00	%	3.030E-04	G
			794.70	0.000E+00	%	2.162E-04	G
			463.00	9.528E-04	&	3.287E-04	G
			209.28	0.000E+00	%	8.968E-05	G
			270.23	7.792E-04	&(	2.188E-04	G

ORTEC g v - i (63) wan32 G53W2.06 08-AUG-2007 14:02:39 Page 4
8905696 Spectrum name: Win00389.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	3.098E-04	G
			95.35	3.354E-04	-	2.741E-04	X
			327.64	3.055E-04	-	2.187E-04	G
Pb-212	N	0.0000E+00	238.62	0.000E+00	%	2.618E-05	G K
			77.11	1.133E-04	&	8.272E-05	X
			74.81	0.000E+00	?	8.164E-05	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	7.617E-06	G
Th-234	N	6.6646E-04	92.35	6.665E-04	(	2.063E-04	G
			63.29	0.000E+00	%	1.992E-04	G
Pb-214	N	1.7899E-04	351.92	1.206E-04	&(	3.692E-05	G K

WI07 - 1029 D1 O-S #2 Free Release 0-6in 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) 8.8214617E+00 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1030 D2 O-S. #3 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 09:54:07 Page 1
8905696 Spectrum name: Win00584.An1

Sample description
WI07- 1030 D2 O-S Area #3 0-6" Free R. 080907

Spectrum Filename: C:\User\Win00584.An1

Acquisition information
Start time: 09-Aug-2007 09:43:57
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: 3.5780E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5780E+02) = 2.7949E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 09:54:07 Page 2
8905696 Spectrum name: Win00584.An1

WI07-1030 D2 O-S. #3 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0936

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.79	2.92	5768.	9630.	16.050	3.02	0.854	-	D
16.90	4.19	14929.	8918.	14.864	4.42	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	184.90	46.40	30.	64.	0.107	43.53	0.554s
AM-241	236.13	59.21	36.	10.	0.016	191.01	0.511s
Th-234	253.34	63.51	48.	41.	0.068	64.04	0.319s
Pb-214	298.54	74.81	77.	130.	0.216	25.98	0.917D
Pb-212	298.56	74.81	152.	0.	0.000	994.28	0.642D
Pb-212	307.74	77.11	77.	207.	0.345	18.33	0.919D
Pb-214	307.74	77.11	205.	0.	0.000	2535.84	0.000D
Pb-214	348.52	87.30	48.	81.	0.135	37.04	0.775
Th-234	368.72	92.35	62.	43.	0.072	60.02	0.933D
Ac-228	380.72	95.35	51.	6.	0.010	334.55	0.935D
Ac-228	836.07	209.16	27.	18.	0.030	102.74	0.345s
Pb-212	953.94	238.62	26.	251.	0.418	13.87	1.057D
Pb-214	967.37	241.98	39.	40.	0.066	55.04	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.55	270.02	10.	42.	0.071	44.58	0.479s
Pb-214	1180.69	295.30	14.	81.	0.135	29.63	0.770s
Ac-228	1310.30	327.69	4.	14.	0.023	72.84	0.423s
Ac-228	1352.93	338.35	7.	74.	0.123	27.76	1.069s
Pb-214	1407.30	351.94	6.	95.	0.159	22.70	1.434s

WI07-1030 D2 O-S. #3 Free Release 0-6in 080907

Ac-228	1852.69	463.25	0.	30.	0.050	36.51	0.583s
Bi-214	2437.32	609.36	7.	69.	0.114	29.54	0.868s
CS-137	2647.10	661.79	0.	29.	0.048	37.14	0.365s
Bi-214	3069.41	767.33	4.	10.	0.018	97.59	0.347s
Ac-228	3179.00	794.72	4.	2.	0.002	401.85	0.000s
Ac-228	3646.29	911.49	0.	49.	0.082	28.57	0.650s
Bi-214	3737.50	934.28	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	0.	13.	0.021	58.19	1.595D
Ac-228	3876.86	969.11	5.	23.	0.039	48.72	1.598D
Bi-214	4483.47	1120.69	0.	16.	0.027	50.00	0.750s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5507.00	1376.44	0.	2.	0.003	141.42	0.250s
K-40	5847.00	1461.40	30.	0.	0.000	0.00	0.000s
Ac-228	6353.50	1587.95	0.	5.	0.008	89.44	0.500s
Bi-214	7060.50	1764.58	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.4553E-04	609.31	3.193E-04	(	2.029E-05	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	5.472E-04	&	3.030E-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	0.0000E+00	1460.81	0.000E+00	%	3.997E-04	G
Ac-228	N	5.1208E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	4.549E-04	(	6.923E-05	G
			338.32	8.672E-04	+	1.551E-04	G
			964.60	7.770E-04	+	3.471E-04	G
			794.70	0.000E+00	%	2.176E-04	G
			463.00	1.169E-03	+	3.220E-04	G
			209.28	3.809E-04	-	2.116E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 09:54:07 Page 4
8905696 Spectrum name: Win00584.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.328E-03	+	3.377E-04	G
		1588.00	7.262E-04	+	5.376E-04	G
		95.35	0.000E+00	%	2.155E-04	X
		327.64	5.701E-04	?(	1.373E-04	G
Pb-212	N 5.7696E-04	238.62	5.770E-04	(	1.774E-05	G K
		77.11	7.931E-04	+	9.314E-05	Energy duplication
		74.81	0.000E+00	%	1.161E-04	Energy duplication
CS-137	7.8587E-05	661.66	7.859E-05	?(	2.710E-06	G
Th-234	N 6.3522E-04	92.35	5.372E-04	(	1.453E-04	G
		63.29	7.747E-04	$(	1.971E-04	G

WI07-1030 D2 O-S. #3 Free Release 0-6in 080907

Pb-214	N	3.5309E-04	351.92	3.531E-04	(	1.446E-05	G K	
			295.21	5.074E-04	+	8.954E-05	G	
			77.11	0.000E+00	%	1.363E-04	Energy duplication	
			241.98	5.468E-04	+	1.808E-04	G	
			74.81	1.446E-03	+	2.324E-04	Energy duplication	
			87.30	1.175E-03	+	2.404E-04	X	
Pb-210	N	1.3065E-03	46.50	1.306E-03	*(	1.687E-04	G	
AM-241		2.0248E-05	59.54	2.025E-05	?(	1.857E-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 09-AUG-2007 09:54:07 Page 5
8905696 Spectrum name: Win00584.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		9.6570E-01	2.853E-01	2.876E-01
K-40	<	1.1171E+00		
Ac-228		1.4312E+00	4.089E-01	4.124E-01
Pb-212		1.6125E+00	2.236E-01	2.316E-01
CS-137	#	2.1964E-01	8.157E-02	8.200E-02
Th-234		1.7753E+00	7.791E-01	7.802E-01
Pb-214		9.8683E-01	2.240E-01	2.270E-01
Pb-210	#	3.6514E+00	1.589E+00	1.592E+00
AM-241	#C	5.6591E-02	1.081E-01	1.081E-01

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

WI07-1030 D2 O-S. #3 Free Release 0-6in 080907

& - 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) 1.0699238E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1031 D2 O-S. #4 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:18:09 Page 1
8905696 Spectrum name: Win00585.An1

Sample description
WI07- 1031 D2 O-S Area #4 0-6" Free R. 080907

Spectrum Filename: C:\User\Win00585.An1

Acquisition information
Start time: 09-Aug-2007 10:07:58
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: 3.5690E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5690E+02) = 2.8019E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:18:09 Page 2
8905696 Spectrum name: Win00585.An1

WI07-1031 D2 O-S. #4 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1894

********** U N I D E N T I F I E D P E A K S U 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	4356.	20601.	34.335	1.89	2.305	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	184.65	46.34	37.	62.	0.103	44.25	1.039
AM-241	233.93	58.66	62.	54.	0.089	63.75	0.991s
Th-234	251.97	63.17	65.	67.	0.112	51.23	0.598s
Pb-214	298.54	74.81	70.	173.	0.289	20.41	0.917D
Pb-212	298.56	74.81	158.	0.	0.000	259.51	0.312D
Pb-212	307.74	77.11	56.	226.	0.377	16.24	0.919D
Pb-214	307.74	77.11	187.	0.	0.000	193.45	0.733D
Pb-214	347.21	86.97	52.	78.	0.130	39.94	0.841
Th-234	368.72	92.35	67.	41.	0.069	64.20	0.933D
Ac-228	380.72	95.35	49.	13.	0.022	160.17	0.935D
Ac-228	837.93	209.63	35.	53.	0.088	54.75	0.535s
Pb-212	953.94	238.62	38.	263.	0.439	13.98	1.057D
Pb-214	967.37	241.98	33.	50.	0.083	43.40	1.060D
Ac-228	1078.46	269.75	10.	26.	0.043	57.56	0.296s

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:18:09 Page 3
8905696 Spectrum name: Win00585.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.63	295.28	22.	94.	0.157	30.72	0.881
Ac-228	1312.12	328.15	2.	28.	0.047	41.65	0.552s
Ac-228	1354.22	338.67	3.	67.	0.111	27.02	1.062s
Pb-214	1407.69	352.03	10.	136.	0.227	19.69	1.017
Ac-228	1850.50	462.70	7.	22.	0.036	69.01	0.340s

WI07-1031 D2 O-S. #4 Free Release 0-6in 080907

Bi-214	2437.90	609.51	0.	116.	0.193	18.57	1.531s
CS-137	2647.80	661.97	0.	30.	0.050	36.51	0.400s
Bi-214	3072.77	768.17	2.	9.	0.014	93.58	0.328s
Ac-228	3179.67	794.88	0.	12.	0.020	57.74	0.312s
Ac-228	3646.06	911.44	0.	62.	0.103	25.40	0.469s
Bi-214	3736.00	933.91	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	3.	11.	0.018	77.84	1.595D
Ac-228	3876.86	969.11	1.	42.	0.069	32.01	1.598D
Bi-214	4483.28	1120.64	0.	27.	0.045	38.49	1.000s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5510.75	1377.38	0.	10.	0.017	63.25	0.375s
K-40	5846.41	1461.25	0.	44.	0.073	30.15	0.833s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.46	0.	21.	0.035	43.64	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	5.6425E-04	609.31	5.395E-04	@(	4.650E-06	G K
			1764.49	7.473E-04	+	2.491E-04	G
			1120.29	6.570E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	4.516E-04	-	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.082E-03	+	5.410E-04	G
			934.06	4.858E-04	?(	9.716E-05	G
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	7.4221E-04	911.07	6.828E-04	(	1.101E-05	G K
			969.11	8.081E-04	(	4.342E-05	G
			338.32	7.813E-04	(	3.668E-05	G
			964.60	6.599E-04	(	1.927E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	8.445E-04	(	1.700E-04	G
			209.28	1.121E-03	+	2.915E-04	G
			270.23	8.123E-04	(	1.562E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:18:09 Page 4
8905696 Spectrum name: Win00585.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.532E-04	-	2.243E-04	X
		327.64	1.140E-03	+	3.365E-04	G
Pb-212	N 6.0522E-04	238.62	6.052E-04	(	2.112E-05	G K
		77.11	8.663E-04	+	9.285E-05	Energy duplication
		74.81	0.000E+00	%	1.184E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	(	2.710E-06	G
Th-234	N 8.2849E-04	92.35	5.139E-04	(	1.506E-04	G
		63.29	1.276E-03	$(	2.269E-04	G
Pb-214	N 5.3340E-04	351.92	5.037E-04	(	1.852E-05	G K

WI07-1031 D2 O-S. #4 Free Release 0-6in 080907

			295.21	5.909E-04	(	4.449E-05	G
			77.11	0.000E+00	?	1.301E-04	Energy duplication
			241.98	6.871E-04	+	1.852E-04	G
			74.81	1.934E-03	+	2.517E-04	Energy duplication
			87.30	1.132E-03	+	2.414E-04	X
Pb-210	N	1.2589E-03	46.50	1.259E-03	(	1.869E-04	G
AM-241		1.1051E-04	59.54	1.105E-04	&(	2.404E-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 09-AUG-2007 10:18:09 Page 5
8905696 Spectrum name: Win00585.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 #	1.5810E+00	2.936E-01	2.995E-01
K-40 #	5.4279E+00	1.637E+00	1.649E+00
Ac-228	2.0796E+00	4.188E-01	4.259E-01
Pb-212	1.6958E+00	2.370E-01	2.454E-01
CS-137 #	2.2779E-01	8.318E-02	8.363E-02
Th-234	2.3214E+00	9.533E-01	9.549E-01
Pb-214	1.4945E+00	2.727E-01	2.784E-01
Pb-210	3.5272E+00	1.561E+00	1.563E+00
AM-241 #	3.0963E-01	1.974E-01	1.977E-01

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

WI07-1031 D2 O-S. #4 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.8664757E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1032 D2 O-S. #5 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:31:02 Page 1
8905696 Spectrum name: Win00586.An1

Sample description
WI07- 1032 D2 O-S Area #5 0-6" Free R. 080907

Spectrum Filename: C:\User\Win00586.An1

Acquisition information
Start time: 09-Aug-2007 10:20:52
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: 3.8040E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8040E+02) = 2.6288E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:31:02 Page 2
8905696 Spectrum name: Win00586.An1

WI07-1032 D2 O-S. #5 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1206

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.98	3.38	7131.	12929.	21.548	2.55	0.854	-	D
17.87	4.85	10983.	9260.	15.434	3.82	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	183.85	46.14	37.	54.	0.089	51.44	0.544s
AM-241	233.99	58.67	53.	15.	0.025	173.44	0.285s
Th-234	251.61	63.08	65.	70.	0.117	49.28	1.040s
Pb-214	298.54	74.81	81.	147.	0.245	23.96	0.917D
Pb-212	298.56	74.81	142.	0.	0.000	380.38	0.329D
Pb-212	307.74	77.11	93.	194.	0.324	20.06	0.919D
Pb-214	307.74	77.11	204.	0.	0.000	550.00	0.644D
Pb-214	348.13	87.20	80.	81.	0.135	46.91	0.495s
Th-234	368.72	92.35	75.	55.	0.092	51.72	0.933D
Ac-228	380.72	95.35	39.	16.	0.026	124.81	0.935D
Ac-228	835.31	208.97	30.	35.	0.058	71.14	1.459s
Pb-212	953.94	238.62	33.	258.	0.431	13.93	1.057D
Pb-214	967.37	241.98	54.	47.	0.078	53.25	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:31:02 Page 3
8905696 Spectrum name: Win00586.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.34	270.22	7.	36.	0.061	44.46	0.937s
Pb-214	1181.23	295.43	18.	102.	0.169	26.45	1.157s
Ac-228	1310.60	327.77	8.	32.	0.053	48.95	0.693s
Ac-228	1352.61	338.27	10.	67.	0.112	31.36	0.726s
Pb-214	1407.94	352.10	5.	132.	0.219	18.68	1.147

WI07-1032 D2 O-S. #5 Free Release 0-6in 080907

Ac-228	1851.50	462.95	4.	6.	0.011	129.14	0.222s
Bi-214	2437.65	609.45	0.	85.	0.142	21.69	0.802s
CS-137	2646.69	661.69	0.	36.	0.060	33.33	0.450s
Bi-214	3068.30	767.05	4.	13.	0.022	82.76	0.464s
Ac-228	3180.63	795.12	0.	19.	0.032	45.88	0.375s
Ac-228	3646.25	911.48	0.	46.	0.077	29.49	1.999s
Bi-214	3736.00	933.91	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	4.	9.	0.015	89.04	1.595D
Ac-228	3876.86	969.11	0.	29.	0.048	37.37	1.598D
Bi-214	4479.87	1119.79	0.	24.	0.040	40.82	0.375s
Bi-214	4954.00	1238.27	1.	0.	0.000	0.00	0.000s
Bi-214	5508.50	1376.82	4.	2.	0.004	254.03	0.292s
K-40	5846.12	1461.18	0.	49.	0.082	28.57	0.437s
Ac-228	6355.33	1588.40	0.	5.	0.008	89.44	0.375s
Bi-214	7059.00	1764.21	6.	0.	0.001	802.08	0.215s

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

***** S U M M A R Y O F L 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	3.9529E-04	609.31	3.953E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	6.948E-04	&	3.310E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	4.328E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	?(	4.403E-05	G
Ac-228	N	5.5782E-04	911.07	5.066E-04	?(	1.101E-05	G K
			969.11	5.561E-04	(	1.942E-05	G
			338.32	7.852E-04	+	1.514E-04	G
			964.60	5.682E-04	(	2.037E-04	G
			794.70	1.117E-03	+	3.930E-04	G
			463.00	2.469E-04	-	1.949E-04	G
			209.28	7.406E-04	*(	1.748E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:31:02 Page 4
8905696 Spectrum name: Win00586.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.135E-03	+	3.058E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	2.999E-04	-	2.119E-04	X
		327.64	1.303E-03	+	3.852E-04	G
Pb-212	N 5.9385E-04	238.62	5.939E-04	(	1.976E-05	G K
		77.11	7.437E-04	+	9.365E-05	Energy duplication
		74.81	0.000E+00	%	1.124E-04	Energy duplication
CS-137	9.7556E-05	661.66	9.756E-05	(	2.710E-06	G
Th-234	N 9.5568E-04	92.35	6.902E-04	(	1.588E-04	G
		63.29	1.334E-03	*(	2.269E-04	G

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                WI07-1032   D2 O-S. #5  Free Release 0-6in   080907
Pb-214   N   4.8765E-04    351.92 4.877E-04  (  1.409E-05          G K
                           295.21 6.358E-04 +   9.982E-05          G
                            77.11 0.000E+00 %   1.359E-04Energy duplication
                           241.98 6.470E-04 +   2.035E-04          G
                            74.81 1.638E-03 +   2.440E-04Energy duplication
                            87.30 1.175E-03 +   2.677E-04          X

Pb-210   N   1.0955E-03     46.50 1.096E-03  (  1.869E-04          G

AM-241       3.0544E-05     59.54 3.054E-05 &(  2.229E-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  09-AUG-2007 10:31:02 Page    5
8905696                          Spectrum name: Win00586.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        1.0391E+00     2.254E-01    2.288E-01
K-40    #     5.6713E+00     1.620E+00    1.634E+00
Ac-228        1.4664E+00     4.324E-01    4.359E-01
Pb-212        1.5611E+00     2.174E-01    2.251E-01
CS-137        2.5646E-01     8.549E-02    8.605E-02
Th-234        2.5123E+00     8.974E-01    8.993E-01
Pb-214        1.2820E+00     2.395E-01    2.442E-01
Pb-210        2.8800E+00     1.482E+00    1.483E+00
AM-241 #C     8.0294E-02     1.393E-01    1.393E-01

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

WI07-1032 D2 O-S. #5 Free Release 0-6in 080907

& - 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) 1.6748924E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1033 D2 O-S. #6 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:43:47 Page 1
8905696 Spectrum name: Win00587.An1

Sample description
WI07- 1033 D2 O-S Area #6 0-6" Free R. 080907

Spectrum Filename: C:\User\Win00587.An1

Acquisition information
Start time: 09-Aug-2007 10:33:36
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: 3.8850E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8850E+02) = 2.5740E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:43:47 Page 2
8905696 Spectrum name: Win00587.An1

WI07-1033 D2 O-S. #6 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1037

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.77	3.88	5241.	21565.	35.942	1.91	2.365	CU-64	s
358.72	89.84	52.	72.	0.121	36.68	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	186.67	46.85	54.	55.	0.092	59.86	0.696s
AM-241	240.44	60.29	62.	28.	0.047	104.49	0.300s
Th-234	253.59	63.57	79.	56.	0.093	64.28	0.838
Pb-214	298.54	74.81	100.	121.	0.202	29.61	0.917D
Pb-212	298.56	74.81	125.	0.	0.000	401.56	0.306D
Pb-212	307.74	77.11	86.	192.	0.321	19.81	0.919D
Pb-214	307.74	77.11	211.	0.	0.000	516.13	0.643D
Pb-214	348.51	87.30	85.	74.	0.123	42.53	0.928D
Th-234	368.72	92.35	76.	60.	0.100	48.74	0.933D
Ac-228	380.72	95.35	36.	13.	0.022	138.45	0.935D
Ac-228	836.30	209.22	30.	53.	0.088	49.63	1.356s
Pb-212	953.94	238.62	38.	289.	0.481	13.25	1.057D
Pb-214	967.37	241.98	55.	26.	0.044	89.00	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:43:47 Page 3
8905696 Spectrum name: Win00587.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.53	270.01	28.	27.	0.044	87.23	0.500s
Pb-214	1181.31	295.45	7.	81.	0.134	26.58	1.125s
Ac-228	1310.00	327.62	4.	0.	0.000	0.00	0.000s
Ac-228	1353.10	338.39	5.	79.	0.131	25.20	1.233
Pb-214	1407.61	352.01	13.	122.	0.204	21.63	1.227

WI07-1033 D2 O-S. #6 Free Release 0-6in 080907

Ac-228	1852.35	463.17	3.	27.	0.044	44.72	0.827s
Bi-214	2437.26	609.35	0.	85.	0.142	21.69	1.233s
CS-137	2646.00	661.52	0.	23.	0.038	41.70	0.583s
Bi-214	3068.60	767.13	0.	20.	0.033	44.72	0.250s
Ac-228	3182.00	795.47	0.	16.	0.027	50.00	0.666s
Ac-228	3645.25	911.23	0.	51.	0.085	28.01	1.562
Bi-214	3736.67	934.08	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	3.	13.	0.022	63.97	1.595D
Ac-228	3876.86	969.11	3.	30.	0.050	39.77	1.598D
Bi-214	4485.17	1121.12	0.	31.	0.052	35.92	0.417s
Bi-214	4954.00	1238.27	0.	12.	0.020	57.74	0.250s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.80	1461.10	0.	46.	0.077	29.49	0.850s
Ac-228	6354.14	1588.11	1.	1.	0.002	281.40	0.440s
Bi-214	7059.82	1764.41	0.	13.	0.022	55.47	0.562s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	4.1241E-04	609.31	3.953E-04	(	4.650E-06	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	7.543E-04	+	2.041E-04	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	1.042E-03	&	3.567E-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	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	5.7037E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	5.849E-04	(	5.730E-05	G
			338.32	9.219E-04	+	1.579E-04	G
			964.60	8.310E-04	+	3.814E-04	G
			794.70	9.408E-04	&	3.633E-04	G
			463.00	1.039E-03	+	3.220E-04	G
			209.28	1.121E-03	+	2.834E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 10:43:47 Page 4
8905696 Spectrum name: Win00587.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.331E-04	+	3.437E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	2.561E-04	-	2.006E-04	X
		327.64	0.000E+00	?	1.373E-04	G
Pb-212	N 6.8443E-04	238.62	6.633E-04	(	2.132E-05	G K
		77.11	7.368E-04	(	5.202E-05	Energy duplication
		74.81	0.000E+00	%	1.057E-04	Energy duplication
CS-137	6.2327E-05	661.66	6.233E-05	(	2.710E-06	G
Th-234	N 8.7565E-04	92.35	7.458E-04	(	1.604E-04	G
		63.29	1.060E-03	(	2.497E-04	G

WI07-1033 D2 O-S. #6 Free Release 0-6in 080907

Pb-214	N	4.7087E-04	351.92	4.531E-04	(	2.059E-05	G K
			295.21	5.053E-04	@(	2.733E-05	G
			77.11	0.000E+00	%	1.380E-04	Energy duplication
			241.98	3.621E-04	-	1.830E-04	G
			74.81	1.350E-03	+	2.403E-04	Energy duplication
			87.30	1.067E-03	+	2.661E-04	X
Pb-210	N	1.1228E-03	46.50	1.123E-03	*(	2.226E-04	G
AM-241		5.7656E-05	59.54	5.766E-05	&(	2.398E-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 09-AUG-2007 10:43:47 Page 5
8905696 Spectrum name: Win00587.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 #	1.0615E+00	2.303E-01	2.337E-01
K-40 #	5.2131E+00	1.537E+00	1.550E+00
Ac-228	1.4681E+00	3.571E-01	3.613E-01
Pb-212	1.7617E+00	2.099E-01	2.201E-01
CS-137 #	1.6043E-01	6.690E-02	6.719E-02
Th-234	2.2539E+00	9.091E-01	9.106E-01
Pb-214	1.2120E+00	2.077E-01	2.126E-01
Pb-210 #	2.8900E+00	1.730E+00	1.731E+00
AM-241	1.4841E-01	1.551E-01	1.552E-01

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

WI07-1033 D2 O-S. #6 Free Release 0-6in 080907

& - 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) 1.6169237E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1034 D2 O-S. #7 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 11:25:07 Page 1
8905696 Spectrum name: Win00588.An1

Sample description
WI07- 1034 D2 O-S Area #7 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00588.An1

Acquisition information
Start time: 09-Aug-2007 11:14:56
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5880E+02) = 2.7871E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 11:25:07 Page 2
8905696 Spectrum name: Win00588.An1

WI07-1034 D2 O-S. #7 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1780

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.87	3.90	5241.	25897.	43.162	1.67	2.392	CU-64	s
2332.59	583.19	4.	86.	0.143	23.94	0.659	TL-208	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.17	46.72	54.	44.	0.074	71.67	0.528s
AM-241	236.98	59.42	59.	14.	0.024	187.49	0.424s
Th-234	251.16	62.97	102.	61.	0.102	69.71	1.032
Pb-214	298.54	74.81	90.	130.	0.217	26.98	0.917D
Pb-212	298.56	74.81	132.	0.	0.000	331.06	0.286D
Pb-212	307.74	77.11	92.	190.	0.316	20.39	0.919D
Pb-214	307.74	77.11	244.	0.	0.000	197.91	0.000D
Pb-214	347.73	87.10	101.	90.	0.149	50.46	1.086s
Th-234	368.72	92.35	41.	82.	0.136	31.45	0.933D
Ac-228	380.72	95.35	58.	14.	0.023	161.80	0.936D
Ac-228	835.86	209.11	33.	51.	0.084	55.14	0.624s
Pb-212	953.94	238.62	31.	294.	0.491	12.82	1.057D
Pb-214	967.37	241.98	32.	56.	0.094	38.74	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 11:25:07 Page 3
8905696 Spectrum name: Win00588.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.60	269.78	18.	28.	0.046	68.51	0.621s
Pb-214	1180.98	295.37	18.	78.	0.131	30.12	1.128
Ac-228	1313.18	328.41	23.	26.	0.043	87.74	0.424s
Ac-228	1352.00	338.11	46.	0.	0.000	0.00	0.000s
Pb-214	1407.49	351.98	6.	125.	0.208	19.53	0.990s

WI07-1034 D2 O-S. #7 Free Release 0-6in 080907

Ac-228	1849.84	462.54	3.	23.	0.038	52.58	0.297s
Bi-214	2438.43	609.64	4.	87.	0.146	23.40	1.405
CS-137	2646.15	661.55	0.	46.	0.077	29.49	0.646s
Bi-214	3071.69	767.90	0.	18.	0.030	47.14	0.562s
Ac-228	3178.60	794.62	0.	15.	0.025	51.64	0.916s
Ac-228	3645.92	911.40	0.	61.	0.102	25.61	0.921s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	14.	0.023	59.12	1.595D
Ac-228	3876.86	969.11	0.	39.	0.065	32.38	1.598D
Bi-214	4483.58	1120.72	0.	19.	0.032	45.88	0.791s
Bi-214	4954.29	1238.34	0.	7.	0.012	75.59	0.312s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.56	1461.04	0.	34.	0.057	34.30	1.718
Ac-228	6355.00	1588.32	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.2477E-04	609.31	4.061E-04	(	1.513E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.623E-04	?(	2.433E-05	G
			1238.11	4.746E-04	?(	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	1.4969E-03	1460.81	1.497E-03	?(	4.403E-05	G
Ac-228	N	7.4946E-04	911.07	6.718E-04	(	1.101E-05	G K
			969.11	7.517E-04	(	2.731E-05	G
			338.32	0.000E+00	%	1.300E-04	G
			964.60	8.439E-04	(	1.361E-04	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	8.900E-04	(	1.195E-04	G
			209.28	1.072E-03	+	2.850E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 11:25:07 Page 4
8905696 Spectrum name: Win00588.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.592E-04	?(	2.011E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.714E-04	-	2.410E-04	X
		327.64	1.045E-03	&	4.240E-04	G
Pb-212 N	6.9079E-04	238.62	6.764E-04	(	1.919E-05	G K
		77.11	7.264E-04	(	5.395E-05	Energy duplication
		74.81	0.000E+00	%	1.085E-04	Energy duplication
CS-137	1.2465E-04	661.66	1.247E-04	(	2.710E-06	G
Th-234 N	1.0772E-03	92.35	1.018E-03	(	1.200E-04	G
		63.29	1.162E-03	(	2.818E-04	G

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                    WI07-1034   D2 O-S. #7  Free Release 0-6in   080907
Pb-214    N   4.7276E-04     351.92 4.630E-04 @(  1.481E-05          G K
                             295.21 4.917E-04  (  4.032E-05          G
                              77.11 0.000E+00 ?   1.484E-04Energy duplication
                             241.98 7.805E-04 +   1.905E-04          G
                              74.81 1.455E-03 +   2.397E-04Energy duplication
                              87.30 1.301E-03 +   2.910E-04          X

Pb-210    N   9.0161E-04      46.50 9.016E-04 @(  2.223E-04          G

AM-241        2.9514E-05      59.54 2.951E-05  (  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  09-AUG-2007 11:25:07 Page    5
8905696                          Spectrum name: Win00588.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        1.1839E+00     2.771E-01    2.806E-01
K-40    #     4.1721E+00     1.431E+00    1.440E+00
Ac-228        2.0888E+00     4.310E-01    4.380E-01
Pb-212        1.9253E+00     2.318E-01    2.428E-01
CS-137        3.4742E-01     1.024E-01    1.033E-01
Th-234        3.0021E+00     9.441E-01    9.467E-01
Pb-214        1.3176E+00     2.365E-01    2.416E-01
Pb-210 #      2.5128E+00     1.801E+00    1.802E+00
AM-241 #C     8.2258E-02     1.542E-01    1.543E-01

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

WI07-1034 D2 O-S. #7 Free Release 0-6in 080907

& - 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) 1.6632313E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1035 D2 O-S. #8 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 12:39:49 Page 1
8905696 Spectrum name: Win00589.An1

Sample description
WI07- 1035 D2 O-S Area #8 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00589.An1

Acquisition information
Start time: 09-Aug-2007 12:29:38
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: 3.5000E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5000E+02) = 2.8571E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 12:39:49 Page 2
8905696 Spectrum name: Win00589.An1

WI07-1035 D2 O-S. #8 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1109

********** U N I D E N T I F I E D P E A K S U 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	4767.	24577.	40.962	1.70	2.353	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.94	46.66	67.	43.	0.071	74.64	1.109s
AM-241	237.62	59.58	142.	886.	1.476	8.33	0.928
Th-234	254.54	63.81	74.	28.	0.047	112.94	0.357s
Pb-214	298.54	74.81	77.	128.	0.213	26.24	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	288.05	0.422D
Pb-212	307.74	77.11	66.	195.	0.325	18.55	0.919D
Pb-214	307.74	77.11	238.	0.	0.000	141.60	0.285D
Pb-214	347.99	87.17	72.	64.	0.106	56.10	1.018
Th-234	368.72	92.35	64.	54.	0.090	50.03	0.933D
Ac-228	380.72	95.35	56.	1.	0.002	2135.54	0.935D
Ac-228	837.52	209.53	21.	37.	0.062	59.46	0.417s
Pb-212	953.94	238.62	39.	240.	0.400	14.89	1.057D
Pb-214	967.37	241.98	37.	56.	0.094	40.37	1.060D
Ac-228	1079.98	270.13	16.	35.	0.059	57.19	0.372s

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 12:39:49 Page 3
8905696 Spectrum name: Win00589.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.73	295.06	10.	85.	0.142	26.66	1.222
Ac-228	1309.70	327.54	20.	2.	0.003	837.75	0.255s
Ac-228	1352.02	338.12	18.	68.	0.112	35.83	0.689s
Pb-214	1407.61	352.01	13.	106.	0.176	24.20	1.154s
Ac-228	1851.11	462.86	0.	18.	0.030	47.14	0.500s

WI07-1035 D2 O-S. #8 Free Release 0-6in 080907

Bi-214	2437.66	609.45	2.	60.	0.099	27.77	0.416s
CS-137	2647.02	661.77	4.	34.	0.058	44.62	0.546s
Bi-214	3071.19	767.77	1.	3.	0.004	180.28	0.323s
Ac-228	3179.44	794.83	0.	11.	0.018	60.30	0.469s
Ac-228	3645.26	911.23	0.	51.	0.085	28.01	0.765s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	4.	9.	0.014	96.83	1.595D
Ac-228	3876.86	969.11	8.	23.	0.039	53.18	1.598D
Bi-214	4480.20	1119.88	0.	14.	0.023	53.45	0.469s
Bi-214	4953.67	1238.18	0.	12.	0.020	57.74	0.312s
Bi-214	5512.67	1377.86	0.	6.	0.010	81.65	0.625s
K-40	5845.00	1460.90	26.	0.	0.000	0.00	0.000s
Ac-228	6354.00	1588.07	2.	0.	0.000	0.00	0.000s
Bi-214	7060.33	1764.54	0.	9.	0.015	66.67	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9812E-04	609.31	2.767E-04	?(	1.298E-05	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	1.390E-04	-	1.757E-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	0.0000E+00	1460.81	0.000E+00	%	3.423E-04	G
Ac-228	N	5.4561E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	4.538E-04	(	8.617E-05	G
			338.32	7.911E-04	+	1.588E-04	G
			964.60	5.316E-04	(	2.163E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	7.016E-04	?(	3.898E-05	G
			209.28	7.829E-04	+	2.387E-04	G
			270.23	1.099E-03	+	3.315E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 12:39:49 Page 4
8905696 Spectrum name: Win00589.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	3.720E-04	G
		95.35	0.000E+00	%	2.155E-04	X
		327.64	0.000E+00	%	2.913E-04	G
Pb-212	N 5.5087E-04	238.62	5.509E-04	(	2.156E-05	G K
		77.11	7.464E-04	+	8.940E-05	Energy duplication
		74.81	0.000E+00	%	1.036E-04	Energy duplication
CS-137	9.3491E-05	661.66	9.349E-05	?(	9.597E-06	G
Th-234	N 6.1542E-04	92.35	6.730E-04	(	1.476E-04	G
		63.29	5.334E-04	&(	2.415E-04	G
Pb-214	N 3.9136E-04	351.92	3.914E-04	@(	2.107E-05	G K

WI07-1035 D2 O-S. #8 Free Release 0-6in 080907

			295.21	5.325E-04	+	8.954E-05	G
			77.11	0.000E+00	?	1.467E-04	Energy duplication
			241.98	7.799E-04	+	1.956E-04	G
			74.81	1.429E-03	+	2.316E-04	Energy duplication
			87.30	9.214E-04	+	2.467E-04	X
Pb-210	N	8.7439E-04	46.50	8.744E-04	*(	2.470E-04	G
AM-241		1.8237E-03	59.54	1.824E-03	(	3.579E-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 09-AUG-2007 12:39:49 Page 5
8905696 Spectrum name: Win00589.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	#	8.5178E-01	2.365E-01	2.387E-01
K-40	<	9.7797E-01		
Ac-228		1.5589E+00	4.280E-01	4.320E-01
Pb-212		1.5739E+00	2.343E-01	2.416E-01
CS-137	#	2.6712E-01	1.192E-01	1.196E-01
Th-234		1.7584E+00	8.797E-01	8.806E-01
Pb-214		1.1182E+00	2.706E-01	2.738E-01
Pb-210	#	2.4983E+00	1.865E+00	1.866E+00
AM-241		5.2106E+00	4.339E-01	4.749E-01

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

WI07-1035 D2 O-S. #8 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.4837086E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1036 D2 O-S. #9 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:05:53 Page 1
8905696 Spectrum name: Win00590.An1

Sample description
WI07- 1036 D2 O-S Area #9 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00590.An1

Acquisition information
Start time: 09-Aug-2007 12:55:44
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7760E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7760E+02) = 2.6483E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:05:53 Page 2
8905696 Spectrum name: Win00590.An1

WI07-1036 D2 O-S. #9 Free Release 0-6in 080907

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0995

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.64	2.90	4350.	9398.	15.663	2.86	0.854	-	D
15.88	3.96	13968.	8761.	14.602	4.37	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	184.73	46.36	42.	52.	0.086	54.96	0.991
AM-241	237.49	59.55	82.	78.	0.129	52.82	1.052s
Th-234	252.54	63.31	54.	53.	0.088	55.33	0.908s
Pb-214	298.54	74.81	81.	159.	0.265	22.52	0.917D
Pb-212	298.56	74.81	148.	0.	0.000	497.34	0.280D
Pb-212	307.74	77.11	95.	176.	0.293	21.81	0.919D
Pb-214	307.74	77.11	219.	0.	0.000	296.73	0.232D
Pb-214	348.07	87.19	54.	54.	0.090	54.43	0.667s
Th-234	368.72	92.35	67.	64.	0.106	44.07	0.933D
Ac-228	380.72	95.35	25.	12.	0.020	134.39	0.935D
Ac-228	835.41	209.00	11.	49.	0.082	38.13	0.413s
Pb-212	953.94	238.62	19.	289.	0.481	12.51	1.057D
Pb-214	967.37	241.98	41.	57.	0.095	41.62	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:05:53 Page 3
8905696 Spectrum name: Win00590.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.86	270.10	13.	25.	0.041	69.54	0.312s
Pb-214	1179.74	295.06	16.	69.	0.115	32.75	0.594s
Ac-228	1309.96	327.61	15.	28.	0.047	69.44	0.670s
Ac-228	1353.73	338.55	16.	58.	0.097	37.25	1.023
Pb-214	1407.32	351.94	12.	100.	0.168	23.90	0.721s

WI07-1036 D2 O-S. #9 Free Release 0-6in 080907

Ac-228	1852.26	463.15	2.	15.	0.025	59.50	0.480s
Bi-214	2438.13	609.57	3.	69.	0.114	26.55	1.282
CS-137	2647.31	661.84	5.	20.	0.034	58.93	0.472s
Bi-214	3074.58	768.62	0.	12.	0.020	57.74	0.500s
Ac-228	3176.00	793.97	8.	2.	0.003	509.90	0.000s
Ac-228	3646.05	911.43	0.	66.	0.110	24.62	0.915s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	7.	6.	0.009	159.61	1.595D
Ac-228	3876.86	969.11	2.	50.	0.083	29.52	1.598D
Bi-214	4479.64	1119.74	6.	2.	0.004	355.18	0.246s
Bi-214	4951.60	1237.67	0.	11.	0.018	60.30	0.312s
Bi-214	5508.83	1376.90	1.	1.	0.001	366.67	0.223s
K-40	5845.00	1460.90	0.	31.	0.052	35.92	0.770s
Ac-228	6350.00	1587.07	0.	11.	0.018	60.30	0.250s
Bi-214	7060.82	1764.66	0.	14.	0.023	53.45	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.1933E-04	609.31	3.193E-04	(	1.456E-05	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	0.000E+00	%	1.103E-04	G
			1238.11	7.457E-04	+	3.537E-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	%	2.771E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	7.0612E-04	911.07	7.269E-04	?(	1.101E-05	G K
			969.11	9.680E-04	+	2.080E-04	G
			338.32	6.797E-04	(	7.241E-05	G
			964.60	3.489E-04	-	3.471E-04	G
			794.70	0.000E+00	%	2.940E-04	G
			463.00	5.912E-04	?(	9.663E-05	G
			209.28	1.044E-03	+	2.426E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:05:53 Page 4
8905696 Spectrum name: Win00590.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.706E-04	(	1.777E-04	G
		1588.00	1.598E-03	+	7.577E-04	G
		95.35	2.262E-04	-	1.756E-04	X
		327.64	1.154E-03	+	3.986E-04	G
Pb-212	N 6.6599E-04	238.62	6.636E-04	(	1.528E-05	G K
		77.11	6.719E-04	(	5.485E-05	Energy duplication
		74.81	0.000E+00	%	1.147E-04	Energy duplication
CS-137	5.5101E-05	661.66	5.510E-05	?(	9.744E-06	G
Th-234	N 8.8475E-04	92.35	7.970E-04	(	1.509E-04	G
		63.29	1.010E-03	@(	2.077E-04	G

WI07-1036 D2 O-S. #9 Free Release 0-6in 080907

Pb-214	N	3.9265E-04	351.92	3.722E-04	(	2.046E-05	G K
			295.21	4.322E-04	(	3.871E-05	G
			77.11	0.000E+00	%	1.407E-04	Energy duplication
			241.98	7.841E-04	+	2.006E-04	G
			74.81	1.776E-03	+	2.502E-04	Energy duplication
			87.30	7.836E-04	+	2.206E-04	X
Pb-210	N	1.0513E-03	46.50	1.051E-03	(	1.987E-04	G
AM-241		1.5993E-04	59.54	1.599E-04	@(	2.747E-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 09-AUG-2007 13:05:53 Page 5
8905696 Spectrum name: Win00590.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	8.4568E-01	2.246E-01	2.268E-01
K-40 #	3.6146E+00	1.298E+00	1.305E+00
Ac-228	1.8700E+00	4.604E-01	4.657E-01
Pb-212	1.7637E+00	2.207E-01	2.304E-01
CS-137 #	1.4592E-01	8.599E-02	8.617E-02
Th-234	2.3431E+00	8.287E-01	8.305E-01
Pb-214	1.0399E+00	2.108E-01	2.144E-01
Pb-210	2.7842E+00	1.530E+00	1.531E+00
AM-241 #	4.2353E-01	2.237E-01	2.243E-01

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

WI07-1036 D2 O-S. #9 Free Release 0-6in 080907

& - 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) 1.4830620E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1037 D2 O-S. #10 Free Release 0-6in 080907

Sample description
WI07- 1037 D2 O-S Area #10 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00591.An1

Acquisition information

Start time:	09-Aug-2007 13:08:34
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:	3.8040E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.8040E+02) = 2.6288E+03
Detection limit method:	Traditional ORTEC method

WI07-1037 D2 O-S. #10 Free Release 0-6in 080907

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1518

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.68	2.91	6816.	10212.	17.020	3.02	0.854	-	D
15.81	3.94	14424.	9486.	15.810	4.13	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.69	46.85	28.	42.	0.071	51.64	0.838
AM-241	239.79	60.12	70.	32.	0.053	104.02	0.439s
Th-234	253.00	63.43	88.	54.	0.090	71.88	0.530s
Pb-214	298.54	74.81	86.	114.	0.189	29.80	0.917D
Pb-212	298.56	74.81	112.	0.	0.000	256.04	0.689D
Pb-212	307.74	77.11	71.	228.	0.380	16.90	0.919D
Pb-214	307.74	77.11	302.	0.	0.000	80.45	0.229D
Pb-214	348.20	87.22	56.	71.	0.118	43.55	0.414s
Th-234	368.72	92.35	73.	60.	0.101	47.44	0.933D
Ac-228	380.72	95.35	46.	6.	0.010	331.85	0.935D
Ac-228	835.58	209.04	22.	24.	0.040	77.43	0.712s
Pb-212	953.94	238.62	28.	256.	0.426	13.81	1.057D
Pb-214	967.37	241.98	46.	37.	0.061	61.73	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:18:45 Page 3
8905696 Spectrum name: Win00591.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.09	270.40	9.	37.	0.062	43.12	1.154
Pb-214	1180.87	295.34	3.	77.	0.129	24.14	1.781s
Ac-228	1309.96	327.61	13.	18.	0.031	91.99	0.305s
Ac-228	1353.60	338.51	13.	70.	0.116	32.41	0.412s
Pb-214	1407.41	351.96	7.	111.	0.185	21.51	0.446s

WI07-1037 D2 O-S. #10 Free Release 0-6in 080907

Ac-228	1851.51	462.96	3.	26.	0.044	46.51	0.479s
Bi-214	2437.59	609.43	0.	80.	0.133	22.36	1.285
CS-137	2646.89	661.74	5.	16.	0.027	69.15	0.937s
Bi-214	3075.20	768.78	2.	10.	0.017	80.00	0.478s
Ac-228	3178.50	794.59	2.	0.	0.000	0.00	0.292s
Ac-228	3646.07	911.44	0.	59.	0.098	26.04	0.875s
Bi-214	3735.50	933.78	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	2.	9.	0.015	83.09	1.595D
Ac-228	3876.86	969.11	0.	24.	0.040	40.67	1.598D
Bi-214	4483.86	1120.79	0.	14.	0.023	53.45	0.281s
Bi-214	4950.29	1237.34	0.	15.	0.025	51.64	0.500s
Bi-214	5514.50	1378.32	0.	7.	0.012	75.59	1.499
K-40	5845.49	1461.02	0.	39.	0.065	32.03	0.812s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.25	1764.77	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	3.7715E-04	609.31	3.720E-04	(	4.650E-06	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	1.017E-03	+	4.068E-04	G
			768.36	5.211E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	+	4.625E-04	G
			934.06	2.915E-04	-	2.915E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	7.0202E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	4.695E-04	-	1.451E-04	G
			338.32	8.165E-04	(	6.666E-05	G
			964.60	5.407E-04	-	3.220E-04	G
			794.70	0.000E+00	?	1.506E-04	G
			463.00	1.020E-03	+	3.170E-04	G
			209.28	5.078E-04	-	2.138E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:18:45 Page 4
8905696 Spectrum name: Win00591.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.166E-03	+	3.157E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.063E-04	X
		327.64	7.466E-04	?(	2.263E-04	G
Pb-212 N	5.8752E-04	238.62	5.875E-04	(	1.838E-05	G K
		77.11	8.719E-04	+	9.555E-05	Energy duplication
		74.81	0.000E+00	%	1.002E-04	Energy duplication
CS-137	4.4262E-05	661.66	4.426E-05	?(	9.744E-06	G
Th-234 N	8.6747E-04	92.35	7.542E-04	(	1.567E-04	G
		63.29	1.029E-03	$(	2.624E-04	G

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                WI07-1037   D2 O-S. #10  Free Release 0-6in   080907
Pb-214    N   4.4464E-04    351.92 4.111E-04  (  1.583E-05          G K
                            295.21 4.844E-04 *(  1.793E-05          G
                             77.11 0.000E+00 ?   1.645E-04Energy duplication
                            241.98 5.092E-04  (  1.400E-04          G
                             74.81 1.268E-03 +   2.289E-04Energy duplication
                             87.30 1.030E-03 +   2.386E-04          X

Pb-210    N   8.6759E-04     46.50 8.676E-04  (  1.619E-04          G

AM-241        6.5892E-05     59.54 6.589E-05 &(  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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  09-AUG-2007 13:18:45 Page    5
8905696                          Spectrum name: Win00591.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        9.9145E-01     2.217E-01    2.248E-01
K-40    #     4.5139E+00     1.446E+00    1.455E+00
Ac-228        1.8455E+00     4.805E-01    4.855E-01
Pb-212        1.5445E+00     2.133E-01    2.210E-01
CS-137  #     1.1636E-01     8.046E-02    8.058E-02
Th-234        2.2804E+00     9.820E-01    9.834E-01
Pb-214        1.1689E+00     2.514E-01    2.552E-01
Pb-210        2.2807E+00     1.178E+00    1.179E+00
AM-241  #     1.7322E-01     1.802E-01    1.803E-01

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

WI07-1037 D2 O-S. #10 Free Release 0-6in 080907

& - 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) 1.4914899E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1038 D2 O-S. #11 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:40:41 Page 1
8905696 Spectrum name: Win00592.An1

Sample description
WI07- 1038 D2 O-S Area #11 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00592.An1

Acquisition information
Start time: 09-Aug-2007 13:30:30
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4880E+02) = 2.8670E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:40:41 Page 2
8905696 Spectrum name: Win00592.An1

WI07-1038 D2 O-S. #11 Free Release 0-6in 080907

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

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

Corrections

	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1619

********** U N I D E N T I F I E D P E A K S U 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	6858.	9977.	16.628	3.09	0.854	-	D
15.87	3.96	13874.	9787.	16.312	3.96	0.855	-	D
2334.48	583.66	0.	81.	0.135	22.22	0.981	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	184.21	46.23	23.	65.	0.109	37.77	1.136s
AM-241	239.10	59.95	51.	46.	0.076	64.48	0.696
Th-234	252.63	63.33	76.	62.	0.102	61.25	0.929s
Pb-214	298.54	74.81	80.	135.	0.225	25.42	0.917D
Pb-212	298.56	74.81	179.	0.	0.000	947.25	0.426D
Pb-212	307.74	77.11	85.	161.	0.268	22.58	0.919D
Pb-214	307.74	77.11	275.	0.	0.000	85.61	0.311D
Pb-214	348.04	87.18	54.	69.	0.116	45.45	0.462s
Th-234	368.72	92.35	78.	57.	0.096	50.74	0.933D
Ac-228	380.72	95.35	55.	3.	0.006	641.89	0.935D
Ac-228	836.14	209.18	32.	38.	0.062	71.40	1.078
Pb-212	953.94	238.62	30.	245.	0.408	14.25	1.057D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:40:41 Page 3
8905696
Spectrum name: Win00592.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	34.	30.	0.050	65.64	1.060D
Ac-228	1079.17	269.92	16.	27.	0.045	71.05	0.355s
Pb-214	1179.30	294.95	18.	63.	0.104	38.86	1.489s
Ac-228	1310.14	327.65	12.	26.	0.043	70.62	0.491s
Ac-228	1354.38	338.71	6.	50.	0.083	34.41	0.919s

WI07-1038 D2 O-S. #11 Free Release 0-6in 080907

* - 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) 1.6541391E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1039 D2 O-S. #12 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:58:56 Page 1
8905696 Spectrum name: Win00593.An1

Sample description
WI07- 1039 D2 O-S Area #12 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00593.An1

Acquisition information
Start time: 09-Aug-2007 13:48:46
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7460E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7460E+02) = 2.6695E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:58:56 Page 2
8905696 Spectrum name: Win00593.An1

WI07-1039 D2 O-S. #12 Free Release 0-6in 080907

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1309

********** U N I D E N T I F I E D P E A K S U 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	4602.	22680.	37.800	1.79	2.243	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	183.82	46.14	37.	70.	0.117	43.05	0.791s
AM-241	239.49	60.05	42.	18.	0.030	131.41	0.451s
Th-234	252.19	63.22	65.	75.	0.125	46.38	0.859s
Pb-214	298.54	74.81	69.	136.	0.227	24.24	0.917D
Pb-212	298.56	74.81	146.	0.	0.000	275.58	0.270D
Pb-212	307.74	77.11	74.	173.	0.288	20.68	0.919D
Pb-214	307.74	77.11	300.	0.	0.000	69.19	0.502D
Pb-214	348.22	87.23	54.	67.	0.112	45.17	0.717
Th-234	368.72	92.35	66.	50.	0.084	53.40	0.933D
Ac-228	380.72	95.35	49.	11.	0.019	187.75	0.935D
Ac-228	835.56	209.04	24.	41.	0.068	57.10	0.429s
Pb-212	953.94	238.62	29.	262.	0.436	13.67	1.057D
Pb-214	967.37	241.98	38.	53.	0.088	43.17	1.060D
Ac-228	1080.51	270.26	21.	34.	0.057	63.90	0.364s

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 13:58:56 Page 3
8905696 Spectrum name: Win00593.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.47	295.49	9.	76.	0.127	27.85	1.406s
Ac-228	1307.90	327.09	14.	16.	0.026	105.79	0.263s
Ac-228	1353.29	338.44	8.	67.	0.112	29.30	1.015s
Pb-214	1407.49	351.98	17.	90.	0.150	27.68	0.893
Ac-228	1851.80	463.03	0.	20.	0.033	44.72	0.625s

```
                WI07-1039   D2 O-S. #12  Free Release 0-6in   080907
                           295.21 4.761E-04 +   8.487E-05         G
                            77.11 0.000E+00 ?   1.641E-04Energy duplication
                           241.98 7.284E-04 +   1.936E-04         G
                            74.81 1.523E-03 +   2.316E-04Energy duplication
                            87.30 9.722E-04 +   2.331E-04         X

Pb-210   N   1.4358E-03     46.50 1.436E-03 *(  1.853E-04         G

AM-241       3.6721E-05     59.54 3.672E-05 &(  1.997E-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  09-AUG-2007 13:58:56 Page    5
8905696                                Spectrum name: Win00593.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       8.2983E-01    2.457E-01    2.477E-01
K-40   #     2.7033E+00    1.127E+00    1.132E+00
Ac-228       1.9899E+00    4.936E-01    4.992E-01
Pb-212       1.6523E+00    2.048E-01    2.140E-01
CS-137       3.4000E-01    9.919E-02    1.000E-01
Th-234       1.6808E+00    8.975E-01    8.984E-01
Pb-214       8.8984E-01    2.463E-01    2.486E-01
Pb-210 #     3.8328E+00    1.650E+00    1.653E+00
AM-241 #     9.8028E-02    1.288E-01    1.289E-01

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

WI07-1039 D2 O-S. #12 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.4016779E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1040 D2 O-S. #13 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:42:54 Page 1
8905696 Spectrum name: Win00594.An1

Sample description
WI07- 1040 D2 O-S Area #13 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00594.An1

Acquisition information

Start time:	09-Aug-2007 15:32:44
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:	3.6770E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.6770E+02) = 2.7196E+03
Detection limit method:	Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:42:54 Page 2
8905696 Spectrum name: Win00594.An1

WI07-1040 D2 O-S. #13 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1432

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.76	2.90	3276.	12293.	20.488	2.23	0.854	-	D
17.98	4.46	16225.	9605.	16.008	4.27	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.68	46.60	42.	46.	0.078	60.10	0.972s
AM-241	236.23	59.23	63.	28.	0.047	110.19	0.936
Th-234	251.58	63.07	88.	53.	0.089	74.28	0.266s
Pb-214	298.54	74.81	81.	105.	0.174	31.26	0.917D
Pb-212	298.56	74.81	96.	0.	0.000	296.65	0.392D
Pb-212	307.74	77.11	63.	200.	0.333	18.05	0.919D
Pb-214	307.74	77.11	280.	0.	0.000	73.50	0.265D
Pb-214	347.44	87.03	62.	47.	0.078	64.95	0.377s
Th-234	368.72	92.35	47.	84.	0.140	31.65	0.933D
Ac-228	380.72	95.35	43.	8.	0.013	244.87	0.936D
Ac-228	836.57	209.29	46.	45.	0.075	72.67	1.386s
Pb-212	953.94	238.62	25.	251.	0.419	13.79	1.057D
Pb-214	967.37	241.98	41.	28.	0.047	73.90	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:42:54 Page 3
8905696 Spectrum name: Win00594.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.20	270.18	14.	28.	0.047	68.14	0.779s
Pb-214	1179.81	295.08	10.	63.	0.105	32.74	0.905
Ac-228	1309.29	327.44	11.	37.	0.062	50.80	0.323s
Ac-228	1351.99	338.11	9.	70.	0.117	29.42	0.917
Pb-214	1407.36	351.95	0.	107.	0.178	19.33	1.027s

WI07-1040 D2 O-S. #13 Free Release 0-6in 080907

Ac-228	1852.00	463.08	9.	3.	0.004	358.82	0.000s
Bi-214	2437.65	609.45	0.	80.	0.133	22.36	1.288
CS-137	2645.70	661.44	4.	22.	0.037	56.24	0.628s
Bi-214	3071.80	767.93	0.	5.	0.008	89.44	0.375s
Ac-228	3181.36	795.31	0.	11.	0.018	60.30	0.375s
Ac-228	3646.22	911.47	0.	51.	0.085	28.01	0.783s
Bi-214	3734.00	933.41	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	2.	8.	0.013	90.33	1.595D
Ac-228	3876.86	969.11	0.	29.	0.048	37.21	1.598D
Bi-214	4480.93	1120.06	0.	17.	0.028	48.51	1.000s
Bi-214	4953.00	1238.02	1.	1.	0.002	316.23	0.000s
Bi-214	5515.33	1378.53	0.	8.	0.013	70.71	0.250s
K-40	5846.19	1461.19	0.	22.	0.037	42.64	0.916s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.17	1764.75	0.	9.	0.015	66.67	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7034E-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	0.000E+00	%	1.737E-04	G
			768.36	2.606E-04	-	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	+	4.902E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	9.6861E-04	1460.81	9.686E-04	?(	4.403E-05	G
Ac-228	N	5.6070E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	5.610E-04	(	1.942E-05	G
			338.32	8.204E-04	+	1.533E-04	G
			964.60	4.784E-04	(	1.654E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	0.000E+00	%	2.114E-04	G
			209.28	9.522E-04	+	2.962E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:42:54 Page 4
8905696 Spectrum name: Win00594.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.748E-04	+	3.024E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.044E-04	X
		327.64	1.507E-03	+	4.199E-04	G
Pb-212	N 5.7796E-04	238.62	5.780E-04	(	1.728E-05	G K
		77.11	7.658E-04	+	8.974E-05	Energy duplication
		74.81	0.000E+00	%	9.297E-05	Energy duplication
CS-137	6.0521E-05	661.66	6.052E-05	?(	8.817E-06	G
Th-234	N 1.0354E-03	92.35	1.051E-03	(	1.270E-04	G
		63.29	1.013E-03	(	2.622E-04	G

```
                WI07-1040   D2 O-S. #13  Free Release 0-6in   080907
Pb-214    N   3.9528E-04    351.92 3.963E-04  (  3.704E-06          G K
                            295.21 3.947E-04  (  3.132E-05          G
                             77.11 0.000E+00 ?   1.588E-04Energy duplication
                            241.98 3.918E-04  (  1.318E-04          G
                             74.81 1.168E-03 +   2.209E-04Energy duplication
                             87.30 6.820E-04 +   2.216E-04          X

Pb-210    N   9.4924E-04     46.50 9.492E-04 *(  1.987E-04          G

AM-241        5.7656E-05     59.54 5.766E-05 ?(  2.417E-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  09-AUG-2007 15:42:54 Page    5
8905696                          Spectrum name: Win00594.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        1.0072E+00     2.252E-01    2.284E-01
K-40    #     2.6342E+00     1.123E+00    1.128E+00
Ac-228        1.5249E+00     4.271E-01    4.309E-01
Pb-212        1.5718E+00     2.167E-01    2.246E-01
CS-137  #     1.6459E-01     9.257E-02    9.279E-02
Th-234        2.8158E+00     8.912E-01    8.936E-01
Pb-214        1.0750E+00     2.078E-01    2.117E-01
Pb-210  #     2.5816E+00     1.552E+00    1.553E+00
AM-241  #     1.5680E-01     1.728E-01    1.729E-01

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

WI07-1040 D2 O-S. #13 Free Release 0-6in 080907

& - 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) 1.3531859E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-1041 D2 O-S. #14 Free Release 0-6in 080907

Sample description
WI07- 1041 D2 O-S Area #14 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00596.An1

Acquisition information
Start time: 09-Aug-2007 15:16:33
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: 4.1880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.1880E+02) = 2.3878E+03
Detection limit method: Traditional ORTEC method

WI07-1041 D2 O-S. #14 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0901

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.14	3.36	6150.	11218.	18.696	2.73	0.854	-	D
17.98	4.81	9512.	8457.	14.095	3.92	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	185.17	46.47	35.	46.	0.077	56.85	1.037s
AM-241	232.83	58.38	45.	5.	0.008	433.59	0.443s
Th-234	252.88	63.40	72.	50.	0.083	64.15	0.885
Pb-214	298.54	74.81	81.	136.	0.227	25.31	0.917D
Pb-212	298.56	74.81	128.	0.	0.000	806.23	0.571D
Pb-212	307.74	77.11	82.	194.	0.323	19.53	0.919D
Pb-214	307.74	77.11	193.	0.	0.000	1279.06	0.143D
Pb-214	347.45	87.03	72.	72.	0.120	50.92	0.697s
Th-234	368.72	92.35	71.	74.	0.123	39.83	0.933D
Ac-228	380.72	95.35	49.	7.	0.011	306.85	0.935D
Ac-228	836.20	209.20	15.	44.	0.073	44.65	0.550s
Pb-212	953.94	238.62	28.	239.	0.398	14.38	1.057D
Pb-214	967.37	241.98	36.	42.	0.070	50.45	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:26:43 Page 3
8905696 Spectrum name: Win00596.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.73	270.31	18.	26.	0.044	70.70	0.462s
Pb-214	1179.99	295.12	23.	69.	0.115	38.91	1.036
Ac-228	1308.46	327.23	11.	2.	0.004	447.21	0.215s
Ac-228	1353.59	338.51	17.	58.	0.097	39.18	0.556s
Pb-214	1406.94	351.85	11.	98.	0.163	24.94	1.013

WI07-1041 D2 O-S. #14 Free Release 0-6in 080907

Ac-228	1851.48	462.95	5.	20.	0.033	57.74	0.752s
Bi-214	2437.35	609.37	0.	74.	0.123	23.25	0.406s
CS-137	2649.14	662.30	0.	13.	0.022	55.47	0.250s
Bi-214	3066.33	766.56	0.	10.	0.017	63.25	0.375s
Ac-228	3177.75	794.40	0.	8.	0.013	70.71	0.625s
Ac-228	3645.89	911.39	0.	72.	0.120	23.57	1.283
Bi-214	3737.29	934.23	0.	8.	0.013	70.71	0.375s
Ac-228	3858.81	964.60	0.	16.	0.026	52.06	1.595D
Ac-228	3876.86	969.11	2.	36.	0.059	35.82	1.598D
Bi-214	4483.19	1120.62	0.	16.	0.027	50.00	0.812s
Bi-214	4948.56	1236.91	3.	0.	0.001	512.08	0.204s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.64	1461.06	0.	56.	0.093	26.73	0.458s
Ac-228	6354.00	1588.07	0.	7.	0.012	75.59	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	3.5525E-04	609.31	3.441E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	0.000E+00	&	2.034E-04	G
			768.36	5.211E-04	&	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	2.4656E-03	1460.81	2.466E-03	?(	4.403E-05	G
Ac-228	N	7.7371E-04	911.07	7.929E-04	(	1.101E-05	G K
			969.11	6.898E-04	(	5.401E-05	G
			338.32	6.836E-04	(	7.378E-05	G
			964.60	9.612E-04	(	9.582E-05	G
			794.70	4.704E-04	-	2.664E-04	G
			463.00	7.795E-04	?(	1.443E-04	G
			209.28	9.310E-04	(	1.270E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:26:43 Page 4
8905696 Spectrum name: Win00596.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.279E-04	(	2.011E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	2.137E-04	X
		327.64	0.000E+00	%	2.290E-04	G
Pb-212	N 5.4907E-04	238.62	5.491E-04	(	1.841E-05	G K
		77.11	7.420E-04	+	9.188E-05	Energy duplication
		74.81	0.000E+00	%	1.069E-04	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 9.3011E-04	92.35	9.210E-04	(	1.552E-04	G
		63.29	9.430E-04	$(	2.375E-04	G

```
                    WI07-1041   D2 O-S. #14  Free Release 0-6in   080907
Pb-214    N   3.8655E-04     351.92 3.630E-04  (  1.932E-05          G K
                             295.21 4.322E-04  (  4.573E-05          G
                              77.11 0.000E+00 %   1.324E-04Energy duplication
                             241.98 5.846E-04 +   1.797E-04          G
                              74.81 1.521E-03 +   2.381E-04Energy duplication
                              87.30 1.045E-03 +   2.536E-04          X

Pb-210    N   9.4584E-04      46.50 9.458E-04 *(  1.805E-04          G

AM-241        0.0000E+00      59.54 0.000E+00 &   2.165E-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  09-AUG-2007 15:26:43 Page    5
8905696                          Spectrum name: Win00596.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        8.4825E-01    1.972E-01    1.998E-01
K-40    #     5.8872E+00    1.573E+00    1.589E+00
Ac-228        1.8474E+00    3.381E-01    3.451E-01
Pb-212        1.3110E+00    1.885E-01    1.948E-01
CS-137  #     8.4118E-02    4.666E-02    4.677E-02
Th-234        2.2209E+00    8.385E-01    8.401E-01
Pb-214        9.2298E-01    2.133E-01    2.161E-01
Pb-210  #     2.2585E+00    1.284E+00    1.285E+00
AM-241   <    5.1687E-02

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

WI07-1041 D2 O-S. #14 Free Release 0-6in 080907

& - 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) 1.5380384E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1042 D2 O-S. #15 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:57:10 Page 1
8905696 Spectrum name: Win00596.An1

Sample description
WI07- 1042 D2 O-S Area #15 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00596.An1

Acquisition information
Start time: 09-Aug-2007 15:46:58
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: 4.0380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0380E+02) = 2.4765E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:57:10 Page 2
8905696 Spectrum name: Win00596.An1

WI07-1042 D2 O-S. #15 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1166

********** U N I D E N T I F I E D P E A K S U 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	2.92	5282.	12485.	20.809	2.43	0.854	-	D
17.93	4.45	15788.	8570.	14.283	4.68	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	185.85	46.64	521.	66.	0.111	118.38	0.491s
AM-241	234.43	58.78	362.	56.	0.094	126.12	0.411s
Th-234	253.04	63.44	323.	63.	0.105	104.32	0.615s
Pb-214	298.54	74.81	251.	116.	0.193	42.83	0.917D
Pb-212	298.56	74.81	191.	0.	0.000	982.34	0.423D
Pb-212	307.74	77.11	224.	188.	0.313	26.89	0.919D
Pb-214	307.74	77.11	260.	0.	0.000	699.09	0.200D
Pb-214	347.76	87.11	127.	60.	0.101	66.14	1.115s
Th-234	368.72	92.35	128.	88.	0.146	42.39	0.933D
Ac-228	380.72	95.35	101.	2.	0.003	1428.82	0.936D
Ac-228	837.20	209.45	28.	36.	0.059	64.67	0.546s
Pb-212	953.94	238.62	22.	269.	0.448	13.18	1.057D
Pb-214	967.37	241.98	27.	49.	0.082	40.91	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:57:10 Page 3
8905696 Spectrum name: Win00596.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.44	270.24	19.	26.	0.044	73.94	0.821
Pb-214	1181.37	295.47	12.	67.	0.112	33.64	1.210s
Ac-228	1310.60	327.77	0.	28.	0.047	37.80	0.337s
Ac-228	1353.17	338.41	15.	68.	0.114	34.23	1.227
Pb-214	1407.53	351.99	11.	101.	0.169	23.01	1.012

WI07-1042 D2 O-S. #15 Free Release 0-6in 080907

Ac-228	1849.78	462.52	7.	19.	0.032	71.84	0.344s
Bi-214	2437.87	609.50	6.	69.	0.114	28.40	1.150
CS-137	2646.13	661.55	0.	30.	0.050	36.51	1.208
Bi-214	3065.88	766.45	6.	2.	0.003	447.21	0.228s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3645.73	911.35	0.	73.	0.122	23.41	1.050s
Bi-214	3736.00	933.91	0.	6.	0.010	81.65	0.375s
Ac-228	3858.81	964.60	0.	6.	0.010	81.48	1.595D
Ac-228	3876.86	969.11	5.	30.	0.050	41.69	1.598D
Bi-214	4482.00	1120.33	0.	27.	0.045	38.49	0.750s
Bi-214	4952.00	1237.77	1.	0.	0.000	0.00	0.083s
Bi-214	5509.33	1377.03	0.	5.	0.008	89.44	0.375s
K-40	5845.77	1461.09	0.	39.	0.065	32.03	1.624
Ac-228	6355.50	1588.45	0.	3.	0.005	115.47	0.500s
Bi-214	7060.25	1764.52	0.	13.	0.022	55.47	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	3.1933E-04	609.31	3.193E-04	(	1.904E-05	G K
			1764.49	4.626E-04	+	2.001E-04	G
			1120.29	6.570E-04	+	1.914E-04	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	0.000E+00	&	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-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	7.9576E-04	911.07	8.039E-04	(	1.101E-05	G K
			969.11	5.873E-04	-	1.725E-04	G
			338.32	8.008E-04	(	6.960E-05	G
			964.60	3.719E-04	-	2.473E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	7.536E-04	?(	1.631E-04	G
			209.28	7.512E-04	(	1.679E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 15:57:10 Page 4
8905696 Spectrum name: Win00596.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.227E-04	(	2.072E-04	G
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	0.000E+00	%	2.863E-04	X
		327.64	1.140E-03	+	3.258E-04	G
Pb-212	N 6.1735E-04	238.62	6.174E-04	(	1.656E-05	G K
		77.11	7.182E-04	+	1.118E-04	Energy duplication
		74.81	0.000E+00	%	1.299E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 1.1383E-03	92.35	1.093E-03	(	2.063E-04	G
		63.29	1.203E-03	@(	4.937E-04	G

```
                 WI07-1042   D2 O-S. #15  Free Release 0-6in   080907
Pb-214    N   3.9002E-04    351.92 3.747E-04  (  1.919E-05          G K
                            295.21 4.197E-04 *(  3.398E-05          G
                             77.11 0.000E+00 %   1.530E-04Energy duplication
                            241.98 6.844E-04 +   1.775E-04          G
                             74.81 1.295E-03 +   3.080E-04Energy duplication
                             87.30 8.755E-04 +   2.880E-04          X

Pb-210    N   1.3541E-03     46.50 1.354E-03  (  6.690E-04          G

AM-241        1.1600E-04     59.54 1.160E-04 &(  5.642E-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  09-AUG-2007 15:57:10 Page    5
8905696                          Spectrum name: Win00596.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        7.9081E-01    2.246E-01    2.265E-01
K-40    #     4.2523E+00    1.362E+00    1.371E+00
Ac-228        1.9707E+00    4.613E-01    4.672E-01
Pb-212        1.5289E+00    2.015E-01    2.095E-01
CS-137  #     2.0133E-01    7.352E-02    7.392E-02
Th-234        2.8189E+00    1.195E+00    1.197E+00
Pb-214        9.6586E-01    1.968E-01    2.001E-01
Pb-210        3.3534E+00    3.970E+00    3.971E+00
AM-241        2.8727E-01    3.623E-01    3.624E-01

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

WI07-1042 D2 O-S. #15 Free Release 0-6in 080907

& - 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) 1.6169439E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1043 D2 O-S. #16 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 16:51:39 Page 1
8905696 Spectrum name: Win00597.An1

Sample description
WI07- 1043 D2 O-S Area #16 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00597.An1

Acquisition information
Start time: 09-Aug-2007 16:41:29
Live time: 600
Real time: 602
Dead time: 0.26 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.0210E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0210E+02) = 2.4869E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 16:51:39 Page 2
8905696 Spectrum name: Win00597.An1

WI07-1043 D2 O-S. #16 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1695

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.67	3.21	1089.	1720.	2.867	7.26	0.854	-	D
18.49	4.66	3077.	1146.	1.910	14.91	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	183.01	45.93	61.	29.	0.049	103.75	0.421s
AM-241	236.91	59.40	58.	18.	0.030	153.96	0.563s
Th-234	254.37	63.77	91.	34.	0.057	108.04	0.446s
Pb-214	298.54	74.81	166.	57.	0.095	68.91	0.917D
Pb-212	298.56	74.81	108.	0.	0.000	140.25	0.222D
Pb-212	307.74	77.11	176.	52.	0.087	77.41	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	156.97	0.286D
Pb-214	347.24	86.98	87.	45.	0.076	78.89	0.404s
Th-234	368.72	92.35	65.	18.	0.029	137.63	0.933D
Ac-228	380.72	95.35	54.	7.	0.012	306.52	0.935D
Ac-228	834.74	208.83	15.	34.	0.057	57.03	0.724s
Pb-212	953.94	238.62	109.	118.	0.197	31.04	1.057D
Pb-214	967.37	241.98	47.	22.	0.037	96.46	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 16:51:39 Page 3
8905696 Spectrum name: Win00597.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.13	5.	0.	0.000	0.00	0.000s
Pb-214	1182.83	295.83	29.	36.	0.059	73.66	0.465s
Ac-228	1310.58	327.76	9.	18.	0.029	79.07	0.330s
Ac-228	1352.75	338.30	21.	53.	0.089	47.70	1.130s
Pb-214	1407.27	351.93	30.	93.	0.154	34.43	0.872s

WI07-1043 D2 O-S. #16 Free Release 0-6in 080907

Ac-228	1852.30	463.16	0.	33.	0.055	34.82	0.333s
Bi-214	2437.37	609.38	0.	78.	0.130	22.65	0.875s
CS-137	2646.60	661.67	2.	0.	0.001	331.66	0.350s
Bi-214	3075.00	768.73	7.	1.	0.002	986.58	0.000s
Ac-228	3171.00	792.72	0.	19.	0.032	45.88	0.250s
Ac-228	3645.20	911.22	10.	36.	0.059	51.25	0.566s
Bi-214	3737.80	934.36	0.	11.	0.018	60.30	0.500s
Ac-228	3858.81	964.60	12.	6.	0.010	190.87	1.595D
Ac-228	3876.86	969.11	18.	3.	0.004	493.47	1.598D
Bi-214	4480.00	1119.83	2.	2.	0.002	258.20	0.100s
Bi-214	4953.00	1238.02	0.	4.	0.007	100.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5843.92	1460.63	6.	2.	0.003	374.17	0.317s
Ac-228	6354.75	1588.26	0.	4.	0.007	100.00	0.312s
Bi-214	7060.33	1764.54	0.	15.	0.025	51.64	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	3.6273E-04	609.31	3.627E-04	*(	4.650E-06	G K
			1764.49	5.338E-04	+	2.135E-04	G
			1120.29	0.000E+00	%	7.300E-05	G
			1238.11	2.712E-04	-	2.286E-04	G
			768.36	0.000E+00	%	2.361E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	1.069E-03	+	5.069E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.995E-04	G
Ac-228	N	4.9248E-04	911.07	3.910E-04	@(	5.627E-05	G K
			969.11	0.000E+00	%	1.359E-04	G
			338.32	6.231E-04	*(	8.174E-05	G
			964.60	3.557E-04	(	3.378E-04	G
			794.70	1.117E-03	&	3.930E-04	G
			463.00	1.286E-03	+	3.367E-04	G
			209.28	7.194E-04	@(	1.270E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 16:51:39 Page 4
8905696 Spectrum name: Win00597.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	1.156E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	2.229E-04	X
		327.64	7.194E-04	(	1.975E-04	G
Pb-212	N 2.7136E-04	238.62	2.714E-04	(	3.509E-05	G K
		77.11	1.988E-04	-	8.369E-05	Energy duplication
		74.81	0.000E+00	?	9.849E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	6.942E-06	G
Th-234	N 3.9695E-04	92.35	2.208E-04	(	1.490E-04	G
		63.29	6.477E-04	?(	2.667E-04	G

WI07-1043 D2 O-S. #16 Free Release 0-6in 080907

Pb-214	N	3.3737E-04	351.92	3.432E-04	*(	3.076E-05		G K
			295.21	2.234E-04	&	7.462E-05		G
			77.11	0.000E+00		1.147E-04	Energy duplication	
			241.98	3.084E-04	(	1.407E-04		G
			74.81	6.387E-04	+	2.413E-04	Energy duplication	
			87.30	6.578E-04	+	2.431E-04		X
Pb-210	N	5.9880E-04	46.50	5.988E-04	&(	2.353E-04		G
AM-241		3.7064E-05	59.54	3.706E-05	(	2.323E-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 09-AUG-2007 16:51:39 Page 5
8905696 Spectrum name: Win00597.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	#	9.0210E-01	2.043E-01	2.071E-01
K-40	<	4.9613E-01		
Ac-228		1.2248E+00	5.035E-01	5.056E-01
Pb-212		6.7486E-01	2.095E-01	2.110E-01
CS-137	<	1.7263E-02		
Th-234	C	9.8720E-01	8.636E-01	8.639E-01
Pb-214		8.3902E-01	2.889E-01	2.906E-01
Pb-210		1.4892E+00	1.545E+00	1.545E+00
AM-241		9.2177E-02	1.419E-01	1.420E-01

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

WI07-1043 D2 O-S. #16 Free Release 0-6in 080907

& - 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) 6.2093186E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:05:10 Page 1
8905696 Spectrum name: Win00598.An1

Sample description
WI07- 1044 D2 O-S Area #17 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00598.An1

Acquisition information
Start time: 09-Aug-2007 16:55:00
Live time: 600
Real time: 601
Dead time: 0.20 %
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: 4.0550E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0550E+02) = 2.4661E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:05:10 Page 2
8905696 Spectrum name: Win00598.An1

WI07-1044 D2 O-S. #17 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0732

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
18.11	4.71	567.	707.	1.179	15.67	1.946	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	186.20	46.73	37.	53.	0.088	52.28	0.397s
AM-241	236.24	59.24	53.	17.	0.028	153.76	0.230s
Th-234	252.51	63.30	110.	40.	0.068	106.38	0.874
Pb-214	298.54	74.81	152.	61.	0.102	62.27	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	666.93	0.229D
Pb-212	307.74	77.11	192.	73.	0.122	58.56	0.919D
Pb-214	307.74	77.11	165.	0.	0.000	184.75	0.481D
Pb-214	348.94	87.41	100.	30.	0.050	129.96	0.442s
Th-234	368.72	92.35	73.	23.	0.039	111.31	0.933D
Ac-228	380.72	95.35	53.	10.	0.017	208.52	0.935D
Ac-228	831.50	208.02	28.	10.	0.016	202.40	0.250s
Pb-212	953.94	238.62	100.	157.	0.262	24.01	1.057D
Pb-214	967.37	241.98	42.	31.	0.051	69.70	1.060D
Ac-228	1080.31	270.21	22.	35.	0.058	67.05	0.608s

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:05:10 Page 3
8905696 Spectrum name: Win00598.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.09	295.15	17.	68.	0.114	36.37	0.566s
Ac-228	1312.23	328.17	12.	22.	0.036	75.14	0.436s
Ac-228	1352.15	338.15	12.	71.	0.118	32.24	0.573s
Pb-214	1406.81	351.81	21.	100.	0.167	27.89	1.428s
Ac-228	1853.22	463.38	6.	18.	0.031	69.04	1.158s

WI07-1044 D2 O-S. #17 Free Release 0-6in 080907

Bi-214	2438.32	609.61	0.	73.	0.122	23.41	0.813s
CS-137	2648.00	662.02	7.	2.	0.003	503.32	0.000s
Bi-214	3077.60	769.38	0.	11.	0.018	60.30	0.312s
Ac-228	3176.64	794.13	0.	16.	0.027	50.00	0.500s
Ac-228	3645.56	911.31	0.	62.	0.103	25.40	0.737s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3857.38	964.24	6.	0.	0.000	0.00	1.595
Ac-228	3878.90	969.62	9.	4.	0.006	284.84	0.262s
Bi-214	4482.35	1120.41	0.	28.	0.047	37.80	0.417s
Bi-214	4955.86	1238.73	5.	3.	0.005	269.43	0.204s
Bi-214	5511.50	1377.57	0.	7.	0.012	75.59	0.312s
K-40	5845.75	1461.08	0.	55.	0.092	26.97	0.916s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7064.00	1765.46	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3948E-04	609.31	3.395E-04	*(	4.650E-06	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	6.813E-04	+	1.947E-04	G
			1238.11	0.000E+00	%	3.072E-04	G
			768.36	5.732E-04	&	2.719E-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	?	9.716E-05	G
K-40	N	2.4215E-03	1460.81	2.422E-03	(	4.403E-05	G
Ac-228	N	7.5386E-04	911.07	6.828E-04	*(	1.101E-05	G K
			969.11	0.000E+00	%	1.092E-04	G
			338.32	8.321E-04	*(	6.357E-05	G
			964.60	0.000E+00	%	2.481E-04	G
			794.70	9.408E-04	?(	5.880E-05	G
			463.00	7.146E-04	*(	1.521E-04	G
			209.28	0.000E+00	&	1.953E-04	G
			270.23	1.093E-03	+	3.496E-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	%	2.261E-04	X
		327.64	8.756E-04	?(	2.250E-04	G
Pb-212	N 3.6148E-04	238.62	3.615E-04	(	3.362E-05	G K
		77.11	2.795E-04	-	9.007E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.293E-05	G
Th-234	N 4.8937E-04	92.35	2.912E-04	(	1.568E-04	G
		63.29	7.716E-04	$(	2.929E-04	G
Pb-214	N 3.9701E-04	351.92	3.704E-04	*(	2.593E-05	G K

```
                WI07-1044   D2 O-S. #17  Free Release 0-6in   080907
                           295.21 4.281E-04 *(  3.943E-05          G
                            77.11 0.000E+00 &   1.225E-04Energy duplication
                           241.98 4.258E-04  (  1.341E-04          G
                            74.81 6.845E-04 +   2.360E-04Energy duplication
                            87.30 4.353E-04  (  2.126E-04          X

Pb-210    N   1.0751E-03     46.50 1.075E-03 *(  1.869E-04          G

AM-241        3.4662E-05     59.54 3.466E-05 ?(  2.229E-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        8.3719E-01    1.960E-01    1.985E-01
K-40          5.9717E+00    1.610E+00    1.626E+00
Ac-228        1.8591E+00    4.492E-01    4.546E-01
Pb-212        8.9145E-01    2.141E-01    2.167E-01
CS-137   <    3.1891E-02
Th-234        1.2068E+00    9.291E-01    9.295E-01
Pb-214        9.7907E-01    2.731E-01    2.755E-01
Pb-210 #      2.6514E+00    1.386E+00    1.388E+00
AM-241 #C     8.5480E-02    1.314E-01    1.315E-01

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

WI07-1044 D2 O-S. #17 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.4482166E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1045 D2 O-S. #18 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:17:48 Page 1
8905696 Spectrum name: Win00599.An1

Sample description
WI07- 1045 D2 O-S Area #18 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00599.An1

Acquisition information
Start time: 09-Aug-2007 17:07:37
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: 4.0330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0330E+02) = 2.4795E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:17:48 Page 2
8905696 Spectrum name: Win00599.An1

WI07-1045 D2 O-S. #18 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1003

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
14.83	3.89	2828.	3021.	5.036	7.79	1.208	- 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	184.38	46.27	52.	56.	0.093	52.00	0.399s
AM-241	230.16	57.72	64.	13.	0.022	220.27	0.218s
Th-234	251.89	63.15	93.	59.	0.098	65.56	0.904
Pb-214	298.54	74.81	157.	105.	0.175	39.02	0.917D
Pb-212	298.56	74.81	174.	0.	0.000	1230.86	0.000D
Pb-212	307.74	77.11	149.	150.	0.250	28.24	0.919D
Pb-214	307.74	77.11	184.	0.	0.000	833.63	0.427D
Pb-214	348.14	87.21	110.	43.	0.072	96.22	0.785
Th-234	368.72	92.35	83.	68.	0.114	44.68	0.933D
Ac-228	380.72	95.35	50.	5.	0.008	441.30	0.935D
Ac-228	836.05	209.16	29.	36.	0.059	73.66	0.389s
Pb-212	953.94	238.62	87.	227.	0.378	17.67	1.057D
Pb-214	967.37	241.98	41.	32.	0.053	66.57	1.060D
Ac-228	1072.72	268.31	27.	21.	0.036	102.32	0.252s

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:17:48 Page 3
8905696 Spectrum name: Win00599.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.98	295.12	22.	79.	0.131	33.19	0.466s
Ac-228	1299.00	324.87	17.	7.	0.011	235.37	0.082s
Ac-228	1352.02	338.12	11.	82.	0.136	27.39	1.033s
Pb-214	1407.40	351.96	10.	122.	0.203	21.08	1.488s
Ac-228	1851.12	462.86	0.	40.	0.067	31.62	0.450s

WI07-1045 D2 O-S. #18 Free Release 0-6in 080907

Bi-214	2436.76	609.22	4.	72.	0.119	27.44	1.212s
CS-137	2645.65	661.43	9.	9.	0.015	149.07	0.287s
Bi-214	3074.17	768.52	0.	13.	0.022	55.47	0.750s
Ac-228	3180.14	795.00	0.	17.	0.028	48.51	0.375s
Ac-228	3645.39	911.27	0.	54.	0.090	27.22	1.093s
Bi-214	3736.60	934.06	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	4.	9.	0.015	90.26	1.595D
Ac-228	3876.86	969.11	10.	38.	0.063	40.01	1.598D
Bi-214	4481.57	1120.22	0.	17.	0.028	48.51	0.375s
Bi-214	4954.00	1238.27	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5844.73	1460.83	0.	53.	0.088	27.47	0.385s
Ac-228	6353.00	1587.82	0.	7.	0.012	75.59	0.750s
Bi-214	7058.00	1763.96	3.	1.	0.002	529.15	0.255s

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

***** S U M M A R Y O F L 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	3.5909E-04	609.31	3.325E-04	@(	1.647E-05	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	4.858E-04	?(	9.716E-05	G
K-40	N	2.3335E-03	1460.81	2.333E-03	(	4.403E-05	G
Ac-228	N	6.5013E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	7.389E-04	(	9.685E-05	G
			338.32	9.571E-04	+	1.658E-04	G
			964.60	5.622E-04	(	2.058E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	1.559E-03	+	3.687E-04	G
			209.28	7.547E-04	(	1.730E-04	G
			270.23	6.665E-04	&(	2.443E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	2.102E-04	X
		327.64	0.000E+00	&	3.032E-04	G
Pb-212	N 5.3628E-04	238.62	5.211E-04	(	3.153E-05	G K
		77.11	5.739E-04	(	6.805E-05	Energy duplication
		74.81	0.000E+00	%	1.241E-04	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	1.293E-05	G
Th-234	N 9.6255E-04	92.35	8.536E-04	(	1.667E-04	G
		63.29	1.118E-03	(	2.700E-04	G
Pb-214	N 4.6347E-04	351.92	4.519E-04	*(	1.852E-05	G K

```
                WI07-1045   D2 O-S. #18  Free Release 0-6in   080907
                           295.21 4.938E-04  (  4.496E-05          G
                            77.11 0.000E+00 %   1.292E-04Energy duplication
                           241.98 4.434E-04  (  1.322E-04          G
                            74.81 1.171E-03 +   2.611E-04Energy duplication
                            87.30 6.240E-04 +   2.612E-04          X

Pb-210    N   1.1432E-03     46.50 1.143E-03 *(  2.186E-04          G

AM-241        0.0000E+00     59.54 0.000E+00 &   2.660E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  09-AUG-2007 17:17:48 Page    5
8905696                          Spectrum name: Win00599.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 #     8.9038E-01     2.443E-01    2.466E-01
K-40         5.7859E+00     1.590E+00    1.604E+00
Ac-228       1.6120E+00     4.387E-01    4.429E-01
Pb-212       1.3297E+00     2.215E-01    2.270E-01
CS-137 #     6.0474E-02     9.015E-02    9.018E-02
Th-234       2.3867E+00     9.467E-01    9.483E-01
Pb-214       1.1492E+00     2.422E-01    2.460E-01
Pb-210 #     2.8345E+00     1.474E+00    1.475E+00
AM-241  <    6.5965E-02

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

WI07-1045 D2 O-S. #18 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.6048998E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
Energysolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1046 D2 O-S. #19 Free Release 0-6in 080907

Sample description
WI07- 1046 D2 O-S Area #19 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00600.An1

Acquisition information

Start time:	09-Aug-2007 17:21:04
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:	4.0620E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.0620E+02) = 2.4618E+03
Detection limit method:	Traditional ORTEC method

WI07-1046 D2 O-S. #19 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2053

********** U N I D E N T I F I E D P E A K S U 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	2.93	2469.	6106.	10.177	3.44	0.854	-	D
17.94	4.46	8008.	4282.	7.137	6.65	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	38.	71.	0.118	42.66	1.231s
AM-241	237.23	59.48	26.	7.	0.012	206.07	0.280s
Th-234	253.03	63.43	78.	58.	0.097	62.08	0.789
Pb-214	298.54	74.81	177.	98.	0.163	43.35	0.917D
Pb-212	298.56	74.81	89.	0.	0.000	392.03	0.402D
Pb-212	307.74	77.11	152.	157.	0.261	27.43	0.919D
Pb-214	307.74	77.11	266.	0.	0.000	111.56	0.000D
Pb-214	346.61	86.82	87.	59.	0.099	61.58	1.333s
Th-234	368.72	92.35	81.	66.	0.110	45.67	0.933D
Ac-228	380.72	95.35	44.	10.	0.017	193.35	0.935D
Ac-228	835.14	208.93	23.	67.	0.112	39.84	0.698s
Pb-212	953.94	238.62	62.	244.	0.407	15.69	1.057D
Pb-214	967.37	241.98	44.	31.	0.052	69.37	1.060D

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:31:14 Page 3
8905696 Spectrum name: Win00600.Anl

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.73	269.56	12.	37.	0.062	49.84	0.387s
Pb-214	1180.15	295.16	16.	68.	0.114	33.98	1.009s
Ac-228	1310.59	327.76	20.	29.	0.048	74.17	1.084
Ac-228	1352.51	338.24	12.	63.	0.105	33.45	0.954
Pb-214	1407.28	351.93	10.	107.	0.178	22.92	1.118s

WI07-1046 D2 O-S. #19 Free Release 0-6in 080907

Ac-228	1852.25	463.14	7.	33.	0.055	48.67	0.375s
Bi-214	2436.89	609.26	0.	71.	0.118	23.74	1.277s
CS-137	2648.32	662.09	2.	13.	0.021	69.16	0.514s
Bi-214	3073.10	768.25	2.	4.	0.007	146.86	0.229s
Ac-228	3178.76	794.66	0.	17.	0.028	48.51	0.375s
Ac-228	3643.83	910.88	0.	65.	0.108	24.81	0.589s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	9.	0.016	81.13	1.595D
Ac-228	3876.86	969.11	5.	36.	0.061	37.08	1.598D
Bi-214	4482.94	1120.56	0.	17.	0.028	48.51	0.583s
Bi-214	4951.67	1237.68	1.	0.	0.000	260.34	0.210s
Bi-214	5511.00	1377.44	0.	2.	0.003	141.42	0.250s
K-40	5845.20	1460.95	0.	41.	0.068	31.23	0.604s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7060.00	1764.46	0.	4.	0.007	100.00	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	3.5071E-04	609.31	3.302E-04	@(	4.650E-06	G K
			1764.49	1.423E-04	-	1.200E-04	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	2.171E-04	-	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	7.0619E-04	911.07	7.158E-04	(	1.101E-05	G K
			969.11	7.072E-04	(	6.928E-05	G
			338.32	7.383E-04	(	6.357E-05	G
			964.60	5.812E-04	(	1.746E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	1.286E-03	+	3.687E-04	G
			209.28	1.418E-03	+	2.947E-04	G

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:31:14 Page 4
8905696 Spectrum name: Win00600.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.156E-03	&	3.253E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	1.970E-04	-	2.100E-04	X
		327.64	1.181E-03	+	4.240E-04	G
Pb-212	N 5.7255E-04	238.62	5.617E-04	(	2.668E-05	G K
		77.11	5.995E-04	(	6.878E-05	Energy duplication
		74.81	0.000E+00	%	8.955E-05	Energy duplication
CS-137	3.4777E-05	661.66	3.478E-05	?(	7.156E-06	G
Th-234	N 9.4429E-04	92.35	8.248E-04	(	1.651E-04	G
		63.29	1.114E-03	?(	2.469E-04	G

```
                WI07-1046   D2 O-S. #19  Free Release 0-6in   080907
Pb-214   N   4.0996E-04    351.92 3.963E-04  (  1.852E-05          G K
                           295.21 4.270E-04 *(  3.852E-05          G
                            77.11 0.000E+00 ?   1.546E-04Energy duplication
                           241.98 4.341E-04  (  1.362E-04          G
                            74.81 1.095E-03 +   2.674E-04Energy duplication
                            87.30 8.610E-04 +   2.553E-04          X

Pb-210   N   1.4494E-03     46.50 1.449E-03 *(  1.885E-04          G

AM-241       0.0000E+00     59.54 0.000E+00 %   1.779E-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  09-AUG-2007 17:31:14 Page    5
8905696                          Spectrum name: Win00600.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 #     8.6339E-01     2.049E-01    2.075E-01
K-40   #     4.4440E+00     1.388E+00    1.398E+00
Ac-228       1.7385E+00     4.278E-01    4.328E-01
Pb-212       1.4095E+00     2.211E-01    2.274E-01
CS-137 #     8.5615E-02     5.921E-02    5.930E-02
Th-234       2.3247E+00     8.959E-01    8.975E-01
Pb-214       1.0093E+00     2.313E-01    2.344E-01
Pb-210 #     3.5681E+00     1.522E+00    1.524E+00
AM-241  <    4.3796E-02

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

WI07-1046 D2 O-S. #19 Free Release 0-6in 080907

& - 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) 1.5443131E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-1047 D2 O-S. #20 Free Release 0-6in 080907

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:43:45 Page 1
8905696 Spectrum name: Win00601.An1

Sample description
WI07- 1047 D2 O-S Area #20 0-6" Free Release 080907

Spectrum Filename: C:\User\Win00601.An1

Acquisition information
Start time: 09-Aug-2007 17:33:34
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: 3.7060E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7060E+02) = 2.6983E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 09-AUG-2007 17:43:45 Page 2
8905696 Spectrum name: Win00601.An1

WI07-1047 D2 O-S. #20 Free Release 0-6in 080907

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1041

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.56	3.83	4149.	24920.	41.533	1.64	2.107	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	185.88	46.65	48.	44.	0.073	68.97	0.984s
AM-241	237.00	59.43	10.	0.	0.000	0.00	0.000s
Th-234	251.95	63.16	89.	81.	0.136	52.21	1.059s
Pb-214	298.54	74.81	70.	151.	0.252	22.53	0.917D
Pb-212	298.56	74.81	147.	0.	0.000	577.35	0.000D
Pb-212	307.74	77.11	60.	211.	0.352	17.22	0.919D
Pb-214	307.74	77.11	189.	0.	0.000	679.46	0.275D
Pb-214	348.23	87.23	56.	55.	0.091	55.85	0.697
Th-234	368.72	92.35	70.	56.	0.093	50.05	0.933D
Ac-228	380.72	95.35	27.	10.	0.017	152.00	0.935D
Ac-228	837.25	209.46	24.	68.	0.114	39.04	0.658s
Pb-212	953.94	238.62	24.	259.	0.431	13.56	1.057D
Pb-214	967.37	241.98	33.	27.	0.045	71.03	1.060D
Ac-228	1082.88	270.85	16.	14.	0.023	112.49	0.299s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.98	295.62	7.	89.	0.148	25.00	0.845s
Ac-228	1310.28	327.69	15.	25.	0.041	80.58	0.405s
Ac-228	1352.91	338.34	6.	60.	0.101	30.03	1.072
Pb-214	1407.38	351.96	5.	96.	0.159	22.44	0.631s
Ac-228	1851.77	463.02	0.	29.	0.048	37.14	0.875s

WI07-1047 D2 O-S. #20 Free Release 0-6in 080907

Bi-214	2437.80	609.48	0.	75.	0.125	23.09	0.469s
CS-137	2647.17	661.81	0.	41.	0.068	31.23	0.375s
Bi-214	3073.73	768.41	0.	11.	0.018	60.30	0.500s
Ac-228	3179.73	794.90	0.	15.	0.025	51.64	0.416s
Ac-228	3645.00	911.17	0.	63.	0.105	25.20	0.437s
Bi-214	3736.50	934.03	0.	11.	0.018	60.30	0.250s
Ac-228	3858.81	964.60	0.	14.	0.023	54.65	1.595D
Ac-228	3876.86	969.11	2.	48.	0.080	29.80	1.598D
Bi-214	4481.93	1120.31	0.	16.	0.027	50.00	1.062s
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	5845.02	1460.90	0.	44.	0.073	30.15	0.365s
Ac-228	6355.00	1588.32	0.	4.	0.007	100.00	0.250s
Bi-214	7061.69	1764.88	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5875E-04	609.31	3.488E-04	(	4.650E-06	G K
			1764.49	4.626E-04	+	2.001E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-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	1.069E-03	+	5.069E-04	G
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	7.3137E-04	911.07	6.938E-04	(	1.101E-05	G K
			969.11	9.373E-04	+	2.041E-04	G
			338.32	7.071E-04	(	4.575E-05	G
			964.60	8.514E-04	(	8.116E-05	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	1.130E-03	+	3.170E-04	G
			209.28	1.449E-03	+	2.994E-04	G
			270.23	4.374E-04	&	2.581E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	5.810E-04	-	4.898E-04	G
		95.35	2.020E-04	-	1.756E-04	X
		327.64	1.005E-03	+	3.852E-04	G
Pb-212	N 5.9431E-04	238.62	5.943E-04	(	1.724E-05	G K
		77.11	8.085E-04	+	9.106E-05	Energy duplication
		74.81	0.000E+00	%	1.143E-04	Energy duplication
CS-137	1.1111E-04	661.66	1.111E-04	(	2.710E-06	G
Th-234	N 6.9803E-04	92.35	6.980E-04	(	1.541E-04	G
		63.29	1.549E-03	+	3.609E-04	G
Pb-214	N 3.5782E-04	351.92	3.543E-04	*(	1.409E-05	G K

```
                WI07-1047   D2 O-S. #20  Free Release 0-6in   080907
                            295.21 5.554E-04 +   8.999E-05          G
                             77.11 0.000E+00 %   1.309E-04Energy duplication
                            241.98 3.752E-04  (  1.192E-04          G
                             74.81 1.689E-03 +   2.403E-04Energy duplication
                             87.30 7.933E-04 +   2.236E-04          X

Pb-210   N   8.9480E-04      46.50 8.948E-04 *(  2.108E-04          G

AM-241       0.0000E+00      59.54 0.000E+00 ?   1.030E-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
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  09-AUG-2007 17:43:45 Page    5
8905696                          Spectrum name: Win00601.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        9.6803E-01    2.236E-01    2.265E-01
K-40    #     5.2273E+00    1.576E+00    1.588E+00
Ac-228        1.9735E+00    4.184E-01    4.248E-01
Pb-212        1.6036E+00    2.174E-01    2.256E-01
CS-137        2.9980E-01    9.364E-02    9.434E-02
Th-234        1.8835E+00    9.428E-01    9.438E-01
Pb-214        9.6551E-01    2.167E-01    2.197E-01
Pb-210  #     2.4145E+00    1.665E+00    1.666E+00
AM-241   <    2.7781E-02

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

WI07-1047 D2 O-S. #20 Free Release 0-6in 080907

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.5335699E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0576 D2 Grid [redacted]-6 in.Free rel. 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 08:45:02 Page 1
EnergySolutions Spectrum name: Win00339.An1

Sample description
WI07-0576 D2 Grid A0-1 Free Rel. 07-26-07

Spectrum Filename: C:\User\Win00339.An1

Acquisition information
Start time: 26-Jul-2007 08:34:52
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: 2.8400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8400E+02) = 3.5211E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 08:45:02 Page 2
EnergySolutions Spectrum name: Win00339.An1

WI07-0576 D2 Grid A0-1 0-6 in.Free rel. 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: 0.1529

********** U N I D E N T I F I E D P E A K S U 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	3540.	23016.	38.360	1.68	2.192	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	185.74	46.61	17.	48.	0.079	42.49	0.568s
AM-241	238.20	59.73	35.	23.	0.039	95.30	0.645s
Th-234	252.49	63.30	37.	30.	0.050	80.33	0.717
Pb-214	298.54	74.81	56.	97.	0.161	29.97	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	234.52	0.313D
Pb-212	307.74	77.11	47.	129.	0.215	23.17	0.919D
Pb-214	307.74	77.11	154.	0.	0.000	153.33	0.000D
Pb-214	348.28	87.24	37.	50.	0.084	51.49	0.657s
Th-234	368.72	92.35	53.	37.	0.061	65.49	0.933D
Ac-228	380.72	95.35	39.	5.	0.008	384.42	0.935D
Ac-228	836.71	209.32	21.	22.	0.036	92.26	0.314s
Pb-212	953.94	238.62	18.	228.	0.381	14.21	1.057D
Pb-214	967.37	241.98	28.	28.	0.046	66.02	1.060D
Ac-228	1082.42	270.74	16.	25.	0.042	75.87	0.307s

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 08:45:02 Page 3
EnergySolutions Spectrum name: Win00339.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.76	295.06	11.	57.	0.096	34.26	0.727s
Ac-228	1313.49	328.49	10.	32.	0.053	51.16	0.266s
Ac-228	1353.55	338.50	4.	42.	0.070	34.99	1.156
Pb-214	1408.00	352.11	7.	95.	0.158	23.68	0.840s
Ac-228	1851.60	462.98	0.	10.	0.017	63.25	0.562s

WI07-0576 D2 Grid A0-1 0-6 in.Free rel. 072607

Bi-214	2437.53	609.42	3.	59.	0.099	28.02	0.578s
CS-137	2646.64	661.67	0.	27.	0.045	38.49	0.750s
Bi-214	3071.50	767.85	0.	5.	0.008	89.44	0.500s
Ac-228	3177.50	794.34	0.	2.	0.003	141.42	0.500s
Ac-228	3646.02	911.42	0.	45.	0.075	29.81	0.750s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.11	964.42	1.	3.	0.005	149.07	0.350s
Ac-228	3876.86	969.11	26.	0.	0.000	0.00	1.598
Bi-214	4479.50	1119.70	0.	11.	0.018	60.30	1.499
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5846.03	1461.15	0.	38.	0.063	32.44	0.321s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7061.64	1764.87	0.	14.	0.023	53.45	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	2.7288E-04	609.31	2.759E-04	(	1.331E-05	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	2.606E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	?(	4.403E-05	G
Ac-228	N	4.8165E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.501E-04	G
			338.32	4.922E-04	(	3.952E-05	G
			964.60	1.852E-04	-	2.082E-04	G
			794.70	1.176E-04	-	1.506E-04	G
			463.00	3.898E-04	?(	3.898E-05	G
			209.28	4.585E-04	(	1.492E-04	G
			270.23	7.863E-04	+	2.990E-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	%	1.906E-04	X
		327.64	1.303E-03	&	3.942E-04	G
Pb-212	N 5.1602E-04	238.62	5.251E-04	(	1.480E-05	G K
		77.11	4.935E-04	(	3.911E-05	Energy duplication
		74.81	0.000E+00	%	9.163E-05	Energy duplication
CS-137	7.3167E-05	661.66	7.317E-05	?(	2.710E-06	G
Th-234	N 5.0517E-04	92.35	4.563E-04	(	1.354E-04	G
		63.29	5.747E-04	?(	1.733E-04	G
Pb-214	N 3.5786E-04	351.92	3.519E-04	(	1.583E-05	G K

```
                WI07-0576  D2  Grid  A0-1  0-6 in.Free rel.  072607
                           295.21 3.592E-04  (  3.223E-05          G
                            77.11 0.000E+00 ?   1.187E-04Energy duplication
                           241.98 3.844E-04  (  1.110E-04          G
                            74.81 1.078E-03 +   2.009E-04Energy duplication
                            87.30 7.280E-04 +   1.988E-04          X

Pb-210   N   9.7306E-04     46.50 9.731E-04  (  1.308E-04          G

AM-241       4.7703E-05     59.54 4.770E-05  (  1.825E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 08:45:02 Page    5
EnergySolutions                    Spectrum name: Win00339.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        9.6085E-01    2.693E-01    2.717E-01
K-40    #     5.8910E+00    1.911E+00    1.924E+00
Ac-228        1.6960E+00    5.056E-01    5.096E-01
Pb-212        1.8170E+00    2.469E-01    2.562E-01
CS-137 #      2.5763E-01    9.916E-02    9.965E-02
Th-234        1.7788E+00    9.218E-01    9.227E-01
Pb-214        1.2601E+00    2.984E-01    3.021E-01
Pb-210        3.4263E+00    1.456E+00    1.458E+00
AM-241        1.6797E-01    1.601E-01    1.602E-01

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

WI07-0576 D2 Grid A0-1 0-6 in.Free rel. 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) 1.7255510E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Lunn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0577 D2 Grid [redacted]0-6 in.Free rel. 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:07:10 Page 1
EnergySolutions Spectrum name: Win00340.An1

Sample description
WI07-0577 D2 Grid A0-2 Free Rel. 07-26-07

Spectrum Filename: C:\User\Win00340.An1

Acquisition information
Start time: 26-Jul-2007 08:57:00
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: 3.0170E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0170E+02) = 3.3146E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:07:10 Page 2
EnergySolutions Spectrum name: Win00340.An1

WI07-0577 D2 Grid A0-2 0-6 in.Free rel. 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: 0.1487

********** U N I D E N T I F I E D P E A K S U 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	3.28	8038.	13861.	23.102	2.50	0.854	-	D
17.41	4.62	14098.	10410.	17.349	3.78	0.855	-	D
253.00	63.43	51.	67.	0.112	49.56	0.507	PA-234	s
2333.09	583.31	2.	52.	0.087	29.29	0.383	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	185.41	46.53	47.	65.	0.109	45.50	0.667
AM-241	237.47	59.54	93.	671.	1.118	9.63	0.866
Th-234	252.43	63.28	90.	0.	0.000	0.00	0.907
Pb-214	298.54	74.81	59.	86.	0.143	33.32	0.917D
Pb-212	298.56	74.81	108.	0.	0.000	882.64	0.000D
Pb-212	307.74	77.11	59.	122.	0.203	25.47	0.919D
Pb-214	307.74	77.11	152.	0.	0.000	215.47	0.213D
Pb-214	347.35	87.01	32.	60.	0.100	41.63	0.618s
Th-234	371.19	92.97	35.	70.	0.117	39.64	0.480s
Ac-228	380.72	95.35	18.	0.	0.000	0.00	0.935
Ac-228	836.21	209.20	8.	36.	0.061	45.54	0.447s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	21.	187.	0.312	16.16	1.057D
Pb-214	967.37	241.98	17.	34.	0.057	48.30	1.060D
Ac-228	1078.33	269.71	8.	32.	0.052	50.83	0.673s
Pb-214	1179.15	294.91	11.	43.	0.071	43.50	0.639s
Ac-228	1310.00	327.62	5.	0.	0.000	0.00	0.000s

WI07-0577 D2 Grid A0-2 0-6 in.Free rel. 072607

Ac-228	1354.01	338.62	7.	49.	0.082	36.62	0.927s
Pb-214	1406.61	351.76	9.	77.	0.128	27.61	1.082
Ac-228	1852.07	463.10	0.	15.	0.025	51.64	0.667s
Bi-214	2437.11	609.31	0.	46.	0.077	29.49	0.521s
CS-137	2645.00	661.27	10.	0.	0.000	0.00	0.104s
Bi-214	3074.00	768.48	0.	11.	0.018	60.30	0.250s
Ac-228	3184.20	796.02	0.	11.	0.018	60.30	0.250s
Ac-228	3646.27	911.49	0.	49.	0.082	28.57	0.566s
Bi-214	3735.00	933.66	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	0.	8.	0.013	73.02	1.595D
Ac-228	3876.86	969.11	3.	24.	0.041	44.71	1.598D
Bi-214	4479.00	1119.58	0.	8.	0.013	70.71	0.250s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5512.33	1377.78	0.	6.	0.010	81.65	0.375s
K-40	5844.76	1460.84	0.	37.	0.062	32.88	0.400s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7064.91	1765.69	4.	2.	0.003	336.65	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.0845E-04	609.31	2.139E-04	(	4.650E-06	G K
			1764.49	0.000E+00	&	1.423E-04	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	5.732E-04	+	2.719E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	+	4.328E-04	G
			934.06	1.943E-04	?(	9.716E-05	G
K-40	N	1.6290E-03	1460.81	1.629E-03	(	4.403E-05	G
Ac-228	N	5.3363E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	4.729E-04	(	5.540E-05	G
			338.32	5.743E-04	*(	5.010E-05	G
			964.60	4.630E-04	(	6.173E-05	G
			794.70	6.468E-04	&(	5.880E-05	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:07:10 Page 4
EnergySolutions Spectrum name: Win00340.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	5.847E-04	?(	3.898E-05	G
		209.28	7.723E-04	+	2.116E-04	G
		270.23	9.841E-04	+	2.955E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.256E-04	X
		327.64	0.000E+00	?	1.507E-04	G
Pb-212	N 4.4044E-04	238.62	4.301E-04	(	1.603E-05	G K
		77.11	4.660E-04	(	4.364E-05	Energy duplication
		74.81	0.000E+00	%	9.871E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	1.355E-05	G
Th-234	N 8.7338E-04	92.35	8.734E-04	&(	1.108E-04	G

```
                WI07-0577  D2  Grid  A0-2  0-6 in.Free rel.  072607
                                63.29 0.000E+00     2.653E-04          G

Pb-214    N   2.7909E-04     351.92 2.852E-04  (  1.767E-05          G K
                              295.21 2.673E-04  (  3.312E-05          G
                               77.11 0.000E+00 %   1.176E-04Energy duplication
                              241.98 4.717E-04 +   1.467E-04          G
                               74.81 9.574E-04 +   1.957E-04Energy duplication
                               87.30 8.707E-04 +   2.042E-04          X

Pb-210    N   1.3337E-03      46.50 1.334E-03 ?(  2.077E-04          G

AM-241        1.3817E-03      59.54 1.382E-03  (  2.913E-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  26-JUL-2007 09:07:10 Page    5
 EnergySolutions                    Spectrum name: Win00340.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	6.9090E-01	2.037E-01	2.054E-01
K-40	5.3995E+00	1.775E+00	1.787E+00
Ac-228	1.7687E+00	3.704E-01	3.763E-01
Pb-212	1.4598E+00	2.202E-01	2.269E-01
CS-137 <	4.4910E-02		
Th-234 #	2.8949E+00	1.148E+00	1.150E+00
Pb-214	9.2505E-01	2.383E-01	2.408E-01
Pb-210 #	4.4206E+00	2.011E+00	2.014E+00
AM-241	4.5797E+00	4.408E-01	4.723E-01

WI07-0577 D2 Grid A0-2 0-6 in.Free rel. 072607

- 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) 2.2139170E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0578 D2 Grid [redacted] 0-6 in.Free rel. 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:23:36 Page 1
4714781 Spectrum name: Win00341.An1

Sample description
WI07-0578 D2 Grid A0-3 Free Rel. 07-26-07

Spectrum Filename: C:\User\Win00341.An1

Acquisition information
Start time: 26-Jul-2007 09:13:25
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: 3.1720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1720E+02) = 3.1526E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:23:36 Page 2
4714781 Spectrum name: Win00341.An1

WI07-0578 D2 Grid A0-3 0-6 in.Free rel. 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: 0.1635

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.70	2.92	6955.	10801.	18.001	2.91	0.854	-	D
15.81	3.94	14603.	10118.	16.863	3.92	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	186.31	46.76	35.	30.	0.050	80.74	1.207s
AM-241	238.14	59.71	59.	153.	0.256	25.04	0.728
Th-234	251.30	63.00	40.	24.	0.039	99.25	0.532s
Pb-214	298.54	74.81	68.	127.	0.211	25.65	0.917D
Pb-212	298.56	74.81	121.	0.	0.000	628.65	0.264D
Pb-212	307.74	77.11	59.	163.	0.272	20.58	0.919D
Pb-214	307.74	77.11	232.	0.	0.000	163.64	0.651D
Pb-214	348.25	87.23	49.	77.	0.128	40.27	0.412s
Th-234	368.72	92.35	65.	31.	0.051	83.05	0.933D
Ac-228	380.72	95.35	39.	0.	0.000	6613.75	0.935D
Ac-228	835.49	209.02	15.	35.	0.058	52.26	0.338s
Pb-212	953.94	238.62	19.	201.	0.334	15.42	1.057D
Pb-214	967.37	241.98	26.	33.	0.055	56.18	1.060D

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:23:36 Page 3
4714781 Spectrum name: Win00341.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.07	270.65	10.	34.	0.057	48.86	0.351s
Pb-214	1181.50	295.50	4.	70.	0.117	26.35	0.882s
Ac-228	1311.34	327.95	7.	14.	0.023	85.89	0.670s
Ac-228	1352.05	338.13	7.	54.	0.091	33.58	1.159s
Pb-214	1407.48	351.98	18.	90.	0.149	29.53	0.805s

WI07-0578 D2 Grid A0-3 0-6 in.Free rel. 072607

Ac-228	1851.57	462.97	0.	28.	0.047	37.80	0.667s
Bi-214	2436.86	609.25	0.	79.	0.132	22.50	1.066
CS-137	2646.46	661.63	0.	46.	0.077	29.49	0.750s
Bi-214	3074.18	768.52	0.	14.	0.023	53.45	0.375s
Ac-228	3180.36	795.06	0.	14.	0.023	53.45	0.375s
Ac-228	3645.68	911.34	0.	50.	0.083	28.28	1.074s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	13.	0.021	57.34	1.595D
Ac-228	3876.86	969.11	0.	22.	0.036	43.68	1.598D
Bi-214	4481.79	1120.27	8.	2.	0.004	368.78	0.228s
Bi-214	4949.00	1237.02	0.	9.	0.015	66.67	0.250s
Bi-214	5511.00	1377.44	0.	5.	0.008	89.44	1.249s
K-40	5845.98	1461.14	0.	43.	0.072	30.50	1.031s
Ac-228	6346.00	1586.07	0.	6.	0.010	81.65	0.250s
Bi-214	7058.25	1764.02	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.9161E-04	609.31	3.674E-04	(	4.650E-06	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	1.217E-04	G
			1238.11	6.101E-04	&	3.235E-04	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.8932E-03	1460.81	1.893E-03	(	4.403E-05	G
Ac-228	N	6.4090E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	4.203E-04	-	1.389E-04	G
			338.32	6.368E-04	@(	4.905E-05	G
			964.60	7.848E-04	(	8.680E-05	G
			794.70	8.232E-04	?(	5.880E-05	G
			463.00	1.091E-03	+	3.118E-04	G
			209.28	7.371E-04	(	1.276E-04	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:23:36 Page 4
4714781 Spectrum name: Win00341.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.062E-03	+	3.091E-04	G
		1588.00	8.715E-04	&(	1.452E-04	G
		95.35	0.000E+00	%	1.800E-04	X
		327.64	5.566E-04	(	1.776E-04	G
Pb-212	N 4.6109E-04	238.62	4.611E-04	(	1.550E-05	G K
		77.11	6.237E-04	+	8.260E-05	Energy duplication
		74.81	0.000E+00	%	1.041E-04	Energy duplication
CS-137	1.2465E-04	661.66	1.247E-04	(	2.710E-06	G
Th-234	N 4.1024E-04	92.35	3.817E-04	(	1.491E-04	G
		63.29	4.509E-04	$(	1.809E-04	G

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                WI07-0578  D2  Grid  A0-3  0-6 in.Free rel.  072607
Pb-214   N   3.7933E-04    351.92 3.321E-04  (  2.436E-05         G K
                           295.21 4.416E-04 @(  2.000E-05         G
                            77.11 0.000E+00 ?   1.447E-04Energy duplication
                           241.98 4.542E-04  (  1.071E-04         G
                            74.81 1.413E-03 +   2.261E-04Energy duplication
                            87.30 1.117E-03 +   2.377E-04         X

Pb-210   N   6.1241E-04     46.50 6.124E-04 @(  1.813E-04         G

AM-241       3.1573E-04     59.54 3.157E-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  26-JUL-2007 09:23:36 Page    5
4714781                          Spectrum name: Win00341.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        1.2346E+00    2.778E-01    2.816E-01
K-40          5.9685E+00    1.820E+00    1.834E+00
Ac-228        2.0205E+00    4.550E-01    4.612E-01
Pb-212        1.4536E+00    2.242E-01    2.307E-01
CS-137 #      3.9299E-01    1.159E-01    1.169E-01
Th-234        1.2933E+00    8.369E-01    8.374E-01
Pb-214        1.1959E+00    2.739E-01    2.776E-01
Pb-210 #      1.9307E+00    1.559E+00    1.559E+00
AM-241        9.9538E-01    2.492E-01    2.519E-01

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

WI07-0578 D2 Grid A0-3 0-6 in.Free rel. 072607

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

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

Total Activity (2.7 to 1999.3 keV) 1.6485382E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fina
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07 - 0961 D1 Grid A0-4 0-6in Free. R. 080607

Sample description
WI07-0961 D1 Grid A0-4 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00357.An1

Acquisition information

Start time:	06-Aug-2007 11:26:10
Live time:	600
Real time:	602
Dead time:	0.30 %
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:	4.0110E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.0110E+02) = 2.4931E+03
Detection limit method:	Traditional ORTEC method

WI07 - 0961 D1 Grid A0-4 0-6in Free. R. 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: 0.3848

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
27.20	6.98	372.	166.	0.277	39.89	0.771	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	180.03	45.18	40.	10.	0.017	228.04	0.597s
AM-241	233.18	58.46	62.	36.	0.059	89.83	0.284s
Th-234	252.88	63.38	23.	3.	0.004	483.48	0.375s
Pb-214	298.61	74.81	128.	0.	0.000	0.00	0.417D
Pb-212	298.63	74.81	85.	0.	0.000	168.60	0.370D
Pb-212	311.60	78.06	171.	87.	0.146	61.15	0.478s
Pb-214	307.80	77.11	150.	0.	0.000	92.39	0.416D
Pb-214	350.09	87.68	90.	37.	0.062	101.41	0.255s
Th-234	368.79	92.35	41.	10.	0.017	193.24	0.985D
Ac-228	380.79	95.35	40.	9.	0.016	201.76	0.987D
Ac-228	837.00	209.37	4.	0.	0.000	0.00	0.000s
Pb-212	947.17	236.90	84.	66.	0.111	54.97	1.421s
Pb-214	967.50	241.98	25.	0.	0.000	0.00	0.510D
Ac-228	1081.17	270.39	3.	1.	0.001	498.89	0.198s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1178.17	294.63	8.	2.	0.003	391.58	0.191s
Ac-228	1307.52	326.96	6.	1.	0.002	636.96	0.223s
Ac-228	1348.05	337.08	29.	17.	0.028	133.75	0.355s
Pb-214	1411.79	353.01	38.	17.	0.028	134.65	0.569s
Ac-228	1848.84	462.24	4.	4.	0.006	190.24	0.306s

WI07 - 0961 D1 Grid A0-4 0-6in Free. R. 080607

Bi-214	2437.10	609.25	5.	61.	0.102	30.55	0.395s
CS-137	2640.12	659.98	0.	24.	0.040	40.82	0.312s
Bi-214	3075.00	768.65	1.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	1.	0.	0.000	0.00	0.083s
Ac-228	3647.38	911.69	8.	41.	0.068	45.00	0.562s
Bi-214	3735.00	933.58	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	6.	3.	0.005	275.48	1.589D
Ac-228	3877.18	969.11	12.	8.	0.013	151.59	1.591D
Bi-214	4481.67	1120.16	1.	1.	0.001	339.93	0.197s
Bi-214	4952.33	1237.77	1.	0.	0.001	240.37	0.197s
Bi-214	5512.00	1377.61	0.	1.	0.002	200.00	0.250s
K-40	5847.62	1461.47	5.	31.	0.052	48.52	0.273s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.14	3.	6.	0.010	149.56	0.085s

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

***** S U M M A R Y O F L 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	3.1386E-04	609.31	3.139E-04	*(	1.840E-05	G K
			1764.49	2.207E-04	-	1.805E-04	G
			1120.29	0.000E+00	%	6.720E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	?	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.318E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	1.4750E-03	1460.81	1.475E-03	?(	1.693E-04	G
Ac-228	N	4.8614E-04	911.07	4.861E-04	*(	5.515E-05	G K
			969.11	1.582E-04	-	1.440E-04	G
			338.32	2.196E-04	&	1.331E-04	G
			964.60	0.000E+00	%	3.191E-04	G
			794.70	0.000E+00	?	1.282E-04	G
			463.00	1.516E-04	&	1.851E-04	G
			209.28	0.000E+00	?	8.170E-05	G
			270.23	0.000E+00	%	1.194E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 12:04:32 Page 4
8905696 Spectrum name: Win00357.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	%	2.344E-04	X
		327.64	0.000E+00	&	1.959E-04	G
Pb-212	N 1.7409E-04	238.62	1.741E-04	&(	3.537E-05	G K
		77.11	4.039E-04	&	1.074E-04	X
		74.81	0.000E+00	?	1.063E-04	Energy duplication
CS-137	7.1363E-05	661.66	7.136E-05	&(	2.973E-06	G
Th-234	N 1.4586E-04	92.35	1.459E-04	(	1.407E-04	G
		63.29	0.000E+00	%	1.782E-04	G
Pb-214	N 1.3403E-04	351.92	7.067E-05	&(	3.838E-05	G K

WI07 - 0961 D1 Grid A0-4 0-6in Free. R. 080607

			295.21	0.000E+00	&	3.539E-05		G
			77.11	0.000E+00	&	1.411E-04	Energy duplication	
			241.98	0.000E+00	%	1.202E-04		G
			74.81	0.000E+00	&	2.230E-04	Energy duplication	
			87.30	6.388E-04	$(	2.404E-04		X
Pb-210	N	0.0000E+00	46.50	0.000E+00	&	2.463E-04		G
AM-241		8.8011E-05	59.54	8.801E-05	&(	2.899E-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 12:04:32 Page 5
8905696 Spectrum name: Win00357.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	#	7.8251E-01	2.391E-01	2.402E-01
K-40	#	3.6774E+00	1.784E+00	1.787E+00
Ac-228		1.2120E+00	5.454E-01	5.466E-01
Pb-212		4.3402E-01	2.386E-01	2.389E-01
CS-137	#	1.7792E-01	7.263E-02	7.284E-02
Th-234	C	3.6365E-01	7.027E-01	7.028E-01
Pb-214		3.3416E-01	2.816E-01	2.818E-01
Pb-210	<	6.1396E-01		
AM-241		2.1942E-01	1.971E-01	1.973E-01

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

WI07 - 0961 D1 Grid A0-4 0-6in Free. R. 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) 7.2010622E+00 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fern
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0579 D2 Grid [redacted]0-6 in.Free rel. 072607

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:37:28 Page 1
4714781 Spectrum name: Win00342.An1

Sample description
WI07-0579 D2 Grid A0-5 Free Rel. 07-26-07

Spectrum Filename: C:\User\Win00342.An1

Acquisition information
Start time: 26-Jul-2007 09:25:37
Live time: 600
Real time: 601
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9030E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9030E+02) = 3.4447E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:37:28 Page 2
4714781 Spectrum name: Win00342.An1

WI07-0579 D2 Grid A0-5 0-6 in.Free rel. 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: 0.1584

********** U N I D E N T I F I E D P E A K S U 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	2.90	3176.	9333.	15.554	2.68	0.854	-	D
16.58	4.11	12072.	8643.	14.405	4.19	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	185.23	46.49	17.	53.	0.088	41.02	0.650s
AM-241	237.08	59.45	86.	94.	0.156	45.36	0.996
Th-234	251.82	63.13	65.	30.	0.050	102.38	0.412s
Pb-214	298.54	74.81	69.	82.	0.136	36.28	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	244.91	0.225D
Pb-212	307.74	77.11	67.	116.	0.193	27.40	0.919D
Pb-214	307.74	77.11	124.	0.	0.000	856.35	0.549D
Pb-214	347.47	87.04	30.	67.	0.111	38.86	0.826s
Th-234	368.72	92.35	60.	45.	0.075	57.43	0.933D
Ac-228	380.72	95.35	39.	11.	0.018	179.06	0.935D
Ac-228	835.19	208.94	14.	45.	0.075	44.42	0.709s
Pb-212	953.94	238.62	33.	193.	0.322	16.66	1.057D
Pb-214	967.37	241.98	22.	38.	0.063	48.18	1.060D

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:37:28 Page 3
4714781 Spectrum name: Win00342.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.07	270.40	3.	28.	0.047	43.58	1.593s
Pb-214	1179.43	294.98	15.	47.	0.079	45.46	0.471s
Ac-228	1310.00	327.62	15.	0.	0.000	0.00	0.000s
Ac-228	1352.19	338.16	10.	50.	0.084	37.59	0.409s
Pb-214	1407.74	352.05	10.	92.	0.154	24.85	0.965s

WI07-0579 D2 Grid A0-5 0-6 in.Free rel. 072607

Ac-228	1852.11	463.11	0.	19.	0.032	45.88	0.625s
Bi-214	2437.92	609.51	0.	64.	0.107	25.00	1.083
CS-137	2647.38	661.86	0.	34.	0.057	34.30	0.417s
Bi-214	3075.40	768.83	0.	5.	0.008	89.44	0.312s
Ac-228	3181.25	795.28	0.	13.	0.022	55.47	0.312s
Ac-228	3645.75	911.36	0.	49.	0.082	28.57	1.206
Bi-214	3735.00	933.66	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	0.	6.	0.009	84.83	1.595D
Ac-228	3876.86	969.11	2.	34.	0.057	35.55	1.598D
Bi-214	4484.88	1121.05	0.	17.	0.028	48.51	0.312s
Bi-214	4953.00	1238.02	0.	8.	0.013	70.71	0.500s
Bi-214	5513.50	1378.07	0.	2.	0.003	141.42	0.500s
K-40	5845.69	1461.07	2.	26.	0.044	44.81	0.360s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.75	1764.40	0.	8.	0.013	70.71	0.375s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.9180E-04	609.31	2.976E-04	?(	4.650E-06	G K
			1764.49	2.847E-04	?(	3.558E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	5.424E-04	+	3.072E-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	-	2.771E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	1.1667E-03	1460.81	1.167E-03	?(	1.229E-04	G
Ac-228	N	6.1173E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	6.693E-04	(	4.507E-05	G
			338.32	5.918E-04	(	5.728E-05	G
			964.60	3.431E-04	-	2.390E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	7.406E-04	?(	3.898E-05	G
			209.28	9.487E-04	+	2.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 09:37:28 Page 4
4714781 Spectrum name: Win00342.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.852E-04	+	2.621E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.035E-04	-	2.025E-04	X
		327.64	0.000E+00	%	2.468E-04	G
Pb-212	N 4.4340E-04	238.62	4.439E-04	(	1.981E-05	G K
		77.11	4.423E-04	(	4.643E-05	Energy duplication
		74.81	0.000E+00	%	9.343E-05	Energy duplication
CS-137	9.2136E-05	661.66	9.214E-05	(	2.710E-06	G
Th-234	N 5.6391E-04	92.35	5.586E-04	(	1.433E-04	G
		63.29	5.715E-04	?(	2.269E-04	G

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                WI07-0579  D2  Grid  A0-5  0-6 in.Free rel.  072607
Pb-214    N   3.2690E-04    351.92 3.426E-04  (  1.810E-05          G K
                           295.21 2.965E-04  (  3.720E-05          G
                            77.11 0.000E+00 %   1.067E-04Energy duplication
                           241.98 5.208E-04 +   1.585E-04          G
                            74.81 9.130E-04 +   1.996E-04Energy duplication
                            87.30 9.674E-04 +   2.095E-04          X

Pb-210    N   1.0819E-03     46.50 1.082E-03 *(  1.297E-04          G

AM-241        1.9253E-04     59.54 1.925E-04  (  2.798E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  26-JUL-2007 09:37:28 Page    5
4714781                          Spectrum name: Win00342.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 #     1.0052E+00     2.513E-01    2.541E-01
K-40   #     4.0191E+00     1.801E+00    1.807E+00
Ac-228       2.1072E+00     3.925E-01    4.004E-01
Pb-212       1.5274E+00     2.449E-01    2.515E-01
CS-137       3.1738E-01     1.089E-01    1.095E-01
Th-234       1.9425E+00     1.116E+00    1.116E+00
Pb-214       1.1261E+00     2.798E-01    2.830E-01
Pb-210 #     3.7269E+00     1.529E+00    1.531E+00
AM-241       6.6321E-01     3.009E-01    3.019E-01

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

WI07-0579 D2 Grid A0-5 0-6 in.Free rel. 072607

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

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

Total Activity (2.7 to 1999.3 keV) 1.6434980E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0439 D2 Grid [redacted]-6 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 11:25:50 Page 1
EnergySolutions Spectrum name: Win00265.An1

Sample description
WI07- 0439 D2 Grid (A1 - 1) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00265.An1

Acquisition information
Start time: 21-Jul-2007 11:15:37
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: 2.5080E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.5080E+02) = 3.9872E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 11:25:50 Page 2
EnergySolutions Spectrum name: Win00265.An1

WI07-0439 D2 Grid A1-1 0-6 in. Free Release 072107

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.2014

********** U N I D E N T I F I E D P E A K S U 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	6454.	11600.	19.334	2.70	0.854	-	D
16.83	4.17	17329.	10180.	16.967	4.16	0.855	-	D
53.35	13.52	286.	76.	0.127	69.25	0.720	PU-239	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	104.	65.	0.108	61.10	1.478s
AM-241	237.63	59.58	110.	503.	0.838	12.45	1.045s
Th-234	253.15	63.46	39.	20.	0.033	108.40	0.437s
Pb-214	298.54	74.81	53.	50.	0.083	50.17	0.917D
Pb-212	298.56	74.81	52.	0.	0.000	179.51	0.777D
Pb-212	307.74	77.11	44.	42.	0.070	54.28	0.919D
Pb-214	307.74	77.11	53.	0.	0.000	2234.08	0.000D
Pb-214	348.44	87.28	22.	14.	0.023	123.73	0.501s
Th-234	368.72	92.35	37.	24.	0.040	81.80	0.933D
Ac-228	380.72	95.35	18.	5.	0.008	274.80	0.935D
Ac-228	835.98	209.14	3.	17.	0.028	60.66	1.218
Pb-212	953.94	238.62	11.	92.	0.154	23.10	1.057D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 11:25:50 Page 3
EnergySolutions Spectrum name: Win00265.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	6.	12.	0.020	80.37	1.060D
Ac-228	1079.00	269.88	1.	0.	0.000	0.00	0.083s
Pb-214	1178.60	294.78	12.	26.	0.043	71.34	0.844s
Ac-228	1304.98	326.36	3.	8.	0.014	106.83	0.245s
Ac-228	1352.00	338.11	12.	1.	0.002	1216.55	0.000s

Pb-214	1406.11	351.64	0.	35.	0.058	33.81	0.351s
Ac-228	1851.43	462.94	0.	7.	0.012	75.59	0.292s
Bi-214	2438.06	609.55	0.	16.	0.027	50.00	0.312s
CS-137	2647.13	661.80	0.	23.	0.038	41.70	0.968s
Bi-214	3072.00	767.98	0.	1.	0.002	200.00	0.250s
Ac-228	3179.00	794.72	0.	1.	0.002	200.00	0.250s
Ac-228	3644.80	911.12	0.	15.	0.025	51.64	0.625s
Bi-214	3735.00	933.66	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	1.595
Ac-228	3873.33	968.23	1.	0.	0.001	240.37	0.197s
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4953.50	1238.14	0.	3.	0.005	115.47	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.00	1460.65	5.	1.	0.001	724.19	0.000s
Ac-228	6354.00	1588.07	0.	2.	0.003	141.42	0.250s
Bi-214	7058.00	1763.96	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	7.4407E-05	609.31	7.441E-05	?(	4.650E-06	G K
			1764.49	1.779E-04	+	1.317E-04	G
			1120.29	0.000E+00	?	2.433E-05	G
			1238.11	2.034E-04	+	2.034E-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	0.0000E+00	1460.81	0.000E+00	%	1.761E-04	G
Ac-228	N	2.1780E-04	911.07	1.652E-04	?(	1.101E-05	G K
			969.11	0.000E+00	&	3.884E-05	G
			338.32	0.000E+00	%	6.590E-05	G
			964.60	0.000E+00		6.173E-05	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	2.728E-04	?(	3.898E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	3.527E-04	?(	6.623E-05	G
		270.23	0.000E+00	?	6.248E-05	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.406E-04	X
		327.64	3.326E-04	&(	1.194E-04	G
Pb-212	N 2.1213E-04	238.62	2.121E-04	(	1.184E-05	G K
		77.11	1.608E-04	-	5.216E-05	Energy duplication
		74.81	0.000E+00	?	6.937E-05	Energy duplication
CS-137	6.2327E-05	661.66	6.233E-05	?(	2.710E-06	G
Th-234	N 3.3444E-04	92.35	3.017E-04	(	1.135E-04	G
		63.29	3.810E-04	?(	1.780E-04	G

Pb-214	N	1.4765E-04	351.92	1.296E-04	(	3.704E-06		G K
			295.21	1.629E-04	*(	3.398E-05		G
			77.11	0.000E+00	%	7.114E-05	Energy duplication	
			241.98	1.680E-04	(	5.470E-05		G
			74.81	5.560E-04	+	1.659E-04	Energy duplication	
			87.30	1.959E-04	?(	1.049E-04		X
Pb-210	N	1.3269E-03	46.50	1.327E-03	*(	3.048E-04		G
AM-241		1.0357E-03	59.54	1.036E-03	@(	3.159E-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 #	2.9668E-01	1.483E-01	1.488E-01
K-40 <	7.0220E-01		
Ac-228 #	8.6843E-01	3.621E-01	3.636E-01
Pb-212	8.4580E-01	1.954E-01	1.980E-01
CS-137 #	2.4851E-01	1.036E-01	1.041E-01
Th-234	1.3335E+00	9.054E-01	9.059E-01
Pb-214	5.8871E-01	1.990E-01	2.002E-01
Pb-210 #	5.2907E+00	3.233E+00	3.235E+00
AM-241 #	4.1298E+00	5.140E-01	5.362E-01

- All peaks for activity calculation had bad shape.

WI07-0439 D2 Grid A1-1 0-6 in. Free Release 072107

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

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

Total Activity (2.7 to 1999.3 keV) 1.3602049E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0459 D2 Grid [redacted] 6-12 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:22:14 Page 1
EnergySolutions Spectrum name: WI07-0469 D1 A-F (WZ) Baggin

Sample description
WI07- 0459 D2 Grid A1-2 6-12in. Free Rel. 072107

Spectrum Filename: C:\User\D1 Samples\WI07-0469 D1 A-F (WZ) Baggi
nf Soil 072107.An1

Acquisition information
Start time: 21-Jul-2007 16:12:04
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: 3.3140E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3140E+02) =
3.0175E+03

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:22:14 Page 2
EnergySolutions Spectrum name: WI07-0469 D1 A-F (WZ) Baggin

Detection limit method: Traditional ORTEC method

WI07-0459 D2 Grid A1-2 6-12 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1036

********** U N I D E N T I F I E D P E A K S U 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	3777.	21697.	36.162	1.77	2.201	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.52	46.56	31.	76.	0.126	36.86	1.052s
AM-241	237.74	59.61	61.	40.	0.067	75.60	0.475s
Th-234	251.63	63.08	93.	53.	0.088	75.46	0.769
Pb-214	298.54	74.81	80.	117.	0.195	28.45	0.917D
Pb-212	298.56	74.81	115.	0.	0.000	1523.15	0.219D
Pb-212	307.74	77.11	68.	192.	0.320	18.90	0.919D
Pb-214	307.74	77.11	240.	0.	0.000	113.88	0.000D
Pb-214	347.81	87.12	56.	60.	0.100	52.35	0.941
Th-234	368.72	92.35	66.	67.	0.112	41.93	0.933D
Ac-228	380.72	95.35	29.	3.	0.004	593.31	0.935D
Ac-228	836.64	209.31	26.	38.	0.062	62.03	0.560s
Pb-212	953.94	238.62	22.	244.	0.407	13.90	1.057D
Pb-214	967.37	241.98	32.	41.	0.068	49.98	1.060D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:22:14 Page 3
EnergySolutions Spectrum name: WI07-0469 D1 A-F (WZ) Baggin

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.07	270.15	9.	35.	0.058	46.79	0.569s
Pb-214	1180.93	295.36	10.	54.	0.090	34.94	0.667s
Ac-228	1310.99	327.87	4.	16.	0.026	69.21	0.397s
Ac-228	1352.38	338.21	7.	59.	0.099	31.66	0.649s
Pb-214	1406.99	351.86	7.	92.	0.153	24.48	1.163

WI07-0459 D2 Grid A1-2 6-12 in. Free Release 072107

Ac-228	1852.10	463.10	0.	20.	0.033	44.72	0.667s
Bi-214	2437.28	609.35	4.	75.	0.126	25.53	0.955s
CS-137	2647.00	661.77	2.	0.	0.000	0.00	0.000s
Bi-214	3072.36	768.07	0.	13.	0.022	55.47	0.312s
Ac-228	3177.00	794.22	3.	3.	0.004	254.95	0.000s
Ac-228	3645.07	911.19	0.	44.	0.073	30.15	0.450s
Bi-214	3732.33	932.99	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	2.	7.	0.011	98.52	1.595D
Ac-228	3876.86	969.11	0.	41.	0.068	31.23	1.598D
Bi-214	4481.92	1120.31	0.	13.	0.022	55.47	1.000s
Bi-214	4954.00	1238.27	0.	5.	0.008	89.44	0.750s
Bi-214	5512.80	1377.89	0.	5.	0.008	89.44	0.625s
K-40	5845.22	1460.95	0.	45.	0.075	29.81	0.412s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
Bi-214	7060.18	1764.50	0.	18.	0.030	47.14	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	Peak MDA Value microCi	Comments
Bi-214	N	3.4170E-04	609.31	3.503E-04	*(	1.513E-05	G K
			1764.49	6.405E-04	+	2.320E-04	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	4.858E-04	&	3.597E-04	G
K-40	N	1.9812E-03	1460.81	1.981E-03	(	4.403E-05	G
Ac-228	N	5.3837E-04	911.07	4.846E-04	(	1.101E-05	G K
			969.11	7.962E-04	+	1.858E-04	G
			338.32	6.954E-04	@(	4.905E-05	G
			964.60	4.195E-04	(	1.641E-04	G
			794.70	0.000E+00	%	2.352E-04	G
			463.00	7.795E-04	+	2.668E-04	G
			209.28	7.935E-04	+	2.483E-04	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:22:14 Page 4
EnergySolutions Spectrum name: WI07-0469 D1 A-F (WZ) Baggin

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.083E-03	+	3.091E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	0.000E+00	%	1.640E-04	X
		327.64	6.380E-04	(	1.420E-04	G
Pb-212	N 5.6107E-04	238.62	5.611E-04	(	1.639E-05	G K
		77.11	7.341E-04	+	8.923E-05	Energy duplication
		74.81	0.000E+00	%	1.015E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	6.942E-06	G
Th-234	N 9.0677E-04	92.35	8.389E-04	(	1.495E-04	G
		63.29	1.003E-03	?(	2.700E-04	G

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                WI07-0459  D2  Grid  A1-2  6-12 in. Free Release  072107
Pb-214    N   3.3909E-04    351.92 3.395E-04  (  1.616E-05          G K
                           295.21 3.383E-04  (  3.132E-05          G
                            77.11 0.000E+00 ?   1.471E-04Energy duplication
                           241.98 5.670E-04 +   1.741E-04          G
                            74.81 1.306E-03 +   2.272E-04Energy duplication
                            87.30 8.707E-04 +   2.284E-04          X

Pb-210    N   1.5480E-03     46.50 1.548E-03  (  1.717E-04          G

AM-241        8.3052E-05     59.54 8.305E-05  (  2.373E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 16:22:14 Page    5
EnergySolutions                  Spectrum name: WI07-0469  D1  A-F   (WZ) Baggin

   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 #     1.0311E+00     2.632E-01    2.660E-01
K-40         5.9784E+00     1.782E+00    1.796E+00
Ac-228       1.6245E+00     4.898E-01    4.936E-01
Pb-212       1.6930E+00     2.353E-01    2.437E-01
CS-137   <   2.0946E-02
Th-234       2.7362E+00     1.147E+00    1.149E+00
Pb-214       1.0232E+00     2.183E-01    2.216E-01
Pb-210 #     4.6712E+00     1.722E+00    1.725E+00
AM-241       2.5061E-01     1.895E-01    1.897E-01

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

WI07-0459 D2 Grid A1-2 6-12 in. Free Release 072107

& - 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) 1.9008293E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0465 D2 Grid [redacted] 12 in... Free Rel. 072207

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 10:28:45 Page 1
EnergySolutions Spectrum name: Win00287.An1

Sample description
WI07-0465 D2 Grid A1-2 12 in. Free Rel. 072207

Spectrum Filename: C:\User\Win00287.An1

Acquisition information
Start time: 22-Jul-2007 10:18:35
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: 3.5220E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5220E+02) = 2.8393E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 10:28:45 Page 2
EnergySolutions Spectrum name: Win00287.An1

WI07-0465 D2 Grid A1-2 12 in... Free Rel. 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: 0.1258

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
15.02	3.94	6342.	20016.	33.360	2.13	2.498	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	185.27	46.50	43.	25.	0.041	103.16	0.389s
AM-241	237.60	59.58	80.	291.	0.485	16.61	1.025s
Th-234	252.00	63.18	44.	78.	0.129	38.66	0.593s
Pb-214	298.54	74.81	97.	91.	0.152	37.12	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	213.81	0.588D
Pb-212	307.74	77.11	70.	161.	0.269	21.50	0.919D
Pb-214	307.74	77.11	129.	0.	0.000	159.08	0.412D
Pb-214	348.30	87.25	58.	54.	0.091	56.82	0.458s
Th-234	368.72	92.35	60.	35.	0.058	71.42	0.933D
Ac-228	380.72	95.35	41.	9.	0.015	205.01	0.935D
Ac-228	836.48	209.27	22.	26.	0.044	77.43	0.392s
Pb-212	953.94	238.62	19.	241.	0.401	13.89	1.057D
Pb-214	967.37	241.98	31.	38.	0.063	53.09	1.060D
Ac-228	1079.77	270.07	5.	46.	0.077	34.65	0.979s

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 10:28:45 Page 3
EnergySolutions Spectrum name: Win00287.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.53	295.51	23.	61.	0.102	43.02	1.250
Ac-228	1309.00	327.37	3.	0.	0.000	0.00	0.062s
Ac-228	1352.95	338.35	22.	51.	0.085	47.08	0.372s
Pb-214	1407.74	352.05	10.	100.	0.168	24.19	0.944
Ac-228	1853.18	463.37	10.	15.	0.025	94.28	0.457s

WI07-0465 D2 Grid A1-2 12 in... Free Rel. 072207

Bi-214	2437.84	609.49	4.	68.	0.114	26.80	0.522s
CS-137	2640.27	660.08	3.	12.	0.020	81.65	0.213s
Bi-214	3070.94	767.71	1.	5.	0.008	119.52	0.238s
Ac-228	3179.71	794.89	0.	10.	0.017	63.25	0.437s
Ac-228	3645.98	911.41	0.	59.	0.098	26.04	0.425s
Bi-214	3739.00	934.66	0.	4.	0.007	100.00	0.750s
Ac-228	3858.81	964.60	1.	9.	0.015	77.13	1.595D
Ac-228	3876.86	969.11	0.	35.	0.058	34.44	1.598D
Bi-214	4486.00	1121.32	0.	21.	0.035	43.64	0.250s
Bi-214	4953.38	1238.11	0.	9.	0.015	66.67	0.375s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5845.10	1460.92	0.	51.	0.085	28.01	0.417s
Ac-228	6353.67	1587.99	1.	0.	0.001	240.37	0.197s
Bi-214	7053.86	1762.93	7.	2.	0.004	384.39	0.226s

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

***** S U M M A R Y O F L 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	3.2310E-04	609.31	3.186E-04	(	1.485E-05	G K
			1764.49	0.000E+00	&	1.698E-04	G
			1120.29	5.110E-04	&	1.703E-04	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	2.432E-04	-	2.084E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.2454E-03	1460.81	2.245E-03	?(	4.403E-05	G
Ac-228	N	6.2549E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	6.713E-04	(	3.016E-05	G
			338.32	5.957E-04	(	8.411E-05	G
			964.60	5.378E-04	(	1.346E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	5.847E-04	(	1.949E-04	G
			209.28	5.607E-04	?(	1.529E-04	G
			270.23	1.437E-03	+	3.315E-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	%	2.025E-04	X
		327.64	0.000E+00	?	1.222E-04	G
Pb-212	N 5.7158E-04	238.62	5.531E-04	(	1.549E-05	G K
		77.11	6.175E-04	(	4.716E-05	Energy duplication
		74.81	0.000E+00	%	9.716E-05	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	&(	8.130E-06	G
Th-234	N 8.6609E-04	92.35	4.351E-04	(	1.432E-04	G
		63.29	1.480E-03	*(	1.892E-04	G
Pb-214	N 3.7559E-04	351.92	3.722E-04	(	1.893E-05	G K

```
                WI07-0465  D2  Grid  A1-2   12 in... Free Rel.  072207
                              295.21 3.821E-04  (  4.573E-05          G
                               77.11 0.000E+00 ?   1.087E-04Energy duplication
                              241.98 5.216E-04 +   1.695E-04          G
                               74.81 1.015E-03 +   2.221E-04Energy duplication
                               87.30 7.908E-04 +   2.255E-04          X

Pb-210    N   5.0354E-04      46.50 5.035E-04 ?(  2.005E-04          G

AM-241        5.9921E-04      59.54 5.992E-04 *(  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  22-JUL-2007 10:28:45 Page    5
 EnergySolutions                  Spectrum name: Win00287.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	9.1738E-01	2.459E-01	2.482E-01
K-40 #	6.3754E+00	1.785E+00	1.801E+00
Ac-228	1.7760E+00	4.314E-01	4.365E-01
Pb-212	1.6229E+00	2.077E-01	2.164E-01
CS-137 #	9.2330E-02	7.539E-02	7.547E-02
Th-234	2.4591E+00	9.508E-01	9.525E-01
Pb-214	1.0664E+00	2.580E-01	2.610E-01
Pb-210 #	1.4297E+00	1.475E+00	1.475E+00
AM-241 #	1.7013E+00	2.827E-01	2.896E-01

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

WI07-0465 D2 Grid A1-2 12 in... Free Rel. 072207

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

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

Total Activity (2.7 to 1999.3 keV) 1.7440481E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fina
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0440 D2 Grid [redacted]-6 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:24:41 Page 1
EnergySolutions Spectrum name: Win00266.An1

Sample description
WI07- 0440 D2 Grid(A1 -3) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00266.An1

Acquisition information
Start time: 21-Jul-2007 12:14:31
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.3910E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.3910E+02) = 4.1824E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:24:41 Page 2
EnergySolutions Spectrum name: Win00266.An1

WI07-0440 D2 Grid A1-3 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1912

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.91	3.91	6786.	23420.	39.033	1.92	2.450	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	184.76	46.37	68.	28.	0.047	108.80	1.048s
AM-241	237.68	59.60	155.	1892.	3.153	5.33	1.003
Th-234	252.71	63.35	6.	40.	0.066	39.25	0.768
Pb-214	298.54	74.81	28.	33.	0.054	58.02	0.917D
Pb-212	298.56	74.81	34.	0.	0.000	286.74	0.493D
Pb-212	307.74	77.11	36.	62.	0.103	37.64	0.919D
Pb-214	307.74	77.11	88.	0.	0.000	238.19	0.373D
Pb-214	348.40	87.27	18.	34.	0.058	56.73	0.369s
Th-234	368.72	92.35	26.	25.	0.042	70.06	0.933D
Ac-228	380.72	95.35	12.	0.	0.001	2283.42	0.935D
Ac-228	838.86	209.86	8.	14.	0.023	88.06	0.555s
Pb-212	953.94	238.62	7.	91.	0.151	22.65	1.057D
Pb-214	967.37	241.98	17.	6.	0.010	218.30	1.060D
Ac-228	1082.06	270.65	4.	18.	0.030	60.86	0.632s

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:24:41 Page 3
EnergySolutions Spectrum name: Win00266.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.81	295.08	2.	30.	0.049	41.25	0.359s
Ac-228	1306.98	326.86	3.	13.	0.022	74.46	0.245s
Ac-228	1352.41	338.22	3.	28.	0.046	46.03	0.561s
Pb-214	1406.27	351.68	0.	50.	0.083	28.28	0.635s
Ac-228	1846.00	461.58	5.	10.	0.017	104.88	0.085s

WI07-0440 D2 Grid A1-3 0-6 in. Free Release 072107

Bi-214	2436.18	609.08	0.	34.	0.057	34.30	0.916s
CS-137	2646.43	661.62	0.	30.	0.050	36.51	0.469s
Bi-214	3071.00	767.73	0.	5.	0.008	89.44	0.250s
Ac-228	3176.00	793.97	0.	4.	0.007	100.00	0.250s
Ac-228	3644.80	911.12	0.	20.	0.033	44.72	0.416s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	3.	0.005	130.94	1.595D
Ac-228	3876.86	969.11	1.	9.	0.014	78.47	1.598D
Bi-214	4479.00	1119.58	0.	5.	0.008	89.44	0.250s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5836.81	1458.85	8.	2.	0.003	509.90	0.220s
Ac-228	6352.00	1587.57	0.	2.	0.003	141.42	0.250s
Bi-214	7060.00	1764.46	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	1.4915E-04	609.31	1.581E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	1.217E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	2.606E-04	+	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	&	2.201E-04	G
Ac-228	N	2.3899E-04	911.07	2.203E-04	?(	1.101E-05	G K
			969.11	1.671E-04	(	4.357E-05	G
			338.32	3.262E-04	?(	3.593E-05	G
			964.60	1.699E-04	(	8.415E-05	G
			794.70	2.352E-04	?(	5.880E-05	G
			463.00	3.898E-04	&(	1.443E-04	G
			209.28	2.962E-04	&(	9.588E-05	G
			270.23	5.624E-04	+	2.234E-04	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:24:41 Page 4
EnergySolutions Spectrum name: Win00266.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.045E-04	X
		327.64	5.362E-04	&	2.516E-04	G
Pb-212	N 2.1621E-04	238.62	2.083E-04	(	1.004E-05	G K
		77.11	2.358E-04	(	3.463E-05	Energy duplication
		74.81	0.000E+00	%	5.675E-05	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 4.9402E-04	92.35	3.125E-04	(	9.635E-05	G
		63.29	7.525E-04	(	7.887E-05	G
Pb-214	N 1.8541E-04	351.92	1.852E-04	(	3.704E-06	G K

```
                WI07-0440  D2  Grid  A1-3  0-6 in. Free Release  072107
                                295.21 1.858E-04  (  1.702E-05          G
                                 77.11 0.000E+00 %   9.041E-05Energy duplication
                                241.98 0.000E+00 %   1.009E-04          G
                                 74.81 3.638E-04 +   1.290E-04Energy duplication
                                 87.30 5.006E-04 +   1.554E-04          X

Pb-210   N   5.7159E-04      46.50 5.716E-04  (  2.485E-04          G

AM-241       3.8955E-03      59.54 3.896E-03  (  3.732E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  21-JUL-2007 12:24:41 Page    5
EnergySolutions                    Spectrum name: Win00266.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        6.2380E-01    2.140E-01    2.152E-01
K-40    <     9.2070E-01
Ac-228        9.9955E-01    3.448E-01    3.469E-01
Pb-212        9.0428E-01    1.986E-01    2.015E-01
CS-137 #      3.4001E-01    1.242E-01    1.248E-01
Th-234        2.0662E+00    8.109E-01    8.123E-01
Pb-214        7.7544E-01    1.939E-01    1.961E-01
Pb-210 #      2.3906E+00    2.601E+00    2.601E+00
AM-241        1.6293E+01    8.678E-01    1.057E+00

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

WI07-0440 D2 Grid A1-3 0-6 in. Free Release 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 2.4392368E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0441 D2 Grid [redacted] 0-6 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:12:25 Page 1
EnergySolutions Spectrum name: Win00267.An1

Sample description
WI07- 0441 D2 Grid (A1 -4) 0-6in. Free Release 072107
7

Spectrum Filename: C:\User\Win00267.An1

Acquisition information
Start time: 21-Jul-2007 12:02:15
Live time: 600
Real time: 602
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.8190E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8190E+02) = 3.5474E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:12:25 Page 2
EnergySolutions Spectrum name: Win00267.An1

WI07-0441 D2 Grid A1-4 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1746

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.83	3.89	4626.	20930.	34.883	1.90	2.347	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.30	46.50	32.	44.	0.073	53.78	1.051
AM-241	237.81	59.63	66.	383.	0.638	13.28	0.997
Th-234	251.61	63.08	33.	32.	0.053	69.35	0.579s
Pb-214	298.54	74.81	48.	58.	0.097	42.77	0.917D
Pb-212	298.56	74.81	59.	0.	0.000	552.27	0.419D
Pb-212	307.74	77.11	40.	87.	0.145	29.84	0.919D
Pb-214	307.74	77.11	96.	0.	0.000	244.71	0.594D
Pb-214	347.37	87.01	51.	37.	0.062	80.02	0.515s
Th-234	370.51	92.80	26.	58.	0.097	40.21	1.095
Ac-228	380.72	95.35	12.	0.	0.000	0.00	0.184D
Ac-228	838.10	209.67	14.	14.	0.023	106.90	0.813
Pb-212	953.94	238.62	17.	129.	0.215	19.86	1.057D
Pb-214	967.37	241.98	28.	18.	0.030	94.09	1.060D
Ac-228	1082.26	270.70	3.	26.	0.044	46.51	0.539s

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:12:25 Page 3
EnergySolutions Spectrum name: Win00267.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.05	295.14	8.	37.	0.062	47.43	0.619s
Ac-228	1300.65	325.28	12.	19.	0.032	86.16	0.472s
Ac-228	1352.90	338.34	7.	40.	0.067	42.28	0.397s
Pb-214	1407.40	351.96	3.	60.	0.100	28.56	1.187
Ac-228	1852.62	463.24	2.	13.	0.021	69.16	0.299s

WI07-0441 D2 Grid A1-4 0-6 in. Free Release 072107

Bi-214	2437.41	609.39	0.	44.	0.073	30.15	1.267
CS-137	2645.55	661.40	0.	22.	0.037	42.64	0.333s
Bi-214	3072.33	768.06	1.	0.	0.001	240.37	0.197s
Ac-228	3179.14	794.75	0.	8.	0.013	70.71	0.375s
Ac-228	3640.19	909.97	10.	4.	0.007	246.46	0.243s
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	0.500D
Ac-228	3877.00	969.14	0.	22.	0.037	42.64	0.552s
Bi-214	4484.00	1120.82	0.	4.	0.007	100.00	0.750s
Bi-214	4953.33	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.84	1460.86	0.	30.	0.050	36.51	0.583s
Ac-228	6354.00	1588.07	0.	5.	0.008	89.44	0.250s
Bi-214	7058.60	1764.11	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	MDA Value microCi	Comments
Bi-214	N	2.0688E-04	609.31	2.046E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	9.733E-05	-	8.206E-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	1.3208E-03	1460.81	1.321E-03	?(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	&	6.608E-05	G K
			969.11	4.272E-04	?	1.389E-04	G
			338.32	4.688E-04	@	1.196E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	4.704E-04	?	2.664E-04	G
			463.00	5.002E-04	?	2.339E-04	G
			209.28	2.962E-04		1.693E-04	G
			270.23	8.175E-04		2.541E-04	G

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:12:25 Page 4
EnergySolutions Spectrum name: Win00267.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	7.262E-04	?	5.376E-04	G
		95.35	0.000E+00	%	1.032E-04	X
		327.64	7.737E-04	&	3.417E-04	G
Pb-212	N 3.0619E-04	238.62	2.958E-04	(	1.471E-05	G K
		77.11	3.319E-04	(	3.634E-05	Energy duplication
		74.81	0.000E+00	%	7.367E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 6.7399E-04	92.35	7.237E-04	(	9.643E-05	G
		63.29	6.033E-04	(	1.654E-04	G
Pb-214	N 2.2827E-04	351.92	2.216E-04	(	1.135E-05	G K

WI07-0441 D2 Grid A1-4 0-6 in. Free Release 072107

			295.21	2.318E-04	@(	2.838E-05		G
			77.11	0.000E+00	%	9.428E-05	Energy	duplication
			241.98	2.524E-04	(	1.101E-04		G
			74.81	6.476E-04	+	1.682E-04	Energy	duplication
			87.30	5.417E-04	+	1.999E-04		X
Pb-210	N	8.9821E-04	46.50	8.982E-04	(	1.738E-04		G
AM-241		7.8865E-04	59.54	7.886E-04	(	2.471E-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		7.3387E-01	2.213E-01	2.230E-01
K-40	#	4.6855E+00	1.711E+00	1.720E+00
Ac-228	B<	2.3440E-01		
Pb-212		1.0862E+00	1.946E-01	1.989E-01
CS-137	#	2.1148E-01	9.018E-02	9.054E-02
Th-234		2.3909E+00	9.583E-01	9.599E-01
Pb-214		8.0976E-01	2.313E-01	2.333E-01
Pb-210		3.1863E+00	1.714E+00	1.715E+00
AM-241		2.7976E+00	3.716E-01	3.858E-01

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

WI07-0441 D2 Grid A1-4 0-6 in. Free Release 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.5901505E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0462 D2 Grid A1-5 2ft.. Free Rel. 072207

Sample description
WI07-0462 D2 Grid A1-5 2ft. Free Rel. 072207

Spectrum Filename: C:\User\Win00284.An1

Acquisition information

Start time:	22-Jul-2007 09:23:47
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:	3.0070E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0070E+02) = 3.3256E+03
Detection limit method:	Traditional ORTEC method

WI07-0462 D2 Grid A1-5 2ft.. Free Rel. 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: 0.1341

********** U N I D E N T I F I E D P E A K S U 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	5599.	9641.	16.068	2.99	0.854	-	D
16.86	4.18	15053.	8499.	14.165	4.62	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	185.58	46.57	37.	19.	0.032	121.60	0.353s
AM-241	235.81	59.13	13.	2.	0.003	586.52	0.511s
Th-234	252.47	63.29	54.	52.	0.087	58.11	0.751
Pb-214	298.54	74.81	71.	100.	0.167	30.98	0.917D
Pb-212	298.56	74.81	116.	0.	0.000	768.11	0.704D
Pb-212	307.74	77.11	87.	189.	0.315	20.19	0.919D
Pb-214	307.74	77.11	255.	0.	0.000	117.15	0.000D
Pb-214	347.63	87.08	85.	71.	0.118	56.11	1.167s
Th-234	368.72	92.35	59.	63.	0.105	42.54	0.933D
Ac-228	380.72	95.35	37.	12.	0.021	148.93	0.935D
Ac-228	835.38	208.99	21.	28.	0.046	74.39	0.694s
Pb-212	953.94	238.62	16.	280.	0.466	12.61	1.057D
Pb-214	967.37	241.98	23.	31.	0.051	57.65	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.27	270.45	10.	39.	0.065	46.53	0.710s
Pb-214	1180.86	295.34	12.	78.	0.129	30.76	1.054s
Ac-228	1304.00	326.12	7.	36.	0.059	46.88	0.394s
Ac-228	1353.70	338.54	12.	72.	0.119	31.53	0.588s
Pb-214	1407.74	352.05	8.	122.	0.203	20.87	1.309

WI07-0462 D2 Grid A1-5 2ft.. Free Rel. 072207

Ac-228	1852.13	463.11	6.	21.	0.036	61.52	0.340s
Bi-214	2437.64	609.44	3.	82.	0.136	23.82	0.960s
CS-137	2648.00	662.02	1.	0.	0.000	0.00	0.000s
Bi-214	3072.33	768.06	2.	1.	0.002	416.33	0.197s
Ac-228	3179.00	794.72	0.	20.	0.033	44.72	0.375s
Ac-228	3646.32	911.50	0.	59.	0.098	26.04	0.814s
Bi-214	3737.44	934.27	0.	9.	0.015	66.67	0.312s
Ac-228	3858.81	964.60	12.	4.	0.007	248.61	1.595D
Ac-228	3876.86	969.11	20.	1.	0.001	1938.74	1.598D
Bi-214	4484.86	1121.04	0.	15.	0.025	51.64	0.500s
Bi-214	4952.00	1237.77	1.	0.	0.000	0.00	0.083s
Bi-214	5512.75	1377.88	0.	4.	0.007	100.00	0.375s
K-40	5845.00	1460.90	26.	0.	0.000	0.00	0.000s
Ac-228	6355.00	1588.32	0.	5.	0.008	89.44	0.375s
Bi-214	7062.25	1765.02	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.8933E-04	609.31	3.806E-04	(	1.426E-05	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	8.745E-04	+	4.637E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	3.694E-04	G
Ac-228	N	7.0676E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.359E-04	G
			338.32	8.379E-04	@(	6.237E-05	G
			964.60	0.000E+00	%	3.802E-04	G
			794.70	1.176E-03	+	4.024E-04	G
			463.00	8.315E-04	?(	1.521E-04	G
			209.28	5.854E-04	?(	1.492E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:33:58 Page 4
EnergySolutions Spectrum name: Win00284.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.218E-03	+	3.253E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	2.393E-04	-	2.006E-04	X
		327.64	1.452E-03	&	3.986E-04	G
Pb-212	N 6.6603E-04	238.62	6.432E-04	(	1.413E-05	G K
		77.11	7.227E-04	(	5.251E-05	Energy duplication
		74.81	0.000E+00	%	1.019E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 8.7465E-04	92.35	7.887E-04	(	1.417E-04	G
		63.29	9.970E-04	?(	2.071E-04	G

```
                WI07-0462  D2  Grid  A1-5  2ft.. Free Rel.  072207
Pb-214   N   4.5848E-04    351.92 4.519E-04  (  1.678E-05        G K
                           295.21 4.855E-04 *(  3.461E-05        G
                            77.11 0.000E+00 ?   1.515E-04Energy duplication
                           241.98 4.222E-04  (  1.019E-04        G
                            74.81 1.120E-03 +   2.120E-04Energy duplication
                            87.30 1.030E-03 +   2.637E-04        X

Pb-210   N   3.9126E-04     46.50 3.913E-04 ?(  1.857E-04        G

AM-241       0.0000E+00     59.54 0.000E+00 %   1.235E-05        G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  22-JUL-2007 09:33:58 Page    5
EnergySolutions                    Spectrum name: Win00284.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        1.2948E+00    3.085E-01    3.123E-01
K-40     <    1.2284E+00
Ac-228        2.3504E+00    6.120E-01    6.183E-01
Pb-212        2.2149E+00    2.637E-01    2.764E-01
CS-137   <    1.8024E-02
Th-234        2.9087E+00    1.047E+00    1.050E+00
Pb-214        1.5247E+00    3.181E-01    3.232E-01
Pb-210 #      1.3012E+00    1.582E+00    1.583E+00
AM-241   <    4.1087E-02

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

WI07-0462 D2 Grid A1-5 2ft.. Free Rel. 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) 1.1594687E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0458 D2 Grid A1-5 6-12 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:04:19 Page 1
EnergySolutions Spectrum name: Win00274.An1

Sample description
WI07- 0458 D2 Grid A1-5 6-12in. Free Rel. 072107

Spectrum Filename: C:\User\Win00274.An1

Acquisition information
Start time: 21-Jul-2007 15:54:08
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: 3.8090E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8090E+02) = 2.6254E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:04:19 Page 2
EnergySolutions Spectrum name: Win00274.An1

WI07-0458 D2 Grid A1-5 6-12 in. Free Release 072107

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1546

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
14.80	3.89	4281.	23139.	38.565	1.73	2.407	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	184.16	46.22	54.	36.	0.061	80.75	0.554s
AM-241	237.21	59.48	85.	525.	0.875	11.11	0.924s
Th-234	252.87	63.39	36.	15.	0.025	136.63	0.456s
Pb-214	298.54	74.81	64.	94.	0.157	31.54	0.917D
Pb-212	298.56	74.81	104.	0.	0.000	2891.37	0.418D
Pb-212	307.74	77.11	63.	140.	0.234	23.20	0.919D
Pb-214	307.74	77.11	224.	0.	0.000	86.07	0.000D
Pb-214	348.30	87.25	37.	50.	0.084	49.35	1.157s
Th-234	368.72	92.35	40.	27.	0.044	77.64	0.933D
Ac-228	380.72	95.35	27.	9.	0.015	171.28	0.935D
Ac-228	839.76	210.09	18.	42.	0.069	52.85	0.371s
Pb-212	953.94	238.62	23.	180.	0.299	16.75	1.057D
Pb-214	967.37	241.98	33.	26.	0.043	74.94	1.060D
Ac-228	1079.85	270.09	13.	35.	0.059	53.13	0.746s

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 16:04:19 Page 3
EnergySolutions Spectrum name: Win00274.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.61	295.03	7.	60.	0.100	31.89	0.658s
Ac-228	1301.53	325.50	8.	6.	0.011	176.08	0.337s
Ac-228	1351.74	338.05	3.	52.	0.087	30.77	0.814s
Pb-214	1406.84	351.82	0.	85.	0.142	21.69	1.583s
Ac-228	1852.05	463.09	0.	23.	0.038	41.70	0.364s

WI07-0458 D2 Grid A1-5 6-12 in. Free Release 072107

Bi-214	2436.41	609.14	0.	68.	0.113	24.25	1.277s
CS-137	2646.50	661.64	0.	34.	0.057	34.30	0.343s
Bi-214	3073.33	768.31	0.	18.	0.030	47.14	0.333s
Ac-228	3179.75	794.90	0.	8.	0.013	70.71	0.375s
Ac-228	3644.64	911.08	0.	33.	0.055	34.82	0.594s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	4.	8.	0.014	95.88	1.595D
Ac-228	3876.86	969.11	6.	22.	0.037	51.73	1.598D
Bi-214	4481.50	1120.20	0.	14.	0.023	53.45	0.312s
Bi-214	4953.33	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5512.50	1377.82	0.	5.	0.008	89.44	0.250s
K-40	5845.84	1461.11	0.	38.	0.063	32.44	0.337s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.67	1764.38	2.	1.	0.002	416.33	0.225s

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

***** S U M M A R Y O F L 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	3.2224E-04	609.31	3.162E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	9.380E-04	+	3.398E-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	?	9.716E-05	G
K-40	N	1.6731E-03	1460.81	1.673E-03	(	4.403E-05	G
Ac-228	N	4.0866E-04	911.07	3.634E-04	?(	1.101E-05	G K
			969.11	4.351E-04	(	7.537E-05	G
			338.32	6.094E-04	+	1.289E-04	G
			964.60	5.107E-04	(	2.022E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	8.781E-04	&	2.407E-04	G
			270.23	1.104E-03	+	3.221E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	1.782E-04	-	1.734E-04	X
		327.64	2.647E-04	&	2.368E-04	G
Pb-212	N 4.1277E-04	238.62	4.128E-04	(	1.691E-05	G K
		77.11	5.377E-04	+	7.908E-05	Energy duplication
		74.81	0.000E+00	%	9.671E-05	Energy duplication
CS-137	9.2136E-05	661.66	9.214E-05	(	2.710E-06	G
Th-234	N 3.1347E-04	92.35	3.329E-04	(	1.184E-04	G
		63.29	2.858E-04	?(	1.715E-04	G
Pb-214	N 3.3782E-04	351.92	3.148E-04	(	3.704E-06	G K

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                WI07-0458  D2  Grid  A1-5  6-12 in. Free Release  072107
                             295.21 3.759E-04  (  2.678E-05          G
                              77.11 0.000E+00 ?   1.422E-04Energy duplication
                             241.98 3.546E-04  (  1.201E-04          G
                              74.81 1.054E-03 +   2.040E-04Energy duplication
                              87.30 7.304E-04 +   1.988E-04          X

Pb-210    N   7.4170E-04      46.50 7.417E-04  (  2.219E-04          G

AM-241        1.0810E-03      59.54 1.081E-03 @(  2.790E-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  21-JUL-2007 16:04:19 Page    5
EnergySolutions                  Spectrum name: Win00274.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 #     8.4599E-01    2.052E-01    2.076E-01
K-40         4.3924E+00    1.425E+00    1.435E+00
Ac-228       1.0729E+00    3.607E-01    3.629E-01
Pb-212       1.0837E+00    1.816E-01    1.861E-01
CS-137       2.4189E-01    8.297E-02    8.348E-02
Th-234       8.2298E-01    6.390E-01    6.393E-01
Pb-214       8.8691E-01    1.924E-01    1.952E-01
Pb-210       1.9472E+00    1.572E+00    1.573E+00
AM-241 #     2.8381E+00    3.154E-01    3.324E-01

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

WI07-0458 D2 Grid A1-5 6-12 in. Free Release 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.4132065E+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 22-JUL-2007 10:08:46 Page 1
EnergySolutions Spectrum name: Win00286.An1

Sample description
WI07-0464 D2 Grid A2-1 4in. Free Rel. 072207

Spectrum Filename: C:\User\Win00286.An1

Acquisition information
Start time: 22-Jul-2007 09:58:34
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: 3.8380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8380E+02) = 2.6055E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 10:08:46 Page 2
EnergySolutions Spectrum name: Win00286.An1

WI07-0464 D2 Grid A2-1 4 in... Free Rel. 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: 0.0919

********** U N I D E N T I F I E D P E A K S U 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	3.35	8323.	13086.	21.810	2.64	0.854	-	D
17.28	4.66	14493.	10907.	18.179	3.66	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	186.70	46.85	21.	53.	0.088	44.17	0.439s
AM-241	237.30	59.50	38.	12.	0.021	164.92	0.679
Th-234	252.70	63.35	57.	36.	0.060	77.65	0.294s
Pb-214	298.54	74.81	68.	92.	0.153	33.01	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	3228.17	0.231D
Pb-212	307.74	77.11	74.	118.	0.196	27.67	0.919D
Pb-214	307.74	77.11	204.	0.	0.000	116.42	0.000D
Pb-214	348.28	87.24	53.	60.	0.100	48.49	0.807
Th-234	368.72	92.35	56.	26.	0.043	90.99	0.933D
Ac-228	380.72	95.35	33.	0.	0.000	7683.33	0.935D
Ac-228	836.65	209.31	24.	21.	0.035	92.89	0.920
Pb-212	953.94	238.62	22.	208.	0.346	15.31	1.057D
Pb-214	967.37	241.98	32.	30.	0.050	64.91	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 10:08:46 Page 3
EnergySolutions Spectrum name: Win00286.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.37	269.97	9.	15.	0.024	92.26	0.417s
Pb-214	1180.58	295.27	8.	69.	0.115	30.26	0.546s
Ac-228	1308.67	327.28	16.	2.	0.004	561.43	0.194s
Ac-228	1352.10	338.14	9.	47.	0.078	38.77	0.684s
Pb-214	1407.08	351.88	0.	92.	0.153	20.85	1.078

WI07-0464 D2 Grid A2-1 4 in... Free Rel. 072207

Ac-228	1852.00	463.08	3.	0.	0.000	0.00	0.000s
Bi-214	2437.71	609.46	5.	73.	0.122	27.52	0.958s
CS-137	2646.94	661.75	0.	30.	0.050	36.51	0.666s
Bi-214	3074.50	768.60	0.	5.	0.008	89.44	0.375s
Ac-228	3178.12	794.50	0.	11.	0.018	60.30	0.500s
Ac-228	3645.88	911.39	4.	60.	0.099	29.16	0.988s
Bi-214	3738.00	934.41	4.	1.	0.002	642.91	0.000s
Ac-228	3858.81	964.60	1.	9.	0.016	69.88	1.595D
Ac-228	3876.86	969.11	1.	31.	0.051	37.89	1.598D
Bi-214	4481.91	1120.30	4.	2.	0.003	316.23	0.195s
Bi-214	4954.33	1238.35	0.	6.	0.010	81.65	0.375s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.33	1460.98	0.	33.	0.055	34.82	0.394s
Ac-228	6355.50	1588.45	0.	4.	0.007	100.00	0.500s
Bi-214	7062.11	1764.99	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.7447E-04	609.31	3.403E-04	@(	1.697E-05	G K
			1764.49	4.626E-04	?(	3.558E-05	G
			1120.29	0.000E+00	%	9.733E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	2.606E-04	-	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	3.597E-04	G
K-40	N	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	6.1277E-04	911.07	6.553E-04	(	3.516E-05	G K
			969.11	5.929E-04	(	4.432E-05	G
			338.32	5.508E-04	?(	5.593E-05	G
			964.60	5.768E-04	(	1.080E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	0.000E+00	?	1.169E-04	G
			209.28	4.479E-04	-	2.116E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	4.582E-04	-	2.326E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.664E-04	X
		327.64	0.000E+00	%	2.722E-04	G
Pb-212	N 4.6960E-04	238.62	4.770E-04	(	1.659E-05	G K
		77.11	4.513E-04	(	4.856E-05	Energy duplication
		74.81	0.000E+00	%	1.037E-04	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 4.7363E-04	92.35	3.223E-04	(	1.386E-04	G
		63.29	6.890E-04	?(	2.129E-04	G

Pb-214	N	3.5290E-04	351.92	3.407E-04	(	3.704E-06		G K
			295.21	4.322E-04	+	8.093E-05		G
			77.11	0.000E+00	?	1.359E-04	Energy duplication	
			241.98	4.133E-04	(	1.179E-04		G
			74.81	1.022E-03	+	2.053E-04	Energy duplication	
			87.30	8.682E-04	+	2.255E-04		X
Pb-210	N	1.0819E-03	46.50	1.082E-03	*(	1.429E-04		G
AM-241		2.5739E-05	59.54	2.574E-05	?(	1.889E-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 #	9.7569E-01	2.685E-01	2.710E-01
K-40 #	3.7856E+00	1.318E+00	1.326E+00
Ac-228	1.5966E+00	3.974E-01	4.019E-01
Pb-212	1.2236E+00	1.873E-01	1.929E-01
CS-137 #	2.1182E-01	7.735E-02	7.777E-02
Th-234	1.2341E+00	7.381E-01	7.387E-01
Pb-214	9.1949E-01	1.917E-01	1.948E-01
Pb-210 #	2.8190E+00	1.245E+00	1.247E+00
AM-241 #C	6.7064E-02	1.106E-01	1.106E-01

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

WI07-0464 D2 Grid A2-1 4 in... Free Rel. 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) 1.2832872E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0463 D2 Grid ~~A2-2~~ A2-2 4 in... Free Rel. 072207

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:53:31 Page 1
EnergySolutions Spectrum name: Win00285.An1

Sample description
WI07-0463 D2 Grid A2-2 4in. Free Rel. 072207

Spectrum Filename: C:\User\Win00285.An1

Acquisition information
Start time: 22-Jul-2007 09:43:21
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: 3.2830E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2830E+02) = 3.0460E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:53:31 Page 2
EnergySolutions Spectrum name: Win00285.An1

WI07-0463 D2 Grid A12-2 4 in... Free Rel. 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: 0.1430

********** U N I D E N T I F I E D P E A K S U 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	3107.	9197.	15.329	2.70	0.854	-	D
18.09	4.48	12216.	7045.	11.741	5.04	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	186.01	46.68	50.	38.	0.064	73.36	0.384s
AM-241	237.54	59.56	77.	233.	0.388	19.53	0.995
Th-234	252.02	63.18	72.	43.	0.071	78.96	0.525s
Pb-214	298.54	74.81	75.	86.	0.143	35.73	0.917D
Pb-212	298.56	74.81	81.	0.	0.000	134.91	0.639D
Pb-212	307.74	77.11	72.	143.	0.238	23.74	0.919D
Pb-214	307.74	77.11	170.	0.	0.000	438.20	0.226D
Pb-214	347.75	87.11	68.	46.	0.078	72.32	0.710
Th-234	368.72	92.35	59.	43.	0.072	58.75	0.933D
Ac-228	380.72	95.35	45.	12.	0.020	164.94	0.935D
Ac-228	836.62	209.30	28.	59.	0.098	47.82	0.664s
Pb-212	953.94	238.62	23.	216.	0.360	15.00	1.057D
Pb-214	967.37	241.98	25.	34.	0.057	53.46	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 09:53:31 Page 3
EnergySolutions Spectrum name: Win00285.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.82	270.09	8.	31.	0.052	50.11	0.467s
Pb-214	1180.96	295.37	3.	57.	0.095	29.45	1.232s
Ac-228	1310.58	327.76	4.	32.	0.052	43.64	0.735s
Ac-228	1353.83	338.57	10.	54.	0.090	36.54	1.573s
Pb-214	1407.00	351.86	10.	80.	0.134	28.08	1.088s

WI07-0463 D2 Grid A12-2 4 in... Free Rel. 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) 1.7459093E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0466 D2 Grid A2-3 (4 in. down) Free Release 072207

Sample description
WI07-0466 D2 Grid A2-3 (4in.down) Free Release 072207

Spectrum Filename: C:\User\Win00290.An1

Acquisition information

Start time:	22-Jul-2007 12:50:48
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:	3.0190E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0190E+02) = 3.3124E+03
Detection limit method:	Traditional ORTEC method

WI07-0466 D2 Grid A2-3 (4 in. down) Free Release 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: 0.0453

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.85	2.92	5351.	11627.	19.378	2.57	0.854	-	D
17.88	4.42	15634.	9502.	15.837	4.25	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.41	46.53	37.	33.	0.056	70.29	0.547s
AM-241	237.44	59.54	67.	618.	1.031	9.74	0.984
Th-234	252.55	63.31	36.	26.	0.043	89.04	0.371s
Pb-214	298.54	74.81	49.	65.	0.109	39.05	0.917D
Pb-212	298.56	74.81	55.	0.	0.000	132.58	0.232D
Pb-212	307.74	77.11	43.	95.	0.159	28.17	0.919D
Pb-214	307.74	77.11	162.	0.	0.000	102.42	0.543D
Pb-214	348.23	87.23	12.	54.	0.091	35.54	0.613s
Th-234	368.72	92.35	45.	35.	0.058	64.15	0.933D
Ac-228	380.72	95.35	17.	1.	0.002	917.45	0.935D
Ac-228	836.61	209.30	15.	21.	0.036	74.35	0.889
Pb-212	953.94	238.62	22.	111.	0.185	22.49	1.057D
Pb-214	967.37	241.98	22.	32.	0.054	53.76	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:00:58 Page 3
EnergySolutions Spectrum name: Win00290.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.93	270.37	3.	24.	0.040	51.06	0.366s
Pb-214	1179.91	295.10	4.	69.	0.114	27.90	1.140s
Ac-228	1310.00	327.62	9.	0.	0.000	0.00	0.000s
Ac-228	1353.72	338.54	3.	30.	0.049	44.77	1.095s
Pb-214	1407.50	351.99	0.	72.	0.120	23.57	1.237

WI07-0466 D2 Grid A2-3 (4 in. down) Free Release 072207

Ac-228	1850.00	462.58	0.	0.	0.001	223.61	0.000s
Bi-214	2437.50	609.41	0.	52.	0.087	27.74	0.958s
CS-137	2645.84	661.48	0.	19.	0.032	45.88	1.687s
Bi-214	3069.50	767.35	0.	6.	0.010	81.65	0.500s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3645.85	911.38	0.	20.	0.033	44.72	0.469s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	5.	0.008	106.47	1.595D
Ac-228	3876.86	969.11	3.	29.	0.048	40.82	1.598D
Bi-214	4483.50	1120.70	0.	17.	0.028	48.51	0.583s
Bi-214	4954.50	1238.39	0.	2.	0.003	141.42	0.500s
Bi-214	5512.50	1377.82	0.	3.	0.005	115.47	0.500s
K-40	5845.45	1461.01	0.	32.	0.053	35.36	0.500s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.33	1764.29	1.	0.	0.001	240.37	0.197s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.5440E-04	609.31	2.418E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	4.137E-04	+	1.546E-04	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	3.127E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.4089E-03	1460.81	1.409E-03	?(	4.403E-05	G
Ac-228	N	2.8026E-04	911.07	2.203E-04	?(	1.101E-05	G K
			969.11	5.629E-04	+	1.654E-04	G
			338.32	3.477E-04	(	3.668E-05	G
			964.60	3.073E-04	(	1.244E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	4.514E-04	?(	1.257E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.446E-04	+	2.457E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.256E-04	X
		327.64	0.000E+00	%	1.975E-04	G
Pb-212	N 2.5463E-04	238.62	2.546E-04	(	1.651E-05	G K
		77.11	3.653E-04	+	6.554E-05	Energy duplication
		74.81	0.000E+00	?	7.125E-05	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	?(	2.710E-06	G
Th-234	N 4.5997E-04	92.35	4.351E-04	(	1.249E-04	G
		63.29	4.953E-04	(	1.715E-04	G

```
          WI07-0466  D2   Grid  A2-3  (4 in. down)  Free Release  072207
Pb-214   N   2.6667E-04    351.92 2.667E-04  (  3.704E-06          G K
                           295.21 4.301E-04 +   7.889E-05          G
                            77.11 0.000E+00 ?   1.215E-04Energy duplication
                           241.98 4.474E-04 +   1.508E-04          G
                            74.81 7.290E-04 +   1.742E-04Energy duplication
                            87.30 7.884E-04 +   1.741E-04          X

Pb-210   N   6.8046E-04     46.50 6.805E-04  (  1.853E-04          G

AM-241       1.2732E-03     59.54 1.273E-03  (  2.483E-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 13:00:58 Page    5
EnergySolutions                    Spectrum name: Win00290.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        8.4265E-01    2.337E-01    2.358E-01
K-40    #     4.6667E+00    1.650E+00    1.659E+00
Ac-228        9.2832E-01    3.353E-01    3.371E-01
Pb-212        8.4344E-01    1.897E-01    1.923E-01
CS-137  #     1.7055E-01    7.825E-02    7.852E-02
Th-234        1.5236E+00    8.360E-01    8.368E-01
Pb-214        8.8329E-01    2.082E-01    2.108E-01
Pb-210        2.2539E+00    1.584E+00    1.585E+00
AM-241        4.2174E+00    4.109E-01    4.395E-01

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

WI07-0466 D2 Grid A2-3 (4 in. down) Free Release 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) 1.6329906E+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 22-JUL-2007 13:15:04 Page 1
EnergySolutions Spectrum name: Win00291.An1

Sample description
WI07-0467 D2 Grid A2-4 (4in. down) Free Release 072207

Spectrum Filename: C:\User\Win00291.An1

Acquisition information
Start time: 22-Jul-2007 13:04:52
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: 3.0990E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0990E+02) = 3.2268E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:15:04 Page 2
EnergySolutions Spectrum name: Win00291.An1

WI07-0467 D2 Grid A2-4 4 in... Free Rel. 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: 0.1628

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.23	3.43	7763.	10691.	17.819	3.03	0.854	-	D
17.98	4.87	9720.	8289.	13.814	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	185.64	46.59	41.	29.	0.048	87.52	0.454s
AM-241	237.33	59.51	65.	623.	1.038	9.49	1.009
Th-234	252.97	63.42	45.	33.	0.054	87.97	0.408s
Pb-214	298.54	74.81	45.	60.	0.099	41.13	0.917D
Pb-212	298.56	74.81	92.	0.	0.000	2937.12	0.306D
Pb-212	307.74	77.11	52.	80.	0.134	33.78	0.919D
Pb-214	307.74	77.11	154.	0.	0.000	123.98	0.000D
Pb-214	346.75	86.86	40.	43.	0.072	64.06	0.545s
Th-234	368.72	92.35	22.	37.	0.061	49.22	0.933D
Ac-228	380.72	95.35	17.	3.	0.004	458.92	0.936D
Ac-228	834.64	208.81	13.	20.	0.034	84.10	0.265s
Pb-212	953.94	238.62	20.	113.	0.188	21.93	1.057D
Pb-214	967.37	241.98	24.	18.	0.031	88.18	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:15:04 Page 3
EnergySolutions Spectrum name: Win00291.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.00	270.63	22.	7.	0.012	237.67	0.000s
Pb-214	1180.62	295.28	6.	47.	0.078	34.31	1.615s
Ac-228	1309.00	327.37	2.	0.	0.001	331.66	0.071s
Ac-228	1353.00	338.36	7.	0.	0.000	0.00	0.000s
Pb-214	1405.95	351.60	4.	68.	0.114	27.32	0.632s

WI07-0467 D2 Grid A2-4 4 in... Free Rel. 072207

Ac-228	1851.41	462.93	0.	22.	0.037	42.64	0.312s
Bi-214	2436.58	609.18	0.	59.	0.098	26.04	1.125
CS-137	2646.65	661.68	0.	31.	0.052	35.92	0.412s
Bi-214	3075.50	768.85	0.	5.	0.008	89.44	0.500s
Ac-228	3179.25	794.78	0.	4.	0.007	100.00	0.375s
Ac-228	3644.65	911.08	0.	26.	0.043	39.22	0.800s
Bi-214	3738.00	934.41	1.	0.	0.000	260.34	0.000s
Ac-228	3858.81	964.60	0.	7.	0.012	75.37	1.595D
Ac-228	3876.86	969.11	0.	14.	0.023	53.41	1.598D
Bi-214	4482.00	1120.33	3.	3.	0.005	216.02	0.000s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.00	1460.90	4.	0.	0.001	538.52	0.000s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7059.57	1764.35	2.	2.	0.004	198.98	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	2.7302E-04	609.31	2.744E-04	(	4.650E-06	G K
			1764.49	8.303E-05	-	1.200E-04	G
			1120.29	0.000E+00	%	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	0.000E+00	%	1.943E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.630E-04	G
Ac-228	N	3.0232E-04	911.07	2.863E-04	?(	1.101E-05	G K
			969.11	2.722E-04	(	1.942E-05	G
			338.32	0.000E+00	?	5.010E-05	G
			964.60	4.347E-04	(	6.173E-05	G
			794.70	2.352E-04	?(	5.880E-05	G
			463.00	8.575E-04	+	2.788E-04	G
			209.28	4.302E-04	@(	1.176E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:15:04 Page 4
EnergySolutions Spectrum name: Win00291.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	2.541E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.318E-04	X
		327.64	0.000E+00	%	1.043E-04	G
Pb-212	N 2.7315E-04	238.62	2.594E-04	(	1.577E-05	G K
		77.11	3.072E-04	(	4.091E-05	Energy duplication
		74.81	0.000E+00	%	9.116E-05	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	?(	2.710E-06	G
Th-234	N 5.2538E-04	92.35	4.573E-04	(	8.989E-05	G
		63.29	6.223E-04	@(	1.912E-04	G

```
                WI07-0467  D2  Grid  A2-4   4 in... Free Rel.  072207
Pb-214    N   2.6526E-04     351.92 2.525E-04 @(  1.227E-05          G K
                             295.21 2.944E-04  (  2.506E-05          G
                              77.11 0.000E+00 ?   1.185E-04Energy duplication
                             241.98 2.540E-04  (  1.022E-04          G
                              74.81 6.655E-04 +   1.674E-04Energy duplication
                              87.30 6.240E-04 +   1.944E-04          X

Pb-210    N   5.8860E-04      46.50 5.886E-04 *(  1.957E-04          G

AM-241        1.2825E-03      59.54 1.282E-03  (  2.456E-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 13:15:04 Page    5
EnergySolutions                    Spectrum name: Win00291.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        8.8099E-01    2.294E-01    2.318E-01
K-40    <     5.2588E-01
Ac-228        9.7556E-01    3.215E-01    3.235E-01
Pb-212        8.8142E-01    1.775E-01    1.805E-01
CS-137 #      2.7108E-01    9.737E-02    9.792E-02
Th-234        1.6953E+00    8.344E-01    8.353E-01
Pb-214        8.5595E-01    2.338E-01    2.360E-01
Pb-210 #      1.8993E+00    1.662E+00    1.663E+00
AM-241        4.1384E+00    3.926E-01    4.214E-01

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

WI07-0467 D2 Grid A2-4 4 in... Free Rel. 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) 1.1598074E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0468 D2 Grid [redacted] 4 in... Free Rel. 072207

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:35:48 Page 1
EnergySolutions Spectrum name: Win00292.An1

Sample description
WI07-0468 D2 Grid A2-5 4in.. Free Release 072207

Spectrum Filename: C:\User\Win00292.An1

Acquisition information
Start time: 22-Jul-2007 13:25:38
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: 3.2150E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2150E+02) = 3.1104E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:35:48 Page 2
EnergySolutions Spectrum name: Win00292.An1

WI07-0468 D2 Grid A2-5 4 in... Free Rel. 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: 0.1784

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.73	2.92	5837.	11543.	19.238	2.64	0.854	-	D
16.80	4.18	15835.	9325.	15.542	4.34	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	186.70	46.85	17.	36.	0.059	53.36	1.078s
AM-241	235.90	59.15	66.	51.	0.085	69.60	0.685s
Th-234	252.56	63.32	61.	28.	0.047	104.80	0.270s
Pb-214	298.54	74.81	57.	73.	0.121	37.62	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	320.16	0.260D
Pb-212	307.74	77.11	52.	146.	0.243	21.72	0.919D
Pb-214	307.74	77.11	169.	0.	0.000	303.15	0.605D
Pb-214	347.77	87.11	46.	62.	0.104	45.99	0.832s
Th-234	368.72	92.35	50.	40.	0.067	58.48	0.933D
Ac-228	380.72	95.35	31.	9.	0.015	184.45	0.935D
Ac-228	836.63	209.30	21.	59.	0.099	43.66	0.465s
Pb-212	953.94	238.62	25.	176.	0.293	17.11	1.057D
Pb-214	967.37	241.98	29.	29.	0.049	63.11	1.060D

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:35:48 Page 3
EnergySolutions Spectrum name: Win00292.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.80	269.83	4.	5.	0.008	151.44	0.322s
Pb-214	1181.08	295.40	8.	44.	0.073	38.92	1.224s
Ac-228	1311.03	327.88	14.	21.	0.035	83.22	0.776s
Ac-228	1352.61	338.27	22.	30.	0.050	74.11	0.542s
Pb-214	1407.79	352.06	18.	92.	0.154	28.29	1.134

WI07-0468 D2 Grid A2-5 4 in... Free Rel. 072207

Ac-228	1852.19	463.13	4.	24.	0.041	51.79	0.738s
Bi-214	2438.30	609.61	0.	73.	0.122	23.41	1.028s
CS-137	2643.90	660.99	11.	7.	0.012	176.51	0.357s
Bi-214	3072.00	767.98	0.	0.	0.000	0.00	0.000s
Ac-228	3179.00	794.72	1.	0.	0.000	0.00	0.000s
Ac-228	3645.44	911.28	0.	50.	0.083	28.28	0.771s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	7.	0.012	79.19	1.595D
Ac-228	3876.86	969.11	3.	29.	0.048	41.23	1.598D
Bi-214	4482.36	1120.42	0.	13.	0.022	55.47	0.500s
Bi-214	4955.43	1238.62	0.	7.	0.012	75.59	0.500s
Bi-214	5511.00	1377.44	0.	2.	0.003	141.42	0.250s
K-40	5845.45	1461.01	0.	40.	0.067	31.62	0.344s
Ac-228	6354.60	1588.22	0.	5.	0.008	89.44	0.375s
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	3.3379E-04	609.31	3.395E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	4.746E-04	+	2.898E-04	G
			768.36	0.000E+00	?	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	5.5567E-04	911.07	5.506E-04	?(	1.101E-05	G K
			969.11	5.590E-04	(	5.988E-05	G
			338.32	3.496E-04	-	1.255E-04	G
			964.60	4.571E-04	(	1.050E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	9.549E-04	+	3.118E-04	G
			209.28	1.252E-03	+	2.784E-04	G

ORTEC g v - i (63) wan32 G53W2.06 22-JUL-2007 13:35:48 Page 4
EnergySolutions Spectrum name: Win00292.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.562E-04	-	1.491E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	1.758E-04	-	1.822E-04	X
		327.64	8.484E-04	+	3.617E-04	G
Pb-212	N 4.0398E-04	238.62	4.040E-04	(	1.751E-05	G K
		77.11	5.577E-04	+	7.812E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	1.8969E-05	661.66	1.897E-05	?(	1.414E-05	G
Th-234	N 5.1886E-04	92.35	5.042E-04	(	1.307E-04	G
		63.29	5.398E-04	?(	2.196E-04	G

```
                WI07-0468  D2  Grid  A2-5   4 in... Free Rel.  072207
Pb-214    N   3.3009E-04    351.92 3.426E-04  (  2.384E-05          G K
                           295.21 2.756E-04 *(  2.838E-05          G
                            77.11 0.000E+00 %   1.241E-04Energy duplication
                           241.98 4.076E-04  (  1.116E-04          G
                            74.81 8.119E-04 +   1.856E-04Energy duplication
                            87.30 9.069E-04 +   2.206E-04          X

Pb-210    N   7.2809E-04     46.50 7.281E-04  (  1.308E-04          G

AM-241        1.0502E-04     59.54 1.050E-04 @(  2.471E-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 13:35:48 Page    5
EnergySolutions                  Spectrum name: Win00292.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 #      1.0382E+00    2.430E-01    2.461E-01
K-40   #      5.4778E+00    1.732E+00    1.744E+00
Ac-228        1.7284E+00    4.889E-01    4.931E-01
Pb-212        1.2566E+00    2.150E-01    2.201E-01
CS-137 #C     5.9002E-02    1.041E-01    1.042E-01
Th-234        1.6139E+00    9.437E-01    9.445E-01
Pb-214        1.0267E+00    2.716E-01    2.743E-01
Pb-210        2.2647E+00    1.208E+00    1.210E+00
AM-241 #      3.2664E-01    2.273E-01    2.277E-01

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

WI07-0468 D2 Grid A2-5 4 in... Free Rel. 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) 1.4791829E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0541 D2 Grid A3-1 1-6 in... Free Rel. 072407

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 14:07:29 Page 1
EnergySolutions Spectrum name: Win00309.An1

Sample description
WI07-0541 D2 Grid A3-1 0-6in. Free Rel. 072407

Spectrum Filename: C:\User\Win00309.An1

Acquisition information
Start time: 24-Jul-2007 13:57:18
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5650E+02) = 2.8050E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 14:07:29 Page 2
EnergySolutions Spectrum name: Win00309.An1

WI07-0541 D2 Grid A3-1 1-6 in... Free Rel. 072407

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1081

********** U N I D E N T I F I E D P E A K S U 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	6760.	12611.	21.018	2.56	0.854	-	D
16.85	4.20	18463.	9589.	15.982	4.50	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.20	46.73	28.	64.	0.108	41.98	0.892s
AM-241	237.12	59.46	50.	28.	0.046	94.20	0.224s
Th-234	252.55	63.31	46.	46.	0.078	59.38	0.701
Pb-214	298.54	74.81	74.	115.	0.191	28.25	0.917D
Pb-212	298.56	74.81	108.	0.	0.000	232.81	0.324D
Pb-212	307.74	77.11	73.	149.	0.248	23.09	0.919D
Pb-214	307.74	77.11	196.	0.	0.000	154.71	0.368D
Pb-214	348.34	87.26	56.	63.	0.104	49.55	0.944s
Th-234	368.72	92.35	64.	59.	0.099	46.17	0.933D
Ac-228	380.72	95.35	29.	8.	0.014	190.46	0.935D
Ac-228	836.37	209.24	21.	41.	0.068	54.54	0.641s
Pb-212	953.94	238.62	16.	249.	0.414	13.49	1.057D
Pb-214	967.37	241.98	43.	27.	0.045	79.58	1.060D

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 14:07:29 Page 3
EnergySolutions Spectrum name: Win00309.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.00	269.88	19.	38.	0.063	56.97	0.312s
Pb-214	1180.45	295.24	5.	59.	0.099	29.17	1.055
Ac-228	1310.84	327.83	5.	16.	0.027	67.70	1.034
Ac-228	1353.34	338.45	7.	62.	0.104	30.65	0.614s
Pb-214	1406.85	351.82	0.	95.	0.158	20.52	1.083

WI07-0541 D2 Grid A3-1 1-6 in... Free Rel. 072407

Ac-228	1849.32	462.41	0.	28.	0.047	37.80	0.500s
Bi-214	2435.83	608.99	5.	76.	0.127	26.56	0.962s
CS-137	2646.41	661.62	0.	22.	0.037	42.64	0.833s
Bi-214	3073.27	768.29	0.	11.	0.018	60.30	0.312s
Ac-228	3180.00	794.97	4.	0.	0.001	685.57	0.000s
Ac-228	3645.51	911.30	0.	45.	0.075	29.81	1.333
Bi-214	3735.00	933.66	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	1.	9.	0.015	70.54	1.595D
Ac-228	3876.86	969.11	0.	40.	0.067	31.55	1.598D
Bi-214	4482.31	1120.40	0.	18.	0.030	47.14	0.875s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5507.00	1376.44	0.	2.	0.003	141.42	0.250s
K-40	5843.28	1460.47	0.	46.	0.077	29.49	1.437s
Ac-228	6354.67	1588.24	1.	0.	0.001	240.37	0.197s
Bi-214	7063.00	1765.21	3.	2.	0.003	389.87	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	3.7540E-04	609.31	3.550E-04	(	1.672E-05	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	4.380E-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	2.164E-04	&	2.771E-04	G
			934.06	2.915E-04	-	2.915E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	(	4.403E-05	G
Ac-228	N	5.2056E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	7.805E-04	+	1.841E-04	G
			338.32	7.305E-04	+	1.437E-04	G
			964.60	5.730E-04	(	1.110E-04	G
			794.70	0.000E+00	%	2.176E-04	G
			463.00	1.091E-03	+	3.118E-04	G
			209.28	8.675E-04	+	2.464E-04	G

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 14:07:29 Page 4
EnergySolutions Spectrum name: Win00309.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.187E-03	+	3.496E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.637E-04	-	1.756E-04	X
		327.64	6.516E-04	?(	1.507E-04	G
Pb-212	N 5.7088E-04	238.62	5.714E-04	(	1.430E-05	G K
		77.11	5.697E-04	(	4.827E-05	Energy duplication
		74.81	0.000E+00	%	9.849E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	(	2.710E-06	G
Th-234	N 7.9937E-04	92.35	7.386E-04	(	1.473E-04	G
		63.29	8.859E-04	$(	1.915E-04	G

```
                WI07-0541  D2  Grid  A3-1   1-6 in... Free Rel.  072407
Pb-214    N   3.5992E-04    351.92 3.519E-04  (  3.704E-06          G K
                           295.21 3.717E-04  (  2.252E-05          G
                            77.11 0.000E+00 &   1.334E-04Energy duplication
                           241.98 3.698E-04  (  1.357E-04          G
                            74.81 1.282E-03 +   2.226E-04Energy duplication
                            87.30 9.094E-04 +   2.312E-04          X

Pb-210    N   1.3167E-03     46.50 1.317E-03 @(  1.647E-04          G

AM-241        5.6626E-05     59.54 5.663E-05 ?(  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
   M - No MDA Calculation                  A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  24-JUL-2007 14:07:29 Page    5
EnergySolutions                  Spectrum name: Win00309.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       1.0530E+00    2.797E-01    2.825E-01
K-40         5.6810E+00    1.675E+00    1.689E+00
Ac-228       1.4602E+00    4.353E-01    4.388E-01
Pb-212       1.6013E+00    2.141E-01    2.224E-01
CS-137       1.6723E-01    7.131E-02    7.159E-02
Th-234       2.2423E+00    8.433E-01    8.449E-01
Pb-214       1.0096E+00    2.072E-01    2.106E-01
Pb-210 #     3.6934E+00    1.550E+00    1.553E+00
AM-241 #     1.5884E-01    1.496E-01    1.497E-01

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

WI07-0541 D2 Grid A3-1 1-6 in... Free Rel. 072407

& - 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) 1.7066851E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0532 D2 Grid [redacted] 1-6 in... Free Rel. 072407

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:17:20 Page 1
EnergySolutions Spectrum name: Win00306.An1

Sample description
WI07-0532 D2 Grid A3-2 0-6in. Free Rel. 072407

Spectrum Filename: C:\User\Win00306.An1

Acquisition information
Start time: 24-Jul-2007 13:07:10
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: 3.8500E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8500E+02) = 2.5974E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:17:20 Page 2
EnergySolutions Spectrum name: Win00306.An1

WI07-0532 D2 Grid A3-2 1-6 in... Free Rel. 072407

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1225

********** U N I D E N T I F I E D P E A K S U 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	2.90	3642.	13322.	22.204	2.15	0.854	-	D
17.67	4.38	16441.	10172.	16.953	4.08	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	186.51	46.81	42.	30.	0.050	81.92	0.279s
AM-241	237.61	59.58	114.	887.	1.478	8.32	0.892
Th-234	254.06	63.69	44.	54.	0.089	52.89	0.379s
Pb-214	298.54	74.81	63.	93.	0.154	32.01	0.917D
Pb-212	298.56	74.81	95.	0.	0.000	190.90	0.223D
Pb-212	307.74	77.11	78.	152.	0.253	23.10	0.919D
Pb-214	307.74	77.11	242.	0.	0.000	89.17	0.231D
Pb-214	347.91	87.15	53.	67.	0.111	48.58	0.489s
Th-234	368.72	92.35	37.	36.	0.061	57.38	0.933D
Ac-228	380.72	95.35	38.	3.	0.006	534.77	0.936D
Ac-228	836.29	209.22	12.	38.	0.064	47.11	0.401s
Pb-212	953.94	238.62	27.	215.	0.358	15.26	1.057D
Pb-214	967.37	241.98	36.	37.	0.062	56.13	1.060D

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:17:20 Page 3
EnergySolutions Spectrum name: Win00306.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.68	270.05	12.	40.	0.067	50.00	1.173s
Pb-214	1180.13	295.16	9.	70.	0.117	31.23	0.701s
Ac-228	1312.91	328.35	8.	32.	0.053	53.03	0.411s
Ac-228	1352.91	338.34	8.	37.	0.062	44.02	0.906s
Pb-214	1406.94	351.85	2.	100.	0.166	20.91	0.810s

WI07-0532 D2 Grid A3-2 1-6 in... Free Rel. 072407

Ac-228	1850.59	462.73	0.	34.	0.057	34.30	0.437s
Bi-214	2437.74	609.47	3.	76.	0.127	24.69	0.806s
CS-137	2645.48	661.38	0.	21.	0.035	43.64	0.500s
Bi-214	3073.80	768.43	0.	7.	0.012	75.59	0.625s
Ac-228	3180.00	794.97	0.	3.	0.005	115.47	0.250s
Ac-228	3645.45	911.28	0.	47.	0.078	29.17	0.666s
Bi-214	3738.50	934.53	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	4.	8.	0.014	98.15	1.595D
Ac-228	3876.86	969.11	3.	27.	0.045	42.38	1.598D
Bi-214	4480.20	1119.88	0.	12.	0.020	57.74	0.375s
Bi-214	4953.00	1238.02	0.	6.	0.010	81.65	0.250s
Bi-214	5508.33	1376.78	0.	5.	0.008	89.44	0.375s
K-40	5843.57	1460.54	0.	42.	0.070	30.86	1.374s
Ac-228	6352.50	1587.70	0.	4.	0.007	100.00	0.500s
Bi-214	7058.29	1764.03	0.	17.	0.028	48.51	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	3.4578E-04	609.31	3.534E-04	(	1.395E-05	G K
			1764.49	6.049E-04	+	2.260E-04	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	4.068E-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	5.410E-04	+	4.005E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	1.8492E-03	1460.81	1.849E-03	?(	4.403E-05	G
Ac-228	N	5.0697E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	5.258E-04	(	5.764E-05	G
			338.32	4.336E-04	@(	5.310E-05	G
			964.60	5.013E-04	(	2.056E-04	G
			794.70	1.764E-04	-	1.764E-04	G
			463.00	1.325E-03	+	3.415E-04	G
			209.28	8.146E-04	+	2.245E-04	G

0

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:17:20 Page 4
EnergySolutions Spectrum name: Win00306.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.250E-03	+	3.346E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.843E-04	X
		327.64	1.303E-03	&	3.852E-04	G
Pb-212	N 5.1866E-04	238.62	4.932E-04	(	1.800E-05	G K
		77.11	5.818E-04	(	4.977E-05	Energy duplication
		74.81	0.000E+00	?	9.258E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	(	2.710E-06	G
Th-234	N 6.8918E-04	92.35	4.551E-04	(	1.131E-04	G
		63.29	1.022E-03	*(	1.892E-04	G

```
                WI07-0532  D2  Grid  A3-2   1-6 in... Free Rel.  072407
Pb-214    N   3.9234E-04    351.92 3.685E-04  (  1.034E-05          G K
                           295.21 4.385E-04 @(  2.989E-05          G
                            77.11 0.000E+00 ?   1.477E-04Energy duplication
                           241.98 5.140E-04 +   1.741E-04          G
                            74.81 1.033E-03 +   2.028E-04Energy duplication
                            87.30 9.674E-04 +   2.322E-04          X

Pb-210    N   6.0901E-04     46.50 6.090E-04  (  1.980E-04          G

AM-241        1.8265E-03     59.54 1.826E-03  (  3.214E-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  24-JUL-2007 13:17:20 Page    5
EnergySolutions                    Spectrum name: Win00306.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       8.9813E-01    2.217E-01    2.243E-01
K-40    #    4.8030E+00    1.482E+00    1.493E+00
Ac-228       1.3168E+00    3.842E-01    3.873E-01
Pb-212       1.3472E+00    1.865E-01    1.932E-01
CS-137       1.4781E-01    6.451E-02    6.476E-02
Th-234       1.7901E+00    6.985E-01    6.997E-01
Pb-214       1.0191E+00    1.915E-01    1.953E-01
Pb-210 #     1.5818E+00    1.296E+00    1.296E+00
AM-241       4.7440E+00    3.948E-01    4.321E-01

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

WI07-0532 D2 Grid A3-2 1-6 in... Free Rel. 072407

& - 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) 1.7648018E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0443 D2 Grid [redacted] 0-6 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:52:23 Page 1
EnergySolutions Spectrum name: Win00269.An1

Sample description
WI07- 0443 D2 Grid (A3 -3) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00269.An1

Acquisition information
Start time: 21-Jul-2007 12:42:11
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: 2.5590E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.5590E+02) = 3.9078E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:52:23 Page 2
EnergySolutions Spectrum name: Win00269.An1

WI07-0443 D2 Grid A3-3 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0894

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.04	3.34	7475.	12419.	20.698	2.66	0.854	-	D
17.03	4.59	12497.	9710.	16.184	3.84	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	186.19	46.73	51.	63.	0.105	51.87	0.758s
AM-241	237.60	59.58	67.	618.	1.030	9.33	0.944
Th-234	252.66	63.34	30.	42.	0.070	57.74	1.144s
Pb-214	298.54	74.81	34.	69.	0.115	33.94	0.917D
Pb-212	298.56	74.81	75.	0.	0.000	280.31	0.270D
Pb-212	307.74	77.11	32.	84.	0.140	29.01	0.919D
Pb-214	307.74	77.11	75.	0.	0.000	594.85	0.000D
Pb-214	348.58	87.32	20.	36.	0.061	50.59	0.365s
Th-234	368.72	92.35	37.	17.	0.029	110.73	0.933D
Ac-228	380.72	95.35	21.	4.	0.007	306.13	0.935D
Ac-228	838.96	209.89	5.	35.	0.058	42.48	1.161s
Pb-212	953.94	238.62	11.	93.	0.154	23.19	1.057D
Pb-214	967.37	241.98	18.	30.	0.051	53.34	1.060D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 12:52:23 Page 3
EnergySolutions Spectrum name: Win00269.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.13	6.	3.	0.005	282.84	0.000s
Pb-214	1181.10	295.40	3.	35.	0.059	38.58	0.380s
Ac-228	1317.33	329.45	0.	7.	0.012	75.59	0.250s
Ac-228	1351.73	338.05	3.	28.	0.047	44.36	0.697s
Pb-214	1407.73	352.04	5.	66.	0.109	28.12	1.337

WI07-0443 D2 Grid A3-3 0-6 in. Free Release 072107

Ac-228	1847.00	461.83	0.	8.	0.013	70.71	0.250s
Bi-214	2437.00	609.28	0.	34.	0.057	34.30	0.600s
CS-137	2648.50	662.14	0.	22.	0.037	42.64	0.625s
Bi-214	3069.33	767.31	0.	5.	0.008	89.44	0.375s
Ac-228	3177.00	794.22	0.	1.	0.002	200.00	0.250s
Ac-228	3644.38	911.01	0.	21.	0.035	43.64	0.625s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	4.	0.007	126.25	1.595D
Ac-228	3876.86	969.11	0.	20.	0.034	44.28	1.598D
Bi-214	4481.11	1120.10	0.	9.	0.015	66.67	0.500s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	2.	0.003	141.42	0.250s
K-40	5844.89	1460.87	0.	20.	0.033	44.72	0.312s
Ac-228	6353.50	1587.95	0.	2.	0.003	141.42	0.500s
Bi-214	7059.00	1764.21	0.	11.	0.018	60.30	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8186E-04	609.31	1.581E-04	(	4.650E-06	G K
			1764.49	3.914E-04	+	1.856E-04	G
			1120.29	2.190E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	2.606E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	8.8056E-04	1460.81	8.806E-04	?(	4.403E-05	G
Ac-228	N	2.9584E-04	911.07	2.313E-04	(	1.101E-05	G K
			969.11	3.961E-04	(	1.942E-05	G
			338.32	3.301E-04	(	3.437E-05	G
			964.60	2.413E-04	(	1.271E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	3.118E-04	&(	3.898E-05	G
			209.28	7.335E-04	&	2.001E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.491E-04	G
		1588.00	2.905E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.462E-04	X
		327.64	2.851E-04	&(	4.072E-05	G
Pb-212	N 2.1292E-04	238.62	2.129E-04	(	1.216E-05	G K
		77.11	3.212E-04	+	6.026E-05	Energy duplication
		74.81	0.000E+00	%	8.246E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	(	2.710E-06	G
Th-234	N 4.5627E-04	92.35	2.147E-04	(	1.134E-04	G
		63.29	8.001E-04	(	1.574E-04	G

```
                WI07-0443  D2  Grid  A3-3  0-6 in. Free Release  072107
Pb-214    N   2.3541E-04    351.92 2.432E-04  (  1.409E-05          G K
                           295.21 2.203E-04 ?(  1.837E-05          G
                            77.11 0.000E+00 %   8.355E-05Energy duplication
                           241.98 4.200E-04 +   1.426E-04          G
                            74.81 7.699E-04 +   1.659E-04Energy duplication
                            87.30 5.297E-04 +   1.610E-04          X

Pb-210    N   1.2861E-03     46.50 1.286E-03 *(  2.166E-04          G

AM-241        1.2722E-03     59.54 1.272E-03  (  2.492E-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  21-JUL-2007 12:52:23 Page    5
EnergySolutions                    Spectrum name: Win00269.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        7.1066E-01    2.438E-01    2.452E-01
K-40    #     3.4410E+00    1.539E+00    1.544E+00
Ac-228        1.1561E+00    3.784E-01    3.808E-01
Pb-212        8.3203E-01    1.929E-01    1.954E-01
CS-137  #     2.3297E-01    9.934E-02    9.974E-02
Th-234        1.7830E+00    1.029E+00    1.030E+00
Pb-214        9.1993E-01    2.196E-01    2.223E-01
Pb-210  #     5.0257E+00    2.607E+00    2.610E+00
AM-241        4.9715E+00    4.638E-01    4.990E-01

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

WI07-0443 D2 Grid A3-3 0-6 in. Free Release 072107

& - 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) 1.9072809E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0444 D2 Grid A3-4 0-6 in. Free Release 072107

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 13:04:47 Page 1
EnergySolutions Spectrum name: Win00270.An1

Sample description
WI07- 0444 D2 Grid (A3 -4) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00270.An1

Acquisition information
Start time: 21-Jul-2007 12:54:35
Live time: 600
Real time: 602
Dead time: 0.32 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2140E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2140E+02) = 3.1114E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 13:04:47 Page 2
EnergySolutions Spectrum name: Win00270.An1

WI07-0444 D2 Grid A3-4 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0718

********** U N I D E N T I F I E D P E A K S U 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	2.90	4352.	12127.	20.212	2.38	0.854	-	D
16.76	4.18	18302.	9598.	15.997	4.48	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.51	46.56	200.	66.	0.110	83.87	1.209s
AM-241	237.43	59.53	142.	839.	1.399	8.86	0.935
Th-234	252.33	63.26	90.	48.	0.080	79.39	0.613s
Pb-214	298.54	74.81	52.	71.	0.118	37.50	0.917D
Pb-212	298.56	74.81	73.	0.	0.000	310.24	0.263D
Pb-212	307.74	77.11	51.	113.	0.188	25.93	0.919D
Pb-214	307.74	77.11	116.	0.	0.000	2115.55	0.266D
Pb-214	347.69	87.10	51.	39.	0.066	76.29	0.777s
Th-234	368.72	92.35	41.	34.	0.057	62.34	0.933D
Ac-228	380.72	95.35	26.	14.	0.023	119.45	0.935D
Ac-228	837.21	209.45	15.	10.	0.016	154.71	0.485s
Pb-212	953.94	238.62	16.	148.	0.247	18.15	1.057D
Pb-214	967.37	241.98	20.	23.	0.038	70.30	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.93	270.36	16.	21.	0.035	88.20	0.651s
Pb-214	1180.32	295.21	2.	44.	0.073	32.85	0.783s
Ac-228	1313.47	328.49	7.	12.	0.020	99.07	0.286s
Ac-228	1352.18	338.16	4.	46.	0.077	35.32	1.001s
Pb-214	1407.30	351.94	6.	63.	0.105	29.61	0.968

WI07-0444 D2 Grid A3-4 0-6 in. Free Release 072107

Ac-228	1853.21	463.38	2.	8.	0.013	93.54	0.418s
Bi-214	2436.92	609.26	0.	36.	0.060	33.33	1.150
CS-137	2645.27	661.33	5.	21.	0.035	59.09	0.294s
Bi-214	3068.25	767.04	4.	1.	0.002	513.57	0.452s
Ac-228	3181.33	795.30	0.	5.	0.008	89.44	0.250s
Ac-228	3644.50	911.04	0.	28.	0.047	37.80	0.708s
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	8.	0.013	92.55	1.595D
Ac-228	3876.86	969.11	2.	19.	0.032	49.01	1.598D
Bi-214	4481.67	1120.24	0.	12.	0.020	57.74	0.500s
Bi-214	4952.00	1237.77	0.	5.	0.008	89.44	0.250s
Bi-214	5512.83	1377.90	4.	2.	0.003	336.65	0.202s
K-40	5845.70	1461.07	0.	28.	0.047	37.80	0.364s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.50	1764.83	0.	3.	0.005	115.47	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	1.6742E-04	609.31	1.674E-04	(	4.650E-06	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	2.920E-04	+	1.320E-04	G
			1238.11	3.390E-04	+	2.509E-04	G
			768.36	0.000E+00	&	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	4.328E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	3.4423E-04	911.07	3.084E-04	?(	1.101E-05	G K
			969.11	3.767E-04	(	4.579E-05	G
			338.32	5.391E-04	+	1.232E-04	G
			964.60	4.696E-04	(	1.694E-04	G
			794.70	2.940E-04	?(	5.880E-05	G
			463.00	3.118E-04	?(	9.984E-05	G
			209.28	2.081E-04	-	1.606E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.613E-04	+	2.848E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.627E-04	(	1.498E-04	X
		327.64	4.887E-04	&(	1.741E-04	G
Pb-212	N 3.4015E-04	238.62	3.402E-04	(	1.428E-05	G K
		77.11	4.329E-04	+	7.127E-05	Energy duplication
		74.81	0.000E+00	%	8.157E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	1.003E-05	G
Th-234	N 6.3001E-04	92.35	4.302E-04	(	1.187E-04	G
		63.29	9.144E-04	$(	2.653E-04	G

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                WI07-0444  D2  Grid  A3-4  0-6 in. Free Release  072107
Pb-214    N   2.5477E-04    351.92 2.333E-04  (  1.481E-05          G K
                           295.21 2.735E-04  (  1.702E-05          G
                            77.11 0.000E+00 %   1.031E-04Energy duplication
                           241.98 3.131E-04  (  9.541E-05          G
                            74.81 7.883E-04 +   1.807E-04Energy duplication
                            87.30 5.708E-04 +   2.021E-04          X

Pb-210    N   1.3473E-03     46.50 1.347E-03  (  4.186E-04          G

AM-241        1.7283E-03     59.54 1.728E-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  21-JUL-2007 13:04:47 Page    5
EnergySolutions                    Spectrum name: Win00270.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        5.2090E-01    1.736E-01    1.747E-01
K-40    #     3.8356E+00    1.450E+00    1.457E+00
Ac-228        1.0710E+00    3.530E-01    3.553E-01
Pb-212        1.0583E+00    1.921E-01    1.961E-01
CS-137  #     1.7706E-01    1.046E-01    1.049E-01
Th-234        1.9602E+00    9.893E-01    9.903E-01
Pb-214        7.9268E-01    2.195E-01    2.215E-01
Pb-210        4.1920E+00    3.516E+00    3.517E+00
AM-241        5.3774E+00    4.764E-01    5.163E-01

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

WI07-0444 D2 Grid A3-4 0-6 in. Free Release 072107

& - 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) 1.8985300E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0533 D2 Grid A3-5 1-6 in... Free Rel. 072407

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:32:44 Page 1
EnergySolutions Spectrum name: Win00307.An1

Sample description
WI07-0533 D2 Grid A3-5 0-6in. Free Rel. 072407

Spectrum Filename: C:\User\Win00307.An1

Acquisition information
Start time: 24-Jul-2007 13:22:34
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: 3.5660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5660E+02) = 2.8043E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:32:44 Page 2
EnergySolutions Spectrum name: Win00307.An1

WI07-0533 D2 Grid A3-5 1-6 in... Free Rel. 072407

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1002

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.63	3.84	4422.	23376.	38.960	1.73	2.193	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	185.31	46.51	35.	36.	0.060	68.64	0.574s
AM-241	237.03	59.43	82.	182.	0.303	24.52	0.930
Th-234	252.41	63.28	62.	58.	0.096	57.81	0.806
Pb-214	298.54	74.81	95.	106.	0.177	32.35	0.917D
Pb-212	298.56	74.81	117.	0.	0.000	284.59	0.000D
Pb-212	307.74	77.11	61.	191.	0.318	18.57	0.919D
Pb-214	307.74	77.11	162.	0.	0.000	258.02	0.332D
Pb-214	347.33	87.00	50.	60.	0.100	49.08	0.624s
Th-234	368.72	92.35	55.	64.	0.107	41.13	0.933D
Ac-228	380.72	95.35	33.	11.	0.018	165.51	0.936D
Ac-228	836.45	209.26	24.	25.	0.042	78.79	0.649s
Pb-212	953.94	238.62	28.	227.	0.378	14.85	1.057D
Pb-214	967.37	241.98	38.	33.	0.056	62.25	1.060D
Ac-228	1078.73	269.82	14.	25.	0.042	67.72	0.489s

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:32:44 Page 3
EnergySolutions Spectrum name: Win00307.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.10	295.40	10.	52.	0.087	34.83	0.772s
Ac-228	1312.22	328.17	11.	8.	0.013	156.46	0.836s
Ac-228	1352.66	338.28	7.	53.	0.088	32.97	1.062
Pb-214	1407.80	352.06	14.	80.	0.133	29.02	1.105
Ac-228	1852.06	463.10	2.	21.	0.035	49.49	0.555s

```
                WI07-0533  D2  Grid  A3-5   1-6 in... Free Rel.  072407
                           295.21 3.257E-04  (  3.132E-05          G
                            77.11 0.000E+00 %   1.215E-04Energy duplication
                           241.98 4.628E-04 +   1.718E-04          G
                            74.81 1.186E-03 +   2.294E-04Energy duplication
                            87.30 8.731E-04 +   2.226E-04          X

Pb-210   N   7.3490E-04     46.50 7.349E-04  (  1.813E-04          G

AM-241       3.7442E-04     59.54 3.744E-04  (  2.745E-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  24-JUL-2007 13:32:44 Page    5
EnergySolutions                    Spectrum name: Win00307.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       7.0288E-01    2.227E-01    2.243E-01
K-40         4.1978E+00    1.440E+00    1.448E+00
Ac-228       1.8525E+00    3.645E-01    3.711E-01
Pb-212       1.4609E+00    2.169E-01    2.238E-01
CS-137 #     1.4439E-01    6.625E-02    6.648E-02
Th-234       2.5851E+00    9.171E-01    9.191E-01
Pb-214       8.5786E-01    1.944E-01    1.971E-01
Pb-210       2.0608E+00    1.415E+00    1.415E+00
AM-241       1.0500E+00    2.574E-01    2.603E-01

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

WI07-0533 D2 Grid A3-5 1-6 in... Free Rel. 072407

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.4912355E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0445 D2 Grid A4-1 0-6 in. Free Release 072107

Sample description
WI07- 0445 D2 Grid (A4-1) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00271.An1

Acquisition information
Start time: 21-Jul-2007 13:07:05
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: 2.8380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8380E+02) = 3.5236E+03
Detection limit method: Traditional ORTEC method

WI07-0445 D2 Grid A4-1 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0751

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.86	3.90	5619.	24825.	41.375	1.75	2.406	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	185.18	46.47	16.	48.	0.079	39.67	1.119s
AM-241	237.30	59.50	20.	177.	0.295	17.76	0.448s
Th-234	251.77	63.12	20.	42.	0.070	50.40	0.862
Pb-214	298.54	74.81	26.	61.	0.102	34.88	0.917D
Pb-212	298.56	74.81	62.	0.	0.000	751.30	0.201D
Pb-212	307.74	77.11	25.	70.	0.117	31.10	0.919D
Pb-214	307.74	77.11	72.	0.	0.000	526.12	0.303D
Pb-214	347.70	87.10	37.	27.	0.045	95.52	0.263s
Th-234	371.47	93.04	37.	38.	0.063	70.15	1.012s
Ac-228	380.72	95.35	12.	0.	0.000	0.00	0.478D
Ac-228	835.27	208.96	11.	10.	0.017	128.32	0.386s
Pb-212	953.94	238.62	5.	122.	0.203	18.81	1.057D
Pb-214	967.37	241.98	18.	23.	0.039	65.26	1.060D
Ac-228	1075.89	269.10	13.	11.	0.018	144.70	0.269s

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 13:17:16 Page 3
EnergySolutions Spectrum name: Win00271.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.06	295.39	4.	38.	0.064	38.26	0.910s
Ac-228	1302.17	325.66	7.	4.	0.006	269.68	0.279s
Ac-228	1354.87	338.83	5.	23.	0.038	57.33	0.700s
Pb-214	1407.40	351.96	6.	40.	0.067	39.06	0.833s
Ac-228	1850.00	462.58	0.	0.	0.001	223.61	0.000s

WI07-0445 D2 Grid A4-1 0-6 in. Free Release 072107

Bi-214	2437.39	609.38	0.	33.	0.055	34.82	1.375
CS-137	2646.33	661.60	0.	24.	0.040	40.82	0.469s
Bi-214	3072.00	767.98	0.	2.	0.003	141.42	0.250s
Ac-228	3177.00	794.22	0.	1.	0.002	200.00	0.250s
Ac-228	3643.50	910.79	2.	0.	0.000	0.00	0.292s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	0.	0.000	0.00	0.218D
Ac-228	3877.72	969.32	0.	18.	0.030	47.14	0.583s
Bi-214	4480.50	1119.95	0.	7.	0.012	75.59	0.500s
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	0.250s
K-40	5847.85	1461.61	0.	29.	0.048	37.14	0.275s
Ac-228	6354.00	1588.07	1.	0.	0.000	0.00	0.000s
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	1.5761E-04	609.31	1.535E-04	(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	1.703E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	1.042E-04	-	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	+	3.649E-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	0.0000E+00	911.07	0.000E+00	?	2.821E-05	G K
			969.11	3.495E-04	?	1.266E-04	G
			338.32	2.656E-04	*	9.376E-05	G
			964.60	0.000E+00	%	1.235E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	0.000E+00	%	7.795E-05	G
			209.28	2.116E-04	?	1.481E-04	G
			270.23	3.333E-04	&	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	&	1.032E-04	X
		327.64	0.000E+00	&	2.125E-04	G
Pb-212	N 2.7669E-04	238.62	2.797E-04	(	8.263E-06	G K
		77.11	2.693E-04	(	2.886E-05	Energy duplication
		74.81	0.000E+00	%	7.544E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	(	2.710E-06	G
Th-234	N 6.0619E-04	92.35	4.700E-04	&(	1.142E-04	G
		63.29	8.001E-04	$(	1.304E-04	G
Pb-214	N 1.8063E-04	351.92	1.494E-04	(	1.446E-05	G K

WI07-0445 D2 Grid A4-1 0-6 in. Free Release 072107

			295.21	2.412E-04	(	2.000E-05		G
			77.11	0.000E+00	%	8.210E-05	Energy duplication	
			241.98	3.243E-04	+	1.323E-04		G
			74.81	6.804E-04	+	1.529E-04	Energy duplication	
			87.30	3.942E-04	+	1.716E-04		X
Pb-210	N	9.6966E-04	46.50	9.697E-04	(	1.279E-04		G
AM-241		3.6447E-04	59.54	3.645E-04	(	1.409E-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 21-JUL-2007 13:17:16 Page 5
EnergySolutions Spectrum name: Win00271.An1

R - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		5.5536E-01	1.934E-01	1.945E-01
K-40	#	4.4990E+00	1.671E+00	1.679E+00
Ac-228	B<	9.9402E-02		
Pb-212		9.7495E-01	1.772E-01	1.809E-01
CS-137		2.2917E-01	9.356E-02	9.397E-02
Th-234		2.1360E+00	9.225E-01	9.238E-01
Pb-214		6.3647E-01	1.740E-01	1.756E-01
Pb-210		3.4167E+00	1.355E+00	1.358E+00
AM-241		1.2842E+00	2.281E-01	2.330E-01

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

WI07-0445 D2 Grid A4-1 0-6 in. Free Release 072107

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.3731817E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-0534 D2 Grid A4-2 1-6 in... Free Rel. 072407

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:52:46 Page 1
EnergySolutions Spectrum name: Win00308.An1

Sample description
WI07-0534 D2 Grid A4-2 0-6in. Free Rel. 072407

Spectrum Filename: C:\User\Win00308.An1

Acquisition information
Start time: 24-Jul-2007 13:42:36
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: 2.8210E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8210E+02) = 3.5448E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:52:46 Page 2
EnergySolutions Spectrum name: Win00308.An1

WI07-0534 D2 Grid A4-2 1-6 in... Free Rel. 072407

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1528

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.62	3.84	4500.	25204.	42.007	1.65	2.204	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	184.64	46.34	38.	36.	0.060	68.04	0.624s
AM-241	237.61	59.58	46.	598.	0.998	9.11	0.918
Th-234	252.25	63.24	15.	3.	0.004	398.43	0.202s
Pb-214	298.54	74.81	51.	47.	0.078	52.30	0.917D
Pb-212	298.56	74.81	71.	0.	0.000	1108.41	0.328D
Pb-212	307.74	77.11	34.	88.	0.147	28.39	0.919D
Pb-214	307.74	77.11	97.	0.	0.000	329.50	0.000D
Pb-214	348.00	87.17	24.	42.	0.070	51.44	1.043s
Th-234	368.72	92.35	36.	29.	0.049	68.46	0.933D
Ac-228	380.72	95.35	18.	0.	0.000	8717.82	0.935D
Ac-228	835.70	209.07	14.	19.	0.031	90.82	0.432s
Pb-212	953.94	238.62	21.	117.	0.196	21.47	1.057D
Pb-214	967.37	241.98	11.	21.	0.035	62.15	1.060D
Ac-228	1079.40	269.98	0.	20.	0.033	44.72	0.333s

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:52:46 Page 3
EnergySolutions Spectrum name: Win00308.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.62	295.03	7.	21.	0.035	63.41	1.406s
Ac-228	1311.75	328.05	3.	3.	0.006	185.47	0.312s
Ac-228	1351.64	338.02	2.	26.	0.043	45.90	0.324s
Pb-214	1406.78	351.81	2.	40.	0.066	34.73	0.528s
Ac-228	1851.87	463.05	2.	9.	0.016	79.54	0.357s

WI07-0534 D2 Grid A4-2 1-6 in... Free Rel. 072407

Bi-214	2436.29	609.11	0.	52.	0.087	27.74	0.464s
CS-137	2645.06	661.28	0.	20.	0.033	44.72	0.312s
Bi-214	3070.00	767.48	0.	2.	0.003	141.42	0.250s
Ac-228	3176.50	794.09	0.	4.	0.007	100.00	0.250s
Ac-228	3645.68	911.34	0.	25.	0.042	40.00	0.833s
Bi-214	3734.78	933.60	1.	1.	0.002	346.41	0.218s
Ac-228	3858.81	964.60	0.	7.	0.011	77.81	1.595D
Ac-228	3876.86	969.11	2.	12.	0.020	67.69	1.598D
Bi-214	4481.00	1120.08	0.	8.	0.013	70.71	0.250s
Bi-214	4953.00	1238.02	0.	0.	0.001	223.61	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.001	223.61	0.100s
K-40	5843.84	1460.61	0.	25.	0.042	40.00	0.469s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7058.17	1764.00	3.	1.	0.002	529.15	0.156s

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

***** S U M M A R Y O F L 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	2.3022E-04	609.31	2.418E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-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	%	2.164E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	1.1007E-03	1460.81	1.101E-03	?(	4.403E-05	G
Ac-228	N	2.8823E-04	911.07	2.753E-04	(	1.101E-05	G K
			969.11	2.304E-04	(	5.096E-05	G
			338.32	2.988E-04	(	3.271E-05	G
			964.60	4.078E-04	(	6.173E-05	G
			794.70	2.352E-04	?(	5.880E-05	G
			463.00	3.638E-04	?(	9.327E-05	G
			209.28	3.985E-04	?(	1.237E-04	G
			270.23	6.248E-04	+	2.138E-04	G

ORTEC g v - i (63) wan32 G53W2.06 24-JUL-2007 13:52:46 Page 4
EnergySolutions Spectrum name: Win00308.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.256E-04	X
		327.64	1.357E-04	-	1.629E-04	G
Pb-212	N 2.8895E-04	238.62	2.696E-04	(	1.597E-05	G K
		77.11	3.368E-04	(	3.355E-05	Energy duplication
		74.81	0.000E+00	%	8.031E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 3.6573E-04	92.35	3.657E-04	(	1.118E-04	G
		63.29	0.000E+00	%	1.242E-04	G
Pb-214	N 1.4168E-04	351.92	1.469E-04	(	1.006E-05	G K

```
                WI07-0534  D2  Grid  A4-2   1-6 in... Free Rel.  072407
                                295.21 1.316E-04 ?(  2.678E-05          G
                                 77.11 0.000E+00 %   9.491E-05Energy duplication
                                241.98 2.915E-04 +   1.177E-04          G
                                 74.81 5.215E-04 +   1.619E-04Energy duplication
                                 87.30 6.119E-04 +   1.741E-04          X

Pb-210    N   7.3490E-04      46.50 7.349E-04 ?(  1.885E-04          G

AM-241        1.2324E-03      59.54 1.232E-03  (  2.070E-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  24-JUL-2007 13:52:46 Page    5
EnergySolutions                    Spectrum name: Win00308.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        8.1611E-01    2.263E-01    2.284E-01
K-40    #     3.9018E+00    1.561E+00    1.568E+00
Ac-228        1.0217E+00    2.879E-01    2.905E-01
Pb-212        1.0243E+00    1.823E-01    1.863E-01
CS-137  #     1.9212E-01    8.592E-02    8.623E-02
Th-234        1.2964E+00    8.876E-01    8.881E-01
Pb-214        5.0225E-01    1.744E-01    1.754E-01
Pb-210  #     2.6051E+00    1.773E+00    1.774E+00
AM-241        4.3686E+00    3.978E-01    4.294E-01

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

WI07-0534 D2 Grid A4-2 1-6 in... Free Rel. 072407

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.5728454E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0446 D2 Grid A4-3 0-6 in. Free Release 072107

Sample description
WI07- 0446 D2 Grid (A4-3) 0-6in. Free Release 072107

Spectrum Filename: C:\User\Win00272.An1

Acquisition information
Start time: 21-Jul-2007 13:20:03
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: 2.1710E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.1710E+02) = 4.6062E+03
Detection limit method: Traditional ORTEC method

WI07-0446 D2 Grid A4-3 0-6 in. Free Release 072107

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1340

********** U N I D E N T I F I E D P E A K S U 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	7747.	14327.	23.879	2.41	0.854	-	D
16.94	4.22	20367.	12132.	20.219	3.79	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	186.02	46.69	15.	31.	0.052	58.95	0.491s
AM-241	237.43	59.53	34.	300.	0.500	13.83	0.816
Th-234	253.61	63.58	8.	24.	0.040	57.74	0.920
Pb-214	298.54	74.81	21.	23.	0.039	69.48	0.917D
Pb-212	298.56	74.81	28.	0.	0.000	324.14	0.297D
Pb-212	307.74	77.11	21.	41.	0.068	44.58	0.919D
Pb-214	307.74	77.11	78.	0.	0.000	152.08	0.000D
Pb-214	347.67	87.09	16.	22.	0.037	76.06	0.301s
Th-234	368.72	92.35	23.	15.	0.025	106.30	0.933D
Ac-228	380.72	95.35	17.	7.	0.012	173.95	0.935D
Ac-228	836.23	209.20	12.	26.	0.043	70.62	0.456s
Pb-212	953.94	238.62	17.	56.	0.093	34.12	1.057D
Pb-214	967.37	241.98	9.	13.	0.022	84.57	1.060D

ORTEC g v - i (63) wan32 G53W2.06 21-JUL-2007 13:30:14 Page 3
EnergySolutions Spectrum name: Win00272.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.00	270.13	10.	3.	0.005	363.11	0.000s
Pb-214	1182.41	295.73	3.	28.	0.046	46.91	0.401s
Ac-228	1310.67	327.79	8.	12.	0.021	99.60	0.272s
Ac-228	1353.41	338.47	2.	24.	0.040	46.49	0.510s
Pb-214	1407.10	351.89	0.	32.	0.053	35.36	1.187

WI07-0446 D2 Grid A4-3 0-6 in. Free Release 072107

Pb-214	N	1.4239E-04	351.92	1.185E-04	?(	3.704E-06	G K
			295.21	1.733E-04	*(	1.961E-05	G
			77.11	0.000E+00	?	8.532E-05	Energy duplication
			241.98	1.816E-04	(	6.553E-05	G
			74.81	2.587E-04	+	1.104E-04	Energy duplication
			87.30	3.192E-04	+	1.340E-04	X
Pb-210	N	6.3283E-04	46.50	6.328E-04	?(	1.225E-04	G
AM-241		6.1774E-04	59.54	6.177E-04	(	1.804E-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 21-JUL-2007 13:30:14 Page 5
EnergySolutions Spectrum name: Win00272.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		4.7228E-01	2.167E-01	2.174E-01
K-40	<	6.0840E-01		
Ac-228		1.0746E+00	3.082E-01	3.108E-01
Pb-212		6.2703E-01	1.760E-01	1.776E-01
CS-137	#	1.9972E-01	9.986E-02	1.001E-01
Th-234		1.3661E+00	7.887E-01	7.894E-01
Pb-214		6.5585E-01	2.251E-01	2.265E-01
Pb-210	#	2.9149E+00	1.718E+00	1.720E+00
AM-241		2.8454E+00	3.935E-01	4.074E-01

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

WI07-0446 D2 Grid A4-3 0-6 in. Free Release 072107

& - 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) 1.0155902E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0817 D2 Grid B0-1 0-6 in. F.R. 080207

Sample description
WI07- 0817 D2 Grid B0-1 0-6

Spectrum Filename: C:\User\Win00474.An1

Acquisition information

Start time:	02-Aug-2007 09:09:40
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:	3.0920E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0920E+02) = 3.2342E+03
Detection limit method:	Traditional ORTEC method

WI07-0817 D2 Grid B0-1 0-6 in. F.R. 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: 0.1198

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.79	2.92	5761.	10332.	17.221	2.86	0.854	-	D
16.91	4.20	15794.	8380.	13.966	4.77	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	48.	29.	0.049	87.42	0.458s
AM-241	235.77	59.12	73.	50.	0.084	74.97	1.007s
Th-234	253.12	63.46	63.	76.	0.127	47.66	0.556s
Pb-214	298.54	74.81	90.	98.	0.164	33.84	0.917D
Pb-212	298.56	74.81	139.	0.	0.000	437.23	0.211D
Pb-212	307.74	77.11	67.	153.	0.255	22.12	0.919D
Pb-214	307.74	77.11	207.	0.	0.000	157.30	0.513D
Pb-214	348.67	87.34	52.	43.	0.072	65.61	0.390s
Th-234	368.72	92.35	56.	21.	0.034	112.36	0.933D
Ac-228	380.72	95.35	37.	18.	0.029	109.20	0.935D
Ac-228	837.50	209.52	21.	34.	0.056	62.84	1.244s
Pb-212	953.94	238.62	57.	176.	0.293	19.34	1.057D
Pb-214	967.37	241.98	42.	13.	0.022	148.71	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:19:51 Page 3
4714781 Spectrum name: Win00474.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.79	270.33	8.	39.	0.065	45.58	0.903s
Pb-214	1180.85	295.34	11.	51.	0.086	37.05	0.717s
Ac-228	1308.89	327.34	13.	22.	0.036	82.28	0.347s
Ac-228	1352.24	338.17	8.	46.	0.078	36.69	0.835s
Pb-214	1407.52	351.99	2.	88.	0.146	22.29	1.481s

WI07-0817 D2 Grid B0-1 0-6 in. F.R. 080207

Ac-228	1852.42	463.18	0.	24.	0.040	40.82	0.916s
Bi-214	2436.53	609.17	0.	62.	0.103	25.40	1.438
CS-137	2646.50	661.64	6.	0.	0.000	0.00	0.292s
Bi-214	3074.37	768.57	1.	3.	0.004	180.28	0.220s
Ac-228	3181.00	795.22	0.	4.	0.007	100.00	0.500s
Ac-228	3645.95	911.41	0.	55.	0.092	26.97	1.458
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	9.	0.015	80.58	1.595D
Ac-228	3876.86	969.11	3.	29.	0.048	40.68	1.598D
Bi-214	4481.81	1120.28	0.	19.	0.032	45.88	0.417s
Bi-214	4953.00	1238.02	0.	12.	0.020	57.74	0.417s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5844.65	1460.81	0.	51.	0.085	28.01	0.458s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7056.06	1763.47	3.	3.	0.005	216.02	0.344s

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

***** S U M M A R Y O F L 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	2.8833E-04	609.31	2.883E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	%	1.423E-04	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	8.135E-04	+	3.677E-04	G
			768.36	1.390E-04	-	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	2.2454E-03	1460.81	2.245E-03	?(	4.403E-05	G
Ac-228	N	5.8759E-04	911.07	6.057E-04	?(	1.101E-05	G K
			969.11	5.643E-04	(	5.776E-05	G
			338.32	5.450E-04	@(	5.163E-05	G
			964.60	5.532E-04	(	1.592E-04	G
			794.70	2.352E-04	-	1.983E-04	G
			463.00	9.355E-04	+	2.902E-04	G
			209.28	7.124E-04	@(	1.492E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:19:51 Page 4
4714781 Spectrum name: Win00474.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.218E-03	+	3.189E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	3.391E-04	-	2.119E-04	X
		327.64	8.823E-04	+	3.617E-04	G
Pb-212	N 4.0459E-04	238.62	4.046E-04	(	2.570E-05	G K
		77.11	5.863E-04	+	8.224E-05	Energy duplication
		74.81	0.000E+00	%	1.112E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	1.084E-05	G
Th-234	N 7.4808E-04	92.35	2.565E-04	(	1.389E-04	G
		63.29	1.448E-03	(	2.236E-04	G

```
                    WI07-0817  D2  Grid  B0-1   0-6 in.   F.R. 080207
Pb-214    N   3.2363E-04     351.92 3.247E-04  (  1.006E-05          G K
                             295.21 3.216E-04  (  3.223E-05          G
                              77.11 0.000E+00 ?   1.367E-04Energy duplication
                             241.98 1.829E-04 -   1.521E-04          G
                              74.81 1.099E-03 +   2.221E-04Energy duplication
                              87.30 6.240E-04 +   2.074E-04          X

Pb-210    N   5.9880E-04      46.50 5.988E-04  (  2.098E-04          G

AM-241        1.0330E-04      59.54 1.033E-04 *(  2.590E-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 09:19:51 Page    5
4714781                          Spectrum name: Win00474.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 #      9.3249E-01    2.369E-01    2.394E-01
K-40   #      7.2620E+00    2.034E+00    2.052E+00
Ac-228        1.9004E+00    4.524E-01    4.580E-01
Pb-212        1.3085E+00    2.531E-01    2.578E-01
CS-137   <    3.5057E-02
Th-234        2.4194E+00    1.153E+00    1.154E+00
Pb-214        1.0467E+00    2.263E-01    2.297E-01
Pb-210        1.9366E+00    1.693E+00    1.694E+00
AM-241 #      3.3409E-01    2.505E-01    2.508E-01

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

WI07-0817 D2 Grid B0-1 0-6 in. F.R. 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) 1.7140162E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0818 D2 Grid B0-2 0-6 in. F.R. 080207

Sample description
WI07- 0818 D2 Grid B0-2 0-6" F.R. 080207

Spectrum Filename: C:\User\D1 Samples\WI07-0606 D1 A-F (BZ) Filli
ng Sludge Bags 072807.An1

Acquisition information
Start time: 02-Aug-2007 09:25:54
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: 3.5920E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5920E+02) =
2.7840E+03

Detection limit method: Traditional ORTEC method

WI07-0818 D2 Grid B0-2 0-6 in. F.R. 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: 0.1088

********** 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	
11.75	2.92	5479.	9477.	15.796	3.02	0.854	-	D
16.87	4.20	14298.	8377.	13.961	4.59	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	184.42	46.28	42.	39.	0.065	68.61	0.673s
AM-241	237.83	59.63	76.	76.	0.126	50.87	0.468s
Th-234	251.65	63.09	50.	46.	0.077	61.87	0.549s
Pb-214	298.54	74.81	67.	94.	0.157	31.95	0.917D
Pb-212	298.56	74.81	103.	0.	0.000	963.79	0.253D
Pb-212	307.74	77.11	58.	190.	0.317	18.37	0.919D
Pb-214	307.74	77.11	162.	0.	0.000	276.29	0.293D
Pb-214	347.36	87.01	37.	39.	0.066	60.85	0.439s
Th-234	368.72	92.35	59.	52.	0.087	50.05	0.933D
Ac-228	380.72	95.35	26.	5.	0.008	334.25	0.935D
Ac-228	837.12	209.43	10.	40.	0.067	45.64	0.369s
Pb-212	953.94	238.62	41.	215.	0.358	16.04	1.057D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:36:04 Page 3
4714781 Spectrum name: WI07-0606 D1 A-F (BZ) Fillin

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	35.	20.	0.033	94.59	1.060D
Ac-228	1080.25	270.20	15.	33.	0.056	60.53	0.505s
Pb-214	1180.23	295.18	8.	83.	0.138	27.13	0.376s
Ac-228	1313.61	328.52	10.	12.	0.020	114.26	0.316s
Ac-228	1353.21	338.42	9.	38.	0.064	42.31	0.542s

WI07-0818 D2 Grid B0-2 0-6 in. F.R. 080207

Pb-214	1407.66	352.03	4.	127.	0.212	18.88	0.982
Ac-228	1853.08	463.35	0.	29.	0.048	37.14	0.350s
Bi-214	2437.73	609.47	0.	90.	0.150	21.08	1.050
CS-137	2646.29	661.59	0.	37.	0.062	32.88	0.937s
Bi-214	3075.00	768.73	0.	1.	0.002	200.00	0.250s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.24	911.23	4.	59.	0.098	30.83	0.356s
Bi-214	3736.67	934.08	0.	15.	0.025	51.64	0.500s
Ac-228	3858.81	964.60	0.	8.	0.014	69.85	1.595D
Ac-228	3876.86	969.11	3.	32.	0.053	38.76	1.598D
Bi-214	4481.80	1120.28	0.	10.	0.017	63.25	0.625s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5511.67	1377.61	1.	0.	0.001	240.37	0.197s
K-40	5844.90	1460.87	0.	59.	0.098	26.04	0.357s
Ac-228	6352.50	1587.70	0.	8.	0.013	70.71	0.500s
Bi-214	7057.25	1763.77	0.	8.	0.013	70.71	0.312s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1854E-04	609.31	4.185E-04	(	4.650E-06	G K
			1764.49	2.847E-04	-	1.612E-04	G
			1120.29	2.433E-04	-	1.217E-04	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	1.457E-03	+	5.830E-04	G
K-40	N	2.5976E-03	1460.81	2.598E-03	(	4.403E-05	G
Ac-228	N	6.4052E-04	911.07	6.461E-04	@(	3.839E-05	G K
			969.11	6.188E-04	(	5.928E-05	G
			338.32	4.492E-04	-	1.196E-04	G
			964.60	5.061E-04	(	6.173E-05	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	1.130E-03	+	3.170E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.464E-04	(	1.058E-04	G
		270.23	1.041E-03	+	3.221E-04	G
		1588.00	1.162E-03	+	6.581E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	4.887E-04	&	2.913E-04	G
Pb-212	N 4.9382E-04	238.62	4.938E-04	(	2.202E-05	G K
		77.11	7.287E-04	+	8.720E-05	Energy duplication
		74.81	0.000E+00	%	9.626E-05	Energy duplication
CS-137	1.0027E-04	661.66	1.003E-04	?(	2.710E-06	G
Th-234	N 7.4461E-04	92.35	6.499E-04	(	1.418E-04	G
		63.29	8.795E-04	$(	2.000E-04	G

WI07-0818 D2 Grid B0-2 0-6 in. F.R. 080207

Pb-214	N	4.9373E-04	351.92	4.716E-04	(	1.205E-05	G K	
			295.21	5.178E-04	@(	2.890E-05	G	
			77.11	0.000E+00	%	1.215E-04	Energy duplication	
			241.98	2.773E-04	-	1.521E-04	G	
			74.81	1.054E-03	+	2.059E-04	Energy duplication	
			87.30	5.708E-04	(	1.317E-04	X	
Pb-210	N	7.9614E-04	46.50	7.961E-04	*(	1.976E-04	G	
AM-241		1.5546E-04	59.54	1.555E-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

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:36:04 Page 5
4714781 Spectrum name: WI07-0606 D1 A-F (BZ) Fillin

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	1.1652E+00	2.456E-01	2.495E-01
K-40	7.2317E+00	1.883E+00	1.902E+00
Ac-228	1.7832E+00	4.326E-01	4.377E-01
Pb-212	1.3748E+00	2.206E-01	2.265E-01
CS-137 #	2.7914E-01	9.178E-02	9.240E-02
Th-234	2.0730E+00	8.249E-01	8.263E-01
Pb-214	1.3745E+00	2.595E-01	2.645E-01
Pb-210 #	2.2164E+00	1.521E+00	1.522E+00
AM-241 #	4.3281E-01	2.202E-01	2.207E-01

\# - All peaks for activity calculation had bad shape.

WI07-0818 D2 Grid B0-2 0-6 in. F.R. 080207

* - 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) 1.7930740E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC- Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0819 D2 Grid B0-3 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:49:41 Page 1
4714781 Spectrum name: Win00476.An1

Sample description
WI07- 0819 D2 Grid B0-3 0-6" F.R. 080207

Spectrum Filename: C:\User\Win00476.An1

Acquisition information
Start time: 02-Aug-2007 09:39:30
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: 3.4070E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4070E+02) = 2.9351E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:49:41 Page 2
4714781 Spectrum name: Win00476.An1

WI07-0819 D2 Grid B0-3 0-6 in. F.R. 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: 0.1345

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.87	2.93	3213.	6051.	10.085	3.69	0.854	-	D
17.73	4.39	8044.	6084.	10.141	4.89	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	184.99	46.43	37.	51.	0.085	50.63	0.518s
AM-241	235.59	59.07	56.	41.	0.068	76.56	2.088s
Th-234	250.71	62.85	70.	33.	0.055	98.91	0.736
Pb-214	298.54	74.81	109.	99.	0.165	35.85	0.917D
Pb-212	298.56	74.81	136.	0.	0.000	534.93	0.435D
Pb-212	307.74	77.11	97.	169.	0.281	22.61	0.920D
Pb-214	307.74	77.11	176.	0.	0.000	583.91	0.374D
Pb-214	347.94	87.16	42.	60.	0.100	44.76	1.482s
Th-234	368.72	92.35	49.	41.	0.069	56.98	0.933D
Ac-228	380.72	95.35	44.	13.	0.022	155.44	0.935D
Ac-228	838.09	209.67	31.	43.	0.072	63.88	0.440s
Pb-212	953.94	238.62	31.	203.	0.338	16.09	1.057D
Pb-214	967.37	241.98	32.	33.	0.056	59.03	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:49:41 Page 3
4714781 Spectrum name: Win00476.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.00	269.38	16.	23.	0.038	78.58	0.625s
Pb-214	1180.49	295.25	17.	85.	0.141	31.44	0.958s
Ac-228	1310.00	327.62	28.	2.	0.003	976.39	0.088s
Ac-228	1353.27	338.43	15.	34.	0.057	57.03	0.422s
Pb-214	1407.78	352.06	8.	117.	0.196	21.18	1.162s

WI07-0819 D2 Grid B0-3 0-6 in. F.R. 080207

Ac-228	1849.49	462.45	8.	33.	0.054	53.28	0.687s
Bi-214	2437.88	609.50	0.	73.	0.122	23.41	1.113s
CS-137	2646.00	661.52	0.	38.	0.063	32.44	0.750s
Bi-214	3073.86	768.44	0.	11.	0.018	60.30	0.750s
Ac-228	3178.30	794.54	0.	12.	0.020	57.74	0.500s
Ac-228	3645.69	911.34	0.	45.	0.075	29.81	0.800s
Bi-214	3731.00	932.66	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	4.	8.	0.013	108.24	1.595D
Ac-228	3876.86	969.11	7.	26.	0.044	47.45	1.598D
Bi-214	4484.10	1120.85	0.	21.	0.035	43.64	1.000s
Bi-214	4950.33	1237.35	1.	5.	0.008	119.52	0.349s
Bi-214	5511.00	1377.44	0.	1.	0.002	200.00	0.250s
K-40	5844.98	1460.89	0.	44.	0.073	30.15	0.625s
Ac-228	6360.00	1589.57	0.	6.	0.010	81.65	0.250s
Bi-214	7063.09	1765.23	0.	20.	0.033	44.72	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	3.3985E-04	609.31	3.395E-04	@(	4.650E-06	G K
			1764.49	7.117E-04	+	2.435E-04	G
			1120.29	5.110E-04	+	1.703E-04	G
			1238.11	3.164E-04	?(	1.497E-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	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	4.7978E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	5.144E-04	(	8.042E-05	G
			338.32	3.985E-04	(	7.032E-05	G
			964.60	4.632E-04	(	2.185E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	1.273E-03	+	3.730E-04	G
			209.28	9.169E-04	+	2.682E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 09:49:41 Page 4
4714781 Spectrum name: Win00476.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.186E-04	&	2.920E-04	G
		1588.00	8.715E-04	&	5.810E-04	G
		95.35	2.491E-04	-	2.155E-04	X
		327.64	0.000E+00	%	3.365E-04	G
Pb-212	N 4.6548E-04	238.62	4.655E-04	(	1.941E-05	G K
		77.11	6.455E-04	+	9.023E-05	Energy duplication
		74.81	0.000E+00	%	1.103E-04	Energy duplication
CS-137	1.0298E-04	661.66	1.030E-04	(	2.710E-06	G
Th-234	N 5.6230E-04	92.35	5.157E-04	(	1.295E-04	G
		63.29	6.287E-04	?(	2.351E-04	G

WI07-0819 D2 Grid B0-3 0-6 in. F.R. 080207

Pb-214	N	4.6642E-04	351.92	4.346E-04	@(	1.647E-05		G K
			295.21	5.304E-04	@(	4.015E-05		G
			77.11	0.000E+00	%	1.265E-04	Energy duplication	
			241.98	4.606E-04	(	1.172E-04		G
			74.81	1.108E-03	+	2.333E-04	Energy duplication	
			87.30	8.682E-04	+	2.146E-04		X
Pb-210	N	1.0445E-03	46.50	1.045E-03	*(	1.857E-04		G
AM-241		8.4425E-05	59.54	8.442E-05	(	2.285E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:
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 09:49:41 Page 5
4714781 Spectrum name: Win00476.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	#	9.9752E-01	2.335E-01	2.365E-01
K-40	#	5.6860E+00	1.714E+00	1.728E+00
Ac-228		1.4082E+00	4.199E-01	4.232E-01
Pb-212		1.3663E+00	2.198E-01	2.257E-01
CS-137		3.0225E-01	9.806E-02	9.874E-02
Th-234		1.6504E+00	9.405E-01	9.413E-01
Pb-214		1.3690E+00	2.899E-01	2.945E-01
Pb-210	#	3.0658E+00	1.552E+00	1.554E+00
AM-241	#	2.4780E-01	1.897E-01	1.899E-01

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

WI07-0819 D2 Grid B0-3 0-6 in. F.R. 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) 1.6093218E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Lunn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0820 D2 Grid B0-4 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:02:15 Page 1
4714781 Spectrum name: Win00477.An1

Sample description
WI07- 0820 D2 Grid B0-4 0-6" F.R. 080207

Spectrum Filename: C:\User\Win00477.An1

Acquisition information
Start time: 02-Aug-2007 09:52:05
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: 3.4510E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4510E+02) = 2.8977E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:02:15 Page 2
4714781 Spectrum name: Win00477.An1

WI07-0820 D2 Grid B0-4 0-6 in. F.R. 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: 0.1157

********** U N I D E N T I F I E D P E A K S U 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	5650.	10494.	17.490	2.81	0.854	-	D
16.37	4.06	13439.	9575.	15.958	3.99	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	184.90	46.40	49.	46.	0.077	70.98	0.353s
AM-241	238.46	59.79	49.	76.	0.127	40.71	0.845
Th-234	252.44	63.29	48.	49.	0.082	57.37	0.522s
Pb-214	298.54	74.81	63.	143.	0.239	22.88	0.917D
Pb-212	298.56	74.81	172.	0.	0.000	706.13	0.327D
Pb-212	307.74	77.11	66.	155.	0.259	21.81	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	3529.40	0.275D
Pb-214	346.93	86.90	53.	69.	0.114	47.34	1.295s
Th-234	368.72	92.35	42.	43.	0.072	52.06	0.933D
Ac-228	380.72	95.35	40.	7.	0.011	275.28	0.935D
Ac-228	836.33	209.23	20.	30.	0.051	62.98	0.932
Pb-212	953.94	238.62	19.	187.	0.312	16.03	1.057D
Pb-214	967.37	241.98	33.	42.	0.070	49.55	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:02:15 Page 3
4714781 Spectrum name: Win00477.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.80	270.08	12.	33.	0.055	54.55	0.813s
Pb-214	1179.83	295.08	12.	60.	0.100	34.64	0.869
Ac-228	1312.87	328.33	9.	21.	0.034	69.64	0.820s
Ac-228	1352.67	338.28	9.	39.	0.066	41.55	0.798s
Pb-214	1407.17	351.90	11.	107.	0.178	23.52	1.023

WI07-0820 D2 Grid B0-4 0-6 in. F.R. 080207

Ac-228	1851.56	462.97	6.	21.	0.036	61.52	0.590s
Bi-214	2438.16	609.57	4.	66.	0.109	29.01	1.140
CS-137	2645.51	661.39	0.	43.	0.072	30.50	1.499
Bi-214	3069.40	767.33	2.	4.	0.007	146.86	0.475s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3646.20	911.47	0.	56.	0.093	26.73	1.285s
Bi-214	3734.78	933.60	1.	1.	0.002	346.41	0.218s
Ac-228	3858.81	964.60	4.	11.	0.018	81.82	1.595D
Ac-228	3876.86	969.11	1.	30.	0.050	38.25	1.598D
Bi-214	4482.67	1120.49	2.	0.	0.001	450.92	0.667s
Bi-214	4954.50	1238.39	0.	6.	0.010	81.65	0.375s
Bi-214	5512.60	1377.84	0.	5.	0.008	89.44	0.312s
K-40	5845.95	1461.13	0.	58.	0.097	26.26	0.949s
Ac-228	6350.00	1587.07	0.	3.	0.005	115.47	0.250s
Bi-214	7061.00	1764.71	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1622E-04	609.31	3.046E-04	(	1.647E-05	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	0.000E+00	%	7.300E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	2.171E-04	&	2.084E-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	%	2.489E-04	G
K-40	N	2.5536E-03	1460.81	2.554E-03	(	4.403E-05	G
Ac-228	N	6.3934E-04	911.07	6.167E-04	(	1.101E-05	G K
			969.11	5.771E-04	(	4.238E-05	G
			338.32	4.610E-04	-	1.208E-04	G
			964.60	6.664E-04	(	2.156E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	8.315E-04	?(	1.521E-04	G
			209.28	6.454E-04	(	1.431E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:02:15 Page 4
4714781 Spectrum name: Win00477.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.031E-03	+	3.124E-04	G
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	8.416E-04	&(	1.975E-04	G
Pb-212	N 4.2999E-04	238.62	4.300E-04	(	1.532E-05	G K
		77.11	5.944E-04	+	8.242E-05	Energy duplication
		74.81	0.000E+00	%	1.232E-04	Energy duplication
CS-137	1.1653E-04	661.66	1.165E-04	(	2.710E-06	G
Th-234	N 7.0475E-04	92.35	5.396E-04	(	1.204E-04	G
		63.29	9.398E-04	(	1.958E-04	G

```
                    WI07-0820  D2  Grid  B0-4   0-6 in.   F.R. 080207
Pb-214    N   3.8934E-04     351.92 3.963E-04  (  1.932E-05         G K
                             295.21 3.759E-04  (  3.398E-05         G
                              77.11 0.000E+00 %   1.145E-04Energy duplication
                             241.98 5.801E-04 +   1.764E-04         G
                              74.81 1.599E-03 +   2.322E-04Energy duplication
                              87.30 9.964E-04 +   2.340E-04         X

Pb-210    N   9.3903E-04      46.50 9.390E-04  (  2.126E-04         G

AM-241        1.5649E-04      59.54 1.565E-04  (  2.144E-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 10:02:15 Page    5
4714781                          Spectrum name: Win00477.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       9.1632E-01    2.658E-01    2.680E-01
K-40         7.3996E+00    1.943E+00    1.963E+00
Ac-228       1.8526E+00    4.525E-01    4.578E-01
Pb-212       1.2460E+00    1.997E-01    2.051E-01
CS-137       3.3766E-01    1.030E-01    1.038E-01
Th-234       2.0422E+00    7.911E-01    7.925E-01
Pb-214       1.1282E+00    2.362E-01    2.399E-01
Pb-210       2.7211E+00    1.931E+00    1.932E+00
AM-241       4.5348E-01    1.846E-01    1.854E-01
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
```

WI07-0820 D2 Grid B0-4 0-6 in. F.R. 080207

C - Area < Critical level.
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) 1.8097078E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fera
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0821 D2 Grid B0-5 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:25:39 Page 1
4714781 Spectrum name: Win00478.An1

Sample description
WI07- 0821 D2 Grid B0-5 0-6" F.R. 080207

Spectrum Filename: C:\User\Win00478.An1

Acquisition information
Start time: 02-Aug-2007 10:15:28
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: 3.1980E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1980E+02) = 3.1270E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:25:39 Page 2
4714781 Spectrum name: Win00478.An1

WI07-0821 D2 Grid B0-5 0-6 in. F.R. 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: 0.0973

********** U N I D E N T I F I E D P E A K S U 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	4917.	8927.	14.879	3.07	0.854	-	D
16.90	4.20	12876.	7770.	12.950	4.71	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.11	46.46	42.	32.	0.053	77.28	0.789
AM-241	238.89	59.90	58.	72.	0.119	46.20	0.521s
Th-234	253.05	63.44	61.	28.	0.047	104.80	0.238s
Pb-214	298.54	74.81	45.	80.	0.133	32.70	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	513.81	0.289D
Pb-212	307.74	77.11	49.	119.	0.198	24.74	0.919D
Pb-214	307.74	77.11	124.	0.	0.000	686.25	0.363D
Pb-214	347.93	87.15	35.	51.	0.086	49.45	0.625s
Th-234	368.72	92.35	37.	16.	0.026	121.77	0.933D
Ac-228	380.72	95.35	33.	5.	0.009	316.12	0.935D
Ac-228	838.69	209.82	18.	28.	0.047	71.43	0.717s
Pb-212	953.94	238.62	21.	132.	0.219	20.06	1.057D
Pb-214	967.37	241.98	22.	41.	0.068	45.47	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:25:39 Page 3
4714781 Spectrum name: Win00478.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.48	270.25	3.	22.	0.036	55.47	0.424s
Pb-214	1179.95	295.11	2.	41.	0.068	33.83	0.490s
Ac-228	1309.98	327.61	8.	14.	0.024	94.64	0.297s
Ac-228	1352.14	338.15	2.	38.	0.062	36.27	0.442s
Pb-214	1408.15	352.15	15.	81.	0.134	30.85	0.885

WI07-0821 D2 Grid B0-5 0-6 in. F.R. 080207

Ac-228	1848.31	462.16	2.	12.	0.020	73.08	0.365s
Bi-214	2436.52	609.16	0.	65.	0.108	24.81	1.354
CS-137	2644.78	661.21	0.	30.	0.050	36.51	0.312s
Bi-214	3079.00	769.73	0.	6.	0.010	81.65	0.375s
Ac-228	3180.00	794.97	0.	11.	0.018	60.30	0.250s
Ac-228	3647.00	911.67	5.	1.	0.002	637.70	0.250s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	5.	3.	0.005	225.61	1.595D
Ac-228	3876.86	969.11	1.	14.	0.023	57.97	1.598D
Bi-214	4482.64	1120.49	0.	15.	0.025	51.64	0.417s
Bi-214	4952.67	1237.93	1.	0.	0.001	240.37	0.197s
Bi-214	5513.00	1377.94	0.	1.	0.002	200.00	0.250s
K-40	5845.00	1460.90	0.	77.	0.128	22.79	0.850s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.53	1764.34	0.	18.	0.030	47.14	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	3.1732E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	6.405E-04	+	2.320E-04	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	3.127E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.3901E-03	1460.81	3.390E-03	(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	4.405E-05	G K
			969.11	2.691E-04		1.165E-04	G
			338.32	4.395E-04		1.108E-04	G
			964.60	0.000E+00	%	2.797E-04	G
			794.70	6.468E-04	?	3.067E-04	G
			463.00	4.612E-04	&	2.267E-04	G
			209.28	5.925E-04	&	2.138E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 10:25:39 Page 4
4714781 Spectrum name: Win00478.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.769E-04	?	2.371E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	5.905E-04	?	2.973E-04	G
Pb-212	N 3.0258E-04	238.62	3.026E-04	(	1.621E-05	G K
		77.11	4.558E-04	+	7.211E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 3.3715E-04	92.35	1.948E-04	(	1.143E-04	G
		63.29	5.398E-04	$(	2.196E-04	G

WI07-0821 D2 Grid B0-5 0-6 in. F.R. 080207

Pb-214	N	2.8414E-04	351.92	2.988E-04	(	2.245E-05		G K
			295.21	2.558E-04	(	1.654E-05		G
			77.11	0.000E+00	%	1.067E-04	Energy duplication	
			241.98	5.619E-04	+	1.623E-04		G
			74.81	8.905E-04	+	1.821E-04	Energy duplication	
			87.30	7.449E-04	+	1.977E-04		X
Pb-210	N	6.4984E-04	46.50	6.498E-04	?(	1.980E-04		G
AM-241		1.4723E-04	59.54	1.472E-04	*(	2.314E-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 10:25:39 Page 5
4714781 Spectrum name: Win00478.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	9.9224E-01	2.461E-01	2.489E-01
K-40	1.0601E+01	2.416E+00	2.449E+00
Ac-228 B<	1.3775E-01		
Pb-212	9.4616E-01	1.898E-01	1.931E-01
CS-137 #	2.5421E-01	9.282E-02	9.333E-02
Th-234	1.0543E+00	8.469E-01	8.472E-01
Pb-214	8.8848E-01	2.034E-01	2.061E-01
Pb-210 #	2.0320E+00	1.570E+00	1.571E+00
AM-241 #	4.6038E-01	2.127E-01	2.134E-01

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

WI07-0821 D2 Grid B0-5 0-6 in. F.R. 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) 1.7228546E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0766 D2 Grid B1-1 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:08:31 Page 1
4714781 Spectrum name: Win00455.An1

Sample description
WI07-0766 D2 Grid B1-1 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00455.An1

Acquisition information
Start time: 01-Aug-2007 07:58:20
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: 3.7110E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7110E+02) = 2.6947E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:08:31 Page 2
4714781 Spectrum name: Win00455.An1

WI07-0766 D2 Grid B1-1 0-6 in. F.R. 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: 0.0709

********** U N I D E N T I F I E D P E A K S U 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	6499.	11981.	19.968	2.64	0.854	-	D
16.73	4.17	16900.	9993.	16.655	4.19	0.855	-	D
2332.75	583.23	3.	91.	0.151	22.46	0.776	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	185.39	46.53	35.	37.	0.062	61.71	0.890
AM-241	237.98	59.67	47.	19.	0.032	124.04	1.001
Th-234	255.01	63.93	88.	42.	0.071	87.88	0.374s
Pb-214	298.54	74.81	93.	141.	0.235	25.59	0.917D
Pb-212	298.56	74.81	142.	0.	0.000	680.00	0.175D
Pb-212	307.74	77.11	79.	218.	0.364	17.77	0.919D
Pb-214	307.74	77.11	274.	0.	0.000	136.40	0.410D
Pb-214	349.07	87.44	68.	55.	0.092	58.52	0.663s
Th-234	371.13	92.95	54.	86.	0.144	37.73	0.809s
Ac-228	380.72	95.35	44.	0.	0.000	0.00	0.935
Ac-228	836.40	209.25	33.	52.	0.087	55.20	0.497s
Pb-212	953.94	238.62	28.	289.	0.482	12.85	1.057D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:08:31 Page 3
4714781 Spectrum name: Win00455.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	44.	37.	0.062	59.52	1.060D
Ac-228	1078.96	269.87	7.	48.	0.080	37.15	0.511s
Pb-214	1181.95	295.61	13.	64.	0.107	33.64	1.229s
Ac-228	1310.99	327.86	10.	13.	0.022	106.59	0.461s
Ac-228	1353.99	338.61	8.	54.	0.091	32.98	1.421s

WI07-0766 D2 Grid B1-1 0-6 in. F.R. 080107

Pb-214	1407.55	352.00	12.	132.	0.219	21.30	1.016
Ac-228	1851.62	462.99	2.	23.	0.038	46.83	1.861s
Bi-214	2437.30	609.36	0.	77.	0.128	22.79	0.875s
CS-137	2640.05	660.03	2.	7.	0.011	114.02	0.300s
Bi-214	3073.12	768.26	0.	17.	0.028	48.51	1.374
Ac-228	3179.00	794.72	2.	0.	0.001	450.92	0.333s
Ac-228	3645.79	911.37	0.	58.	0.097	26.26	0.750s
Bi-214	3737.00	934.16	0.	0.	0.001	223.61	0.000s
Ac-228	3858.81	964.60	2.	8.	0.014	80.10	1.595D
Ac-228	3876.86	969.11	0.	37.	0.061	33.28	1.598D
Bi-214	4480.00	1119.83	3.	1.	0.002	529.15	0.255s
Bi-214	4950.78	1237.46	1.	1.	0.002	346.41	0.217s
Bi-214	5511.67	1377.61	1.	0.	0.001	240.37	0.197s
K-40	5845.67	1461.06	0.	54.	0.090	27.22	1.249s
Ac-228	6350.00	1587.07	0.	4.	0.007	100.00	0.250s
Bi-214	7056.67	1763.63	4.	2.	0.002	401.85	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	3.5808E-04	609.31	3.581E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	0.000E+00	%	8.206E-05	G
			1238.11	0.000E+00	%	1.737E-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	2.3775E-03	1460.81	2.377E-03	(	4.403E-05	G
Ac-228	N	6.3983E-04	911.07	6.388E-04	?(	1.101E-05	G K
			969.11	7.126E-04	(	2.761E-05	G
			338.32	6.387E-04	@(	5.163E-05	G
			964.60	5.232E-04	(	1.430E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	8.965E-04	+	2.958E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:08:31 Page 4
4714781 Spectrum name: Win00455.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.100E-03	+	2.867E-04	G
		270.23	1.500E-03	+	3.437E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00		1.906E-04	X
		327.64	5.294E-04	?(	2.036E-04	G
Pb-212	N 6.6425E-04	238.62	6.642E-04	(	1.832E-05	G K
		77.11	8.353E-04	+	9.524E-05	Energy duplication
		74.81	0.000E+00	%	1.124E-04	Energy duplication
CS-137	1.8066E-05	661.66	1.807E-05	&(	7.364E-06	G
Th-234	N 9.6680E-04	92.35	1.077E-03	&(	1.357E-04	G
		63.29	8.097E-04	&(	2.617E-04	G

```
Pb-214   N   4.6546E-04    351.92 4.870E-04  (  2.046E-05          G K
                           295.21 4.030E-04 *(  3.482E-05          G
                            77.11 0.000E+00 ?   1.571E-04Energy duplication
                           241.98 5.184E-04  (  1.361E-04          G
                            74.81 1.577E-03 +   2.471E-04Energy duplication
                            87.30 7.981E-04 +   2.350E-04          X

Pb-210   N   7.5531E-04     46.50 7.553E-04  (  1.813E-04          G

AM-241       3.9810E-05     59.54 3.981E-05  (  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

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:08:31 Page 5
4714781 Spectrum name: Win00455.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	9.6493E-01	2.199E-01	2.229E-01
K-40	6.4066E+00	1.744E+00	1.760E+00
Ac-228	1.7241E+00	4.528E-01	4.574E-01
Pb-212	1.7899E+00	2.299E-01	2.395E-01
CS-137 #	4.8682E-02	5.551E-02	5.554E-02
Th-234 #	2.6052E+00	9.829E-01	9.847E-01
Pb-214	1.2543E+00	2.671E-01	2.712E-01
Pb-210	2.0353E+00	1.256E+00	1.257E+00
AM-241	1.0728E-01	1.331E-01	1.331E-01

- All peaks for activity calculation had bad shape.

WI07-0766 D2 Grid B1-1 0-6 in. F.R. 080107

* - 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) 1.6936432E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0768 D2 Grid B1-2 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:22:33 Page 1
4714781 Spectrum name: Win00456.An1

Sample description
WI07-0768 D2 Grid B1-2 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00456.An1

Acquisition information
Start time: 01-Aug-2007 08:12:22
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: 3.8970E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8970E+02) = 2.5661E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:22:33 Page 2
4714781 Spectrum name: Win00456.An1

WI07-0768 D2 Grid B1-2 0-6 in. F.R. 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: 0.1167

********** U N I D E N T I F I E D P E A K S U 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	2.94	4759.	10271.	17.119	2.74	0.854	-	D
18.54	4.61	12062.	7773.	12.955	4.60	0.856	-	D
372.15	93.10	85.	66.	0.110	46.78	0.933	U-235	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	187.68	47.10	86.	50.	0.083	73.97	0.794
AM-241	240.16	60.22	54.	14.	0.023	174.38	0.293s
Th-234	252.24	63.23	111.	97.	0.162	47.96	0.546s
Pb-214	298.54	74.81	120.	83.	0.139	43.07	0.917D
Pb-212	298.56	74.81	122.	0.	0.000	3130.50	0.135D
Pb-212	307.74	77.11	107.	226.	0.377	18.56	0.919D
Pb-214	307.74	77.11	386.	0.	0.000	68.95	0.259D
Pb-214	348.67	87.34	80.	99.	0.165	40.01	1.035s
Th-234	368.72	92.35	126.	12.	0.020	277.10	0.933D
Ac-228	380.72	95.35	58.	15.	0.025	155.40	0.935D
Ac-228	838.74	209.83	43.	34.	0.057	80.46	1.036
Pb-212	953.94	238.62	35.	276.	0.459	13.51	1.057D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:22:33 Page 3
4714781 Spectrum name: Win00456.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	53.	41.	0.069	58.62	1.060D
Ac-228	1079.98	270.13	11.	37.	0.061	48.82	0.826
Pb-214	1180.29	295.20	10.	93.	0.155	25.11	1.095s
Ac-228	1311.99	328.11	22.	34.	0.056	66.41	0.297s
Ac-228	1353.06	338.38	16.	54.	0.089	38.75	0.625s

WI07-0768 D2 Grid B1-2 0-6 in. F.R. 080107

Pb-214	1407.42	351.96	11.	129.	0.215	20.82	1.207s
Ac-228	1851.25	462.89	12.	28.	0.047	64.35	0.329s
Bi-214	2437.62	609.44	6.	78.	0.129	26.27	0.778s
CS-137	2646.86	661.73	0.	25.	0.042	40.00	0.469s
Bi-214	3074.19	768.52	0.	23.	0.038	41.70	0.312s
Ac-228	3178.25	794.53	0.	15.	0.025	51.64	0.375s
Ac-228	3645.62	911.32	0.	71.	0.118	23.74	1.187s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	6.	18.	0.030	62.14	1.595D
Ac-228	3876.86	969.11	10.	41.	0.069	37.89	1.598D
Bi-214	4482.67	1120.49	0.	21.	0.035	43.64	0.875s
Bi-214	4954.08	1238.29	0.	14.	0.023	53.45	0.500s
Bi-214	5511.33	1377.53	0.	3.	0.005	115.47	0.375s
K-40	5845.88	1461.12	0.	51.	0.085	28.01	0.625s
Ac-228	6356.00	1588.57	0.	9.	0.015	66.67	0.250s
Bi-214	7056.00	1763.46	3.	2.	0.003	308.22	0.209s

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

***** S U M M A R Y O F L 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	3.5820E-04	609.31	3.612E-04	(	1.904E-05	G K
			1764.49	0.000E+00	&	1.317E-04	G
			1120.29	5.110E-04	+	1.703E-04	G
			1238.11	9.491E-04	+	3.942E-04	G
			768.36	1.199E-03	+	3.804E-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	2.2454E-03	1460.81	2.245E-03	(	4.403E-05	G
Ac-228	N	7.9144E-04	911.07	7.819E-04	(	1.101E-05	G K
			969.11	7.995E-04	(	9.634E-05	G
			338.32	6.289E-04	-	1.447E-04	G
			964.60	1.093E-03	+	4.596E-04	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	1.111E-03	+	3.687E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 08:22:33 Page 4
4714781 Spectrum name: Win00456.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.265E-04	&(	2.063E-04	G
		270.23	1.146E-03	+	3.221E-04	G
		1588.00	1.307E-03	+	6.931E-04	G
		95.35	2.840E-04	-	2.426E-04	X
		327.64	1.378E-03	+	4.518E-04	G
Pb-212	N 6.3314E-04	238.62	6.331E-04	(	2.055E-05	G K
		77.11	8.652E-04	+	1.007E-04	Energy duplication
		74.81	0.000E+00	%	1.045E-04	Energy duplication
CS-137	6.7747E-05	661.66	6.775E-05	?(	2.710E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	2.136E-04	G
		63.29	1.848E-03	?	3.982E-04	G

WI07-0768 D2 Grid B1-2 0-6 in. F.R. 080107

Pb-214	N	5.2024E-04	351.92	4.778E-04	(	1.932E-05	G K
			295.21	5.826E-04	@(	3.132E-05	G
			77.11	0.000E+00	?	1.857E-04	Energy duplication
			241.98	5.713E-04	(	1.490E-04	G
			74.81	9.307E-04	+	2.305E-04	Energy duplication
			87.30	1.437E-03	+	2.819E-04	X
Pb-210	N	1.0139E-03	46.50	1.014E-03	&(	2.786E-04	G
AM-241		2.8828E-05	59.54	2.883E-05	&(	2.245E-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 01-AUG-2007 08:22:33 Page 5
4714781 Spectrum name: Win00456.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	9.1917E-01	2.414E-01	2.439E-01
K-40	5.7619E+00	1.614E+00	1.628E+00
Ac-228	2.0309E+00	4.820E-01	4.880E-01
Pb-212	1.6247E+00	2.195E-01	2.278E-01
CS-137 #	1.7384E-01	6.954E-02	6.985E-02
Th-234 <	5.4815E-01		
Pb-214	1.3350E+00	2.779E-01	2.824E-01
Pb-210	2.6017E+00	1.925E+00	1.925E+00
AM-241 #C	7.3975E-02	1.290E-01	1.290E-01

\# - All peaks for activity calculation had bad shape.

WI07-0768 D2 Grid B1-2 0-6 in. F.R. 080107

* - 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) 1.4521168E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0765 D2 Grid B1-3 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:52:20 Page 1
4714781 Spectrum name: Win00454.An1

Sample description
WI07-0765 D2 Grid B1-3 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00454.An1

Acquisition information
Start time: 01-Aug-2007 07:42:09
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: 3.8920E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8920E+02) = 2.5694E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:52:20 Page 2
4714781 Spectrum name: Win00454.An1

WI07-0765 D2 Grid B1-3 0-6 in. F.R. 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: 0.1428

********** U N I D E N T I F I E D P E A K S U 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	5190.	23938.	39.897	1.77	2.194	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	184.71	46.36	35.	44.	0.073	58.65	0.936s
AM-241	232.13	58.21	66.	23.	0.038	129.27	0.326s
Th-234	250.66	62.84	85.	58.	0.097	65.02	1.004s
Pb-214	298.54	74.81	92.	162.	0.270	23.01	0.917D
Pb-212	298.56	74.81	164.	0.	0.000	1212.89	0.000D
Pb-212	307.74	77.11	88.	202.	0.337	19.19	0.919D
Pb-214	307.74	77.11	328.	0.	0.000	67.79	0.304D
Pb-214	347.67	87.09	88.	58.	0.097	65.29	0.499s
Th-234	368.72	92.35	69.	67.	0.112	42.49	0.933D
Ac-228	380.72	95.35	42.	9.	0.016	206.56	0.935D
Ac-228	835.36	208.99	21.	36.	0.060	57.20	1.348s
Pb-212	953.94	238.62	18.	277.	0.462	12.77	1.057D
Pb-214	967.37	241.98	38.	41.	0.069	52.56	1.060D
Ac-228	1078.91	269.86	7.	47.	0.078	37.70	0.374s

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:52:20 Page 3
4714781 Spectrum name: Win00454.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.10	295.40	7.	74.	0.123	27.76	0.952
Ac-228	1314.68	328.79	9.	25.	0.042	62.48	0.476s
Ac-228	1353.23	338.42	6.	63.	0.105	28.57	1.046
Pb-214	1407.01	351.86	23.	134.	0.223	22.93	0.840s
Ac-228	1852.18	463.13	3.	19.	0.032	57.18	0.948s

WI07-0765 D2 Grid B1-3 0-6 in. F.R. 080107

Bi-214	2437.65	609.45	7.	91.	0.151	24.65	0.722s
CS-137	2636.98	659.26	3.	11.	0.019	81.08	0.246s
Bi-214	3072.29	768.05	0.	7.	0.012	75.59	0.500s
Ac-228	3175.00	793.72	8.	4.	0.006	343.25	0.000s
Ac-228	3645.84	911.38	0.	49.	0.082	28.57	0.607s
Bi-214	3738.00	934.41	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	6.	10.	0.017	94.49	1.595D
Ac-228	3876.86	969.11	4.	27.	0.044	44.97	1.598D
Bi-214	4482.50	1120.45	0.	18.	0.030	47.14	0.292s
Bi-214	4952.17	1237.81	0.	6.	0.010	81.65	0.312s
Bi-214	5511.67	1377.61	1.	0.	0.001	240.37	0.197s
K-40	5846.04	1461.16	0.	50.	0.083	28.28	1.374s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	4.	1.	0.002	642.91	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	4.1987E-04	609.31	4.216E-04	?(	2.029E-05	G K
			1764.49	0.000E+00	%	1.317E-04	G
			1120.29	4.380E-04	?(	2.433E-05	G
			1238.11	4.068E-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	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	?(	4.403E-05	G
Ac-228	N	5.9880E-04	911.07	5.396E-04	?(	1.101E-05	G K
			969.11	5.146E-04	(	6.876E-05	G
			338.32	7.383E-04	(	4.688E-05	G
			964.60	6.137E-04	(	2.479E-04	G
			794.70	0.000E+00	&	3.189E-04	G
			463.00	7.471E-04	(	1.143E-04	G
			209.28	7.617E-04	(	1.481E-04	G
			270.23	1.468E-03	+	3.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:52:20 Page 4
4714781 Spectrum name: Win00454.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.044E-04	X
		327.64	1.018E-03	&	3.568E-04	G
Pb-212	N 6.3681E-04	238.62	6.368E-04	(	1.495E-05	G K
		77.11	7.752E-04	+	9.413E-05	Energy duplication
		74.81	0.000E+00	%	1.206E-04	Energy duplication
CS-137	3.0712E-05	661.66	3.071E-05	&(	7.758E-06	G
Th-234	N 9.4943E-04	92.35	8.402E-04	(	1.526E-04	G
		63.29	1.105E-03	*(	2.581E-04	G
Pb-214	N 4.9424E-04	351.92	4.951E-04	(	2.722E-05	G K

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                    WI07-0765  D2  Grid  B1-3   0-6 in.   F.R. 080107
                              295.21 4.636E-04  (  2.678E-05          G
                               77.11 0.000E+00 ?   1.714E-04Energy duplication
                              241.98 5.688E-04  (  1.274E-04          G
                               74.81 1.805E-03 +   2.572E-04Energy duplication
                               87.30 8.489E-04 +   2.553E-04          X

Pb-210    N   8.9821E-04      46.50 8.982E-04  (  1.813E-04          G

AM-241        4.7360E-05      59.54 4.736E-05 &(  2.471E-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 07:52:20 Page    5
4714781                          Spectrum name: Win00454.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 #     1.0788E+00    2.659E-01    2.690E-01
K-40   #     5.6562E+00    1.600E+00    1.614E+00
Ac-228       1.5386E+00    3.546E-01    3.593E-01
Pb-212       1.6362E+00    2.089E-01    2.177E-01
CS-137 #     7.8911E-02    6.398E-02    6.405E-02
Th-234       2.4394E+00    9.473E-01    9.490E-01
Pb-214       1.2699E+00    2.697E-01    2.738E-01
Pb-210 #     2.3078E+00    1.354E+00    1.355E+00
AM-241 #     1.2169E-01    1.573E-01    1.574E-01

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

WI07-0765 D2 Grid B1-3 0-6 in. F.R. 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) 1.6127487E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0764 D2 Grid B1-4 0-6 in. F.R.080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:36:35 Page 1
4714781 Spectrum name: Win00453.An1

Sample description
WI07-0764 D2 Grid B1-4 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00453.An1

Acquisition information
Start time: 01-Aug-2007 07:26:23
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: 3.7970E+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 01-AUG-2007 07:36:35 Page 2
4714781 Spectrum name: Win00453.An1

WI07-0764 D2 Grid B1-4 0-6 in. F.R.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: 0.1615

********** U N I D E N T I F I E D P E A K S U 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	2.92	6165.	12863.	21.438	2.47	0.854	-	D
17.10	4.26	15501.	9612.	16.020	4.19	0.855	-	D
252.67	63.34	70.	49.	0.082	63.68	0.487	PA-234	s
2332.93	583.27	0.	97.	0.162	20.31	0.750	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	28.	36.	0.060	62.41	0.562s
AM-241	236.80	59.38	33.	15.	0.026	121.04	0.957
Th-234	252.63	63.33	119.	0.	0.000	0.00	0.907
Pb-214	298.54	74.81	91.	106.	0.176	32.14	0.917D
Pb-212	298.56	74.81	106.	0.	0.000	236.05	0.504D
Pb-212	307.74	77.11	83.	224.	0.373	17.66	0.919D
Pb-214	307.74	77.11	279.	0.	0.000	123.77	0.384D
Pb-214	348.01	87.17	54.	80.	0.133	38.89	1.111
Th-234	368.72	92.35	61.	59.	0.098	45.86	0.933D
Ac-228	380.72	95.35	45.	3.	0.005	629.85	0.936D
Ac-228	835.27	208.96	29.	33.	0.054	72.50	0.511s

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:36:35 Page 3
4714781 Spectrum name: Win00453.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	953.94	238.62	34.	286.	0.477	13.14	1.057D
Pb-214	967.37	241.98	47.	45.	0.075	52.11	1.060D
Ac-228	1079.39	269.98	36.	34.	0.057	78.48	0.356s
Pb-214	1180.98	295.37	13.	101.	0.169	24.50	1.166
Ac-228	1311.88	328.09	4.	21.	0.036	52.80	0.819s

WI07-0764 D2 Grid B1-4 0-6 in. F.R.080107

Ac-228	1353.70	338.54	12.	60.	0.099	34.16	0.752s
Pb-214	1407.67	352.03	8.	105.	0.175	22.08	1.233
Ac-228	1851.56	462.97	11.	6.	0.011	176.45	0.181s
Bi-214	2438.07	609.55	0.	96.	0.160	20.41	0.922s
CS-137	2647.22	661.82	4.	20.	0.034	58.74	1.157
Bi-214	3072.83	768.19	3.	16.	0.027	64.32	0.354s
Ac-228	3180.10	794.99	0.	21.	0.035	43.64	0.312s
Ac-228	3645.51	911.30	0.	73.	0.122	23.41	1.249
Bi-214	3735.33	933.74	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	10.	3.	0.005	298.18	1.595D
Ac-228	3876.86	969.11	6.	45.	0.074	33.90	1.598D
Bi-214	4482.73	1120.51	0.	22.	0.037	42.64	0.646s
Bi-214	4948.33	1236.85	0.	12.	0.020	57.74	0.375s
Bi-214	5510.50	1377.32	0.	2.	0.003	141.42	0.500s
K-40	5846.12	1461.18	0.	48.	0.080	28.87	0.656s
Ac-228	6354.00	1588.07	0.	4.	0.007	100.00	0.500s
Bi-214	7061.08	1764.73	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	4.5985E-04	609.31	4.464E-04	(	4.650E-06	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	5.353E-04	?(	2.433E-05	G
			1238.11	8.135E-04	&	3.677E-04	G
			768.36	8.425E-04	+	3.483E-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	-	2.915E-04	G
K-40	N	2.1133E-03	1460.81	2.113E-03	(	4.403E-05	G
Ac-228	N	7.9683E-04	911.07	8.039E-04	(	1.101E-05	G K
			969.11	8.674E-04	(	7.946E-05	G
			338.32	6.973E-04	(	6.475E-05	G
			964.60	0.000E+00	%	3.471E-04	G
			794.70	1.235E-03	+	4.116E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:36:35 Page 4
4714781 Spectrum name: Win00453.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	2.469E-04	-	2.476E-04	G
		209.28	6.912E-04	(	1.730E-04	G
		270.23	1.062E-03	+	3.856E-04	G
		1588.00	5.810E-04	-	4.898E-04	G
		95.35	0.000E+00	%	1.986E-04	X
		327.64	8.688E-04	(	1.325E-04	G
Pb-212	N 6.5836E-04	238.62	6.584E-04	(	2.013E-05	G K
		77.11	8.564E-04	+	9.679E-05	Energy duplication
		74.81	0.000E+00	%	9.753E-05	Energy duplication
CS-137	5.5553E-05	661.66	5.555E-05	?(	8.652E-06	G
Th-234	N 7.3261E-04	92.35	7.326E-04	(	1.445E-04	G

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                    WI07-0764  D2  Grid  B1-4   0-6 in.   F.R.080107
                                 63.29 0.000E+00     3.036E-04          G

Pb-214    N   3.8889E-04       351.92 3.889E-04  (  1.678E-05          G K
                               295.21 6.348E-04 +   9.777E-05          G
                                77.11 0.000E+00 ?   1.583E-04Energy duplication
                               241.98 6.252E-04 +   1.946E-04          G
                                74.81 1.179E-03 +   2.272E-04Energy duplication
                                87.30 1.161E-03 +   2.449E-04          X

Pb-210    N   7.3149E-04        46.50 7.315E-04 ?(  1.638E-04          G

AM-241        3.1573E-05        59.54 3.157E-05 ?(  1.771E-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  01-AUG-2007 07:36:35 Page    5
4714781                          Spectrum name: Win00453.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        1.2111E+00    2.472E-01    2.513E-01
K-40          5.5658E+00    1.607E+00    1.620E+00
Ac-228        2.0986E+00    4.384E-01    4.454E-01
Pb-212        1.7339E+00    2.279E-01    2.370E-01
CS-137 #      1.4631E-01    8.594E-02    8.612E-02
Th-234        1.9294E+00    8.849E-01    8.860E-01
Pb-214        1.0242E+00    2.261E-01    2.293E-01
Pb-210 #      1.9265E+00    1.202E+00    1.203E+00
AM-241 #      8.3154E-02    1.006E-01    1.007E-01
```

WI07-0764 D2 Grid B1-4 0-6 in. F.R.080107

- 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) 1.5718942E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Funk
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0762 D2 Grid B1-5 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:21:20 Page 1
4714781 Spectrum name: Win00452.An1

Sample description
WI07-0762 D2 Grid B1-5 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00452.An1

Acquisition information
Start time: 01-Aug-2007 07:11:09
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7930E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7930E+02) = 2.6364E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:21:20 Page 2
4714781 Spectrum name: Win00452.An1

WI07-0762 D2 Grid B1-5 0-6 in. F.R. 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: 0.1475

********** U N I D E N T I F I E D P E A K S U 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	3595.	11092.	18.487	2.44	0.854	-	D
16.66	4.14	14085.	9365.	15.609	4.14	0.855	-	D
2333.56	583.43	3.	91.	0.151	22.46	0.783	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	185.76	46.62	42.	25.	0.042	98.31	0.702
AM-241	239.68	60.10	74.	32.	0.054	100.81	0.312s
Th-234	251.56	63.07	74.	41.	0.068	79.11	0.728s
Pb-214	298.54	74.81	89.	153.	0.255	23.77	0.917D
Pb-212	298.56	74.81	157.	0.	0.000	1777.64	0.407D
Pb-212	307.74	77.11	79.	252.	0.419	16.11	0.919D
Pb-214	307.74	77.11	251.	0.	0.000	333.90	0.247D
Pb-214	348.44	87.28	64.	84.	0.140	39.56	0.978s
Th-234	368.72	92.35	90.	41.	0.068	73.43	0.933D
Ac-228	380.72	95.35	52.	3.	0.005	677.42	0.935D
Ac-228	837.25	209.46	27.	42.	0.070	58.32	1.338s
Pb-212	953.94	238.62	26.	309.	0.515	12.29	1.057D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 07:21:20 Page 3
4714781 Spectrum name: Win00452.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	44.	43.	0.071	53.80	1.060D
Ac-228	1078.75	269.82	21.	24.	0.040	86.60	0.581s
Pb-214	1180.64	295.28	11.	85.	0.142	25.67	0.920
Ac-228	1311.78	328.06	23.	28.	0.046	82.03	0.332s
Ac-228	1352.82	338.32	10.	65.	0.108	30.77	1.364

WI07-0762 D2 Grid B1-5 0-6 in. F.R. 080107

* - 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) 1.4901782E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fern
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0767 D2 Grid B2-1 0-6 in. F.R. 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:53:46 Page 1
4714781 Spectrum name: Win00449.An1

Sample description
WI07- 0767 D2 Grid B2-1 0-6" Free.Rel. 073107

Spectrum Filename: C:\User\Win00449.An1

Acquisition information
Start time: 31-Jul-2007 17:43:35
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: 3.8390E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8390E+02) = 2.6048E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:53:46 Page 2
4714781 Spectrum name: Win00449.An1

WI07-0767 D2 Grid B2-1 0-6 in. F.R. 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: 0.0987

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.38	3.78	2208.	18627.	31.045	1.78	2.036	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	188.28	47.25	37.	38.	0.064	70.18	0.721s
AM-241	237.40	59.53	46.	10.	0.018	214.44	0.418s
Th-234	252.77	63.37	45.	53.	0.088	49.63	0.796
Pb-214	298.54	74.81	86.	137.	0.229	25.62	0.917D
Pb-212	298.56	74.81	141.	0.	0.000	182.62	0.425D
Pb-212	307.74	77.11	79.	205.	0.342	18.55	0.919D
Pb-214	307.74	77.11	282.	0.	0.000	89.67	0.000D
Pb-214	348.31	87.25	48.	77.	0.129	39.07	0.829s
Th-234	368.72	92.35	53.	66.	0.109	40.06	0.933D
Ac-228	380.72	95.35	43.	16.	0.026	128.74	0.936D
Ac-228	839.13	209.93	20.	62.	0.103	41.06	0.400s
Pb-212	953.94	238.62	28.	256.	0.426	13.84	1.057D
Pb-214	967.37	241.98	38.	42.	0.070	51.86	1.060D
Ac-228	1078.95	269.87	9.	22.	0.037	63.18	0.292s

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:53:46 Page 3
4714781 Spectrum name: Win00449.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.45	295.24	2.	66.	0.109	26.10	1.183
Ac-228	1310.09	327.64	15.	28.	0.047	67.01	0.510s
Ac-228	1352.46	338.23	15.	63.	0.105	34.12	1.014
Pb-214	1406.91	351.84	15.	89.	0.148	27.43	1.227
Ac-228	1851.82	463.03	3.	25.	0.041	49.66	0.445s

WI07-0767 D2 Grid B2-1 0-6 in. F.R. 073107

Bi-214	2437.08	609.30	0.	75.	0.125	23.09	0.625s
CS-137	2644.64	661.17	0.	23.	0.038	41.70	0.417s
Bi-214	3073.00	768.23	1.	0.	0.000	0.00	0.000s
Ac-228	3179.40	794.82	0.	15.	0.025	51.64	0.583s
Ac-228	3645.07	911.19	0.	58.	0.097	26.26	0.458s
Bi-214	3739.20	934.71	0.	5.	0.008	89.44	0.312s
Ac-228	3858.81	964.60	3.	15.	0.024	63.42	1.595D
Ac-228	3876.86	969.11	1.	47.	0.078	29.81	1.598D
Bi-214	4483.05	1120.59	0.	20.	0.033	44.72	0.625s
Bi-214	4952.00	1237.77	2.	0.	0.001	368.18	0.000s
Bi-214	5511.75	1377.63	0.	4.	0.007	100.00	0.375s
K-40	5845.44	1461.01	0.	59.	0.098	26.04	1.199s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7061.40	1764.81	0.	20.	0.033	44.72	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.5563E-04	609.31	3.488E-04	@(	4.650E-06	G K
			1764.49	7.117E-04	+	2.435E-04	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	0.000E+00	?	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.5976E-03	1460.81	2.598E-03	?(	4.403E-05	G
Ac-228	N	7.3149E-04	911.07	6.388E-04	(	1.101E-05	G K
			969.11	9.121E-04	+	2.002E-04	G
			338.32	7.383E-04	(	7.032E-05	G
			964.60	9.007E-04	(	1.950E-04	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	9.679E-04	?(	1.195E-04	G
			209.28	1.312E-03	&	2.818E-04	G
			270.23	6.977E-04	(	1.466E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:53:46 Page 4
4714781 Spectrum name: Win00449.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	3.026E-04	-	2.191E-04	X
			327.64	1.140E-03	+	3.986E-04	G
Pb-212	N	5.8724E-04	238.62	5.872E-04	(	1.853E-05	G K
			77.11	7.862E-04	+	9.317E-05	Energy duplication
			74.81	0.000E+00	?	1.121E-04	Energy duplication
CS-137		6.2327E-05	661.66	6.233E-05	(	2.710E-06	G
Th-234	N	8.9708E-04	92.35	8.180E-04	(	1.354E-04	G
			63.29	1.010E-03	$(	1.905E-04	G
Pb-214	N	3.5745E-04	351.92	3.296E-04	(	2.222E-05	G K

```
                WI07-0767  D2  Grid  B2-1   0-6 in.   F.R. 073107
                          295.21 4.114E-04  (  1.702E-05          G
                           77.11 0.000E+00 ?   1.591E-04Energy duplication
                          241.98 5.795E-04 +   1.819E-04          G
                           74.81 1.531E-03 +   2.413E-04Energy duplication
                           87.30 1.122E-03 +   2.368E-04          X

Pb-210   N   7.7913E-04     46.50 7.791E-04 &(  1.857E-04          G

AM-241       0.0000E+00     59.54 0.000E+00 %   2.304E-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 17:53:46 Page    5
 4714781                          Spectrum name: Win00449.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 #	9.2636E-01	2.139E-01	2.167E-01
K-40 #	6.7664E+00	1.762E+00	1.780E+00
Ac-228	1.9054E+00	3.890E-01	3.955E-01
Pb-212	1.5297E+00	2.116E-01	2.193E-01
CS-137 #	1.6235E-01	6.771E-02	6.799E-02
Th-234	2.3368E+00	7.452E-01	7.472E-01
Pb-214	9.3111E-01	1.763E-01	1.797E-01
Pb-210 #	2.0295E+00	1.424E+00	1.425E+00
AM-241 <	6.0014E-02		

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

WI07-0767 D2 Grid B2-1 0-6 in. F.R. 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) 1.6587608E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0763 D2 Grid B2-2 0-6 in. F.R. 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:40:14 Page 1
4714781 Spectrum name: Win00448.An1

Sample description
WI07- 0763 D2 Grid B2-2 0-6" Free.Rel. 073107

Spectrum Filename: C:\User\Win00448.An1

Acquisition information
Start time: 31-Jul-2007 17:30:03
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: 3.7800E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7800E+02) = 2.6455E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:40:14 Page 2
4714781 Spectrum name: Win00448.An1

WI07-0763 D2 Grid B2-2 0-6 in. F.R. 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: 0.1613

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.87	2.91	3852.	9764.	16.274	2.71	0.854	-	D
18.43	4.55	10144.	6072.	10.120	5.35	0.856	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.26	46.50	44.	42.	0.069	66.07	0.881
AM-241	237.46	59.54	50.	37.	0.062	70.55	0.696
Th-234	251.08	62.94	76.	96.	0.160	42.32	1.374s
Pb-214	298.54	74.81	116.	105.	0.175	34.99	0.917D
Pb-212	298.56	74.81	111.	0.	0.000	142.00	0.420D
Pb-212	307.74	77.11	87.	201.	0.336	19.23	0.919D
Pb-214	307.74	77.11	322.	0.	0.000	63.49	0.355D
Pb-214	347.69	87.09	48.	76.	0.127	39.03	1.089
Th-234	368.72	92.35	38.	75.	0.124	32.95	0.933D
Ac-228	380.72	95.35	41.	7.	0.011	285.74	0.936D
Ac-228	836.86	209.36	22.	40.	0.066	57.73	0.555s
Pb-212	953.94	238.62	44.	278.	0.464	13.75	1.057D
Pb-214	967.37	241.98	44.	30.	0.050	72.48	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:40:14 Page 3
4714781 Spectrum name: Win00448.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.44	269.74	20.	28.	0.047	72.48	0.737s
Pb-214	1179.42	294.98	11.	62.	0.104	32.32	1.589s
Ac-228	1311.89	328.09	6.	9.	0.015	108.87	0.472s
Ac-228	1353.17	338.41	11.	58.	0.096	34.87	1.142s
Pb-214	1407.47	351.98	6.	127.	0.212	19.18	0.901

WI07-0763 D2 Grid B2-2 0-6 in. F.R. 073107

Ac-228	1853.17	463.37	3.	22.	0.037	53.01	0.728s
Bi-214	2436.89	609.26	0.	66.	0.110	24.62	0.625s
CS-137	2645.69	661.44	0.	13.	0.022	55.47	0.375s
Bi-214	3076.83	769.18	0.	17.	0.028	48.51	0.500s
Ac-228	3179.88	794.93	0.	9.	0.015	66.67	0.562s
Ac-228	3645.74	911.35	0.	50.	0.083	28.28	1.374
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	12.	2.	0.003	671.92	1.595D
Ac-228	3876.86	969.11	8.	23.	0.039	54.52	1.598D
Bi-214	4482.08	1120.35	0.	12.	0.020	57.74	0.625s
Bi-214	4949.33	1237.10	0.	7.	0.012	75.59	0.250s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5845.24	1460.96	0.	37.	0.062	32.88	0.364s
Ac-228	6354.33	1588.15	0.	3.	0.005	115.47	0.375s
Bi-214	7058.69	1764.13	7.	5.	0.009	171.39	0.685s

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

***** S U M M A R Y O F L 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	3.0326E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	1.898E-04	-	1.930E-04	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	4.746E-04	&	2.898E-04	G
			768.36	8.859E-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	?	9.716E-05	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	5.3930E-04	911.07	5.506E-04	?(	1.101E-05	G K
			969.11	4.512E-04	(	9.010E-05	G
			338.32	6.758E-04	*(	6.196E-05	G
			964.60	0.000E+00	%	3.525E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	8.575E-04	+	2.958E-04	G
			209.28	8.429E-04	+	2.464E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 17:40:14 Page 4
4714781 Spectrum name: Win00448.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.800E-04	+	3.221E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.986E-04	X
		327.64	3.665E-04	-	2.443E-04	G
Pb-212	N 6.3934E-04	238.62	6.393E-04	(	2.269E-05	G K
		77.11	7.707E-04	+	9.381E-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 9.3153E-04	92.35	9.315E-04	(	1.157E-04	G
		63.29	1.829E-03	+	3.630E-04	G

WI07-0763 D2 Grid B2-2 0-6 in. F.R. 073107

Pb-214	N	4.6204E-04	351.92	4.716E-04	(	1.446E-05		G K
			295.21	3.905E-04	-	7.889E-05		G
			77.11	0.000E+00	?	1.699E-04	Energy duplication	
			241.98	4.145E-04	(	1.368E-04		G
			74.81	1.171E-03	+	2.403E-04	Energy duplication	
			87.30	1.103E-03	+	2.359E-04		X
Pb-210	N	8.5057E-04	46.50	8.506E-04	?(	2.027E-04		G
AM-241		7.6188E-05	59.54	7.619E-05	?(	2.165E-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 17:40:14 Page 5
4714781 Spectrum name: Win00448.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		8.0226E-01	1.975E-01	1.998E-01
K-40	#	4.3096E+00	1.417E+00	1.426E+00
Ac-228		1.4267E+00	4.035E-01	4.071E-01
Pb-212		1.6914E+00	2.326E-01	2.410E-01
CS-137		9.3197E-02	5.170E-02	5.182E-02
Th-234		2.4644E+00	8.121E-01	8.141E-01
Pb-214		1.2223E+00	2.344E-01	2.388E-01
Pb-210	#	2.2502E+00	1.487E+00	1.488E+00
AM-241	#	2.0156E-01	1.422E-01	1.424E-01

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

WI07-0763 D2 Grid B2-2 0-6 in. F.R. 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) 1.4461579E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0707 D2 Grid [redacted] 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:14:13 Page 1
4714781 Spectrum name: Win00407.An1

Sample description
WI07-0707 D2 Grid B2-3 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00407.An1

Acquisition information
Start time: 30-Jul-2007 11:04:01
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: 3.0380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0380E+02) = 3.2916E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:14:13 Page 2
4714781 Spectrum name: Win00407.An1

WI07-0707 D2 Grid B2-3 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1174

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.69	3.86	5799.	27168.	45.280	1.65	2.205	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	185.32	46.51	40.	57.	0.095	50.07	0.681s
AM-241	237.24	59.49	54.	148.	0.247	25.78	0.753s
Th-234	251.70	63.10	44.	44.	0.073	63.37	0.457s
Pb-214	298.54	74.81	68.	85.	0.142	34.84	0.917D
Pb-212	298.56	74.81	111.	0.	0.000	750.25	0.367D
Pb-212	307.74	77.11	64.	142.	0.237	23.09	0.919D
Pb-214	307.74	77.11	171.	0.	0.000	248.04	0.531D
Pb-214	348.09	87.19	34.	52.	0.086	45.58	0.382s
Th-234	368.72	92.35	45.	59.	0.098	41.78	0.933D
Ac-228	380.72	95.35	33.	11.	0.019	152.19	0.936D
Ac-228	836.25	209.21	7.	18.	0.031	63.51	0.691s
Pb-212	953.94	238.62	18.	191.	0.318	15.82	1.057D
Pb-214	967.37	241.98	28.	29.	0.048	63.50	1.060D
Ac-228	1080.87	270.35	11.	30.	0.051	54.95	0.412s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:14:13 Page 3
4714781 Spectrum name: Win00407.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.79	295.32	9.	49.	0.081	36.71	0.719s
Ac-228	1311.24	327.93	5.	2.	0.004	272.55	0.329s
Ac-228	1352.76	338.30	4.	65.	0.108	28.37	1.087
Pb-214	1407.30	351.93	3.	107.	0.179	20.28	1.225s
Ac-228	1850.07	462.60	2.	16.	0.026	60.18	0.280s

WI07-0707 D2 Grid B2-3 0-6 in. F.R. 073007

Bi-214	2436.56	609.17	0.	64.	0.107	25.00	0.840s
CS-137	2646.32	661.59	0.	42.	0.070	30.86	0.625s
Bi-214	3073.33	768.31	0.	3.	0.005	115.47	0.375s
Ac-228	3182.60	795.62	0.	8.	0.013	70.71	0.375s
Ac-228	3645.95	911.41	0.	41.	0.068	31.23	0.500s
Bi-214	3737.67	934.33	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	5.	9.	0.014	101.72	1.595D
Ac-228	3876.86	969.11	0.	36.	0.060	33.46	1.598D
Bi-214	4481.62	1120.23	0.	10.	0.017	63.25	0.312s
Bi-214	4954.80	1238.47	0.	7.	0.012	75.59	0.625s
Bi-214	5511.67	1377.61	0.	3.	0.005	115.47	0.375s
K-40	5844.30	1460.72	0.	37.	0.062	32.88	0.625s
Ac-228	6349.00	1586.82	0.	2.	0.003	141.42	0.250s
Bi-214	7058.00	1763.96	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	2.9692E-04	609.31	2.976E-04	?(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	4.746E-04	+	2.898E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	4.7235E-04	911.07	4.515E-04	(	1.101E-05	G K
			969.11	6.939E-04	+	1.742E-04	G
			338.32	7.618E-04	+	1.437E-04	G
			964.60	5.339E-04	(	2.351E-04	G
			794.70	4.704E-04	&(	5.880E-05	G
			463.00	6.171E-04	?(	1.029E-04	G
			209.28	3.879E-04	?(	8.856E-05	G
			270.23	9.477E-04	+	2.990E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:14:13 Page 4
4714781 Spectrum name: Win00407.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	2.905E-04	&	3.720E-04	G
			95.35	2.214E-04	-	1.906E-04	X
			327.64	0.000E+00	%	1.741E-04	G
Pb-212	N	4.3809E-04	238.62	4.381E-04	(	1.513E-05	G K
			77.11	5.446E-04	+	7.964E-05	Energy duplication
			74.81	0.000E+00	%	9.973E-05	Energy duplication
CS-137		1.1382E-04	661.66	1.138E-04	?(	2.710E-06	G
Th-234	N	7.7217E-04	92.35	7.302E-04	(	1.254E-04	G
			63.29	8.319E-04	*(	1.892E-04	G
Pb-214	N	3.9767E-04	351.92	3.969E-04	*(	1.086E-05	G K

WI07-0707 D2 Grid B2-3 0-6 in. F.R. 073007

			295.21	3.049E-04	-	7.067E-05		G
			77.11	0.000E+00	%	1.247E-04	Energy duplication	
			241.98	4.014E-04	(	1.106E-04		G
			74.81	9.518E-04	+	2.009E-04	Energy duplication	
			87.30	7.473E-04	+	1.977E-04		X
Pb-210	N	1.1636E-03	46.50	1.164E-03	(	1.931E-04		G
AM-241		3.0475E-04	59.54	3.048E-04	*(	2.245E-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 30-JUL-2007 11:14:13 Page 5
4714781 Spectrum name: Win00407.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	#	9.7737E-01	2.443E-01	2.471E-01
K-40	#	5.3622E+00	1.763E+00	1.774E+00
Ac-228		1.5548E+00	4.815E-01	4.850E-01
Pb-212		1.4420E+00	2.281E-01	2.344E-01
CS-137	#	3.7464E-01	1.156E-01	1.165E-01
Th-234		2.5417E+00	9.646E-01	9.664E-01
Pb-214		1.3090E+00	2.654E-01	2.699E-01
Pb-210	#	3.8301E+00	1.918E+00	1.920E+00
AM-241	#	1.0031E+00	2.586E-01	2.613E-01

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

WI07-0707 D2 Grid B2-3 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.8394915E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0708 D2 Grid [redacted]-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:41:00 Page 1
4714781 Spectrum name: Win00408.An1

Sample description
WI07-0708 D2 Grid B2-4 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00408.An1

Acquisition information
Start time: 30-Jul-2007 11:30:49
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: 3.1320E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1320E+02) = 3.1928E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:41:00 Page 2
4714781 Spectrum name: Win00408.An1

WI07-0708 D2 Grid B2-4 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0736

********** U N I D E N T I F I E D P E A K S U 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	3894.	24579.	40.965	1.63	2.222	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	185.38	46.52	63.	31.	0.052	100.16	0.428s
AM-241	237.53	59.56	152.	790.	1.317	9.55	0.981
Th-234	250.65	62.84	58.	12.	0.019	243.94	0.387s
Pb-214	298.54	74.81	48.	85.	0.141	31.75	0.917D
Pb-212	298.56	74.81	76.	0.	0.000	197.62	0.440D
Pb-212	307.74	77.11	30.	114.	0.190	23.18	0.919D
Pb-214	307.74	77.11	126.	0.	0.000	183.03	0.596D
Pb-214	347.73	87.10	37.	39.	0.064	68.53	1.467s
Th-234	368.72	92.35	30.	39.	0.065	50.62	0.933D
Ac-228	380.72	95.35	29.	4.	0.007	385.40	0.935D
Ac-228	835.13	208.93	13.	29.	0.049	61.78	1.103s
Pb-212	953.94	238.62	12.	119.	0.198	20.11	1.057D
Pb-214	967.37	241.98	11.	45.	0.076	36.04	1.060D
Ac-228	1079.03	269.89	8.	36.	0.059	46.49	1.686s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.37	294.97	4.	67.	0.112	27.56	0.601s
Ac-228	1311.07	327.88	9.	5.	0.008	220.39	0.199s
Ac-228	1352.66	338.28	3.	40.	0.067	35.10	0.697s
Pb-214	1407.00	351.86	3.	81.	0.135	23.81	1.013s
Ac-228	1851.22	462.89	0.	14.	0.023	53.45	0.687s

WI07-0708 D2 Grid B2-4 0-6 in. F.R. 073007

Bi-214	2436.96	609.27	0.	55.	0.092	26.97	1.312
CS-137	2646.43	661.62	0.	26.	0.043	39.22	0.562s
Bi-214	3072.56	768.12	3.	2.	0.003	308.22	0.318s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.41	911.27	0.	39.	0.065	32.03	0.958s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.67	964.56	0.	3.	0.005	115.47	0.375s
Ac-228	3876.86	969.11	19.	0.	0.000	0.00	1.598
Bi-214	4483.18	1120.62	0.	11.	0.018	60.30	0.750s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.44	1460.01	13.	4.	0.007	305.57	0.259s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.5870E-04	609.31	2.558E-04	?(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	2.677E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	0.000E+00	%	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	?	9.716E-05	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.797E-04	G
Ac-228	N	4.6802E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.305E-04	G
			338.32	4.727E-04	(	3.355E-05	G
			964.60	1.852E-04	-	1.852E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	5.457E-04	?(	3.898E-05	G
			209.28	6.207E-04	@(	1.176E-04	G
			270.23	1.109E-03	+	3.091E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:41:00 Page 4
4714781 Spectrum name: Win00408.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.664E-04	X
			327.64	0.000E+00	%	2.368E-04	G
Pb-212	N	2.7331E-04	238.62	2.733E-04	(	1.250E-05	G K
			77.11	4.358E-04	+	6.691E-05	Energy duplication
			74.81	0.000E+00	?	8.316E-05	Energy duplication
CS-137		7.0457E-05	661.66	7.046E-05	?(	2.710E-06	G
Th-234	N	4.8982E-04	92.35	4.898E-04	(	1.027E-04	G
			63.29	0.000E+00	%	2.351E-04	G
Pb-214	N	3.0000E-04	351.92	3.000E-04	@(	1.111E-05	G K

WI07-0708 D2 Grid B2-4 0-6 in. F.R. 073007

			295.21	4.208E-04	+	7.785E-05	G
			77.11	0.000E+00	?	1.075E-04	Energy duplication
			241.98	6.266E-04	+	1.534E-04	G
			74.81	9.463E-04	+	1.877E-04	Energy duplication
			87.30	5.611E-04	+	1.863E-04	X
Pb-210	N	6.3283E-04	46.50	6.328E-04	?(	2.396E-04	G
AM-241		1.6267E-03	59.54	1.627E-03	(	3.695E-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	#	8.2598E-01	2.228E-01	2.249E-01
K-40	<	8.9297E-01		
Ac-228		1.4943E+00	3.531E-01	3.575E-01
Pb-212		8.7265E-01	1.755E-01	1.786E-01
CS-137	#	2.2496E-01	8.824E-02	8.865E-02
Th-234		1.5639E+00	7.917E-01	7.925E-01
Pb-214		9.5785E-01	2.281E-01	2.309E-01
Pb-210	#	2.0205E+00	2.024E+00	2.024E+00
AM-241		5.1939E+00	4.961E-01	5.320E-01

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

WI07-0708 D2 Grid B2-4 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.3154053E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0709 D2 Grid [redacted] 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:53:49 Page 1
4714781 Spectrum name: Win00409.An1

Sample description
WI07-0709 D2 Grid B2-5 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00409.An1

Acquisition information
Start time: 30-Jul-2007 11:43:38
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: 3.4000E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4000E+02) = 2.9412E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:53:49 Page 2
4714781 Spectrum name: Win00409.An1

WI07-0709 D2 Grid B2-5 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0611

********** U N I D E N T I F I E D P E A K S U 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	4410.	23308.	38.847	1.74	2.324	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	185.35	46.52	33.	46.	0.077	58.01	0.448s
AM-241	237.75	59.61	48.	136.	0.227	24.86	1.051
Th-234	252.46	63.29	72.	58.	0.097	64.14	0.556s
Pb-214	298.54	74.81	57.	123.	0.205	25.09	0.917D
Pb-212	298.56	74.81	101.	0.	0.000	156.48	0.422D
Pb-212	307.74	77.11	41.	171.	0.284	18.66	0.919D
Pb-214	307.74	77.11	160.	0.	0.000	775.40	0.617D
Pb-214	347.99	87.17	49.	83.	0.138	37.82	0.867s
Th-234	368.72	92.35	66.	20.	0.034	120.65	0.933D
Ac-228	380.72	95.35	30.	3.	0.005	521.59	0.935D
Ac-228	837.10	209.42	18.	47.	0.078	46.42	0.317s
Pb-212	953.94	238.62	25.	208.	0.347	15.45	1.057D
Pb-214	967.37	241.98	34.	33.	0.056	60.09	1.060D
Ac-228	1080.50	270.26	12.	42.	0.069	44.50	1.072s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:53:49 Page 3
4714781 Spectrum name: Win00409.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.15	295.16	15.	62.	0.104	36.69	1.333s
Ac-228	1312.50	328.24	6.	30.	0.051	47.57	0.912
Ac-228	1353.13	338.40	11.	57.	0.095	36.52	1.457s
Pb-214	1407.69	352.03	17.	105.	0.176	25.30	0.772s
Ac-228	1849.62	462.49	5.	23.	0.038	57.33	0.708s

WI07-0709 D2 Grid B2-5 0-6 in. F.R. 073007

Bi-214	2437.21	609.33	3.	73.	0.122	25.26	1.209
CS-137	2647.57	661.91	3.	22.	0.037	53.01	0.244s
Bi-214	3073.80	768.43	1.	3.	0.005	163.44	0.343s
Ac-228	3181.06	795.23	0.	17.	0.028	48.51	0.364s
Ac-228	3645.65	911.33	0.	54.	0.090	27.22	1.031s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	0.	20.	0.033	45.25	1.595D
Ac-228	3876.86	969.11	3.	36.	0.060	35.88	1.598D
Bi-214	4483.06	1120.59	0.	17.	0.028	48.51	0.500s
Bi-214	4953.00	1238.02	0.	3.	0.005	115.47	0.250s
Bi-214	5512.00	1377.69	0.	4.	0.007	100.00	0.750s
K-40	5845.59	1461.04	0.	41.	0.068	31.23	0.466s
Ac-228	6354.00	1588.07	0.	6.	0.010	81.65	0.250s
Bi-214	7058.60	1764.11	0.	10.	0.017	63.25	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	3.6115E-04	609.31	3.395E-04	(	1.395E-05	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	2.034E-04	-	2.034E-04	G
			768.36	1.476E-04	-	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8051E-03	1460.81	1.805E-03	?(	4.403E-05	G
Ac-228	N	6.7071E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	7.007E-04	(	5.759E-05	G
			338.32	6.680E-04	(	6.114E-05	G
			964.60	1.206E-03	+	4.179E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	8.835E-04	?(	1.483E-04	G
			209.28	9.945E-04	+	2.521E-04	G
			270.23	1.297E-03	+	3.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 11:53:49 Page 4
4714781 Spectrum name: Win00409.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.671E-04	X
		327.64	1.235E-03	&	3.665E-04	G
Pb-212	N 4.7887E-04	238.62	4.789E-04	(	1.755E-05	G K
		77.11	6.531E-04	+	8.077E-05	Energy duplication
		74.81	0.000E+00	?	9.535E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	8.130E-06	G
Th-234	N 6.0548E-04	92.35	2.546E-04	(	1.493E-04	G
		63.29	1.105E-03	$(	2.383E-04	G
Pb-214	N 3.9861E-04	351.92	3.901E-04	(	2.332E-05	G K

WI07-0709 D2 Grid B2-5 0-6 in. F.R. 073007

			295.21	3.905E-04	(	3.720E-05	G
			77.11	0.000E+00	%	1.207E-04	Energy duplication
			241.98	4.616E-04	(	1.205E-04	G
			74.81	1.370E-03	+	2.174E-04	Energy duplication
			87.30	1.204E-03	+	2.431E-04	X
Pb-210	N	9.3903E-04	46.50	9.390E-04	(	1.764E-04	G
AM-241		2.8073E-04	59.54	2.807E-04	(	2.116E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:
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 30-JUL-2007 11:53:49 Page 5
4714781 Spectrum name: Win00409.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		1.0622E+00	2.683E-01	2.712E-01
K-40	#	5.3092E+00	1.658E+00	1.670E+00
Ac-228		1.9727E+00	4.553E-01	4.612E-01
Pb-212		1.4084E+00	2.176E-01	2.239E-01
CS-137	#	1.7535E-01	9.295E-02	9.319E-02
Th-234		1.7808E+00	1.142E+00	1.143E+00
Pb-214		1.1724E+00	2.924E-01	2.957E-01
Pb-210		2.7619E+00	1.602E+00	1.603E+00
AM-241		8.2567E-01	2.053E-01	2.076E-01

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

WI07-0709 D2 Grid B2-5 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.6468662E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0715 D2 Grid B3-1 0-6 in. F.R. 073007

Sample description
WI07-0715 D2 Grid B3-1 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00415.An1

Acquisition information

Start time:	30-Jul-2007 13:26:20
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:	3.3580E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.3580E+02) = 2.9780E+03
Detection limit method:	Traditional ORTEC method

WI07-0715 D2 Grid B3-1 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0747

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.01	3.27	6479.	11047.	18.411	2.81	0.854	-	D
17.24	4.58	10491.	8661.	14.435	3.98	0.855	-	D
198.82	49.88	108.	76.	0.127	59.31	0.747	EU-155	M
2332.55	583.18	3.	74.	0.123	25.06	1.115	TL-208	

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	185.51	46.56	42.	34.	0.057	69.35	0.351s
AM-241	237.40	59.53	143.	1001.	1.668	8.05	0.961
Th-234	251.59	63.07	48.	32.	0.054	80.03	0.763
Pb-214	298.54	74.81	88.	82.	0.137	38.99	0.917D
Pb-212	298.56	74.81	94.	0.	0.000	256.49	0.229D
Pb-212	307.74	77.11	58.	162.	0.270	20.59	0.919D
Pb-214	307.74	77.11	227.	0.	0.000	81.54	0.334D
Pb-214	347.08	86.94	54.	47.	0.079	63.55	0.573s
Th-234	368.72	92.35	66.	39.	0.065	66.82	0.933D
Ac-228	380.72	95.35	45.	14.	0.023	145.07	0.935D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	836.71	209.32	13.	38.	0.063	49.40	0.512s
Pb-212	953.94	238.62	19.	188.	0.313	16.01	1.057D
Pb-214	967.37	241.98	39.	33.	0.055	63.38	1.060D
Ac-228	1080.23	270.19	13.	25.	0.041	73.62	0.316s
Pb-214	1180.19	295.17	13.	54.	0.090	36.13	0.781s

WI07-0715 D2 Grid B3-1 0-6 in. F.R. 073007

Ac-228	1310.57	327.76	12.	18.	0.031	85.30	0.759s
Ac-228	1353.24	338.42	7.	76.	0.127	26.88	1.412s
Pb-214	1407.33	351.94	7.	110.	0.183	21.88	1.268
Ac-228	1851.55	462.97	0.	29.	0.048	37.14	0.521s
Bi-214	2436.90	609.26	0.	82.	0.137	22.09	0.400s
CS-137	2646.85	661.73	0.	26.	0.043	39.22	0.875s
Bi-214	3073.67	768.39	1.	0.	0.001	240.37	0.197s
Ac-228	3176.50	794.09	0.	6.	0.010	81.65	0.500s
Ac-228	3645.51	911.30	0.	49.	0.082	28.57	0.643s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	7.	0.012	75.18	1.595D
Ac-228	3876.86	969.11	0.	27.	0.046	38.20	1.598D
Bi-214	4481.81	1120.28	0.	20.	0.033	44.72	0.312s
Bi-214	4947.00	1236.52	0.	6.	0.010	81.65	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5843.97	1460.64	0.	33.	0.055	34.82	0.366s
Ac-228	6352.33	1587.65	1.	0.	0.001	240.37	0.197s
Bi-214	7056.00	1763.46	0.	10.	0.017	63.25	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.7763E-04	609.31	3.813E-04	(	4.650E-06	G K
			1764.49	3.558E-04	&(	3.558E-05	G
			1120.29	4.867E-04	+	1.665E-04	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	?	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	5.2639E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	5.323E-04	(	1.942E-05	G
			338.32	8.946E-04	+	1.570E-04	G
			964.60	4.369E-04	(	6.173E-05	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:36:31 Page 4
4714781 Spectrum name: Win00415.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	3.528E-04	-	2.352E-04	G
		463.00	1.130E-03	+	3.170E-04	G
		209.28	7.970E-04	+	2.245E-04	G
		270.23	7.706E-04	+	2.884E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.707E-04	-	2.191E-04	X
		327.64	7.534E-04	+	3.417E-04	G
Pb-212	N 4.3171E-04	238.62	4.317E-04	(	1.542E-05	G K
		77.11	6.200E-04	+	8.224E-05	Energy duplication
		74.81	0.000E+00	%	9.211E-05	Energy duplication
CS-137	7.0457E-05	661.66	7.046E-05	(	2.710E-06	G

WI07-0715 D2 Grid B3-1 0-6 in. F.R. 073007

Th-234	N	5.4091E-04	92.35	4.882E-04	(	1.496E-04		G
			63.29	6.160E-04	$(	1.958E-04		G
Pb-214	N	3.9199E-04	351.92	4.062E-04	(	1.616E-05		G K
			295.21	3.383E-04	(	3.523E-05		G
			77.11	0.000E+00	?	1.433E-04	Energy duplication	
			241.98	4.592E-04	(	1.289E-04		G
			74.81	9.189E-04	+	2.114E-04	Energy duplication	
			87.30	6.869E-04	+	2.136E-04		X
Pb-210	N	6.9407E-04	46.50	6.941E-04	?(	1.976E-04		G
AM-241		2.0605E-03	59.54	2.061E-03	(	3.591E-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

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:36:31 Page 5
4714781 Spectrum name: Win00415.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		1.1246E+00	2.484E-01	2.519E-01
K-40	#	4.3267E+00	1.506E+00	1.515E+00
Ac-228		1.5676E+00	4.479E-01	4.517E-01
Pb-212		1.2856E+00	2.058E-01	2.114E-01
CS-137		2.0982E-01	8.230E-02	8.269E-02
Th-234		1.6108E+00	8.397E-01	8.405E-01
Pb-214		1.1673E+00	2.554E-01	2.591E-01
Pb-210	#	2.0669E+00	1.433E+00	1.434E+00
AM-241		6.1361E+00	4.939E-01	5.436E-01

WI07-0715 D2 Grid B3-1 0-6 in. F.R. 073007

- 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) 1.9495510E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0757 D2 Grid B3-2 0-6 in re-sample. F.R. 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:23:21 Page 1
4714781 Spectrum name: Win00433.An1

Sample description
WI07- 0757 D2 Grid B3-2 0-6" re-sample Free Rel.073107

Spectrum Filename: C:\User\Win00433.An1

Acquisition information
Start time: 31-Jul-2007 13:13:10
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: 3.5330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5330E+02) = 2.8305E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:23:21 Page 2
4714781 Spectrum name: Win00433.An1

WI07-0757 D2 Grid B3-2 0-6 in re-sample. F.R. 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: 0.0270

********** U N I D E N T I F I E D P E A K S U 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	2.93	6413.	11664.	19.440	2.68	0.854	-	D
16.79	4.18	16343.	9846.	16.410	4.19	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	185.42	46.53	31.	35.	0.058	63.71	1.025
AM-241	237.51	59.55	65.	543.	0.905	10.22	0.870
Th-234	252.25	63.24	32.	56.	0.093	46.88	0.711s
Pb-214	298.54	74.81	62.	72.	0.120	38.81	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	364.78	0.329D
Pb-212	307.74	77.11	68.	101.	0.169	30.33	0.919D
Pb-214	307.74	77.11	202.	0.	0.000	90.35	0.000D
Pb-214	347.60	87.07	35.	52.	0.087	49.95	0.741s
Th-234	371.10	92.95	42.	82.	0.138	37.98	1.099s
Ac-228	380.72	95.35	30.	0.	0.000	0.00	0.935
Ac-228	836.13	209.18	23.	18.	0.031	111.90	0.364s
Pb-212	953.94	238.62	23.	177.	0.295	16.90	1.057D
Pb-214	967.37	241.98	28.	24.	0.041	73.20	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:23:21 Page 3
4714781 Spectrum name: Win00433.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.88	270.60	10.	46.	0.078	39.91	0.576s
Pb-214	1179.91	295.10	9.	57.	0.095	33.84	0.369s
Ac-228	1311.71	328.05	6.	21.	0.035	63.89	0.387s
Ac-228	1351.80	338.06	0.	45.	0.075	29.81	1.018
Pb-214	1407.30	351.94	8.	84.	0.140	26.51	1.005

WI07-0757 D2 Grid B3-2 0-6 in re-sample. F.R. 073107

Ac-228	1855.14	463.86	4.	2.	0.004	296.65	0.295s
Bi-214	2437.18	609.33	0.	60.	0.100	25.82	0.937s
CS-137	2646.58	661.66	3.	18.	0.031	57.84	0.482s
Bi-214	3065.00	766.23	0.	8.	0.013	70.71	0.250s
Ac-228	3175.67	793.88	4.	3.	0.004	303.62	0.274s
Ac-228	3646.98	911.66	0.	43.	0.072	30.50	0.368s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	10.	0.017	73.30	1.595D
Ac-228	3876.86	969.11	1.	24.	0.040	41.98	1.598D
Bi-214	4476.00	1118.83	0.	15.	0.025	51.64	0.250s
Bi-214	4953.33	1238.10	0.	7.	0.012	75.59	0.375s
Bi-214	5511.00	1377.44	1.	0.	0.000	0.00	0.000s
K-40	5845.31	1460.97	0.	36.	0.060	33.33	0.750s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.56	1764.85	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	3.0428E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	3.650E-04	&(	2.433E-05	G
			1238.11	4.746E-04	+	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	0.000E+00	?	9.716E-05	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	4.8844E-04	911.07	4.736E-04	?(	1.101E-05	G K
			969.11	4.699E-04	(	3.615E-05	G
			338.32	5.274E-04	?(	1.172E-05	G
			964.60	6.268E-04	(	1.534E-04	G
			794.70	0.000E+00	&	2.514E-04	G
			463.00	0.000E+00	&	1.666E-04	G
			209.28	3.879E-04	?(	1.534E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:23:21 Page 4
4714781 Spectrum name: Win00433.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.453E-03	+	3.466E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	8.552E-04	+	3.203E-04	G
Pb-212	N 4.0116E-04	238.62	4.063E-04	(	1.684E-05	G K
		77.11	3.883E-04	(	4.647E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	4.9681E-05	661.66	4.968E-05	?(	7.758E-06	G
Th-234	N 1.0409E-03	92.35	1.029E-03	&(	1.214E-04	G
		63.29	1.057E-03	*(	1.634E-04	G

```
            WI07-0757  D2  Grid  B3-2   0-6 in re-sample.   F.R. 073107
Pb-214   N   3.2797E-04     351.92 3.111E-04  (  1.678E-05         G K
                            295.21 3.571E-04  (  2.989E-05         G
                             77.11 0.000E+00 ?   1.352E-04Energy duplication
                            241.98 3.371E-04  (  1.099E-04         G
                             74.81 8.049E-04 +   1.884E-04Energy duplication
                             87.30 7.546E-04 +   1.988E-04         X

Pb-210   N   7.1108E-04      46.50 7.111E-04  (  1.717E-04         G

AM-241       1.1181E-03      59.54 1.118E-03  (  2.453E-05         G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  31-JUL-2007 13:23:21 Page    5
4714781                          Spectrum name: Win00433.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       8.6124E-01    2.224E-01    2.247E-01
K-40   #     4.4863E+00    1.495E+00    1.505E+00
Ac-228       1.3825E+00    4.052E-01    4.085E-01
Pb-212       1.1355E+00    1.919E-01    1.965E-01
CS-137 #     1.4062E-01    8.133E-02    8.151E-02
Th-234 #     2.9462E+00    8.888E-01    8.914E-01
Pb-214       9.2830E-01    2.461E-01    2.486E-01
Pb-210       2.0127E+00    1.282E+00    1.283E+00
AM-241       3.1648E+00    3.236E-01    3.441E-01

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

WI07-0757 D2 Grid B3-2 0-6 in re-sample. F.R. 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) 1.7058035E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0716 D2 Grid B3-3 0-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:48:29 Page 1
4714781 Spectrum name: Win00416.An1

Sample description
WI07-0716 D2 Grid B3-3 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00416.An1

Acquisition information
Start time: 30-Jul-2007 13:38:17
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: 2.8460E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8460E+02) = 3.5137E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:48:29 Page 2
4714781 Spectrum name: Win00416.An1

WI07-0716 D2 Grid B3-3 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1618

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.69	3.86	5046.	29011.	48.352	1.53	2.330	CU-64	s
359.71	90.00	40.	38.	0.063	57.00	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	184.65	46.34	30.	40.	0.066	58.74	1.384s
AM-241	236.57	59.32	60.	90.	0.150	38.49	0.817
Th-234	252.35	63.26	58.	42.	0.070	69.99	0.882
Pb-214	298.54	74.81	65.	102.	0.170	29.85	0.917D
Pb-212	298.56	74.81	96.	0.	0.000	315.05	0.000D
Pb-212	307.74	77.11	49.	135.	0.225	22.61	0.919D
Pb-214	307.74	77.11	127.	0.	0.000	575.10	0.804D
Pb-214	348.51	87.30	56.	41.	0.068	60.92	0.928D
Th-234	368.72	92.35	49.	59.	0.098	42.43	0.933D
Ac-228	380.72	95.35	35.	1.	0.001	2370.30	0.935D
Ac-228	838.32	209.73	19.	37.	0.062	58.26	0.795
Pb-212	953.94	238.62	17.	205.	0.341	15.10	1.057D
Pb-214	967.37	241.98	37.	29.	0.049	69.42	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:48:29 Page 3
4714781 Spectrum name: Win00416.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.35	269.97	7.	34.	0.057	47.61	0.265s
Pb-214	1180.10	295.15	3.	44.	0.073	33.20	0.856
Ac-228	1310.55	327.75	6.	33.	0.056	44.52	0.551s
Ac-228	1353.04	338.37	10.	47.	0.078	38.53	1.107
Pb-214	1406.57	351.75	22.	94.	0.157	31.27	0.792s

WI07-0716 D2 Grid B3-3 0-6 in. F.R. 073007

Ac-228	1853.54	463.47	4.	26.	0.044	49.06	0.738s
Bi-214	2436.72	609.21	3.	69.	0.115	26.09	0.934s
CS-137	2645.50	661.39	0.	20.	0.033	44.72	0.275s
Bi-214	3073.56	768.37	0.	13.	0.022	55.47	0.625s
Ac-228	3178.90	794.69	0.	15.	0.025	51.64	0.562s
Ac-228	3644.57	911.06	0.	39.	0.065	32.03	1.150s
Bi-214	3737.50	934.28	0.	4.	0.007	100.00	0.500s
Ac-228	3858.81	964.60	2.	5.	0.008	120.72	1.595D
Ac-228	3876.86	969.11	0.	32.	0.053	35.37	1.598D
Bi-214	4482.67	1120.49	2.	1.	0.002	416.33	0.197s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5500.00	1374.69	0.	7.	0.012	75.59	0.250s
K-40	5844.46	1460.76	0.	37.	0.062	32.88	0.382s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.50	1764.33	0.	3.	0.005	115.47	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.2528E-04	609.31	3.209E-04	(	1.395E-05	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	0.000E+00	%	7.300E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.774E-04	+	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	&	4.625E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	5.1133E-04	911.07	4.295E-04	?(	1.101E-05	G K
			969.11	6.208E-04	(	1.942E-05	G
			338.32	5.508E-04	(	5.860E-05	G
			964.60	3.072E-04	-	2.639E-04	G
			794.70	8.820E-04	+	3.528E-04	G
			463.00	1.033E-03	+	3.220E-04	G
			209.28	7.829E-04	+	2.348E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 13:48:29 Page 4
4714781 Spectrum name: Win00416.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.062E-03	+	2.990E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	1.357E-03	+	3.806E-04	G
Pb-212	N 4.8374E-04	238.62	4.707E-04	(	1.467E-05	G K
		77.11	5.161E-04	(	3.976E-05	Energy duplication
		74.81	0.000E+00	%	9.305E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 7.6294E-04	92.35	7.368E-04	(	1.298E-04	G
		63.29	8.001E-04	?(	2.149E-04	G

WI07-0716 D2 Grid B3-3 0-6 in. F.R. 073007

Pb-214	N	3.3334E-04	351.92	3.500E-04	(	2.677E-05		G K
			295.21	2.735E-04	?(	1.961E-05		G
			77.11	0.000E+00	%	1.080E-04	Energy duplication	
			241.98	4.038E-04	(	1.257E-04		G
			74.81	1.139E-03	+	2.096E-04	Energy duplication	
			87.30	5.899E-04	+	2.095E-04		X
Pb-210	N	8.0975E-04	46.50	8.097E-04	(	1.695E-04		G
AM-241		1.8532E-04	59.54	1.853E-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 30-JUL-2007 13:48:29 Page 5
4714781 Spectrum name: Win00416.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	1.1429E+00	2.982E-01	3.012E-01
K-40 #	5.7239E+00	1.882E+00	1.894E+00
Ac-228	1.7967E+00	3.673E-01	3.734E-01
Pb-212	1.6997E+00	2.311E-01	2.397E-01
CS-137 #	1.9044E-01	8.517E-02	8.548E-02
Th-234	2.6808E+00	1.097E+00	1.099E+00
Pb-214	1.1712E+00	3.243E-01	3.273E-01
Pb-210 #	2.8452E+00	1.671E+00	1.673E+00
AM-241	6.5117E-01	2.506E-01	2.518E-01

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

WI07-0716 D2 Grid B3-3 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.7902054E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0736 D2 Grid B3-4 re-sample 0-6 in. F.R. 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:39:35 Page 1
4714781 Spectrum name: Win00434.An1

Sample description
WI07- 0758 D2 Grid B3-4 0-6" re-sample Free Rel.073107

Spectrum Filename: C:\User\Win00434.An1

Acquisition information
Start time: 31-Jul-2007 13:29:25
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: 3.7580E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7580E+02) = 2.6610E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:39:35 Page 2
4714781 Spectrum name: Win00434.An1

WI07-0736 D2 Grid B3-4 re-sample 0-6 in. F.R. 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: 0.1226

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.80	2.92	4775.	10850.	18.083	2.63	0.854	-	D
17.92	4.44	13889.	8347.	13.912	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	185.37	46.52	26.	50.	0.083	45.25	0.970s
AM-241	236.87	59.40	82.	208.	0.346	22.00	0.946
Th-234	252.43	63.28	50.	33.	0.055	81.99	0.672s
Pb-214	298.54	74.81	86.	81.	0.134	39.52	0.917D
Pb-212	298.56	74.81	91.	0.	0.000	252.59	0.512D
Pb-212	307.74	77.11	75.	157.	0.261	22.38	0.919D
Pb-214	307.74	77.11	244.	0.	0.000	79.82	0.610D
Pb-214	347.86	87.14	43.	61.	0.101	46.38	1.223s
Th-234	368.72	92.35	60.	42.	0.071	60.09	0.933D
Ac-228	380.72	95.35	48.	6.	0.009	366.35	0.935D
Ac-228	836.69	209.32	21.	36.	0.060	60.86	0.803s
Pb-212	953.94	238.62	20.	256.	0.427	13.45	1.057D
Pb-214	967.37	241.98	34.	31.	0.052	63.13	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:39:35 Page 3
4714781 Spectrum name: Win00434.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.45	270.49	20.	9.	0.015	184.59	0.264s
Pb-214	1180.11	295.15	22.	69.	0.115	37.98	0.439s
Ac-228	1309.93	327.60	7.	37.	0.061	45.92	0.979s
Ac-228	1352.55	338.25	8.	64.	0.108	29.54	0.447s
Pb-214	1407.74	352.05	3.	91.	0.152	22.16	1.868s

WI07-0736 D2 Grid B3-4 re-sample 0-6 in. F.R. 073107

Ac-228	1852.41	463.18	2.	14.	0.023	67.77	0.352s
Bi-214	2437.61	609.44	4.	70.	0.116	27.94	1.194
CS-137	2646.94	661.75	0.	33.	0.055	34.82	0.625s
Bi-214	3074.63	768.63	2.	8.	0.013	93.54	0.358s
Ac-228	3180.00	794.97	1.	0.	0.000	0.00	0.000s
Ac-228	3645.81	911.37	0.	59.	0.098	26.04	1.458
Bi-214	3733.00	933.16	0.	6.	0.010	81.65	0.250s
Ac-228	3858.81	964.60	10.	0.	0.000	0.00	1.595
Ac-228	3878.69	969.57	0.	35.	0.058	33.81	0.781s
Bi-214	4482.92	1120.55	0.	12.	0.020	57.74	0.500s
Bi-214	4951.50	1237.64	0.	10.	0.017	63.25	0.250s
Bi-214	5508.00	1376.69	0.	3.	0.005	115.47	0.250s
K-40	5845.09	1460.92	0.	43.	0.072	30.50	1.593
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7063.75	1765.40	0.	10.	0.017	63.25	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	3.2925E-04	609.31	3.232E-04	(	1.647E-05	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	4.169E-04	?(	1.335E-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	1.8932E-03	1460.81	1.893E-03	?(	4.403E-05	G
Ac-228	N	6.8634E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	6.796E-04	(	1.942E-05	G
			338.32	7.559E-04	(	5.163E-05	G
			964.60	0.000E+00	%	3.078E-04	G
			794.70	0.000E+00	?	1.176E-04	G
			463.00	5.327E-04	-	2.408E-04	G
			209.28	7.617E-04	*(	1.481E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 13:39:35 Page 4
4714781 Spectrum name: Win00434.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	2.812E-04	-	2.541E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	2.100E-04	X
		327.64	1.493E-03	+	4.029E-04	G
Pb-212	N 5.9146E-04	238.62	5.881E-04	(	1.576E-05	G K
		77.11	5.997E-04	(	4.895E-05	Energy duplication
		74.81	0.000E+00	&	9.068E-05	Energy duplication
CS-137	8.9426E-05	661.66	8.943E-05	(	2.710E-06	G
Th-234	N 5.6954E-04	92.35	5.280E-04	(	1.427E-04	G
		63.29	6.287E-04	?(	2.003E-04	G

```
                WI07-0736  D2  Grid  B3-4 re-sample   0-6 in.   F.R. 073107
Pb-214    N   3.7747E-04     351.92 3.377E-04  (  1.086E-05          G K
                             295.21 4.322E-04  (  4.480E-05          G
                              77.11 0.000E+00 ?   1.483E-04Energy duplication
                             241.98 4.349E-04  (  1.204E-04          G
                              74.81 8.992E-04 +   2.096E-04Energy duplication
                              87.30 8.803E-04 +   2.167E-04          X

Pb-210    N   1.0207E-03      46.50 1.021E-03 *(  1.578E-04          G

AM-241        4.2796E-04      59.54 4.280E-04  (  2.745E-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 13:39:35 Page    5
4714781                          Spectrum name: Win00434.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       8.7613E-01    2.448E-01    2.470E-01
K-40   #     5.0378E+00    1.537E+00    1.548E+00
Ac-228       1.8263E+00    3.652E-01    3.715E-01
Pb-212       1.5739E+00    2.055E-01    2.138E-01
CS-137       2.3796E-01    8.285E-02    8.335E-02
Th-234       1.5155E+00    7.703E-01    7.711E-01
Pb-214       1.0045E+00    2.226E-01    2.257E-01
Pb-210 #     2.7160E+00    1.229E+00    1.231E+00
AM-241       1.1388E+00    2.506E-01    2.541E-01

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

WI07-0736 D2 Grid B3-4 re-sample 0-6 in. F.R. 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) 1.5926909E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0704 D2 Grid [redacted]-6 in. F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:32:35 Page 1
4714781 Spectrum name: Win00404.An1

Sample description
WI07-0704 D2 Grid B3-5 0-6" Free Rel. 073007

Spectrum Filename: C:\User\Win00404.An1

Acquisition information
Start time: 30-Jul-2007 10:22:24
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: 3.5350E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5350E+02) = 2.8289E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:32:35 Page 2
4714781 Spectrum name: Win00404.An1

WI07-0704 D2 Grid B3-5 0-6 in. F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0974

********** 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	
11.72	2.92	5817.	12249.	20.415	2.52	0.854	-	D
16.97	4.23	14529.	9204.	15.340	4.25	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	184.47	46.30	70.	44.	0.073	77.27	0.871
AM-241	237.45	59.54	120.	749.	1.248	9.36	0.856
Th-234	251.22	62.98	70.	34.	0.057	98.25	0.570s
Pb-214	298.54	74.81	71.	108.	0.181	29.17	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	258.20	0.256D
Pb-212	307.74	77.11	67.	159.	0.265	21.50	0.919D
Pb-214	307.74	77.11	196.	0.	0.000	471.10	0.336D
Pb-214	348.22	87.23	37.	51.	0.086	47.58	0.527s
Th-234	368.72	92.35	56.	43.	0.071	58.62	0.933D
Ac-228	380.72	95.35	27.	10.	0.017	154.80	0.935D
Ac-228	831.51	208.02	15.	33.	0.055	54.78	0.400s
Pb-212	953.94	238.62	23.	222.	0.370	14.72	1.057D
Pb-214	967.37	241.98	26.	51.	0.084	40.28	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:32:35 Page 3
4714781 Spectrum name: Win00404.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.30	270.21	15.	30.	0.050	63.25	0.460s
Pb-214	1180.60	295.27	8.	62.	0.103	30.83	0.487s
Ac-228	1310.96	327.86	5.	20.	0.033	63.69	1.723s
Ac-228	1353.21	338.42	9.	68.	0.113	29.99	0.420s
Pb-214	1406.86	351.83	4.	117.	0.196	19.76	0.855s

WI07-0704 D2 Grid B3-5 0-6 in. F.R. 073007

Pb-214	N	4.1885E-04	351.92	4.346E-04	(	1.205E-05		G K
			295.21	3.884E-04	(	2.838E-05		G
			77.11	0.000E+00	%	1.334E-04	Energy duplication	
			241.98	6.984E-04	+	1.786E-04		G
			74.81	1.209E-03	+	2.168E-04	Energy duplication	
			87.30	7.449E-04	+	1.999E-04		X
Pb-210	N	8.9821E-04	46.50	8.982E-04	?(	2.520E-04		G
AM-241		1.5423E-03	59.54	1.542E-03	(	3.295E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 10:32:35 Page 5
4714781 Spectrum name: Win00404.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	8.9457E-01	2.353E-01	2.377E-01
K-40 #	4.4837E+00	1.495E+00	1.504E+00
Ac-228	1.9232E+00	3.682E-01	3.752E-01
Pb-212	1.4441E+00	2.126E-01	2.193E-01
CS-137 #	2.2998E-01	8.398E-02	8.443E-02
Th-234	1.6379E+00	9.370E-01	9.378E-01
Pb-214	1.1849E+00	2.169E-01	2.214E-01
Pb-210 #	2.5409E+00	1.963E+00	1.964E+00
AM-241	4.3629E+00	4.084E-01	4.392E-01

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

WI07-0704 D2 Grid B3-5 0-6 in. F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.8702095E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0701 D2 Grid B4-1 top-soil F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:18:02 Page 1
4714781 Spectrum name: Win00401.An1

Sample description
WI07-0701 D2 Grid B4-1 (topsoil) F.Rel.073007

Spectrum Filename: C:\User\Win00401.An1

Acquisition information
Start time: 30-Jul-2007 09:07:52
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: 2.8860E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8860E+02) =
3.4650E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:18:02 Page 2
4714781 Spectrum name: Win00401.An1

WI07-0701 D2 Grid B4-1 top-soil F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1273

********** U N I D E N T I F I E D P E A K S U 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	4494.	25359.	42.265	1.64	2.062	CU-64	s
71.26	18.00	10.	14.	0.023	89.20	0.599	MO-99	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	184.88	46.40	39.	60.	0.100	45.15	0.792
AM-241	237.63	59.58	113.	900.	1.499	8.12	0.860
Th-234	251.96	63.17	33.	26.	0.043	83.40	0.537s
Pb-214	298.54	74.81	43.	79.	0.132	32.46	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	2505.99	0.207D
Pb-212	307.74	77.11	34.	106.	0.176	24.98	0.919D
Pb-214	307.74	77.11	107.	0.	0.000	417.84	0.466D
Pb-214	349.03	87.43	37.	32.	0.054	75.85	0.498s
Th-234	368.72	92.35	40.	29.	0.049	71.10	0.933D
Ac-228	380.72	95.35	30.	4.	0.007	359.55	0.935D
Ac-228	833.23	208.45	27.	22.	0.037	111.19	0.430s
Pb-212	953.94	238.62	3.	128.	0.213	18.14	1.057D
Pb-214	967.37	241.98	17.	33.	0.055	49.67	1.060D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:18:02 Page 3
4714781 Spectrum name: Win00401.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.00	269.88	3.	0.	0.000	0.00	0.062s
Pb-214	1181.00	295.38	2.	37.	0.061	35.89	1.159
Ac-228	1309.50	327.49	2.	0.	0.000	0.00	0.292s
Ac-228	1353.34	338.45	3.	39.	0.064	37.70	1.106s
Pb-214	1406.77	351.80	0.	60.	0.100	25.82	1.000

WI07-0701 D2 Grid B4-1 top-soil F.R. 073007

Ac-228	1848.89	462.30	0.	23.	0.038	41.70	0.312s
Bi-214	2437.95	609.52	0.	60.	0.100	25.82	0.464s
CS-137	2646.29	661.59	0.	17.	0.028	48.51	0.500s
Bi-214	3072.62	768.13	1.	1.	0.001	339.93	0.375s
Ac-228	3179.20	794.77	0.	12.	0.020	57.74	0.500s
Ac-228	3645.54	911.30	0.	28.	0.047	37.80	0.614s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3859.53	964.78	7.	0.	0.000	0.00	1.595
Ac-228	3877.11	969.17	0.	18.	0.030	47.14	0.364s
Bi-214	4482.23	1120.38	4.	3.	0.006	222.26	0.285s
Bi-214	4953.88	1238.24	0.	8.	0.013	70.71	0.500s
Bi-214	5508.00	1376.69	0.	2.	0.003	141.42	0.250s
K-40	5841.75	1460.08	0.	29.	0.048	37.14	0.417s
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	2.7903E-04	609.31	2.790E-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	5.424E-04	+	3.072E-04	G
			768.36	0.000E+00	%	1.335E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	&	2.771E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	3.5896E-04	911.07	3.084E-04	(	1.101E-05	G K
			969.11	3.495E-04	?(	1.942E-05	G
			338.32	4.532E-04	*(	3.668E-05	G
			964.60	0.000E+00		2.639E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	8.965E-04	&	2.846E-04	G
			209.28	4.690E-04	&(	1.659E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:18:02 Page 4
4714781 Spectrum name: Win00401.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	9.373E-05	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	0.000E+00	?	1.043E-04	G
Pb-212	N 2.9363E-04	238.62	2.936E-04	(	7.103E-06	G K
		77.11	4.047E-04	+	6.600E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 4.1667E-04	92.35	3.659E-04	(	1.176E-04	G
		63.29	4.890E-04	$(	1.654E-04	G

```
                WI07-0701  D2  Grid  B4-1   top-soil   F.R. 073007
Pb-214   N   2.2512E-04     351.92 2.222E-04  (  3.704E-06         G K
                            295.21 2.307E-04  (  1.654E-05         G
                             77.11 0.000E+00 %   9.919E-05Energy duplication
                            241.98 4.559E-04 +   1.454E-04         G
                             74.81 8.829E-04 +   1.800E-04Energy duplication
                             87.30 4.668E-04 +   1.779E-04         X

Pb-210   N   1.2248E-03      46.50 1.225E-03  (  1.908E-04         G

AM-241       1.8525E-03      59.54 1.853E-03  (  3.205E-05         G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

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     ORTEC g v - i (  63) wan32  G53W2.06  30-JUL-2007 09:18:02 Page    5
4714781                          Spectrum name: Win00401.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        9.6683E-01    2.496E-01    2.523E-01
K-40    #     4.4241E+00    1.643E+00    1.651E+00
Ac-228        1.2438E+00    4.106E-01    4.132E-01
Pb-212        1.0174E+00    1.845E-01    1.884E-01
CS-137  #     1.5963E-01    7.743E-02    7.767E-02
Th-234        1.4438E+00    7.911E-01    7.918E-01
Pb-214        7.8004E-01    1.724E-01    1.749E-01
Pb-210        4.2440E+00    1.916E+00    1.919E+00
AM-241        6.4191E+00    5.212E-01    5.728E-01

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

WI07-0701 D2 Grid B4-1 top-soil F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 2.0698700E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fox
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0700 D2 Grid [redacted] top-soil F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:04:46 Page 1
4714781 Spectrum name: Win00400.An1

Sample description
WI07-0700 D2 Grid B4-2 (topsoil) F.Rel.073007

Spectrum Filename: C:\User\Win00400.An1

Acquisition information
Start time: 30-Jul-2007 08:54:36
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: 2.7990E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.7990E+02) = 3.5727E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:04:46 Page 2
4714781 Spectrum name: Win00400.An1

WI07-0700 D2 Grid B4-2 top-soil F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0583

********** U N I D E N T I F I E D P E A K S U 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	4548.	22383.	37.305	1.80	2.109	CU-64	s
360.00	89.93	35.	24.	0.040	80.47	0.931	PB-214	D
742.97	185.89	22.	41.	0.068	50.46	0.680	RA-226	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.56	46.57	33.	35.	0.058	64.78	0.510s
AM-241	237.50	59.55	60.	481.	0.801	11.25	0.807
Th-234	252.49	63.30	35.	43.	0.072	58.77	0.291s
Pb-214	298.54	74.81	51.	62.	0.104	41.22	0.917D
Pb-212	298.56	74.81	75.	0.	0.000	191.60	0.247D
Pb-212	307.74	77.11	50.	107.	0.178	26.91	0.919D
Pb-214	307.74	77.11	196.	0.	0.000	89.11	0.313D
Pb-214	348.51	87.30	38.	31.	0.051	67.10	0.929D
Th-234	368.72	92.35	30.	61.	0.101	36.35	0.933D
Ac-228	380.72	95.35	14.	5.	0.008	238.21	0.936D
Ac-228	835.13	208.93	16.	27.	0.045	68.56	0.825
Pb-212	953.94	238.62	22.	178.	0.296	16.78	1.057D

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:04:46 Page 3
4714781 Spectrum name: Win00400.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	29.	20.	0.033	89.83	1.060D
Ac-228	1082.78	270.83	4.	13.	0.022	73.06	0.757s
Pb-214	1180.23	295.18	4.	68.	0.114	28.19	0.990s
Ac-228	1308.00	327.12	2.	1.	0.002	416.33	0.075s
Ac-228	1352.53	338.25	6.	41.	0.068	40.27	0.604s

WI07-0700 D2 Grid B4-2 top-soil F.R. 073007

Pb-214	1406.96	351.85	7.	71.	0.118	28.52	1.648s
Ac-228	1851.38	462.92	2.	16.	0.026	63.54	0.296s
Bi-214	2437.45	609.40	0.	40.	0.067	31.62	0.825s
CS-137	2648.07	662.03	2.	26.	0.043	45.90	0.700s
Bi-214	3074.50	768.60	0.	4.	0.007	100.00	0.500s
Ac-228	3173.80	793.42	4.	2.	0.004	296.65	0.219s
Ac-228	3644.79	911.12	0.	29.	0.048	37.14	0.375s
Bi-214	3738.00	934.41	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	1.	4.	0.006	139.91	1.595D
Ac-228	3876.86	969.11	4.	23.	0.038	48.75	1.598D
Bi-214	4481.71	1120.25	0.	12.	0.020	57.74	0.375s
Bi-214	4954.50	1238.39	0.	2.	0.003	141.42	0.500s
Bi-214	5513.00	1377.94	0.	2.	0.003	141.42	0.250s
K-40	5844.46	1460.76	0.	28.	0.047	37.80	0.718s
Ac-228	6355.00	1588.32	0.	4.	0.007	100.00	0.750s
Bi-214	7059.33	1764.29	0.	7.	0.012	75.59	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1884E-04	609.31	1.860E-04	(	4.650E-06	G K
			1764.49	2.491E-04	?(	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	1.356E-04	-	1.737E-04	G
			768.36	2.084E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.2328E-03	1460.81	1.233E-03	?(	4.403E-05	G
Ac-228	N	4.2404E-04	911.07	3.194E-04	?(	1.101E-05	G K
			969.11	4.444E-04	(	6.626E-05	G
			338.32	4.766E-04	(	4.798E-05	G
			964.60	2.230E-04	~	2.285E-04	G
			794.70	0.000E+00	&	2.514E-04	G
			463.00	6.042E-04	?(	1.088E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 09:04:46 Page 4
4714781 Spectrum name: Win00400.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	5.713E-04	?(	1.307E-04	G
		270.23	4.166E-04	&(	1.017E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.288E-04	X
		327.64	0.000E+00	%	1.222E-04	G
Pb-212	N 4.0843E-04	238.62	4.085E-04	(	1.653E-05	G K
		77.11	4.084E-04	(	4.011E-05	Energy duplication
		74.81	0.000E+00	?	8.246E-05	Energy duplication
CS-137	6.9102E-05	661.66	6.910E-05	?(	7.564E-06	G
Th-234	N 7.8225E-04	92.35	7.563E-04	(	1.037E-04	G
		63.29	8.192E-04	*(	1.692E-04	G

Pb-214	N	2.6454E-04	351.92	2.630E-04	(	1.583E-05	G K
			295.21	4.291E-04	+	7.889E-05	G
			77.11	0.000E+00	?	1.333E-04	Energy duplication
			241.98	2.724E-04	(	1.130E-04	G
			74.81	6.932E-04	+	1.735E-04	Energy duplication
			87.30	4.477E-04	+	1.779E-04	X
Pb-210	N	7.1448E-04	46.50	7.145E-04	(	1.764E-04	G
AM-241		9.9010E-04	59.54	9.901E-04	(	2.364E-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 30-JUL-2007 09:04:46 Page 5
4714781 Spectrum name: Win00400.An1

M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

A - Not in Average
C - Coincidence Peak

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	7.8186E-01	2.472E-01	2.490E-01
K-40 #	4.4043E+00	1.665E+00	1.673E+00
Ac-228	1.5150E+00	3.714E-01	3.757E-01
Pb-212	1.4592E+00	2.313E-01	2.377E-01
CS-137 #	2.4688E-01	1.133E-01	1.137E-01
Th-234	2.7948E+00	9.657E-01	9.678E-01
Pb-214	9.4513E-01	2.695E-01	2.719E-01
Pb-210	2.5526E+00	1.653E+00	1.655E+00
AM-241	3.5373E+00	3.979E-01	4.189E-01

- All peaks for activity calculation had bad shape.

WI07-0700 D2 Grid B4-2 top-soil F.R. 073007

* - 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) 1.8237129E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0699 D2 Grid [redacted] top-soil F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:48:56 Page 1
4714781 Spectrum name: Win00399.An1

Sample description
WI07-0699 D2 Grid B4-3 (topsoil) F.Rel.073007

Spectrum Filename: C:\User\Win00399.An1

Acquisition information
Start time: 30-Jul-2007 08:38:45
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: 2.9360E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9360E+02) =
3.4060E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:48:56 Page 2
4714781 Spectrum name: Win00399.An1

WI07-0699 D2 Grid B4-3 top-soil F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1295

********** U N I D E N T I F I E D P E A K S U 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	4269.	24838.	41.397	1.65	2.284	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	185.81	46.63	75.	89.	0.148	44.32	0.901
AM-241	237.66	59.59	75.	421.	0.702	12.29	0.778
Th-234	252.62	63.33	57.	52.	0.087	64.36	0.524s
Pb-214	298.54	74.81	49.	76.	0.126	34.86	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	285.45	0.350D
Pb-212	307.74	77.11	54.	145.	0.242	21.93	0.919D
Pb-214	307.74	77.11	226.	0.	0.000	87.75	0.333D
Pb-214	347.67	87.09	36.	45.	0.075	51.64	0.832
Th-234	368.72	92.35	42.	26.	0.043	82.05	0.933D
Ac-228	380.72	95.35	19.	3.	0.006	377.56	0.935D
Ac-228	836.64	209.31	14.	46.	0.077	45.39	1.334s
Pb-212	953.94	238.62	18.	170.	0.283	16.88	1.057D
Pb-214	967.37	241.98	29.	26.	0.044	69.34	1.060D
Ac-228	1079.03	269.89	8.	14.	0.023	93.40	0.246s

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:48:56 Page 3
4714781 Spectrum name: Win00399.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.89	295.10	6.	51.	0.084	34.65	0.636s
Ac-228	1312.45	328.23	4.	26.	0.044	51.10	0.326s
Ac-228	1353.07	338.38	3.	55.	0.091	30.08	0.495s
Pb-214	1406.06	351.63	0.	100.	0.167	20.00	1.250s
Ac-228	1850.00	462.58	2.	2.	0.002	258.20	0.100s

WI07-0699 D2 Grid B4-3 top-soil F.R. 073007

Bi-214	2437.89	609.51	3.	62.	0.103	28.02	1.558
CS-137	2646.22	661.57	0.	24.	0.040	40.82	0.531s
Bi-214	3074.00	768.48	0.	7.	0.012	75.59	0.750s
Ac-228	3186.00	796.47	0.	12.	0.020	57.74	0.250s
Ac-228	3645.53	911.30	0.	47.	0.078	29.17	0.900s
Bi-214	3735.50	933.78	0.	4.	0.007	100.00	0.500s
Ac-228	3858.81	964.60	2.	3.	0.005	166.70	1.595D
Ac-228	3876.86	969.11	0.	28.	0.047	37.53	1.598D
Bi-214	4480.47	1119.94	5.	2.	0.004	302.37	0.289s
Bi-214	4950.33	1237.35	0.	7.	0.012	75.59	0.375s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.26	1461.21	0.	35.	0.058	33.81	0.812s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7060.50	1764.58	0.	2.	0.003	141.42	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0064E-04	609.31	2.876E-04	(	1.426E-05	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	4.746E-04	+	2.898E-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	3.887E-04	?(	9.716E-05	G
K-40	N	1.5410E-03	1460.81	1.541E-03	(	4.403E-05	G
Ac-228	N	5.6493E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	5.516E-04	(	1.942E-05	G
			338.32	6.426E-04	(	3.593E-05	G
			964.60	1.939E-04	-	2.285E-04	G
			794.70	7.056E-04	&(	5.880E-05	G
			463.00	0.000E+00	%	1.169E-04	G
			209.28	9.733E-04	+	2.426E-04	G
			270.23	4.218E-04	-	2.187E-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	%	1.378E-04	X
		327.64	1.066E-03	&	3.365E-04	G
Pb-212	N 3.8959E-04	238.62	3.896E-04	(	1.484E-05	G K
		77.11	5.553E-04	+	7.831E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 5.9643E-04	92.35	3.195E-04	(	1.213E-04	G
		63.29	9.906E-04	$(	2.132E-04	G
Pb-214	N 3.5378E-04	351.92	3.704E-04	*(	3.704E-06	G K

WI07-0699 D2 Grid B4-3 top-soil F.R. 073007

			295.21	3.174E-04	(	2.565E-05	G	
			77.11	0.000E+00	?	1.428E-04	Energy duplication	
			241.98	3.647E-04	(	1.118E-04	G	
			74.81	8.452E-04	+	1.821E-04	Energy duplication	
			87.30	6.530E-04	+	1.921E-04	X	
Pb-210	N	1.8168E-03	46.50	1.817E-03	(	2.604E-04	G	
AM-241		8.6758E-04	59.54	8.676E-04	(	2.621E-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:
[illegible] - Thermal Neutron Activation
[illegible] - Fast Neutron Activation
[illegible] - Fission Product
[illegible] - Naturally Occurring Isotope
[illegible] - Photon Reaction
[illegible] - Charged Particle Reaction
[illegible] - No MDA Calculation

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
[illegible] - Single-Escape
[illegible] - [illegible]

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:48:56 Page 5
Spectrum name: Win00399.An[illegible]

[illegible] - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
[illegible]	1.0240E+00	2.869E-01	2.894E-01
[illegible]	1.2485E+00	1.774E+00	1.785E+00
[illegible]	1.9242E+00	3.878E-01	3.944E-01
[illegible]	1.3270E+00	2.240E-01	2.295E-01
CS-137 #	2.2152E-01	9.043E-02	[illegible].083E-02
Th-234	2.0314E+00	1.059E+00	[illegible].060E+00
[illegible]	1.2050E+00	2.410E-01	[illegible]
Pb-210	6.1881E+00	2.743E+00	[illegible].746E+00
AM-241	2.9550E+00	3.631E-01	3.793E-01

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

WI07-0699 D2 Grid B4-3 top-soil F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 2.2124636E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0827 D2 Grid C0-5a (under concrete) F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 14:09:05 Page 1
4714781 Spectrum name: Win00488.An1

Sample description
WI07-0827 D2 Grid C0-5a (under concrete) Free.R. 080207

Spectrum Filename: C:\User\Win00488.An1

Acquisition information
Start time: 02-Aug-2007 13:58:52
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: 3.3880E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3880E+02) = 2.9516E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 14:09:05 Page 2
4714781 Spectrum name: Win00488.An1

WI07-0827 D2 Grid C0-5a (under concrete) F.R. 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: 0.0939

********** U N I D E N T I F I E D P E A K S U 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	5049.	19388.	32.313	2.05	2.220	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	185.85	46.64	38.	40.	0.066	58.45	0.612s
AM-241	236.96	59.42	104.	143.	0.238	32.03	0.623s
Th-234	252.43	63.28	48.	35.	0.059	77.25	0.667s
Pb-214	298.54	74.81	88.	70.	0.117	44.66	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	284.77	0.334D
Pb-212	307.74	77.11	69.	121.	0.201	26.71	0.919D
Pb-214	307.74	77.11	210.	0.	0.000	104.31	0.223D
Pb-214	347.77	87.12	34.	20.	0.034	95.88	0.692s
Th-234	368.72	92.35	48.	44.	0.073	54.46	0.933D
Ac-228	380.72	95.35	28.	3.	0.005	486.24	0.936D
Ac-228	837.59	209.54	22.	25.	0.041	87.19	1.224
Pb-212	953.94	238.62	20.	170.	0.283	17.02	1.057D
Pb-214	967.37	241.98	35.	33.	0.055	61.85	1.060D
Ac-228	1080.18	270.18	13.	29.	0.048	61.44	1.098

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 14:09:05 Page 3
4714781 Spectrum name: Win00488.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.65	295.04	21.	46.	0.077	51.54	1.081
Ac-228	1310.23	327.68	12.	26.	0.044	72.03	0.273s
Ac-228	1353.59	338.51	5.	44.	0.074	34.91	0.571s
Pb-214	1407.71	352.04	10.	102.	0.169	24.03	1.179s
Ac-228	1851.83	463.04	2.	25.	0.042	44.54	0.658s

WI07-0827 D2 Grid C0-5a (under concrete) F.R. 080207

Bi-214	2437.94	609.52	0.	81.	0.135	22.22	0.646s
CS-137	2647.15	661.80	0.	41.	0.068	31.23	0.656s
Bi-214	3072.92	768.21	0.	16.	0.027	50.00	0.375s
Ac-228	3177.00	794.22	0.	1.	0.002	200.00	0.250s
Ac-228	3645.35	911.26	0.	47.	0.078	29.17	1.000s
Bi-214	3733.67	933.33	2.	1.	0.002	447.21	0.187s
Ac-228	3858.81	964.60	3.	3.	0.005	181.85	1.595D
Ac-228	3876.86	969.11	2.	28.	0.047	39.69	1.598D
Bi-214	4481.12	1120.11	0.	16.	0.027	50.00	0.500s
Bi-214	4954.00	1238.27	3.	1.	0.002	412.31	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.30	1460.72	0.	63.	0.105	25.20	1.395s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.00	1764.46	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	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.7979E-04	609.31	3.767E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	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	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	%	2.915E-04	G
K-40	N	2.7737E-03	1460.81	2.774E-03	(	4.403E-05	G
Ac-228	N	5.2762E-04	911.07	5.176E-04	(	1.101E-05	G K
			969.11	5.504E-04	(	4.632E-05	G
			338.32	5.196E-04	(	4.214E-05	G
			964.60	2.008E-04	-	2.469E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	9.744E-04	+	3.066E-04	G
			209.28	5.255E-04	?(	1.519E-04	G
			270.23	8.956E-04	+	3.024E-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	%	1.616E-04	X
		327.64	1.079E-03	+	3.806E-04	G
Pb-212	N 4.1123E-04	238.62	3.909E-04	(	1.563E-05	G K
		77.11	4.617E-04	(	4.706E-05	Energy duplication
		74.81	0.000E+00	%	8.437E-05	Energy duplication
CS-137	1.1111E-04	661.66	1.111E-04	(	2.710E-06	G
Th-234	N 5.9675E-04	92.35	5.431E-04	(	1.292E-04	G
		63.29	6.731E-04	?(	1.958E-04	G
Pb-214	N 3.8903E-04	351.92	3.759E-04	*(	1.893E-05	G K

```
            WI07-0827  D2  Grid  C0-5a   (under concrete)   F.R. 080207
                              295.21 2.882E-04 -   7.571E-05         G
                               77.11 0.000E+00 ?   1.378E-04Energy duplication
                              241.98 4.541E-04  (  1.231E-04         G
                               74.81 7.835E-04 +   2.040E-04Energy duplication
                               87.30 2.926E-04 -   1.582E-04         X

Pb-210   N   8.0635E-04      46.50 8.063E-04  (  1.873E-04         G

AM-241       2.9446E-04      59.54 2.945E-04  (  3.074E-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
```



```
   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       1.1210E+00    2.491E-01    2.526E-01
K-40         8.1870E+00    2.063E+00    2.086E+00
Ac-228       1.5573E+00    4.129E-01    4.170E-01
Pb-212       1.2138E+00    1.922E-01    1.975E-01
CS-137       3.2794E-01    1.024E-01    1.032E-01
Th-234       1.7614E+00    8.324E-01    8.334E-01
Pb-214       1.1482E+00    2.759E-01    2.793E-01
Pb-210       2.3800E+00    1.391E+00    1.392E+00
AM-241       8.6912E-01    2.783E-01    2.802E-01
  < - MDA value printed.
  A - Activity printed, but activity < MDA.
  B - Activity < MDA and failed test.
  C - Area < Critical level.
```

WI07-0827 D2 Grid C0-5a (under concrete) F.R. 080207

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) 1.8565765E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Funk
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07 - 0987 D1 Grid C0-1 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:34:24 Page 1
8905696 Spectrum name: Win00370.An1

Sample description
WI07-0987 D1 Grid C0-1 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00370.An1

Acquisition information
Start time: 07-Aug-2007 09:24:14
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: 3.2360E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2360E+02) = 3.0902E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:34:24 Page 2
8905696 Spectrum name: Win00370.An1

WI07 - 0987 D1 Grid C0-1 0-6in Free. R. 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: 0.1834

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
27.78	7.12	126.	303.	0.506	17.46	1.406	CU-64 s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.79	46.62	33.	38.	0.063	68.62	0.319s
AM-241	236.36	59.25	26.	26.	0.044	71.70	0.841
Th-234	253.06	63.43	28.	18.	0.029	109.30	0.744
Pb-214	298.61	74.81	54.	93.	0.155	30.50	0.971D
Pb-212	298.63	74.81	86.	0.	0.000	269.81	0.245D
Pb-212	307.80	77.11	65.	102.	0.171	29.72	0.973D
Pb-214	307.80	77.11	103.	0.	0.000	257.37	0.624D
Pb-214	349.36	87.50	30.	53.	0.088	45.13	0.751
Th-234	368.79	92.35	35.	30.	0.050	66.77	0.985D
Ac-228	380.79	95.35	25.	7.	0.011	224.82	0.987D
Ac-228	835.50	208.99	7.	28.	0.047	51.18	0.333s
Pb-212	954.08	238.62	11.	138.	0.231	18.32	1.099D
Pb-214	967.50	241.98	25.	26.	0.043	68.45	1.101D
Ac-228	1082.76	270.78	11.	11.	0.019	120.78	0.473s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:34:24 Page 3
8905696 Spectrum name: Win00370.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.52	294.97	21.	59.	0.099	43.66	0.484s
Ac-228	1311.39	327.92	3.	9.	0.016	84.52	0.283s
Ac-228	1352.70	338.25	10.	42.	0.071	44.58	0.328s
Pb-214	1406.88	351.79	4.	79.	0.131	25.42	0.668s
Ac-228	1852.00	463.03	3.	0.	0.000	0.00	0.000s

WI07 - 0987 D1 Grid C0-1 0-6in Free. R. 080707

Bi-214	2439.15	609.76	0.	53.	0.088	27.47	0.650s
CS-137	2647.93	661.93	0.	29.	0.048	37.14	0.416s
Bi-214	3075.00	768.65	3.	1.	0.002	412.31	0.000s
Ac-228	3180.17	794.94	0.	10.	0.017	63.25	0.312s
Ac-228	3646.84	911.55	0.	32.	0.053	35.36	1.749
Bi-214	3735.00	933.58	0.	2.	0.003	141.42	0.250s
Ac-228	3857.00	964.07	0.	1.	0.002	200.00	0.250s
Ac-228	3877.18	969.11	17.	0.	0.000	0.00	1.591
Bi-214	4482.50	1120.37	0.	7.	0.012	75.59	1.499
Bi-214	4952.33	1237.77	1.	1.	0.001	339.93	0.197s
Bi-214	5512.33	1377.69	1.	0.	0.001	240.37	0.197s
K-40	5846.80	1461.27	0.	40.	0.067	31.62	0.687s
Ac-228	6354.00	1587.99	0.	1.	0.002	200.00	0.250s
Bi-214	7059.50	1764.27	0.	3.	0.005	115.47	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	Code	MDA Value microCi	Comments
Bi-214	N	2.7122E-04	609.31	2.712E-04	(	5.117E-06	G K
			1764.49	1.135E-04	-	1.135E-04	G
			1120.29	1.836E-04	-	1.122E-04	G
			1238.11	0.000E+00	%	1.866E-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	%	2.318E-04	G
			934.06	2.108E-04	-	2.699E-04	G
K-40	N	1.8830E-03	1460.81	1.883E-03	(	4.707E-05	G
Ac-228	N	4.6822E-04	911.07	3.825E-04	(	1.195E-05	G K
			969.11	0.000E+00		1.350E-04	G
			338.32	5.599E-04	(	6.731E-05	G
			964.60	0.000E+00	%	1.338E-04	G
			794.70	6.411E-04	?(	6.411E-05	G
			463.00	0.000E+00	?	1.299E-04	G
			209.28	6.784E-04	(	1.036E-04	G
			270.23	3.955E-04	?(	1.835E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:34:24 Page 4
8905696 Spectrum name: Win00370.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	3.098E-04	G
			95.35	0.000E+00	%	1.917E-04	X
			327.64	4.277E-04	?(	1.312E-04	G
Pb-212	N	3.6239E-04	238.62	3.624E-04	(	1.374E-05	G K
			77.11	4.736E-04	+	8.687E-05	Energy duplication
			74.81	0.000E+00	%	1.068E-04	Energy duplication
CS-137		8.6230E-05	661.66	8.623E-05	(	2.973E-06	G
Th-234	N	4.2654E-04	92.35	4.401E-04	(	1.305E-04	G
			63.29	4.073E-04	$(	1.855E-04	G
Pb-214	N	3.6380E-04	351.92	3.277E-04	@(	1.426E-05	G K

WI07 - 0987 D1 Grid C0-1 0-6in Free. R. 080707

			295.21	4.188E-04	(	4.936E-05		G
			77.11	0.000E+00	%	1.176E-04	Energy duplication	
			241.98	4.022E-04	(	1.205E-04		G
			74.81	1.256E-03	+	2.385E-04	Energy duplication	
			87.30	9.150E-04	+	2.312E-04		X
Pb-210	N	8.9017E-04	46.50	8.902E-04	(	2.024E-04		G
AM-241		6.5698E-05	59.54	6.570E-05	(	1.899E-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 09:34:24 Page 5
8905696 Spectrum name: Win00370.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	8.3813E-01	2.303E-01	2.316E-01
K-40	5.8188E+00	1.840E+00	1.848E+00
Ac-228	1.4469E+00	4.286E-01	4.307E-01
Pb-212	1.1199E+00	2.051E-01	2.078E-01
CS-137	2.6647E-01	9.897E-02	9.930E-02
Th-234	1.3181E+00	8.441E-01	8.447E-01
Pb-214	1.1242E+00	2.857E-01	2.876E-01
Pb-210	2.7508E+00	1.888E+00	1.889E+00
AM-241	2.0302E-01	1.456E-01	1.458E-01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.

WI07 - 0987 D1 Grid CO-1 0-6in Free. R. 080707

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) 1.4886380E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0988 D2 Grid CO-2 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:03:47 Page 1
8905696 Spectrum name: Win00557.An1

Sample description
WI07-0988 D2 Grid CO-2 0-6' Free R. 080707

Spectrum Filename: C:\User\Win00557.An1

Acquisition information

Start time:	07-Aug-2007 09:53:36
Live time:	600
Real time:	602
Dead time:	0.26 %
Detector ID:	2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration

Created:	17-May-2007 15:02:20
Zero offset:	0.187 keV
Gain:	0.250 keV/channel
Quadratic:	-8.670E-09 keV/channel^2

Efficiency Calibration

Created:	17-May-2007 15:44:56
Knee Energy:	140.00 keV
Above the Knee:	Quadratic Uncertainty = 2.56 %
Log(Eff):	-7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee:	Quadratic Uncertainty = 0.16 %
Log(Eff):	-1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

Library Files

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

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.69keV)
Stop channel:	8000 (1999.30keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	4.0540E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 4.0540E+02) = 2.4667E+03
Detection limit method:	Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:03:47 Page 2
8905696 Spectrum name: Win00557.An1

WI07-0988 D2 Grid C0-2 0-6 in. F.R. 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: 0.1261

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.47	2.91	5924.	8148.	13.579	3.47	0.854	-	D
15.60	3.94	12490.	7934.	13.224	4.57	0.855	-	D
19.49	4.91	12411.	5254.	8.756	6.60	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	186.68	46.85	30.	16.	0.027	122.47	0.438s
AM-241	231.17	57.97	46.	32.	0.052	84.13	0.335s
Th-234	253.12	63.46	62.	33.	0.055	89.69	0.562s
Pb-214	298.54	74.81	84.	98.	0.164	33.23	0.918D
Pb-212	298.56	74.81	109.	0.	0.000	301.99	0.300D
Pb-212	307.74	77.11	84.	158.	0.263	22.91	0.920D
Pb-214	307.74	77.11	196.	0.	0.000	860.08	0.492D
Pb-214	348.93	87.40	65.	54.	0.089	61.40	0.834
Th-234	368.72	92.35	76.	32.	0.054	84.36	0.933D
Ac-228	380.72	95.35	32.	12.	0.021	141.10	0.935D
Ac-228	835.00	208.90	38.	38.	0.063	73.75	1.045
Pb-212	953.94	238.62	17.	239.	0.398	13.84	1.057D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:03:47 Page 3
8905696 Spectrum name: Win00557.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	31.	49.	0.082	42.92	1.060D
Ac-228	1075.57	269.03	28.	29.	0.048	85.86	0.354s
Pb-214	1180.31	295.20	9.	61.	0.102	32.29	0.523s
Ac-228	1310.00	327.62	13.	4.	0.006	341.61	0.000s
Ac-228	1353.10	338.39	9.	70.	0.117	29.42	1.028s

WI07-0988 D2 Grid C0-2 0-6 in. F.R. 080707

Pb-214	1407.91	352.09	6.	89.	0.149	23.59	0.801s
Ac-228	1848.00	462.08	19.	1.	0.002	1253.00	0.000s
Bi-214	2437.39	609.38	3.	75.	0.125	24.68	0.911s
CS-137	2647.82	661.97	2.	18.	0.029	57.10	0.740s
Bi-214	3073.00	768.23	0.	1.	0.002	200.00	0.250s
Ac-228	3179.55	794.85	2.	14.	0.024	66.51	0.272s
Ac-228	3645.53	911.30	0.	45.	0.075	29.81	1.041s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	4.	8.	0.013	99.98	1.595D
Ac-228	3876.86	969.11	3.	31.	0.052	38.75	1.598D
Bi-214	4483.12	1120.61	0.	24.	0.040	40.82	0.781s
Bi-214	4953.33	1238.10	1.	1.	0.001	339.93	0.197s
Bi-214	5512.50	1377.82	0.	3.	0.005	115.47	0.500s
K-40	5846.19	1461.19	0.	81.	0.135	22.22	0.384s
Ac-228	6355.50	1588.45	0.	3.	0.005	115.47	0.500s
Bi-214	7061.50	1764.83	0.	6.	0.010	81.65	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.4752E-04	609.31	3.496E-04	(	1.364E-05	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-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	5.2645E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	6.073E-04	(	5.606E-05	G
			338.32	8.204E-04	+	1.533E-04	G
			964.60	4.939E-04	(	2.081E-04	G
			794.70	8.526E-04	+	3.735E-04	G
			463.00	0.000E+00	&	2.668E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:03:47 Page 4
8905696 Spectrum name: Win00557.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			209.28	8.041E-04	+	2.717E-04	G
			270.23	9.060E-04	&	3.496E-04	G
			1588.00	4.357E-04	?(	1.452E-04	G
			95.35	2.375E-04	-	1.906E-04	X
			327.64	0.000E+00	%	2.587E-04	G
Pb-212	N	5.6405E-04	238.62	5.483E-04	(	1.457E-05	G K
			77.11	6.031E-04	(	5.157E-05	Energy duplication
			74.81	0.000E+00	%	9.893E-05	Energy duplication
CS-137		4.7875E-05	661.66	4.787E-05	?(	7.364E-06	G
Th-234	N	4.9498E-04	92.35	4.011E-04	(	1.600E-04	G
			63.29	6.287E-04	$(	2.219E-04	G

```
Pb-214   N   3.4831E-04    351.92 3.309E-04  (  1.446E-05          G K
                           295.21 3.821E-04  (  2.989E-05          G
                            77.11 0.000E+00 %   1.333E-04Energy duplication
                           241.98 6.785E-04 +   1.819E-04          G
                            74.81 1.096E-03 +   2.187E-04Energy duplication
                            87.30 7.788E-04 +   2.312E-04          X

Pb-210   N   3.2662E-04     46.50 3.266E-04 ?(  1.687E-04          G

AM-241       6.4863E-05     59.54 6.486E-05 &(  2.070E-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 10:03:47 Page 5
8905696 Spectrum name: Win00557.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	8.5723E-01	2.116E-01	2.140E-01
K-40	8.7969E+00	1.955E+00	1.982E+00
Ac-228	1.2986E+00	3.872E-01	3.902E-01
Pb-212	1.3913E+00	1.862E-01	1.933E-01
CS-137 #	1.1809E-01	6.744E-02	6.759E-02
Th-234	1.2210E+00	7.517E-01	7.522E-01
Pb-214	8.5919E-01	1.718E-01	1.748E-01
Pb-210 #	8.0568E-01	9.867E-01	9.869E-01
AM-241 #	1.6000E-01	1.346E-01	1.347E-01

\# - All peaks for activity calculation had bad shape.

WI07-0988 D2 Grid C0-2 0-6 in. F.R. 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 1999.3 keV) 1.5507969E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0824 D2 Grid C0-3 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:11:24 Page 1
4714781 Spectrum name: Win00485.An1

Sample description
WI07-0824 D2 Grid C0-3 0-6" Free Release 080207

Spectrum Filename: C:\User\Win00485.An1

Acquisition information
Start time: 02-Aug-2007 12:59:56
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: 3.6270E+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 13:11:24 Page 2
4714781 Spectrum name: Win00485.An1

WI07-0824 D2 Grid C0-3 0-6 in. F.R. 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: 0.1481

********** U N I D E N T I F I E D P E A K S U 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	5592.	9103.	15.171	3.13	0.854	- D
17.99	4.46	15760.	6636.	11.061	5.89	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	184.18	46.22	183.	28.	0.047	157.39	0.253s
AM-241	237.30	59.50	189.	157.	0.262	35.74	0.731
Th-234	247.33	62.01	162.	46.	0.076	108.94	0.443s
Pb-214	298.54	74.81	120.	74.	0.124	47.81	0.917D
Pb-212	298.56	74.81	113.	0.	0.000	3013.30	0.445D
Pb-212	307.74	77.11	143.	82.	0.136	46.88	0.919D
Pb-214	307.74	77.11	214.	0.	0.000	257.29	0.263D
Pb-214	348.64	87.33	110.	38.	0.062	104.98	0.480s
Th-234	368.72	92.35	60.	37.	0.061	68.04	0.933D
Ac-228	380.72	95.35	79.	13.	0.021	203.73	0.936D
Ac-228	838.00	209.65	26.	19.	0.032	105.95	0.413s
Pb-212	953.94	238.62	31.	151.	0.251	19.37	1.057D
Pb-214	967.37	241.98	21.	22.	0.037	71.56	1.060D

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:11:24 Page 3
4714781 Spectrum name: Win00485.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.33	269.72	15.	23.	0.038	79.22	0.563s
Pb-214	1179.85	295.09	6.	60.	0.099	31.09	1.066s
Ac-228	1312.00	328.12	0.	21.	0.035	43.64	0.812s
Ac-228	1351.59	338.01	3.	58.	0.097	28.85	0.403s
Pb-214	1407.38	351.96	10.	98.	0.162	24.02	1.061

WI07-0824 D2 Grid C0-3 0-6 in. F.R. 080207

Ac-228	1853.90	463.55	2.	12.	0.020	70.71	0.277s
Bi-214	2437.90	609.51	6.	40.	0.067	39.06	0.596s
CS-137	2647.44	661.88	0.	37.	0.062	32.88	0.875s
Bi-214	3065.77	766.42	9.	0.	0.000	0.00	0.195s
Ac-228	3177.33	794.30	1.	0.	0.001	240.37	0.197s
Ac-228	3645.95	911.41	0.	41.	0.068	31.23	0.447s
Bi-214	3738.00	934.41	0.	3.	0.005	115.47	0.250s
Ac-228	3858.81	964.60	3.	2.	0.003	291.76	1.595D
Ac-228	3876.86	969.11	2.	18.	0.030	52.47	1.598D
Bi-214	4480.94	1120.06	0.	17.	0.028	48.51	1.249s
Bi-214	4953.00	1238.02	1.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.25	1460.96	0.	85.	0.142	21.69	1.328s
Ac-228	6355.33	1588.40	0.	3.	0.005	115.47	0.375s
Bi-214	7059.83	1764.42	0.	6.	0.010	81.65	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.9895E-04	609.31	1.876E-04	(	1.815E-05	G K
			1764.49	2.135E-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	&	2.527E-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	3.7424E-03	1460.81	3.742E-03	(	4.403E-05	G
Ac-228	N	4.1810E-04	911.07	4.515E-04	(	1.101E-05	G K
			969.11	3.478E-04	(	5.055E-05	G
			338.32	6.797E-04	+	1.354E-04	G
			964.60	0.000E+00	%	2.301E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	4.677E-04	?(	9.984E-05	G
			209.28	4.091E-04	(	1.626E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:11:24 Page 4
4714781 Spectrum name: Win00485.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.186E-04	+	2.884E-04	G
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	2.711E-04	X
		327.64	8.552E-04	+	2.851E-04	G
Pb-212	N 3.3695E-04	238.62	3.465E-04	(	1.935E-05	G K
		77.11	3.134E-04	(	6.672E-05	Energy duplication
		74.81	0.000E+00	%	1.007E-04	Energy duplication
CS-137	1.0027E-04	661.66	1.003E-04	?(	2.710E-06	G
Th-234	N 6.2772E-04	92.35	4.598E-04	(	1.432E-04	G
		63.29	8.668E-04	&(	3.531E-04	G

WI07-0824 D2 Grid C0-3 0-6 in. F.R. 080207

Pb-214	N	3.5874E-04	351.92	3.611E-04	(	1.810E-05		G K
			295.21	3.738E-04	*(	2.565E-05		G
			77.11	0.000E+00	%	1.391E-04	Energy duplication	
			241.98	3.084E-04	(	9.613E-05		G
			74.81	8.288E-04	+	2.259E-04	Energy duplication	
			87.30	5.442E-04	+	2.570E-04		X
Pb-210	N	5.7159E-04	46.50	5.716E-04	(	4.009E-04		G
AM-241		3.2328E-04	59.54	3.233E-04	(	4.108E-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 13:11:24 Page 5
4714781 Spectrum name: Win00485.An1

R - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		5.4852E-01	2.143E-01	2.152E-01
K-40		1.0318E+01	2.238E+00	2.271E+00
Ac-228		1.1527E+00	3.601E-01	3.626E-01
Pb-212		9.2900E-01	1.800E-01	1.833E-01
CS-137	#	2.7644E-01	9.089E-02	9.151E-02
Th-234		1.7307E+00	1.111E+00	1.112E+00
Pb-214		9.8907E-01	2.375E-01	2.404E-01
Pb-210	C	1.5759E+00	2.480E+00	2.481E+00
AM-241		8.9133E-01	3.185E-01	3.202E-01

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

WI07-0824 D2 Grid C0-3 0-6 in. F.R. 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) 1.8411789E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0825 D2 Grid C0-4 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:27:27 Page 1
4714781 Spectrum name: Win00486.An1

Sample description
WI07-0825 D2 Grid C0-4 0-6" Free Rel. 080207

Spectrum Filename: C:\User\Win00486.An1

Acquisition information
Start time: 02-Aug-2007 13:17:16
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: 3.3480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3480E+02) = 2.9869E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:27:27 Page 2
4714781 Spectrum name: Win00486.An1

WI07-0825 D2 Grid C0-4 0-6 in. F.R. 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: 0.1448

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.91	3.91	5658.	19475.	32.458	2.11	2.380	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	185.09	46.45	188.	63.	0.105	79.49	0.385s
AM-241	237.71	59.60	136.	110.	0.183	41.38	1.194s
Th-234	251.62	63.08	160.	68.	0.113	75.25	0.830
Pb-214	298.54	74.81	120.	55.	0.092	61.96	0.917D
Pb-212	298.56	74.81	87.	0.	0.000	1088.34	0.000D
Pb-212	307.74	77.11	148.	110.	0.184	36.47	0.919D
Pb-214	307.74	77.11	211.	0.	0.000	227.94	0.000D
Pb-214	346.81	86.87	117.	31.	0.052	130.85	0.612s
Th-234	369.31	92.50	72.	16.	0.027	176.36	0.643s
Ac-228	380.72	95.35	48.	0.	0.000	0.00	0.356D
Ac-228	837.00	209.40	5.	1.	0.002	663.32	0.000s
Pb-212	953.94	238.62	24.	110.	0.183	22.90	1.057D
Pb-214	967.37	241.98	25.	21.	0.035	80.32	1.060D
Ac-228	1079.00	269.88	7.	2.	0.003	414.33	0.000s

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:27:27 Page 3
4714781 Spectrum name: Win00486.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1178.63	294.78	4.	43.	0.072	35.88	0.970s
Ac-228	1306.21	326.67	5.	2.	0.003	450.78	0.302s
Ac-228	1354.63	338.77	5.	22.	0.037	55.12	0.472s
Pb-214	1407.13	351.89	0.	45.	0.075	29.81	1.125s
Ac-228	1852.61	463.23	3.	13.	0.022	74.46	0.294s

WI07-0825 D2 Grid C0-4 0-6 in. F.R. 080207

Bi-214	2437.49	609.41	0.	51.	0.085	28.01	0.618s
CS-137	2646.50	661.64	0.	14.	0.023	53.45	0.750s
Bi-214	3073.67	768.39	0.	8.	0.013	70.71	0.375s
Ac-228	3178.17	794.51	0.	6.	0.010	81.65	0.375s
Ac-228	3645.00	911.17	8.	2.	0.003	509.90	0.000s
Bi-214	3737.67	934.33	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	0.	0.000	0.00	0.000D
Ac-228	3877.17	969.19	0.	7.	0.012	75.59	0.375s
Bi-214	4481.75	1120.26	0.	9.	0.015	66.67	0.375s
Bi-214	4952.57	1237.91	2.	2.	0.003	311.13	0.328s
Bi-214	5509.00	1376.94	0.	3.	0.005	115.47	0.250s
K-40	5846.22	1461.20	0.	94.	0.157	20.63	1.577
Ac-228	6352.00	1587.57	0.	6.	0.010	81.65	1.249s
Bi-214	7060.00	1764.46	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3270E-04	609.31	2.372E-04	(	4.650E-06	G K
			1764.49	1.068E-04	-	1.068E-04	G
			1120.29	2.190E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.286E-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	+	3.246E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	4.1386E-03	1460.81	4.139E-03	(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.506E-05	G K
			969.11	1.359E-04	?	8.301E-05	G
			338.32	2.617E-04		9.218E-05	G
			964.60	0.000E+00	?	1.235E-04	G
			794.70	3.528E-04	?	2.352E-04	G
			463.00	5.132E-04	?	2.408E-04	G
			209.28	0.000E+00	%	8.464E-05	G
			270.23	0.000E+00	%	1.491E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	8.715E-04	?	5.810E-04	G
		95.35	0.000E+00	&	1.986E-04	X
		327.64	0.000E+00	&	1.741E-04	G
Pb-212	N 2.5244E-04	238.62	2.524E-04	(	1.716E-05	G K
		77.11	4.228E-04	+	8.890E-05	Energy duplication
		74.81	0.000E+00	%	8.858E-05	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G
Th-234	N 6.5421E-04	92.35	2.038E-04	(	1.557E-04	G
		63.29	1.295E-03	(	3.505E-04	G
Pb-214	N 1.6667E-04	351.92	1.667E-04	*(	3.704E-06	G K

WI07-0825 D2 Grid C0-4 0-6 in. F.R. 080207

			295.21	2.715E-04	+	6.395E-05	G
			77.11	0.000E+00	%	1.381E-04	Energy duplication
			241.98	2.901E-04	+	1.397E-04	G
			74.81	6.183E-04	+	2.144E-04	Energy duplication
			87.30	4.547E-04	+	2.570E-04	X
Pb-210	N	1.2861E-03	46.50	1.286E-03	@(	4.062E-04	G
AM-241		2.2651E-04	59.54	2.265E-04	*(	3.501E-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 13:27:27 Page 5
4714781 Spectrum name: Win00486.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	6.9505E-01	1.947E-01	1.964E-01
K-40	1.2361E+01	2.550E+00	2.592E+00
Ac-228 B<	1.6447E-01		
Pb-212	7.5400E-01	1.726E-01	1.749E-01
CS-137 #	1.1332E-01	6.057E-02	6.073E-02
Th-234 C	1.9540E+00	1.470E+00	1.471E+00
Pb-214	4.9781E-01	1.484E-01	1.496E-01
Pb-210 #	3.8413E+00	3.054E+00	3.055E+00
AM-241 #	6.7654E-01	2.800E-01	2.811E-01

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

WI07-0825 D2 Grid C0-4 0-6 in. F.R. 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) 2.0893478E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Funn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0826 D2 Grid C0-5 0-6 in. F.R. 080207

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:51:50 Page 1
4714781 Spectrum name: Win00487.An1

Sample description
WI07-0826 D2 Grid C0-5 0-6" Free Rel. 080207

Spectrum Filename: C:\User\Win00487.An1

Acquisition information
Start time: 02-Aug-2007 13:40:28
Live time: 600
Real time: 602
Dead time: 0.25 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.5820E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.5820E+02) = 3.8730E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:51:50 Page 2
4714781 Spectrum name: Win00487.An1

WI07-0826 D2 Grid C0-5 0-6 in. F.R. 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: 0.1211

********** U N I D E N T I F I E D P E A K S U 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	3783.	18181.	30.302	2.01	2.187	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	185.90	46.65	45.	39.	0.064	75.39	0.262s
AM-241	236.99	59.42	51.	300.	0.501	14.68	1.163s
Th-234	254.46	63.79	44.	20.	0.033	123.29	0.719
Pb-214	298.54	74.81	36.	55.	0.092	40.77	0.917D
Pb-212	298.56	74.81	60.	0.	0.000	556.78	0.260D
Pb-212	307.74	77.11	41.	106.	0.177	25.78	0.919D
Pb-214	307.74	77.11	91.	0.	0.000	475.12	0.416D
Pb-214	347.76	87.11	40.	47.	0.079	59.66	0.330s
Th-234	368.72	92.35	32.	14.	0.023	128.26	0.933D
Ac-228	380.72	95.35	24.	13.	0.022	118.19	0.935D
Ac-228	836.93	209.38	18.	30.	0.050	67.33	0.365s
Pb-212	953.94	238.62	29.	89.	0.148	27.28	1.057D
Pb-214	967.37	241.98	23.	19.	0.032	85.29	1.060D
Ac-228	1074.35	268.72	17.	19.	0.032	98.98	0.212s

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:51:50 Page 3
4714781 Spectrum name: Win00487.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.24	294.94	5.	26.	0.043	50.73	0.413s
Ac-228	1305.54	326.50	4.	20.	0.032	60.89	0.420s
Ac-228	1352.75	338.30	4.	32.	0.054	42.75	0.855s
Pb-214	1408.41	352.21	6.	54.	0.090	31.43	0.950
Ac-228	1852.42	463.18	0.	14.	0.023	53.45	0.333s

WI07-0826 D2 Grid C0-5 0-6 in. F.R. 080207

Bi-214	2437.17	609.33	0.	47.	0.078	29.17	1.400
CS-137	2647.85	661.98	0.	14.	0.023	53.45	0.750s
Bi-214	3074.71	768.65	0.	11.	0.018	60.30	0.375s
Ac-228	3178.10	794.49	0.	11.	0.018	60.30	0.750s
Ac-228	3645.49	911.29	0.	39.	0.065	32.03	1.062s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	3.	0.	0.000	0.00	1.595
Ac-228	3878.33	969.48	0.	15.	0.025	51.64	1.249
Bi-214	4480.00	1119.83	0.	0.	0.001	223.61	0.100s
Bi-214	4946.50	1236.39	0.	7.	0.012	75.59	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.68	1460.82	0.	60.	0.100	25.82	0.818s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	0.	11.	0.018	60.30	0.500s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.1857E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	3.914E-04	+	1.856E-04	G
			1120.29	0.000E+00	%	4.867E-05	G
			1238.11	4.746E-04	&	2.898E-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	%	1.943E-04	G
K-40	N	2.6417E-03	1460.81	2.642E-03	(	4.403E-05	G
Ac-228	N	4.4193E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	2.913E-04	-	1.165E-04	G
			338.32	3.809E-04	(	3.742E-05	G
			964.60	0.000E+00		1.832E-04	G
			794.70	6.468E-04	+	3.067E-04	G
			463.00	5.457E-04	?(	3.898E-05	G
			209.28	6.348E-04	+	2.182E-04	G
			270.23	6.040E-04	&(	1.967E-04	G

ORTEC g v - i (63) wan32 G53W2.06 02-AUG-2007 13:51:50 Page 4
4714781 Spectrum name: Win00487.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.542E-04	-	1.756E-04	X
		327.64	7.941E-04	&	2.973E-04	G
Pb-212	N 2.0436E-04	238.62	2.044E-04	(	1.871E-05	G K
		77.11	4.069E-04	+	6.758E-05	Energy duplication
		74.81	0.000E+00	%	7.427E-05	Energy duplication
CS-137	3.7938E-05	661.66	3.794E-05	?(	2.710E-06	G
Th-234	N 2.5827E-04	92.35	1.721E-04	(	1.066E-04	G
		63.29	3.810E-04	&(	1.885E-04	G
Pb-214	N 1.9606E-04	351.92	2.000E-04	(	1.481E-05	G K

WI07-0826 D2 Grid C0-5 0-6 in. F.R. 080207

			295.21	1.629E-04	(	2.319E-05		G
			77.11	0.000E+00	%	9.188E-05	Energy duplication	
			241.98	2.616E-04	(	1.011E-04		G
			74.81	6.164E-04	+	1.562E-04	Energy duplication	
			87.30	6.869E-04	+	1.988E-04		X
Pb-210	N	7.8933E-04	46.50	7.893E-04	(	2.049E-04		G
AM-241		6.1843E-04	59.54	6.184E-04	(	2.178E-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 13:51:50 Page 5
4714781 Spectrum name: Win00487.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	8.4652E-01	2.470E-01	2.490E-01
K-40	1.0231E+01	2.642E+00	2.669E+00
Ac-228	1.7116E+00	5.329E-01	5.367E-01
Pb-212	7.9149E-01	2.159E-01	2.179E-01
CS-137 #	1.4693E-01	7.854E-02	7.874E-02
Th-234	1.0003E+00	8.898E-01	8.901E-01
Pb-214	7.5933E-01	2.386E-01	2.403E-01
Pb-210	3.0571E+00	2.305E+00	2.306E+00
AM-241	2.3952E+00	3.517E-01	3.627E-01

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

WI07-0826 D2 Grid C0-5 0-6 in. F.R. 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) 2.0939415E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fenn
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 4714781

WI07-0840 D2 Grid C1-1 0-6 in. F.R. 080307

Sample description
WI07-0840 D2 Grid C1-1 0-6" Free R. 080307

Spectrum Filename: C:\User\Win00491.An1

Acquisition information

Start time:	03-Aug-2007 10:05:03
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:	3.5640E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.5640E+02) = 2.8058E+03
Detection limit method:	Traditional ORTEC method

WI07-0840 D2 Grid C1-1 0-6 in. F.R. 080307

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1348

********** U N I D E N T I F I E D P E A K S U 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	2.91	4236.	9482.	15.804	2.83	0.854	-	D
18.13	4.49	10487.	7142.	11.903	4.70	0.855	-	D
371.55	93.07	88.	59.	0.098	52.09	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	185.68	46.60	46.	50.	0.084	55.24	0.966
AM-241	237.07	59.45	50.	86.	0.143	37.57	0.753
Th-234	251.02	62.93	66.	86.	0.143	43.51	1.745s
Pb-214	298.54	74.81	90.	122.	0.204	28.36	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	244.71	0.505D
Pb-212	307.74	77.11	80.	208.	0.346	18.50	0.919D
Pb-214	307.74	77.11	344.	0.	0.000	64.82	0.000D
Pb-214	347.82	87.13	96.	78.	0.129	54.44	0.854
Th-234	368.72	92.35	106.	27.	0.045	115.42	0.933D
Ac-228	380.72	95.35	36.	12.	0.021	148.31	0.935D
Ac-228	834.50	208.77	39.	50.	0.083	57.41	1.015
Pb-212	953.94	238.62	36.	238.	0.396	14.83	1.057D

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:15:14 Page 3
4714781 Spectrum name: Win00491.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	37.	39.	0.066	53.83	1.060D
Ac-228	1082.72	270.81	6.	34.	0.056	46.04	1.061s
Pb-214	1180.08	295.15	10.	92.	0.153	24.50	0.914
Ac-228	1311.27	327.93	11.	29.	0.048	59.25	0.360s

WI07-0840 D2 Grid C1-1 0-6 in. F.R. 080307

Ac-228	1354.25	338.68	16.	70.	0.117	33.26	0.874
Pb-214	1407.48	351.98	11.	119.	0.199	21.10	1.128
Ac-228	1851.88	463.05	6.	23.	0.038	59.61	0.944
Bi-214	2437.38	609.38	0.	93.	0.155	20.74	0.695s
CS-137	2648.00	662.02	1.	0.	0.000	0.00	0.000s
Bi-214	3065.00	766.23	0.	17.	0.028	48.51	0.250s
Ac-228	3179.80	794.92	0.	15.	0.025	51.64	0.750s
Ac-228	3645.83	911.38	0.	63.	0.105	25.20	1.166s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3859.04	964.66	10.	0.	0.000	0.00	1.595
Ac-228	3876.12	968.93	0.	32.	0.053	35.36	1.083s
Bi-214	4482.05	1120.34	0.	20.	0.033	44.72	0.500s
Bi-214	4949.94	1237.25	2.	3.	0.004	208.42	0.318s
Bi-214	5512.71	1377.87	0.	9.	0.015	66.67	0.375s
K-40	5844.70	1460.82	0.	44.	0.073	30.15	1.416s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7059.14	1764.24	0.	19.	0.032	45.88	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	4.4581E-04	609.31	4.325E-04	(	4.650E-06	G K
			1764.49	6.761E-04	+	2.379E-04	G
			1120.29	4.867E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.509E-04	G
			768.36	8.859E-04	&	3.310E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.737E-04	+	5.163E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	7.2503E-04	911.07	6.938E-04	(	1.101E-05	G K
			969.11	6.214E-04	?(	1.942E-05	G
			338.32	8.223E-04	(	7.207E-05	G
			964.60	0.000E+00	%	3.086E-04	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	8.965E-04	?(	1.559E-04	G

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:15:14 Page 4
4714781 Spectrum name: Win00491.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.058E-03	+	2.931E-04	G
		270.23	1.052E-03	&	2.955E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	2.376E-04	-	1.986E-04	X
		327.64	1.167E-03	+	3.852E-04	G
Pb-212	N 5.4594E-04	238.62	5.459E-04	(	2.080E-05	G K
		77.11	7.944E-04	+	9.381E-05	Energy duplication
		74.81	0.000E+00	%	1.036E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 8.7240E-04	92.35	3.344E-04	(	1.882E-04	G

			63.29	1.638E-03	*(	2.286E-04	G	
Pb-214	N	4.5926E-04	351.92	4.420E-04	(	1.906E-05	G	K
			295.21	5.763E-04	+	9.266E-05	G	
			77.11	0.000E+00	?	1.755E-04	Energy duplication	
			241.98	5.451E-04	(	1.254E-04	G	
			74.81	1.367E-03	+	2.355E-04	Energy duplication	
			87.30	1.127E-03	+	2.781E-04	X	
Pb-210	N	1.0309E-03	46.50	1.031E-03	(	2.052E-04	G	
AM-241		1.7709E-04	59.54	1.771E-04	(	2.165E-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 03-AUG-2007 10:15:14 Page 5
4714781 Spectrum name: Win00491.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		1.2509E+00	2.594E-01	2.636E-01
K-40	#	5.4355E+00	1.639E+00	1.651E+00
Ac-228		2.0343E+00	3.905E-01	3.979E-01
Pb-212		1.5318E+00	2.272E-01	2.344E-01
CS-137	<	1.5207E-02		
Th-234		2.4478E+00	1.065E+00	1.066E+00
Pb-214		1.2886E+00	2.718E-01	2.761E-01
Pb-210		2.8925E+00	1.598E+00	1.599E+00
AM-241		4.9687E-01	1.867E-01	1.876E-01

WI07-0840 D2 Grid C1-1 0-6 in. F.R. 080307

- 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) 1.7378313E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0841 D2 Grid C1-2 0-6 in. F.R. 080307

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:29:13 Page 1
4714781 Spectrum name: Win00492.An1

Sample description
WI07-0841 D2 Grid C1-2 0-6" Free R. 080307

Spectrum Filename: C:\User\Win00492.An1

Acquisition information
Start time: 03-Aug-2007 10:19:02
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: 3.6330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6330E+02) = 2.7525E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:29:13 Page 2
4714781 Spectrum name: Win00492.An1

WI07-0841 D2 Grid C1-2 0-6 in. F.R. 080307

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0889

********** U N I D E N T I F I E D P E A K S U 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	3.37	6064.	9513.	15.855	3.09	0.854	-	D
17.17	4.63	10006.	7957.	13.262	4.20	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	185.67	46.60	23.	35.	0.059	53.17	0.961
AM-241	244.24	61.24	94.	50.	0.083	88.04	0.314s
Th-234	252.89	63.40	50.	46.	0.076	59.91	0.527s
Pb-214	298.54	74.81	87.	110.	0.184	30.54	0.917D
Pb-212	298.56	74.81	118.	0.	0.000	242.77	0.444D
Pb-212	307.74	77.11	78.	156.	0.261	22.56	0.919D
Pb-214	307.74	77.11	231.	0.	0.000	98.58	0.000D
Pb-214	347.81	87.13	69.	77.	0.128	47.45	0.870s
Th-234	368.72	92.35	62.	39.	0.065	65.61	0.933D
Ac-228	380.72	95.35	31.	12.	0.020	146.22	0.935D
Ac-228	836.49	209.27	4.	48.	0.079	32.87	1.108
Pb-212	953.94	238.62	39.	232.	0.387	15.15	1.057D
Pb-214	967.37	241.98	40.	27.	0.046	75.19	1.060D

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:29:13 Page 3
4714781 Spectrum name: Win00492.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.79	270.33	18.	38.	0.062	57.50	1.021s
Pb-214	1179.62	295.03	13.	64.	0.106	34.62	1.136
Ac-228	1312.96	328.36	6.	23.	0.038	61.80	0.344s
Ac-228	1353.04	338.37	23.	62.	0.103	42.45	1.012
Pb-214	1408.34	352.20	15.	95.	0.159	26.85	0.448s

WI07-0841 D2 Grid C1-2 0-6 in. F.R. 080307

Ac-228	1853.03	463.34	0.	29.	0.048	37.14	0.333s
Bi-214	2437.19	609.33	0.	85.	0.142	21.69	1.500
CS-137	2643.61	660.92	3.	11.	0.019	84.06	0.351s
Bi-214	3072.30	768.05	0.	12.	0.020	57.74	0.500s
Ac-228	3180.36	795.06	0.	17.	0.028	48.51	1.062s
Ac-228	3644.73	911.10	0.	64.	0.107	25.00	1.416
Bi-214	3736.50	934.03	0.	2.	0.003	141.42	0.500s
Ac-228	3858.81	964.60	6.	7.	0.012	114.96	1.595D
Ac-228	3876.86	969.11	3.	19.	0.032	51.84	1.598D
Bi-214	4484.00	1120.82	5.	1.	0.002	757.19	1.124s
Bi-214	4949.33	1237.10	0.	10.	0.017	63.25	0.375s
Bi-214	5510.00	1377.19	0.	7.	0.012	75.59	0.750s
K-40	5845.25	1460.96	0.	65.	0.108	24.81	1.104s
Ac-228	6354.67	1588.24	1.	1.	0.001	339.93	0.197s
Bi-214	7060.75	1764.65	0.	16.	0.027	50.00	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	3.9529E-04	609.31	3.953E-04	(	4.650E-06	G K
			1764.49	5.693E-04	+	2.199E-04	G
			1120.29	0.000E+00	%	9.733E-05	G
			1238.11	6.779E-04	&	3.390E-04	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	7.573E-04	+	4.625E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.8618E-03	1460.81	2.862E-03	(	4.403E-05	G
Ac-228	N	7.2721E-04	911.07	7.048E-04	(	1.101E-05	G K
			969.11	3.730E-04	-	1.389E-04	G
			338.32	7.266E-04	(	8.556E-05	G
			964.60	4.621E-04	-	3.471E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	1.130E-03	+	3.170E-04	G
			209.28	1.009E-03	+	2.266E-04	G

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:29:13 Page 4
4714781 Spectrum name: Win00492.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.172E-03	+	3.437E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	2.270E-04	-	1.885E-04	X
		327.64	9.231E-04	&(	1.667E-04	G
Pb-212	N 5.5259E-04	238.62	5.338E-04	(	2.140E-05	G K
		77.11	5.991E-04	(	4.962E-05	Energy duplication
		74.81	0.000E+00	%	1.028E-04	Energy duplication
CS-137	3.0260E-05	661.66	3.026E-05	&(	7.947E-06	G
Th-234	N 6.4293E-04	92.35	4.857E-04	(	1.454E-04	G
		63.29	8.668E-04	(	1.993E-04	G

```
                    WI07-0841  D2  Grid  C1-2   0-6 in.   F.R. 080307
Pb-214    N   3.6994E-04     351.92 3.531E-04  (  2.200E-05          G K
                             295.21 3.988E-04  (  3.563E-05          G
                              77.11 0.000E+00 ?   1.444E-04Energy duplication
                             241.98 3.796E-04  (  1.301E-04          G
                              74.81 1.231E-03 +   2.272E-04Energy duplication
                              87.30 1.113E-03 +   2.553E-04          X

Pb-210    N   7.2129E-04      46.50 7.213E-04  (  1.480E-04          G

AM-241        1.0193E-04      59.54 1.019E-04 &(  2.936E-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       1.0880E+00    2.360E-01    2.395E-01
K-40         7.8773E+00    1.954E+00    1.976E+00
Ac-228       2.0017E+00    5.004E-01    5.060E-01
Pb-212       1.5210E+00    2.067E-01    2.144E-01
CS-137 #     8.3293E-02    7.002E-02    7.009E-02
Th-234       1.7697E+00    7.862E-01    7.872E-01
Pb-214       1.0183E+00    2.734E-01    2.760E-01
Pb-210       1.9854E+00    1.056E+00    1.057E+00
AM-241 #     2.8056E-01    2.470E-01    2.472E-01

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

WI07-0841 D2 Grid C1-2 0-6 in. F.R. 080307

& - 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) 1.7625210E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0842 D2 Grid C1-3 0-6 in. F.R. 080307

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:41:59 Page 1
4714781 Spectrum name: Win00493.An1

Sample description
WI07-0842 D2 Grid C1-3 0-6" Free R. 080307

Spectrum Filename: C:\User\Win00493.An1

Acquisition information
Start time: 03-Aug-2007 10:31:48
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: 3.0990E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0990E+02) = 3.2268E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:41:59 Page 2
4714781 Spectrum name: Win00493.An1

WI07-0842 D2 Grid C1-3 0-6 in. F.R. 080307

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.0791

********** U N I D E N T I F I E D P E A K S U 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	4270.	9666.	16.110	2.79	0.854	-	D
17.80	4.41	12404.	7529.	12.549	4.78	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	185.26	46.49	20.	60.	0.100	38.01	1.353s
AM-241	238.09	59.70	27.	6.	0.011	261.47	0.219s
Th-234	254.27	63.74	60.	50.	0.083	64.50	1.030s
Pb-214	298.54	74.81	51.	92.	0.153	30.48	0.917D
Pb-212	298.56	74.81	101.	0.	0.000	575.50	0.244D
Pb-212	307.74	77.11	56.	169.	0.281	19.86	0.919D
Pb-214	307.74	77.11	240.	0.	0.000	148.04	0.448D
Pb-214	348.15	87.21	51.	55.	0.091	54.97	1.629s
Th-234	368.72	92.35	38.	50.	0.084	44.61	0.933D
Ac-228	380.72	95.35	26.	17.	0.029	95.57	0.936D
Ac-228	836.96	209.39	10.	46.	0.077	39.13	0.628s
Pb-212	953.94	238.62	18.	159.	0.265	17.57	1.057D
Pb-214	967.37	241.98	37.	42.	0.070	51.00	1.060D

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:41:59 Page 3
4714781 Spectrum name: Win00493.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.32	269.96	10.	37.	0.062	44.25	1.097
Pb-214	1181.10	295.40	4.	74.	0.124	25.50	0.841s
Ac-228	1314.34	328.70	16.	24.	0.040	78.57	0.457s
Ac-228	1352.43	338.22	10.	66.	0.111	30.98	0.716s

WI07-0842 D2 Grid C1-3 0-6 in. F.R. 080307

Pb-214	1407.28	351.93	8.	84.	0.140	25.35	1.133
Ac-228	1848.71	462.26	0.	21.	0.035	43.64	0.333s
Bi-214	2437.36	609.37	0.	75.	0.125	23.09	0.833s
CS-137	2649.00	662.27	0.	15.	0.025	51.64	0.614s
Bi-214	3070.50	767.60	0.	14.	0.023	53.45	0.437s
Ac-228	3183.20	795.77	0.	12.	0.020	57.74	0.312s
Ac-228	3645.15	911.21	0.	47.	0.078	29.17	0.616s
Bi-214	3743.00	935.66	0.	7.	0.012	75.59	0.250s
Ac-228	3857.50	964.27	3.	2.	0.003	282.84	0.202s
Ac-228	3876.89	969.12	31.	0.	0.000	0.00	1.598
Bi-214	4483.31	1120.65	0.	17.	0.028	48.51	0.312s
Bi-214	4953.86	1238.23	0.	8.	0.013	70.71	0.312s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5845.63	1461.05	0.	41.	0.068	31.23	0.750s
Ac-228	6354.00	1588.07	0.	4.	0.007	100.00	0.750s
Bi-214	7061.14	1764.74	0.	7.	0.012	75.59	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 microCi	Value	Comments
Bi-214	N	3.6474E-04	609.31	3.488E-04	(	4.650E-06		G K
			1764.49	2.491E-04	-	1.521E-04		G
			1120.29	4.137E-04	?(	2.433E-05		G
			1238.11	5.424E-04	+	3.072E-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	%	2.164E-04		G
			934.06	6.802E-04	&	4.154E-04		G
K-40	N	1.8051E-03	1460.81	1.805E-03	(	4.403E-05		G
Ac-228	N	5.4795E-04	911.07	5.176E-04	(	1.101E-05		G K
			969.11	0.000E+00	%	1.622E-04		G
			338.32	7.793E-04	+	1.505E-04		G
			964.60	0.000E+00	%	2.285E-04		G
			794.70	7.056E-04	&(	5.880E-05		G
			463.00	8.185E-04	&	2.728E-04		G
			209.28	9.733E-04	+	2.348E-04		G

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 10:41:59 Page 4
4714781 Spectrum name: Win00493.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.156E-03	+	3.189E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	3.340E-04	-	1.885E-04	X
		327.64	9.841E-04	&	3.852E-04	G
Pb-212	N 3.6538E-04	238.62	3.654E-04	(	1.499E-05	G K
		77.11	6.465E-04	+	8.315E-05	Energy duplication
		74.81	0.000E+00	%	9.535E-05	Energy duplication
CS-137	4.0648E-05	661.66	4.065E-05	?(	2.710E-06	G
Th-234	N 7.6148E-04	92.35	6.273E-04	(	1.148E-04	G
		63.29	9.525E-04	*(	2.184E-04	G

```
Pb-214   N   3.1111E-04    351.92 3.111E-04  (  1.678E-05          G K
                           295.21 4.667E-04 +   8.144E-05          G
                            77.11 0.000E+00 ?   1.472E-04Energy duplication
                           241.98 5.835E-04 +   1.808E-04          G
                            74.81 1.021E-03 +   1.944E-04Energy duplication
                            87.30 7.933E-04 +   2.187E-04          X

Pb-210   N   1.2248E-03     46.50 1.225E-03 *(  1.397E-04          G

AM-241       0.0000E+00     59.54 0.000E+00 %   1.779E-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  03-AUG-2007 10:41:59 Page    5
 4714781                          Spectrum name: Win00493.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	1.1769E+00	2.718E-01	2.754E-01
K-40	5.8249E+00	1.819E+00	1.832E+00
Ac-228	1.7682E+00	5.158E-01	5.201E-01
Pb-212	1.1790E+00	2.071E-01	2.118E-01
CS-137 #	1.3117E-01	6.773E-02	6.792E-02
Th-234	2.4572E+00	9.635E-01	9.651E-01
Pb-214	1.0039E+00	2.545E-01	2.572E-01
Pb-210 #	3.9523E+00	1.502E+00	1.505E+00
AM-241 <	5.7405E-02		

- All peaks for activity calculation had bad shape.

WI07-0842 D2 Grid C1-3 0-6 in. F.R. 080307

* - 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) 1.7493620E+01 pCi/g

The library has energies which.are not separable.

Analyzed by: K.C. Fung
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0843 D2 Grid C1-4 0-6 in. F.R. 080307

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 11:36:04 Page 1
4714781 Spectrum name: Win00496.An1

Sample description
WI07-0843 D2 Grid C1-4 0-6" Free Rel.080307

Spectrum Filename: C:\User\Win00496.An1

Acquisition information
Start time: 03-Aug-2007 11:25:54
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: 3.6610E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6610E+02) =
2.7315E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 11:36:04 Page 2
4714781 Spectrum name: Win00496.An1

WI07-0843 D2 Grid C1-4 0-6 in. F.R. 080307

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during 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	
11.72	2.91	5691.	8410.	14.017	3.35	0.854	-	D
15.94	3.96	12202.	7993.	13.322	4.50	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	187.27	47.00	74.	53.	0.089	68.71	0.774s
AM-241	236.76	59.37	94.	90.	0.149	47.29	0.834
Th-234	250.97	62.92	100.	66.	0.110	61.81	0.344s
Pb-214	298.54	74.81	98.	145.	0.242	25.38	0.917D
Pb-212	298.56	74.81	167.	0.	0.000	214.51	0.551D
Pb-212	307.74	77.11	92.	209.	0.348	18.99	0.919D
Pb-214	307.74	77.11	211.	0.	0.000	1120.66	0.243D
Pb-214	348.28	87.24	84.	60.	0.100	61.46	1.083
Th-234	368.72	92.35	81.	49.	0.082	59.23	0.933D
Ac-228	380.72	95.35	34.	4.	0.007	435.13	0.935D
Ac-228	836.04	209.16	16.	57.	0.095	38.82	0.778s
Pb-212	953.94	238.62	31.	241.	0.401	14.48	1.057D
Pb-214	967.37	241.98	34.	41.	0.069	50.47	1.060D

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 11:36:04 Page 3
4714781 Spectrum name: Win00496.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.60	270.53	21.	24.	0.040	80.79	0.320s
Pb-214	1179.74	295.06	20.	96.	0.160	28.16	0.948
Ac-228	1311.64	328.03	2.	30.	0.051	41.08	0.867
Ac-228	1352.70	338.29	12.	79.	0.132	28.53	0.590s
Pb-214	1407.08	351.88	19.	120.	0.200	23.52	1.068

WI07-0843 D2 Grid C1-4 0-6 in. F.R. 080307

Ac-228	1852.57	463.22	0.	24.	0.040	40.82	0.500s
Bi-214	2437.82	609.49	5.	93.	0.156	23.45	1.348
CS-137	2638.69	659.69	3.	12.	0.020	81.65	0.364s
Bi-214	3074.22	768.53	0.	11.	0.018	60.30	0.687s
Ac-228	3172.40	793.07	0.	12.	0.020	57.74	0.500s
Ac-228	3645.44	911.28	0.	54.	0.090	27.22	1.349
Bi-214	3736.00	933.91	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	3.	6.	0.010	110.27	1.595D
Ac-228	3876.86	969.11	3.	41.	0.069	33.05	1.598D
Bi-214	4481.25	1120.14	0.	27.	0.045	38.49	0.292s
Bi-214	4947.67	1236.68	4.	0.	0.001	685.57	0.412s
Bi-214	5511.67	1377.61	0.	3.	0.005	115.47	0.375s
K-40	5845.12	1460.93	0.	42.	0.070	30.86	0.916s
Ac-228	6352.00	1587.57	0.	0.	0.001	223.61	0.100s
Bi-214	7059.20	1764.26	2.	8.	0.013	97.87	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.3110E-04	609.31	4.340E-04	(	1.672E-05	G K
			1764.49	2.787E-04	-	1.779E-04	G
			1120.29	6.570E-04	+	1.914E-04	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	3.246E-04	-	3.246E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.8492E-03	1460.81	1.849E-03	(	4.403E-05	G
Ac-228	N	7.3811E-04	911.07	5.947E-04	(	1.101E-05	G K
			969.11	8.026E-04	(	5.557E-05	G
			338.32	9.258E-04	(	6.357E-05	G
			964.60	3.842E-04	-	2.946E-04	G
			794.70	7.056E-04	&(	5.880E-05	G
			463.00	9.355E-04	?(	3.898E-05	G
			209.28	1.210E-03	+	2.665E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	7.498E-04	@(	2.187E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	1.242E-03	+	3.518E-04	G
Pb-212	N 5.5286E-04	238.62	5.529E-04	(	1.941E-05	G K
		77.11	7.996E-04	+	9.586E-05	Energy duplication
		74.81	0.000E+00	%	1.216E-04	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	&(	8.130E-06	G
Th-234	N 8.7823E-04	92.35	6.119E-04	(	1.651E-04	G
		63.29	1.257E-03	$(	2.791E-04	G

WI07-0843 D2 Grid C1-4 0-6 in. F.R. 080307

Pb-214	N	4.6569E-04	351.92	4.444E-04	(	2.476E-05	G	K
			295.21	6.014E-04	+	9.860E-05	G	
			77.11	0.000E+00	%	1.382E-04	Energy duplication	
			241.98	5.712E-04	(	1.206E-04	G	
			74.81	1.623E-03	+	2.517E-04	Energy duplication	
			87.30	8.707E-04	+	2.536E-04	X	
Pb-210	N	1.0887E-03	46.50	1.089E-03	(	2.582E-04	G	
AM-241		1.8429E-04	59.54	1.843E-04	(	2.921E-05	G	

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 11:36:04 Page 5
4714781 Spectrum name: Win00496.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	1.1775E+00	2.762E-01	2.797E-01
K-40	5.0510E+00	1.559E+00	1.570E+00
Ac-228	2.0161E+00	4.001E-01	4.071E-01
Pb-212	1.5101E+00	2.187E-01	2.259E-01
CS-137 #	8.8825E-02	7.252E-02	7.260E-02
Th-234	2.3989E+00	1.027E+00	1.028E+00
Pb-214	1.2720E+00	2.992E-01	3.030E-01
Pb-210 #	2.9739E+00	2.043E+00	2.045E+00
AM-241	5.0339E-01	2.381E-01	2.388E-01

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

WI07-0843 D2 Grid C1-4 0-6 in. F.R. 080307

& - 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) 1.6991793E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-084 D2 Grid C1-5 0-6 in. F.R. 080307

Sample description
WI07-0844 D2 Grid C1-5 0-6" Free R. 080307

Spectrum Filename: C:\User\Win00495.An1

Acquisition information

Start time:	03-Aug-2007 12:04:20
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:	3.8140E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.8140E+02) = 2.6219E+03
Detection limit method:	Traditional ORTEC method

WI07-084 D2 Grid C1-5 0-6 in. F.R. 080307

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during 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 Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.11	3.41	8884.	12705.	21.176	2.75	0.854	-	D
17.81	4.83	10495.	9282.	15.470	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	185.97	46.67	35.	42.	0.070	56.29	0.625s
AM-241	237.74	59.61	63.	310.	0.516	15.47	0.911
Th-234	252.94	63.41	24.	32.	0.054	62.08	0.401s
Pb-214	298.54	74.81	50.	78.	0.129	34.38	0.917D
Pb-212	298.56	74.81	80.	0.	0.000	429.47	0.000D
Pb-212	307.74	77.11	41.	99.	0.165	27.22	0.919D
Pb-214	307.74	77.11	96.	0.	0.000	207.72	0.442D
Pb-214	348.93	87.40	26.	34.	0.058	57.46	1.211s
Th-234	368.72	92.35	29.	38.	0.063	51.94	0.933D
Ac-228	380.72	95.35	20.	14.	0.023	107.40	0.936D
Ac-228	835.50	209.02	4.	0.	0.000	0.00	0.292s
Pb-212	953.94	238.62	18.	129.	0.215	19.86	1.057D
Pb-214	967.37	241.98	20.	31.	0.052	54.22	1.060D

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 12:14:30 Page 3
4714781 Spectrum name: Win00495.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.11	270.41	7.	6.	0.011	147.74	0.525s
Pb-214	1180.69	295.30	10.	27.	0.045	55.92	0.631s
Ac-228	1310.03	327.63	10.	13.	0.022	106.59	0.417s
Ac-228	1352.26	338.18	8.	29.	0.048	52.67	0.571s
Pb-214	1407.87	352.08	6.	65.	0.108	29.51	0.555s

WI07-084 D2 Grid C1-5 0-6 in. F.R. 080307

Ac-228	1851.00	462.83	9.	4.	0.006	284.84	0.000s
Bi-214	2438.02	609.54	0.	47.	0.078	29.17	1.075s
CS-137	2647.08	661.79	0.	27.	0.045	38.49	1.062
Bi-214	3074.00	768.48	1.	0.	0.000	0.00	0.000s
Ac-228	3180.34	795.05	1.	3.	0.004	180.28	0.465s
Ac-228	3644.85	911.13	0.	36.	0.060	33.33	1.125s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	3.	2.	0.003	272.29	1.595D
Ac-228	3876.86	969.11	2.	12.	0.020	66.71	1.598D
Bi-214	4480.57	1119.97	0.	15.	0.025	51.64	0.562s
Bi-214	4952.00	1237.77	1.	0.	0.000	0.00	0.083s
Bi-214	5513.67	1378.11	0.	3.	0.005	115.47	0.375s
K-40	5845.23	1460.95	0.	80.	0.133	22.36	0.444s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7058.50	1764.08	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	2.1728E-04	609.31	2.186E-04	(	4.650E-06	G K
			1764.49	2.135E-04	?(	3.558E-05	G
			1120.29	3.650E-04	+	1.460E-04	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	3.246E-04	+	3.246E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.5222E-03	1460.81	3.522E-03	(	4.403E-05	G
Ac-228	N	3.9127E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	2.387E-04	-	1.149E-04	G
			338.32	3.399E-04	*(	5.310E-05	G
			964.60	0.000E+00	%	2.305E-04	G
			794.70	1.568E-04	-	1.983E-04	G
			463.00	0.000E+00	%	2.192E-04	G
			209.28	0.000E+00	?	7.136E-05	G

ORTEC g v - i (63) wan32 G53W2.06 03-AUG-2007 12:14:30 Page 4
4714781 Spectrum name: Win00495.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.979E-04	-	1.757E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.643E-04	-	1.688E-04	X
		327.64	5.294E-04	?(	2.036E-04	G
Pb-212	N 2.9708E-04	238.62	2.971E-04	(	1.488E-05	G K
		77.11	3.785E-04	+	6.600E-05	Energy duplication
		74.81	0.000E+00	%	8.523E-05	Energy duplication
CS-137	7.3167E-05	661.66	7.317E-05	?(	2.710E-06	G
Th-234	N 5.2967E-04	92.35	4.713E-04	(	1.018E-04	G
		63.29	6.128E-04	$(	1.414E-04	G

WI07-084 D2 Grid C1-5 0-6 in. F.R. 080307

Pb-214	N	2.3951E-04	351.92	2.395E-04	(	1.516E-05		G K
			295.21	1.691E-04	-	5.711E-05		G
			77.11	0.000E+00	%	9.412E-05	Energy duplication	
			241.98	4.295E-04	+	1.467E-04		G
			74.81	8.670E-04	+	1.842E-04	Energy duplication	
			87.30	5.006E-04	+	1.664E-04		X
Pb-210	N	8.6078E-04	46.50	8.608E-04	(	1.809E-04		G
AM-241		6.3765E-04	59.54	6.376E-04	(	2.423E-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 03-AUG-2007 12:14:30 Page 5
4714781 Spectrum name: Win00495.An1

R - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	5.6969E-01	1.662E-01	1.676E-01
K-40	9.2350E+00	2.065E+00	2.094E+00
Ac-228	1.0259E+00	3.420E-01	3.441E-01
Pb-212	7.7893E-01	1.547E-01	1.574E-01
CS-137 #	1.9184E-01	7.384E-02	7.420E-02
Th-234	1.3888E+00	5.621E-01	5.630E-01
Pb-214	6.2797E-01	1.853E-01	1.868E-01
Pb-210	2.2569E+00	1.270E+00	1.272E+00
AM-241	1.6719E+00	2.586E-01	2.659E-01

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

WI07-084 D2 Grid C1-5 0-6 in. F.R. 080307

& - 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) 1.7746794E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0804 D2 Grid C2-1 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:50:40 Page 1
4714781 Spectrum name: Win00462.An1

Sample description
WI07-0804 D2 Grid C2-1 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00462.An1

Acquisition information
Start time: 01-Aug-2007 13:40:30
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: 3.3470E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3470E+02) = 2.9878E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:50:40 Page 2
4714781 Spectrum name: Win00462.An1

WI07-0804 D2 Grid C2-1 0-6 in. F.R. 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: 0.1077

********** U N I D E N T I F I E D P E A K S U 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	8217.	12122.	20.203	2.79	0.854	-	D
15.74	3.94	16743.	11435.	19.058	3.71	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.22	46.73	50.	47.	0.078	63.40	0.774s
AM-241	238.56	59.82	72.	102.	0.170	37.51	0.947s
Th-234	253.79	63.62	65.	50.	0.083	66.63	1.108s
Pb-214	298.54	74.81	76.	128.	0.214	26.11	0.917D
Pb-212	298.56	74.81	126.	0.	0.000	641.25	0.173D
Pb-212	307.74	77.11	64.	220.	0.366	17.01	0.919D
Pb-214	307.74	77.11	187.	0.	0.000	640.03	0.411D
Pb-214	347.31	87.00	52.	52.	0.087	52.69	0.603s
Th-234	368.72	92.35	62.	49.	0.081	54.08	0.933D
Ac-228	380.72	95.35	26.	9.	0.015	168.78	0.935D
Ac-228	836.29	209.22	24.	56.	0.094	45.71	0.809s
Pb-212	953.94	238.62	25.	254.	0.423	13.76	1.057D
Pb-214	967.37	241.98	30.	33.	0.055	58.46	1.060D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:50:40 Page 3
4714781 Spectrum name: Win00462.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.94	270.37	10.	36.	0.059	51.25	0.400s
Pb-214	1180.03	295.13	11.	65.	0.109	31.29	1.416s
Ac-228	1312.92	328.35	21.	22.	0.037	93.60	0.219s
Ac-228	1353.19	338.41	14.	60.	0.100	36.97	0.903
Pb-214	1406.89	351.83	8.	100.	0.166	22.54	1.483s

WI07-0804 D2 Grid C2-1 0-6 in. F.R. 080107

Ac-228	1850.07	462.60	4.	24.	0.041	52.91	0.363s
Bi-214	2436.59	609.18	0.	85.	0.142	21.69	1.097
CS-137	2647.00	661.77	1.	0.	0.000	0.00	0.000s
Bi-214	3073.00	768.23	1.	0.	0.000	0.00	0.000s
Ac-228	3174.00	793.47	0.	7.	0.012	75.59	0.250s
Ac-228	3645.67	911.34	0.	60.	0.100	25.82	0.425s
Bi-214	3736.67	934.08	0.	9.	0.015	66.67	0.625s
Ac-228	3858.81	964.60	2.	14.	0.023	61.24	1.595D
Ac-228	3876.86	969.11	5.	31.	0.051	41.66	1.598D
Bi-214	4481.18	1120.12	0.	11.	0.018	60.30	0.500s
Bi-214	4951.75	1237.70	0.	6.	0.010	81.65	0.375s
Bi-214	5511.25	1377.51	0.	6.	0.010	81.65	0.375s
K-40	5844.69	1460.82	0.	52.	0.087	27.74	1.031s
Ac-228	6349.56	1586.96	3.	0.	0.001	512.08	0.204s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.9659E-04	609.31	3.953E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	2.677E-04	-	1.269E-04	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	6.492E-04	+	4.328E-04	G
			934.06	8.745E-04	+	4.637E-04	G
K-40	N	2.2894E-03	1460.81	2.289E-03	(	4.403E-05	G
Ac-228	N	6.7986E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	5.983E-04	(	7.300E-05	G
			338.32	7.032E-04	(	6.815E-05	G
			964.60	8.578E-04	(	1.612E-04	G
			794.70	4.116E-04	&	2.514E-04	G
			463.00	9.485E-04	+	3.118E-04	G
			209.28	1.196E-03	+	2.801E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 13:50:40 Page 4
4714781 Spectrum name: Win00462.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.109E-03	+	3.157E-04	G
		1588.00	0.000E+00	&	4.357E-04	G
		95.35	1.779E-04	-	1.711E-04	X
		327.64	8.959E-04	&(	2.851E-04	G
Pb-212	N 5.8288E-04	238.62	5.829E-04	(	1.756E-05	G K
		77.11	8.404E-04	+	9.317E-05	Energy duplication
		74.81	0.000E+00	%	1.061E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	5.420E-06	G
Th-234	N 7.4986E-04	92.35	6.075E-04	(	1.457E-04	G
		63.29	9.525E-04	*(	2.269E-04	G

Pb-214	N	3.9104E-04	351.92	3.685E-04	(	1.632E-05		G K
			295.21	4.093E-04	(	3.223E-05		G
			77.11	0.000E+00	%	1.301E-04	Energy duplication	
			241.98	4.562E-04	(	1.142E-04		G
			74.81	1.430E-03	+	2.311E-04	Energy duplication	
			87.30	7.594E-04	+	2.167E-04		X
Pb-210	N	9.5945E-04	46.50	9.594E-04	@(	2.146E-04		G
AM-241		2.1003E-04	59.54	2.100E-04	*(	2.576E-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		1.1849E+00	2.570E-01	2.609E-01
K-40		6.8403E+00	1.897E+00	1.914E+00
Ac-228		2.0312E+00	5.183E-01	5.239E-01
Pb-212		1.7415E+00	2.396E-01	2.483E-01
CS-137	<	1.6193E-02		
Th-234		2.2404E+00	9.613E-01	9.627E-01
Pb-214		1.1683E+00	2.633E-01	2.670E-01
Pb-210	#	2.8666E+00	1.818E+00	1.819E+00
AM-241	#	6.2752E-01	2.354E-01	2.365E-01

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

WI07-0804 D2 Grid C2-1 0-6 in. F.R. 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) 1.8700800E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0805 D2 Grid C2-2 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:16:55 Page 1
4714781 Spectrum name: Win00463.An1

Sample description
WI07-0805 D2 Grid C2-2 0-6" Free Rel. 080107

Spectrum Filename: C:\User\Win00463.An1

Acquisition information
Start time: 01-Aug-2007 14:06:44
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 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 14:16:55 Page 2
4714781 Spectrum name: Win00463.An1

WI07-0805 D2 Grid C2-2 0-6 in. F.R. 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: 0.0791

********** U N I D E N T I F I E D P E A K S U 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	2.90	3291.	13732.	22.886	2.08	0.854	-	D
18.30	4.52	14771.	9330.	15.549	4.23	0.856	-	D
358.89	89.79	53.	42.	0.069	58.51	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	185.88	46.65	30.	30.	0.049	77.10	0.434s
AM-241	229.59	57.58	52.	8.	0.013	320.16	0.292s
Th-234	252.92	63.41	48.	38.	0.063	68.53	0.453s
Pb-214	298.54	74.81	65.	102.	0.170	29.84	0.917D
Pb-212	298.56	74.81	98.	0.	0.000	940.45	0.000D
Pb-212	307.74	77.11	63.	202.	0.336	17.95	0.919D
Pb-214	307.74	77.11	314.	0.	0.000	66.35	0.000D
Pb-214	348.51	87.30	66.	51.	0.085	52.91	0.928D
Th-234	368.72	92.35	60.	57.	0.095	46.83	0.933D
Ac-228	380.72	95.35	34.	2.	0.004	751.50	0.935D
Ac-228	836.91	209.37	17.	23.	0.038	77.70	0.692s
Pb-212	953.94	238.62	13.	220.	0.367	14.23	1.057D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:16:55 Page 3
4714781 Spectrum name: Win00463.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	37.	23.	0.039	84.91	1.060D
Ac-228	1079.66	270.05	16.	34.	0.057	58.58	0.611s
Pb-214	1180.63	295.28	6.	60.	0.100	30.55	1.328s
Ac-228	1310.75	327.80	9.	15.	0.024	92.26	0.442s
Ac-228	1352.87	338.33	12.	62.	0.104	34.77	0.907

WI07-0805 D2 Grid C2-2 0-6 in. F.R. 080107

Pb-214	1406.93	351.84	6.	98.	0.164	22.29	1.103
Ac-228	1852.00	463.08	8.	2.	0.003	586.52	0.000s
Bi-214	2437.39	609.38	0.	51.	0.085	28.01	1.064
CS-137	2645.21	661.32	1.	7.	0.011	89.55	0.488s
Bi-214	3074.50	768.60	0.	9.	0.015	66.67	0.375s
Ac-228	3178.00	794.47	0.	18.	0.030	47.14	0.292s
Ac-228	3645.86	911.38	0.	57.	0.095	26.49	1.349
Bi-214	3736.00	933.91	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	1.	24.	0.039	43.53	1.595D
Ac-228	3876.86	969.11	1.	23.	0.038	44.54	1.598D
Bi-214	4484.00	1120.82	0.	3.	0.005	115.47	0.750s
Bi-214	4953.00	1238.02	0.	9.	0.015	66.67	0.562s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.38	1460.74	0.	48.	0.080	28.87	1.083s
Ac-228	6354.17	1588.11	0.	6.	0.010	81.65	0.375s
Bi-214	7057.00	1763.71	0.	15.	0.025	51.64	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	2.3717E-04	609.31	2.372E-04	(	4.650E-06	G K
			1764.49	5.338E-04	+	2.135E-04	G
			1120.29	7.300E-05	-	7.300E-05	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	2.1133E-03	1460.81	2.113E-03	(	4.403E-05	G
Ac-228	N	6.7030E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	4.393E-04	-	1.446E-04	G
			338.32	7.325E-04	(	6.237E-05	G
			964.60	1.457E-03	+	4.684E-04	G
			794.70	1.058E-03	+	3.834E-04	G
			463.00	0.000E+00	%	1.949E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:16:55 Page 4
4714781 Spectrum name: Win00463.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.796E-04	-	2.001E-04	G
		270.23	1.067E-03	+	3.284E-04	G
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	5.973E-04	(	1.975E-04	G
Pb-212	N 5.0623E-04	238.62	5.062E-04	(	1.280E-05	G K
		77.11	7.716E-04	+	8.998E-05	Energy duplication
		74.81	0.000E+00	%	9.398E-05	Energy duplication
CS-137	1.8518E-05	661.66	1.852E-05	?(	5.710E-06	G
Th-234	N 7.1270E-04	92.35	7.093E-04	(	1.432E-04	G
		63.29	7.176E-04	(	1.971E-04	G

WI07-0805 D2 Grid C2-2 0-6 in. F.R. 080107

Pb-214	N	3.6258E-04	351.92	3.642E-04	(	1.446E-05	G	K
			295.21	3.759E-04	(	2.506E-05	G	
			77.11	0.000E+00	?	1.676E-04	Energy duplication	
			241.98	3.205E-04	(	1.258E-04	G	
			74.81	1.139E-03	+	2.096E-04	Energy duplication	
			87.30	7.418E-04	+	2.293E-04	X	
Pb-210	N	6.0561E-04	46.50	6.056E-04	(	1.695E-04	G	
AM-241		0.0000E+00	59.54	0.000E+00	&	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

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:16:55 Page 5
4714781 Spectrum name: Win00463.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	8.0018E-01	2.241E-01	2.261E-01
K-40	7.1300E+00	2.058E+00	2.076E+00
Ac-228	2.2615E+00	5.991E-01	6.051E-01
Pb-212	1.7079E+00	2.431E-01	2.514E-01
CS-137 #	6.2475E-02	5.595E-02	5.600E-02
Th-234	2.4045E+00	9.978E-01	9.994E-01
Pb-214	1.2233E+00	2.726E-01	2.764E-01
Pb-210 #	2.0432E+00	1.575E+00	1.576E+00
AM-241 <	7.9655E-02		

- All peaks for activity calculation had bad shape.

WI07-0805 D2 Grid C2-2 0-6 in. F.R. 080107

* - 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) 1.7633068E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0806 D2 Grid C2-3 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:31:20 Page 1
4714781 Spectrum name: Win00464.An1

Sample description
WI07-0806 D2 Grid C2-3 0-6

Spectrum Filename: C:\User\D1 Samples\Win00464.An1

Acquisition information
Start time: 01-Aug-2007 14:21:07
Live time: 600
Real time: 602
Dead time: 0.37 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5520E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5520E+02) = 2.8153E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:31:20 Page 2
4714781 Spectrum name: Win00464.An1

WI07-0806 D2 Grid C2-3 0-6 in. F.R. 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: 0.1636

********** U N I D E N T I F I E D P E A K S U 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	4722.	25478.	42.463	1.65	2.331	CU-64	s
252.80	63.38	91.	37.	0.061	80.45	0.907	PA-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	184.08	46.20	140.	43.	0.072	94.90	0.409s
AM-241	237.62	59.58	219.	1745.	2.908	5.70	0.929
Th-234	252.46	63.29	102.	18.	0.030	166.96	0.907D
Pb-214	298.54	74.81	108.	129.	0.215	28.77	0.917D
Pb-212	298.56	74.81	123.	0.	0.000	198.50	0.623D
Pb-212	307.74	77.11	112.	217.	0.362	19.37	0.919D
Pb-214	307.74	77.11	380.	0.	0.000	69.10	0.227D
Pb-214	347.30	87.00	76.	92.	0.154	39.56	0.363s
Th-234	371.08	92.94	62.	116.	0.193	32.56	0.923s
Ac-228	380.72	95.35	61.	0.	0.000	0.00	0.935
Ac-228	835.44	209.01	27.	35.	0.059	65.31	0.438s
Pb-212	953.94	238.62	47.	237.	0.394	15.39	1.057D
Pb-214	967.37	241.98	38.	55.	0.092	41.36	1.060D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:31:20 Page 3
4714781 Spectrum name: Win00464.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.69	270.05	10.	54.	0.090	36.54	1.614s
Pb-214	1180.73	295.31	11.	84.	0.141	26.35	0.340s
Ac-228	1312.20	328.17	5.	22.	0.037	55.12	0.421s
Ac-228	1353.01	338.37	17.	68.	0.114	34.70	0.873s
Pb-214	1407.64	352.02	3.	152.	0.253	17.00	1.197

WI07-0806 D2 Grid C2-3 0-6 in. F.R. 080107

Ac-228	1851.06	462.84	0.	21.	0.035	43.64	0.417s
Bi-214	2437.50	609.41	0.	90.	0.150	21.08	0.900s
CS-137	2647.43	661.87	0.	12.	0.020	57.74	0.250s
Bi-214	3075.29	768.80	0.	15.	0.025	51.64	0.500s
Ac-228	3182.47	795.58	0.	15.	0.025	51.64	1.187
Ac-228	3645.42	911.27	0.	52.	0.087	27.74	0.965s
Bi-214	3732.00	932.91	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	1.	12.	0.021	60.13	1.595D
Ac-228	3876.86	969.11	0.	42.	0.070	30.84	1.598D
Bi-214	4481.95	1120.31	0.	21.	0.035	43.64	0.698s
Bi-214	4953.00	1238.02	2.	0.	0.001	368.18	0.000s
Bi-214	5508.83	1376.90	1.	1.	0.001	366.67	0.223s
K-40	5844.74	1460.83	0.	38.	0.063	32.44	0.687s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7053.88	1762.93	5.	1.	0.002	757.19	0.422s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.4349E-04	609.31	4.185E-04	@(	4.650E-06	G K
			1764.49	0.000E+00	&	1.423E-04	G
			1120.29	5.110E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	7.817E-04	+	3.127E-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	&(	9.716E-05	G
K-40	N	1.6731E-03	1460.81	1.673E-03	?(	4.403E-05	G
Ac-228	N	6.4041E-04	911.07	5.727E-04	(	1.101E-05	G K
			969.11	8.169E-04	+	1.881E-04	G
			338.32	8.008E-04	+	1.588E-04	G
			964.60	7.598E-04	(	1.098E-04	G
			794.70	8.820E-04	&	3.528E-04	G
			463.00	8.185E-04	?(	3.898E-05	G
			209.28	7.476E-04	(	1.655E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:31:20 Page 4
4714781 Spectrum name: Win00464.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.687E-03	+	3.694E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.226E-04	X
		327.64	9.095E-04	+	3.203E-04	G
Pb-212	N 5.4368E-04	238.62	5.437E-04	(	2.356E-05	G K
		77.11	8.304E-04	+	1.001E-04	Energy duplication
		74.81	0.000E+00	?	1.050E-04	Energy duplication
CS-137	3.2519E-05	661.66	3.252E-05	?(	2.710E-06	G
Th-234	N 1.4432E-03	92.35	1.443E-03	&(	1.457E-04	G
		63.29	3.401E-04	-	3.048E-04	G

```
                    WI07-0806  D2  Grid  C2-3   0-6 in.   F.R. 080107
Pb-214    N   5.5034E-04     351.92 5.617E-04  (  1.159E-05          G K
                             295.21 5.283E-04 ?(  3.223E-05          G
                              77.11 0.000E+00 ?   1.842E-04Energy duplication
                             241.98 7.643E-04 +   1.956E-04          G
                              74.81 1.441E-03 +   2.486E-04Energy duplication
                              87.30 1.337E-03 +   2.733E-04          X

Pb-210    N   8.7779E-04      46.50 8.778E-04  (  3.519E-04          G

AM-241        3.5925E-03      59.54 3.593E-03  (  4.417E-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 14:31:20 Page    5
4714781                          Spectrum name: Win00464.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 #      1.2486E+00    2.632E-01    2.673E-01
K-40   #      4.7102E+00    1.528E+00    1.538E+00
Ac-228        1.8029E+00    4.631E-01    4.680E-01
Pb-212        1.5306E+00    2.356E-01    2.425E-01
CS-137 #      9.1550E-02    5.286E-02    5.297E-02
Th-234        4.0629E+00    1.323E+00    1.326E+00
Pb-214        1.5494E+00    2.429E-01    2.498E-01
Pb-210        2.4713E+00    2.345E+00    2.346E+00
AM-241        1.0114E+01    5.769E-01    6.877E-01

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

WI07-0806 D2 Grid C2-3 0-6 in. F.R. 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) 2.7581490E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Ferri
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0807 D2 Grid C2-4 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:46:46 Page 1
4714781 Spectrum name: Win00465.An1

Sample description
WI07-0807 D2 Grid C2-4 0-6" Free. Rel. 080107

Spectrum Filename: C:\User\Win00465.An1

Acquisition information
Start time: 01-Aug-2007 14:33:58
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: 2.8860E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8860E+02) = 3.4650E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:46:46 Page 2
4714781 Spectrum name: Win00465.An1

WI07-0807 D2 Grid C2-4 0-6 in. F.R. 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: 0.0920

********** U N I D E N T I F I E D P E A K S U 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	6384.	12211.	20.352	2.59	0.854	-	D
16.59	4.14	15347.	10472.	17.453	3.88	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	185.68	46.60	50.	26.	0.044	92.51	0.566s
AM-241	237.62	59.58	120.	1018.	1.696	7.66	0.912
Th-234	253.52	63.56	52.	64.	0.108	48.86	0.914s
Pb-214	298.54	74.81	73.	101.	0.168	31.19	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	166.29	0.278D
Pb-212	307.74	77.11	73.	168.	0.280	21.11	0.919D
Pb-214	307.74	77.11	218.	0.	0.000	123.72	0.483D
Pb-214	347.47	87.04	41.	73.	0.121	39.14	0.588s
Th-234	368.72	92.35	31.	65.	0.109	34.59	0.933D
Ac-228	380.72	95.35	13.	2.	0.003	651.01	0.936D
Ac-228	836.54	209.28	14.	30.	0.051	52.56	0.365s
Pb-212	953.94	238.62	23.	209.	0.348	15.28	1.057D
Pb-214	967.37	241.98	24.	32.	0.053	56.61	1.060D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:46:46 Page 3
4714781 Spectrum name: Win00465.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.54	270.52	3.	39.	0.064	37.70	0.298s
Pb-214	1180.14	295.16	12.	50.	0.084	38.45	0.428s
Ac-228	1311.40	327.97	7.	15.	0.026	86.74	0.267s
Ac-228	1352.51	338.24	0.	45.	0.075	29.81	0.512s
Pb-214	1406.77	351.80	0.	100.	0.167	20.00	1.190

WI07-0807 D2 Grid C2-4 0-6 in. F.R. 080107

Ac-228	1853.97	463.57	2.	11.	0.018	74.97	0.601s
Bi-214	2437.23	609.34	0.	69.	0.115	24.08	1.000s
CS-137	2645.73	661.45	2.	10.	0.016	83.10	0.474s
Bi-214	3085.33	771.31	0.	8.	0.013	70.71	0.250s
Ac-228	3179.55	794.85	0.	11.	0.018	60.30	0.500s
Ac-228	3647.21	911.72	0.	37.	0.062	32.88	0.333s
Bi-214	3735.33	933.74	0.	4.	0.007	100.00	0.250s
Ac-228	3858.81	964.60	1.	11.	0.018	69.15	1.595D
Ac-228	3876.86	969.11	1.	22.	0.037	43.98	1.598D
Bi-214	4478.00	1119.33	0.	18.	0.030	47.14	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.05	1460.91	0.	42.	0.070	30.86	1.447s
Ac-228	6354.67	1588.24	1.	0.	0.001	240.37	0.197s
Bi-214	7060.38	1764.55	0.	11.	0.018	60.30	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	3.6283E-04	609.31	3.209E-04	(	4.650E-06	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	4.380E-04	&(	2.433E-05	G
			1238.11	0.000E+00	?	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	1.8492E-03	1460.81	1.849E-03	?(	4.403E-05	G
Ac-228	N	4.8452E-04	911.07	4.075E-04	?(	1.101E-05	G K
			969.11	4.308E-04	(	3.628E-05	G
			338.32	5.274E-04	(	1.172E-05	G
			964.60	6.537E-04	(	1.390E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	4.288E-04	(	9.984E-05	G
			209.28	6.454E-04	?(	1.210E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 14:46:46 Page 4
4714781 Spectrum name: Win00465.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.208E-03	+	3.024E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.156E-04	X
		327.64	6.244E-04	?(	1.705E-04	G
Pb-212	N 4.8040E-04	238.62	4.804E-04	(	1.676E-05	G K
		77.11	6.428E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	?	1.012E-04	Energy duplication
CS-137	2.6647E-05	661.66	2.665E-05	?(	7.156E-06	G
Th-234	N 9.8435E-04	92.35	8.127E-04	(	1.045E-04	G
		63.29	1.229E-03	@(	2.050E-04	G

WI07-0807 D2 Grid C2-4 0-6 in. F.R. 080107

Pb-214	N	3.6204E-04	351.92	3.704E-04	(	3.704E-06	G K
			295.21	3.163E-04	(	3.461E-05	G
			77.11	0.000E+00	?	1.405E-04	Energy duplication
			241.98	4.378E-04	(	1.036E-04	G
			74.81	1.125E-03	+	2.138E-04	Energy duplication
			87.30	1.057E-03	+	2.265E-04	X
Pb-210	N	5.4097E-04	46.50	5.410E-04	(	2.136E-04	G
AM-241		2.0955E-03	59.54	2.096E-03	(	3.299E-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 14:46:46 Page 5
4714781 Spectrum name: Win00465.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	1.2572E+00	3.027E-01	3.063E-01
K-40 #	6.4074E+00	1.977E+00	1.992E+00
Ac-228	1.6789E+00	3.526E-01	3.582E-01
Pb-212	1.6646E+00	2.543E-01	2.618E-01
CS-137 #	9.2333E-02	7.673E-02	7.681E-02
Th-234	3.4108E+00	1.021E+00	1.024E+00
Pb-214	1.2545E+00	2.509E-01	2.553E-01
Pb-210	1.8744E+00	1.734E+00	1.735E+00
AM-241	7.2610E+00	5.562E-01	6.177E-01

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

WI07-0807 D2 Grid C2-4 0-6 in. F.R. 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) 2.4901024E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0808 D2 Grid C2-5 0-6 in. F.R. 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:01:17 Page 1
4714781 Spectrum name: Win00466.An1

Sample description
WI07-0808 D2 Grid C2-5 0-6" Free Rel.080107

Spectrum Filename: C:\User\Win00466.An1

Acquisition information
Start time: 01-Aug-2007 14:51:07
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.3870E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3870E+02) = 2.9525E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:01:17 Page 2
4714781 Spectrum name: Win00466.An1

WI07-0808 D2 Grid C2-5 0-6 in. F.R. 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: 0.1031

********** U N I D E N T I F I E D P E A K S U 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	4152.	20841.	34.735	1.86	2.174	CU-64	s
515.00	128.91	19.	23.	0.039	79.28	0.664	AC-228	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	38.	52.	0.087	48.42	0.599s
AM-241	237.48	59.55	76.	500.	0.834	10.88	0.893
Th-234	253.30	63.50	61.	60.	0.101	53.71	1.064
Pb-214	298.54	74.81	63.	113.	0.189	27.25	0.917D
Pb-212	298.56	74.81	97.	0.	0.000	206.03	0.225D
Pb-212	307.74	77.11	44.	183.	0.305	18.01	0.919D
Pb-214	307.74	77.11	164.	0.	0.000	1515.61	0.528D
Pb-214	348.17	87.21	52.	60.	0.100	48.99	1.080s
Th-234	370.99	92.92	40.	72.	0.120	41.08	1.767s
Ac-228	381.89	95.64	32.	0.	0.000	0.00	0.936
Ac-228	835.98	209.14	25.	36.	0.059	66.64	1.108
Pb-212	953.94	238.62	17.	225.	0.375	14.32	1.057D
Pb-214	967.37	241.98	32.	42.	0.070	48.63	1.060D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:01:17 Page 3
4714781 Spectrum name: Win00466.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.92	269.86	10.	21.	0.035	68.01	0.290s
Pb-214	1179.49	295.00	7.	66.	0.110	29.92	0.581s
Ac-228	1312.35	328.20	10.	30.	0.051	54.90	0.268s
Ac-228	1353.00	338.36	72.	0.	0.000	0.00	0.000s
Pb-214	1407.18	351.91	23.	113.	0.188	26.50	1.322

WI07-0808 D2 Grid C2-5 0-6 in. F.R. 080107

Ac-228	1851.17	462.87	0.	29.	0.048	37.14	0.350s
Bi-214	2437.36	609.37	3.	81.	0.135	23.64	0.915s
CS-137	2648.00	662.02	0.	17.	0.028	48.51	0.562s
Bi-214	3071.33	767.81	0.	8.	0.013	70.71	0.250s
Ac-228	3178.53	794.60	0.	20.	0.033	44.72	0.281s
Ac-228	3645.91	911.40	0.	46.	0.077	29.49	0.973s
Bi-214	3733.00	933.16	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	0.	17.	0.029	47.89	1.595D
Ac-228	3876.86	969.11	1.	32.	0.053	36.34	1.598D
Bi-214	4481.14	1120.11	0.	20.	0.033	44.72	0.312s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5846.52	1461.28	0.	54.	0.090	27.22	0.895s
Ac-228	6353.50	1587.95	0.	2.	0.003	141.42	0.500s
Bi-214	7060.00	1764.46	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	4.0527E-04	609.31	3.775E-04	?(	1.364E-05	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	4.867E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	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	1.943E-04	&	2.489E-04	G
K-40	N	2.3775E-03	1460.81	2.377E-03	(	4.403E-05	G
Ac-228	N	5.7457E-04	911.07	5.066E-04	?(	1.101E-05	G K
			969.11	6.226E-04	(	3.801E-05	G
			338.32	0.000E+00	?	1.632E-04	G
			964.60	1.077E-03	+	3.967E-04	G
			794.70	1.176E-03	+	4.024E-04	G
			463.00	1.130E-03	+	3.170E-04	G
			209.28	7.547E-04	(	1.616E-04	G

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 15:01:17 Page 4
4714781 Spectrum name: Win00466.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	6.561E-04	?(	1.562E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00		1.640E-04	X
		327.64	1.242E-03	+	3.852E-04	G
Pb-212	N 5.1723E-04	238.62	5.172E-04	(	1.472E-05	G K
		77.11	7.001E-04	+	8.351E-05	Energy duplication
		74.81	0.000E+00	%	9.351E-05	Energy duplication
CS-137	4.6068E-05	661.66	4.607E-05	?(	2.710E-06	G
Th-234	N 1.0019E-03	92.35	8.983E-04	&(	1.180E-04	G
		63.29	1.149E-03	$(	2.196E-04	G

WI07-0808 D2 Grid C2-5 0-6 in. F.R. 080107

Pb-214	N	4.1679E-04	351.92	4.185E-04	(	2.704E-05		G K
			295.21	4.134E-04	@(	2.678E-05		G
			77.11	0.000E+00	%	1.224E-04	Energy duplication	
			241.98	5.846E-04	+	1.753E-04		G
			74.81	1.265E-03	+	2.150E-04	Energy duplication	
			87.30	8.707E-04	+	2.246E-04		X
Pb-210	N	1.0717E-03	46.50	1.072E-03	(	1.896E-04		G
AM-241		1.0299E-03	59.54	1.030E-03	(	2.641E-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 15:01:17 Page 5
4714781 Spectrum name: Win00466.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 #	1.1965E+00	2.828E-01	2.864E-01
K-40	7.0195E+00	1.910E+00	1.929E+00
Ac-228	1.6964E+00	4.500E-01	4.544E-01
Pb-212	1.5271E+00	2.187E-01	2.260E-01
CS-137 #	1.3601E-01	6.598E-02	6.618E-02
Th-234	2.9581E+00	1.000E+00	1.002E+00
Pb-214	1.2306E+00	2.459E-01	2.502E-01
Pb-210	3.1642E+00	1.532E+00	1.534E+00
AM-241	3.0408E+00	3.308E-01	3.495E-01

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

WI07-0808 D2 Grid C2-5 0-6 in. F.R. 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) 2.1969250E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0609 D2 Grid [redacted] 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:28:05 Page 1
4714781 Spectrum name: Win00355.An1

Sample description
WI07-0609 D2 Grid # C3-1 Free Rel. 07-27-07

Spectrum Filename: C:\User\Win00355.An1

Acquisition information
Start time: 27-Jul-2007 09:17:54
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: 4.3090E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.3090E+02) = 2.3207E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:28:05 Page 2
4714781 Spectrum name: Win00355.An1

WI07-0609 D2 Grid C3-1 6 inches F.R. 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: 0.1349

********** U N I D E N T I F I E D P E A K S U 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	6891.	11660.	19.434	2.74	0.854	-	D
17.37	4.62	11757.	9151.	15.252	3.95	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	184.47	46.30	21.	30.	0.050	66.67	1.105s
AM-241	237.53	59.56	42.	134.	0.222	25.17	1.000
Th-234	250.90	62.90	42.	28.	0.046	96.55	0.798
Pb-214	298.54	74.81	34.	76.	0.127	31.35	0.917D
Pb-212	298.56	74.81	70.	0.	0.000	244.95	0.300D
Pb-212	307.74	77.11	28.	109.	0.182	23.50	0.919D
Pb-214	307.74	77.11	96.	0.	0.000	1086.71	0.414D
Pb-214	347.51	87.05	22.	30.	0.051	61.89	0.701
Th-234	368.72	92.35	36.	48.	0.079	46.04	0.933D
Ac-228	380.72	95.35	33.	6.	0.010	276.46	0.936D
Ac-228	837.08	209.42	8.	40.	0.067	44.72	0.600s
Pb-212	953.94	238.62	17.	119.	0.198	20.85	1.057D
Pb-214	967.37	241.98	14.	22.	0.036	65.68	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:28:05 Page 3
4714781 Spectrum name: Win00355.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.77	269.57	14.	6.	0.011	195.21	0.614s
Pb-214	1180.99	295.37	5.	44.	0.073	36.42	0.683s
Ac-228	1313.14	328.40	3.	18.	0.030	59.31	0.534s
Ac-228	1353.63	338.52	3.	36.	0.060	37.92	1.007s
Pb-214	1407.60	352.01	2.	63.	0.104	26.79	0.579s

WI07-0609 D2 Grid C3-1 6 inches F.R. 072707

Ac-228	1850.00	462.58	3.	0.	0.000	0.00	0.000s
Bi-214	2437.17	609.33	4.	36.	0.059	39.41	1.123
CS-137	2646.29	661.59	0.	21.	0.035	43.64	0.312s
Bi-214	3071.33	767.81	0.	5.	0.008	89.44	0.250s
Ac-228	3175.00	793.72	0.	6.	0.010	81.65	0.250s
Ac-228	3645.62	911.32	0.	26.	0.043	39.22	0.400s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	4.	0.007	98.06	1.595D
Ac-228	3876.86	969.11	0.	17.	0.029	48.27	1.598D
Bi-214	4480.20	1119.88	0.	8.	0.013	70.71	0.375s
Bi-214	4953.33	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5845.03	1460.90	0.	33.	0.055	34.82	0.787s
Ac-228	6354.00	1588.07	0.	1.	0.002	200.00	0.250s
Bi-214	7057.00	1763.71	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	1.8174E-04	609.31	1.659E-04	(	1.621E-05	G K
			1764.49	2.847E-04	+	1.612E-04	G
			1120.29	1.947E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	2.606E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	1.082E-04	G
			934.06	0.000E+00	?	9.716E-05	G
K-40	N	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	3.2451E-04	911.07	2.863E-04	?(	1.101E-05	G K
			969.11	3.334E-04	(	1.942E-05	G
			338.32	4.239E-04	(	3.437E-05	G
			964.60	2.568E-04	(	6.173E-05	G
			794.70	3.528E-04	&(	5.880E-05	G
			463.00	0.000E+00	?	1.169E-04	G
			209.28	8.464E-04	+	2.182E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:28:05 Page 4
4714781 Spectrum name: Win00355.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	2.031E-04	&	2.138E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.800E-04	X
		327.64	7.398E-04	&	2.851E-04	G
Pb-212	N 2.7300E-04	238.62	2.730E-04	(	1.470E-05	G K
		77.11	4.182E-04	+	6.531E-05	Energy duplication
		74.81	0.000E+00	%	7.995E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 5.6545E-04	92.35	5.946E-04	(	1.128E-04	G
		63.29	5.239E-04	(	1.854E-04	G

```
                WI07-0609  D2  Grid  C3-1   6 inches   F.R. 072707
Pb-214   N   2.5238E-04     351.92 2.321E-04  (  1.006E-05          G K
                            295.21 2.735E-04 @(  2.383E-05          G
                             77.11 0.000E+00 %   9.412E-05Energy duplication
                            241.98 2.989E-04  (  8.140E-05          G
                             74.81 8.531E-04 +   1.712E-04Energy duplication
                             87.30 4.402E-04 +   1.554E-04          X

Pb-210   N   6.1241E-04      46.50 6.124E-04  (  1.429E-04          G

AM-241       2.7489E-04      59.54 2.749E-04  (  2.004E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:28:05 Page    5
4714781                          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        4.2176E-01    1.662E-01    1.670E-01
K-40    #     3.3718E+00    1.174E+00    1.181E+00
Ac-228        7.5310E-01    2.213E-01    2.231E-01
Pb-212        6.3355E-01    1.321E-01    1.342E-01
CS-137  #     1.3207E-01    5.764E-02    5.786E-02
Th-234        1.3122E+00    6.041E-01    6.049E-01
Pb-214        5.8571E-01    1.557E-01    1.572E-01
Pb-210        1.4212E+00    9.475E-01    9.481E-01
AM-241        6.3796E-01    1.606E-01    1.623E-01

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

WI07-0609 D2 Grid C3-1 6 inches F.R. 072707

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

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

Total Activity (2.7 to 1999.3 keV) 9.2694454E+00 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0610 D2 Grid [redacted] 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:54:20 Page 1
4714781 Spectrum name: Win00356.An1

Sample description
WI07-0610 D2 Grid # C3-2 Free Rel. 07-27-07

Spectrum Filename: C:\User\Win00356.An1

Acquisition information
Start time: 27-Jul-2007 09:44:10
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: 3.8600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8600E+02) = 2.5907E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:54:20 Page 2
4714781 Spectrum name: Win00356.An1

WI07-0610 D2 Grid C3-2 6 inches F.R. 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: 0.0848

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.88	3.91	5334.	21511.	35.852	1.92	2.345	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	185.80	46.63	48.	57.	0.095	54.68	1.047s
AM-241	237.30	59.50	108.	492.	0.821	12.46	0.932s
Th-234	253.02	63.43	83.	47.	0.079	79.10	0.825
Pb-214	298.54	74.81	84.	102.	0.171	32.05	0.917D
Pb-212	298.56	74.81	96.	0.	0.000	205.04	0.411D
Pb-212	307.74	77.11	62.	168.	0.279	20.41	0.919D
Pb-214	307.74	77.11	164.	0.	0.000	1515.61	0.427D
Pb-214	348.00	87.17	42.	85.	0.142	35.29	1.091s
Th-234	368.72	92.35	54.	45.	0.075	55.23	0.933D
Ac-228	380.72	95.35	45.	8.	0.013	263.84	0.935D
Ac-228	836.08	209.17	20.	39.	0.065	53.54	0.772s
Pb-212	953.94	238.62	36.	257.	0.428	14.13	1.057D
Pb-214	967.37	241.98	47.	36.	0.061	62.60	1.060D
Ac-228	1079.94	270.12	15.	47.	0.078	47.10	0.382s

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:54:20 Page 3
4714781 Spectrum name: Win00356.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.60	295.28	11.	72.	0.120	30.85	1.143s
Ac-228	1305.80	326.57	15.	6.	0.011	218.53	0.594s
Ac-228	1352.94	338.35	16.	53.	0.088	39.88	0.943s
Pb-214	1407.39	351.96	12.	110.	0.183	22.85	1.124
Ac-228	1851.68	463.00	3.	31.	0.052	42.31	0.489s

WI07-0610 D2 Grid C3-2 6 inches F.R. 072707

Bi-214	2437.80	609.48	0.	76.	0.127	22.94	0.974s
CS-137	2647.75	661.95	4.	3.	0.006	222.26	0.285s
Bi-214	3073.90	768.45	0.	14.	0.023	53.45	0.541s
Ac-228	3180.33	795.05	2.	1.	0.002	416.33	0.225s
Ac-228	3645.95	911.41	0.	39.	0.065	32.03	1.020s
Bi-214	3732.00	932.91	0.	9.	0.015	66.67	0.250s
Ac-228	3858.81	964.60	3.	8.	0.014	86.70	1.595D
Ac-228	3876.86	969.11	4.	38.	0.064	35.46	1.598D
Bi-214	4482.92	1120.56	0.	14.	0.023	53.45	0.542s
Bi-214	4952.33	1237.85	1.	0.	0.001	240.37	0.197s
Bi-214	5510.88	1377.41	0.	9.	0.015	66.67	0.625s
K-40	5845.31	1460.97	0.	67.	0.112	24.43	0.750s
Ac-228	6350.00	1587.07	0.	9.	0.015	66.67	0.250s
Bi-214	7060.00	1764.46	1.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5029E-04	609.31	3.534E-04	(	4.650E-06	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	9.737E-04	+	5.163E-04	G
			934.06	8.745E-04	&	4.637E-04	G
K-40	N	2.9499E-03	1460.81	2.950E-03	?(	4.403E-05	G
Ac-228	N	4.8986E-04	911.07	4.295E-04	(	1.101E-05	G K
			969.11	7.460E-04	+	1.888E-04	G
			338.32	6.211E-04	@(	7.241E-05	G
			964.60	5.236E-04	(	1.728E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	1.208E-03	+	3.415E-04	G
			209.28	8.252E-04	+	2.407E-04	G
			270.23	1.458E-03	+	3.639E-04	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	1.307E-03	+	6.931E-04	G
			95.35	0.000E+00	%	2.082E-04	X
			327.64	0.000E+00	&	2.851E-04	G
Pb-212	N	6.0487E-04	238.62	5.901E-04	(	2.075E-05	G K
			77.11	6.415E-04	(	4.473E-05	Energy duplication
			74.81	0.000E+00	%	9.305E-05	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	%	1.158E-05	G
Th-234	N	7.0054E-04	92.35	5.592E-04	(	1.363E-04	G
			63.29	9.017E-04	$(	2.547E-04	G
Pb-214	N	4.3172E-04	351.92	4.074E-04	(	2.009E-05	G K

```
                WI07-0610  D2  Grid  C3-2   6 inches   F.R. 072707
                          295.21 4.510E-04  (  3.268E-05         G
                           77.11 0.000E+00 %   1.224E-04Energy duplication
                          241.98 5.029E-04  (  1.406E-04         G
                           74.81 1.143E-03 +   2.209E-04Energy duplication
                           87.30 1.233E-03 +   2.386E-04         X

Pb-210   N   1.1602E-03     46.50 1.160E-03 @(  2.108E-04         G

AM-241       1.0138E-03     59.54 1.014E-03 @(  3.126E-05         G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:54:20 Page    5
4714781                          Spectrum name: Win00356.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        9.0749E-01    2.082E-01    2.110E-01
K-40    #     7.6421E+00    1.867E+00    1.889E+00
Ac-228        1.2691E+00    4.064E-01    4.092E-01
Pb-212        1.5670E+00    1.945E-01    2.032E-01
CS-137   <    3.0012E-02
Th-234        1.8149E+00    8.754E-01    8.764E-01
Pb-214        1.1184E+00    2.556E-01    2.590E-01
Pb-210 #      3.0057E+00    1.644E+00    1.645E+00
AM-241 #      2.6264E+00    3.273E-01    3.414E-01

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

WI07-0610 D2 Grid C3-2 6 inches F.R. 072707

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

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

Total Activity (2.7 to 1999.3 keV) 1.9951046E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0611 D2 Grid [redacted] 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:10:59 Page 1
4714781 Spectrum name: Win00357.An1

Sample description
WI07-0611 D2 Grid # C3-3 Free Rel. 07-27-07

Spectrum Filename: C:\User\Win00357.An1

Acquisition information
Start time: 27-Jul-2007 10:00:48
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: 3.4910E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4910E+02) =
2.8645E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:10:59 Page 2
4714781 Spectrum name: Win00357.An1

WI07-0611 D2 Grid C3-3 6 inches F.R. 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: 0.0735

********** U N I D E N T I F I E D P E A K S U 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	5540.	10604.	17.673	2.78	0.854	-	D
16.67	4.16	14410.	8686.	14.477	4.46	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	186.00	46.68	50.	28.	0.046	89.44	0.267s
AM-241	237.62	59.58	141.	1150.	1.917	7.20	0.866
Th-234	251.28	63.00	48.	55.	0.092	51.30	0.903
Pb-214	298.54	74.81	70.	107.	0.179	29.30	0.917D
Pb-212	298.56	74.81	104.	0.	0.000	262.26	0.639D
Pb-212	307.74	77.11	81.	170.	0.284	21.41	0.919D
Pb-214	307.74	77.11	253.	0.	0.000	88.65	0.212D
Pb-214	348.12	87.20	58.	43.	0.072	68.52	0.627s
Th-234	368.72	92.35	63.	68.	0.113	41.30	0.933D
Ac-228	380.72	95.35	37.	11.	0.018	172.11	0.935D
Ac-228	836.30	209.22	18.	36.	0.059	55.41	1.101
Pb-212	953.94	238.62	44.	206.	0.343	16.65	1.057D
Pb-214	967.37	241.98	50.	21.	0.035	105.81	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:10:59 Page 3
4714781 Spectrum name: Win00357.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1082.60	270.78	12.	43.	0.072	44.37	0.853s
Pb-214	1180.38	295.22	13.	47.	0.079	38.75	0.823s
Ac-228	1311.33	327.95	4.	1.	0.002	529.15	0.375s
Ac-228	1353.90	338.59	0.	78.	0.130	22.65	0.786s
Pb-214	1407.68	352.03	10.	118.	0.197	21.53	1.378

WI07-0611 D2 Grid C3-3 6 inches F.R. 072707

Ac-228	1850.72	462.76	0.	25.	0.042	40.00	0.562s
Bi-214	2437.72	609.46	0.	79.	0.132	22.50	0.802s
CS-137	2647.00	661.77	10.	0.	0.000	0.00	0.000s
Bi-214	3074.09	768.50	0.	11.	0.018	60.30	0.500s
Ac-228	3183.50	795.84	0.	12.	0.020	57.74	0.250s
Ac-228	3644.97	911.16	0.	60.	0.100	25.82	1.321
Bi-214	3737.00	934.16	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	2.	8.	0.013	90.58	1.595D
Ac-228	3876.86	969.11	0.	34.	0.057	34.12	1.598D
Bi-214	4481.64	1120.24	0.	19.	0.032	45.88	0.812s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.60	1461.05	0.	53.	0.088	27.47	0.583s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7056.60	1763.61	6.	2.	0.003	412.31	0.234s

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

***** S U M M A R Y O F L 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	3.9073E-04	609.31	3.674E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.612E-04	G
			1120.29	4.623E-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	0.000E+00	?	1.082E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.3335E-03	1460.81	2.333E-03	(	4.403E-05	G
Ac-228	N	6.7404E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	6.670E-04	(	1.942E-05	G
			338.32	9.141E-04	+	1.524E-04	G
			964.60	4.774E-04	-	3.086E-04	G
			794.70	7.056E-04	&(	5.880E-05	G
			463.00	9.744E-04	+	2.958E-04	G
			209.28	7.512E-04	?(	1.362E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:10:59 Page 4
4714781 Spectrum name: Win00357.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.343E-03	&	3.437E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	2.067E-04	-	1.986E-04	X
		327.64	0.000E+00	%	1.507E-04	G
Pb-212	N 4.7327E-04	238.62	4.733E-04	(	2.275E-05	G K
		77.11	6.515E-04	+	8.771E-05	Energy duplication
		74.81	0.000E+00	%	9.678E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	1.355E-05	G
Th-234	N 9.2725E-04	92.35	8.426E-04	(	1.469E-04	G
		63.29	1.048E-03	?(	1.964E-04	G

```
                WI07-0611  D2  Grid  C3-3   6 inches   F.R. 072707
Pb-214   N   4.3704E-04    351.92 4.370E-04  (  1.852E-05         G K
                           295.21 2.955E-04 -   7.183E-05         G
                            77.11 0.000E+00 ?   1.509E-04Energy duplication
                           241.98 2.877E-04 -   1.718E-04         G
                            74.81 1.197E-03 +   2.156E-04Energy duplication
                            87.30 6.240E-04 +   2.136E-04         X

Pb-210   N   5.6138E-04     46.50 5.614E-04 ?(  2.136E-04         G

AM-241       2.3680E-03     59.54 2.368E-03  (  3.562E-05         G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 10:10:59 Page    5
4714781                          Spectrum name: Win00357.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       1.1193E+00    2.519E-01    2.553E-01
K-40         6.6842E+00    1.836E+00    1.853E+00
Ac-228       1.9308E+00    4.380E-01    4.440E-01
Pb-212       1.3557E+00    2.258E-01    2.314E-01
CS-137   <   3.8813E-02
Th-234       2.6561E+00    8.746E-01    8.768E-01
Pb-214       1.2519E+00    2.695E-01    2.736E-01
Pb-210 #     1.6081E+00    1.438E+00    1.439E+00
AM-241       6.7832E+00    4.884E-01    5.492E-01

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

WI07-0611 D2 Grid C3-3 6 inches F.R. 072707

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

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

Total Activity (2.7 to 1999.3 keV) 2.3389286E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fine
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0698 D2 Grid [redacted]0-6 inches F.R. 073007

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:34:05 Page 1
4714781 Spectrum name: Win00398.An1

Sample description
WI07-0698 D2 Grid C3-4 0-6" Free Rel. 07-30-07

Spectrum Filename: C:\User\Win00398.An1

Acquisition information
Start time: 30-Jul-2007 08:23:54
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: 3.5290E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5290E+02) = 2.8337E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:34:05 Page 2
4714781 Spectrum name: Win00398.An1

WI07-0698 D2 Grid C3-4 0-6 inches F.R. 073007

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1104

********** 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	
11.75	2.90	2979.	12319.	20.531	2.19	0.854	-	D
17.82	4.42	15017.	8766.	14.610	4.49	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	184.17	46.22	47.	47.	0.079	60.19	1.000s
AM-241	237.25	59.49	93.	367.	0.612	14.81	0.756
Th-234	252.80	63.38	57.	21.	0.036	123.11	0.660s
Pb-214	298.54	74.81	68.	109.	0.182	28.72	0.917D
Pb-212	298.56	74.81	122.	0.	0.000	730.18	0.470D
Pb-212	307.74	77.11	66.	156.	0.260	21.77	0.919D
Pb-214	307.74	77.11	215.	0.	0.000	323.41	0.259D
Pb-214	348.08	87.19	58.	44.	0.074	68.12	0.493s
Th-234	368.72	92.35	79.	42.	0.070	67.58	0.933D
Ac-228	380.72	95.35	23.	7.	0.012	207.83	0.935D
Ac-228	836.44	209.26	10.	30.	0.051	49.40	0.891
Pb-212	953.94	238.62	31.	216.	0.359	15.46	1.057D
Pb-214	967.37	241.98	39.	39.	0.065	55.37	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.12	270.41	15.	32.	0.053	57.45	0.792s
Pb-214	1180.87	295.34	6.	73.	0.121	27.39	0.756s
Ac-228	1310.22	327.67	8.	37.	0.061	48.70	0.583s
Ac-228	1352.86	338.33	7.	66.	0.111	29.42	0.904s
Pb-214	1406.35	351.70	13.	80.	0.133	29.43	0.636s

WI07-0698 D2 Grid C3-4 0-6 inches F.R. 073007

Ac-228	1852.84	463.29	3.	27.	0.045	47.16	0.834s
Bi-214	2437.43	609.39	0.	65.	0.108	24.81	0.637s
CS-137	2646.36	661.61	2.	14.	0.024	66.51	0.644s
Bi-214	3074.00	768.48	0.	9.	0.015	66.67	0.562s
Ac-228	3179.43	794.82	0.	10.	0.017	63.25	0.312s
Ac-228	3644.93	911.15	0.	44.	0.073	30.15	0.375s
Bi-214	3737.00	934.16	0.	4.	0.007	100.00	0.750s
Ac-228	3858.00	964.40	0.	12.	0.020	57.74	0.500s
Ac-228	3876.86	969.11	18.	0.	0.000	0.00	1.598
Bi-214	4483.63	1120.73	0.	19.	0.032	45.88	0.417s
Bi-214	4953.50	1238.14	0.	10.	0.017	63.25	0.375s
Bi-214	5512.00	1377.69	0.	0.	0.001	223.61	0.000s
K-40	5846.38	1461.24	0.	55.	0.092	26.97	1.041s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7060.93	1764.69	0.	17.	0.028	48.51	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	3.0788E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	6.049E-04	+	2.260E-04	G
			1120.29	4.623E-04	+	1.627E-04	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	2.4215E-03	1460.81	2.422E-03	?(	4.403E-05	G
Ac-228	N	5.1681E-04	911.07	4.846E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.282E-04	G
			338.32	7.774E-04	+	1.476E-04	G
			964.60	7.407E-04	+	3.348E-04	G
			794.70	5.880E-04	?(	5.880E-05	G
			463.00	1.046E-03	+	3.220E-04	G
			209.28	6.454E-04	?(	1.081E-04	G

ORTEC g v - i (63) wan32 G53W2.06 30-JUL-2007 08:34:05 Page 4
4714781 Spectrum name: Win00398.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.998E-04	+	3.189E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	1.493E-03	+	4.072E-04	G
Pb-212	N 4.9529E-04	238.62	4.953E-04	(	1.927E-05	G K
		77.11	5.969E-04	+	8.260E-05	Energy duplication
		74.81	0.000E+00	%	1.047E-04	Energy duplication
CS-137	3.9293E-05	661.66	3.929E-05	?(	7.564E-06	G
Th-234	N 4.7452E-04	92.35	5.223E-04	(	1.633E-04	G
		63.29	4.064E-04	?(	2.126E-04	G

```
                WI07-0698  D2  Grid  C3-4   0-6 inches   F.R. 073007
Pb-214   N   2.9506E-04    351.92 2.951E-04  (  2.107E-05          G K
                           295.21 4.552E-04 +   8.194E-05          G
                            77.11 0.000E+00 %   1.394E-04Energy duplication
                           241.98 5.401E-04 +   1.797E-04          G
                            74.81 1.216E-03 +   2.156E-04Energy duplication
                            87.30 6.457E-04 +   2.157E-04          X

Pb-210   N   9.6625E-04     46.50 9.663E-04  (  2.077E-04          G

AM-241       7.5570E-04     59.54 7.557E-04  (  2.913E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
     ORTEC g v - i (  63) wan32  G53W2.06  30-JUL-2007 08:34:05 Page    5
4714781                          Spectrum name: Win00398.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       8.7243E-01    2.164E-01    2.189E-01
K-40   #     6.8618E+00    1.850E+00    1.868E+00
Ac-228       1.4645E+00    4.185E-01    4.221E-01
Pb-212       1.4035E+00    2.169E-01    2.232E-01
CS-137 #     1.1134E-01    7.405E-02    7.418E-02
Th-234       1.3446E+00    9.087E-01    9.093E-01
Pb-214       8.3611E-01    2.461E-01    2.481E-01
Pb-210 #     2.7380E+00    1.648E+00    1.649E+00
AM-241       2.1414E+00    3.172E-01    3.270E-01

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

WI07-0698 D2 Grid C3-4 0-6 inches F.R. 073007

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

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

Total Activity (2.7 to 1999.3 keV) 1.7773680E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0612 D2 Grid [redacted] 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:41:02 Page 1
4714781 Spectrum name: Win00358.An1

Sample description
WI07-0612 D2 Grid # C3-5 Free Rel. 07-27-07

Spectrum Filename: C:\User\Win00358.An1

Acquisition information
Start time: 27-Jul-2007 10:30:51
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: 3.6550E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6550E+02) = 2.7360E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:41:02 Page 2
4714781 Spectrum name: Win00358.An1

WI07-0612 D2 Grid C3-5 6 inches F.R. 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: 0.1116

********** U N I D E N T I F I E D P E A K S U 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	4974.	24900.	41.500	1.70	2.212	CU-64	s
2333.32	583.37	4.	68.	0.114	26.80	0.606	TL-208	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.53	46.81	55.	49.	0.082	57.09	0.620s
AM-241	237.69	59.60	143.	669.	1.114	10.74	0.941
Th-234	254.43	63.78	61.	67.	0.112	48.77	0.516s
Pb-214	298.54	74.81	56.	152.	0.254	21.35	0.917D
Pb-212	298.56	74.81	133.	0.	0.000	256.97	0.596D
Pb-212	307.74	77.11	62.	188.	0.314	18.73	0.919D
Pb-214	307.74	77.11	168.	0.	0.000	186.87	0.663D
Pb-214	348.23	87.23	50.	58.	0.097	50.53	0.859
Th-234	368.72	92.35	60.	40.	0.067	62.49	0.933D
Ac-228	380.72	95.35	34.	6.	0.010	282.94	0.935D
Ac-228	836.23	209.20	33.	39.	0.064	69.99	0.302s
Pb-212	953.94	238.62	24.	230.	0.383	14.52	1.057D
Pb-214	967.37	241.98	22.	41.	0.069	44.50	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:41:02 Page 3
4714781 Spectrum name: Win00358.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.16	270.42	7.	46.	0.076	39.14	0.325s
Pb-214	1180.08	295.15	19.	55.	0.091	44.29	1.206
Ac-228	1309.67	327.53	12.	1.	0.002	773.79	0.241s
Ac-228	1353.01	338.37	14.	67.	0.112	34.04	0.359s
Pb-214	1407.56	352.00	15.	94.	0.157	25.75	0.857s

WI07-0612 D2 Grid C3-5 6 inches F.R. 072707

Ac-228	1852.09	463.10	4.	34.	0.056	43.98	0.807s
Bi-214	2437.32	609.36	3.	76.	0.126	25.09	1.627s
CS-137	2647.58	661.91	0.	13.	0.022	55.47	0.750s
Bi-214	3069.92	767.46	3.	2.	0.004	250.71	0.234s
Ac-228	3180.85	795.18	0.	14.	0.023	53.45	0.500s
Ac-228	3645.96	911.41	0.	59.	0.098	26.04	0.809s
Bi-214	3732.00	932.91	0.	12.	0.020	57.74	0.250s
Ac-228	3858.81	964.60	2.	7.	0.011	99.77	1.595D
Ac-228	3876.86	969.11	0.	30.	0.051	36.22	1.598D
Bi-214	4483.00	1120.58	0.	20.	0.033	44.72	0.500s
Bi-214	4953.20	1238.07	0.	11.	0.018	60.30	0.625s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.36	1460.99	0.	36.	0.060	33.33	0.500s
Ac-228	6359.00	1589.32	0.	9.	0.015	66.67	0.250s
Bi-214	7060.42	1764.56	0.	14.	0.023	53.45	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	3.5188E-04	609.31	3.519E-04	(	1.456E-05	G K
			1764.49	4.982E-04	+	2.069E-04	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	7.457E-04	+	3.537E-04	G
			768.36	0.000E+00	&	1.929E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	1.166E-03	&	5.271E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	6.8263E-04	911.07	6.498E-04	?(	1.101E-05	G K
			969.11	5.922E-04	(	1.942E-05	G
			338.32	7.852E-04	@(	6.815E-05	G
			964.60	4.154E-04	-	2.946E-04	G
			794.70	8.232E-04	?(	5.880E-05	G
			463.00	1.319E-03	+	3.598E-04	G
			209.28	8.182E-04	?(	1.837E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 10:41:02 Page 4
4714781 Spectrum name: Win00358.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.427E-03	+	3.377E-04	G
		1588.00	1.307E-03	&	6.931E-04	G
		95.35	0.000E+00	%	1.822E-04	X
		327.64	0.000E+00	%	2.290E-04	G
Pb-212	N 5.2805E-04	238.62	5.281E-04	(	1.719E-05	G K
		77.11	7.215E-04	+	8.754E-05	Energy duplication
		74.81	0.000E+00	%	1.089E-04	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	2.710E-06	G
Th-234	N 8.2554E-04	92.35	5.044E-04	(	1.426E-04	G
		63.29	1.283E-03	?(	2.196E-04	G

```
                WI07-0612  D2  Grid  C3-5   6 inches   F.R. 072707
Pb-214    N   3.4656E-04     351.92 3.481E-04  (  2.222E-05          G K
                             295.21 3.435E-04 ?(  4.204E-05          G
                              77.11 0.000E+00 ?   1.236E-04Energy duplication
                             241.98 5.718E-04 +   1.623E-04          G
                              74.81 1.698E-03 +   2.333E-04Energy duplication
                              87.30 8.441E-04 +   2.206E-04          X

Pb-210    N   1.0003E-03      46.50 1.000E-03  (  2.246E-04          G

AM-241        1.3769E-03      59.54 1.377E-03  (  3.591E-05          G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
```

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     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 10:41:02 Page    5
4714781                          Spectrum name: Win00358.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 #	9.6275E-01	2.416E-01	2.442E-01
K-40 #	4.3365E+00	1.446E+00	1.455E+00
Ac-228	1.8677E+00	3.901E-01	3.963E-01
Pb-212	1.4447E+00	2.098E-01	2.166E-01
CS-137 #	9.6385E-02	5.346E-02	5.359E-02
Th-234	2.2587E+00	8.952E-01	8.968E-01
Pb-214	9.4819E-01	2.429E-01	2.455E-01
Pb-210	2.7367E+00	1.563E+00	1.564E+00
AM-241	3.7671E+00	4.047E-01	4.280E-01

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

WI07-0612 D2 Grid C3-5 6 inches F.R. 072707

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

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

Total Activity (2.7 to 1999.3 keV) 1.8418766E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0601 D2 Grid C4 - 1 @ 6 inches Free Rel. 072707

Sample description
WI07-0601 D2 Grid # C4-1 Free Rel. 0-6" 07-27-07

Spectrum Filename: C:\User\D1 Samples\WI07-0617 D1 Box #130 #1 0727 07.An1

Acquisition information

Start time:	27-Jul-2007 08:21:42
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:	3.0860E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0860E+02) = 3.2404E+03

Detection limit method: Traditional ORTEC method

WI07-0601 D2 Grid C4 - 1 @ 6 inches Free Rel. 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: 0.1329

********** U N I D E N T I F I E D P E A K S U 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	7141.	11572.	19.287	2.78	0.854	-	D
15.97	3.99	15844.	10147.	16.912	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	186.22	46.74	48.	46.	0.078	62.74	0.668
AM-241	237.78	59.62	81.	367.	0.612	14.33	0.779
Th-234	253.10	63.45	45.	50.	0.083	57.62	0.721s
Pb-214	298.54	74.81	42.	126.	0.210	23.01	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	509.90	0.244D
Pb-212	307.74	77.11	61.	149.	0.248	22.18	0.919D
Pb-214	307.74	77.11	200.	0.	0.000	581.66	0.392D
Pb-214	347.41	87.02	54.	44.	0.073	66.96	0.899
Th-234	368.72	92.35	71.	42.	0.071	63.87	0.933D
Ac-228	380.72	95.35	36.	17.	0.029	110.23	0.935D
Ac-228	835.10	208.92	20.	36.	0.059	55.56	0.281s
Pb-212	953.94	238.62	20.	209.	0.349	15.06	1.057D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:31:53 Page 3
4714781 Spectrum name: WI07-0617 D1 Box #130 #1 07270

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	30.	30.	0.050	63.22	1.060D
Ac-228	1080.71	270.31	8.	32.	0.052	50.83	0.523s
Pb-214	1181.10	295.40	3.	58.	0.097	28.57	1.338s
Ac-228	1310.35	327.71	10.	17.	0.028	84.84	0.316s
Ac-228	1352.71	338.29	12.	55.	0.092	35.08	1.045

WI07-0601 D2 Grid C4 - 1 @ 6 inches Free Rel. 072707

Pb-214	1408.18	352.16	3.	85.	0.141	23.34	0.616s
Ac-228	1850.20	462.63	4.	8.	0.013	115.47	0.699s
Bi-214	2437.13	609.32	0.	60.	0.100	25.82	0.579s
CS-137	2648.04	662.02	0.	28.	0.047	37.80	0.687s
Bi-214	3072.00	767.98	0.	7.	0.012	75.59	0.250s
Ac-228	3179.83	794.92	0.	12.	0.020	57.74	0.562s
Ac-228	3645.22	911.22	0.	45.	0.075	29.81	0.478s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	3.	10.	0.017	75.74	1.595D
Ac-228	3876.86	969.11	4.	17.	0.028	61.02	1.598D
Bi-214	4480.00	1119.83	0.	0.	0.000	0.00	0.000s
Bi-214	4952.20	1237.82	0.	8.	0.013	70.71	0.250s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5845.69	1461.07	0.	36.	0.060	33.33	0.687s
Ac-228	6354.50	1588.20	0.	2.	0.003	141.42	0.500s
Bi-214	7057.80	1763.91	2.	2.	0.003	244.95	0.307s

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

***** S U M M A R Y O F L 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	2.8744E-04	609.31	2.790E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	0.000E+00	?	2.433E-05	G
			1238.11	5.424E-04	+	3.072E-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	%	2.164E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	5.8818E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	3.212E-04	-	1.359E-04	G
			338.32	6.485E-04	(	6.277E-05	G
			964.60	6.434E-04	(	1.744E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	2.923E-04	-	2.114E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:31:53 Page 4
4714781 Spectrum name: WI07-0617 D1 Box #130 #1 07270

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.512E-04	(	1.431E-04	G
		270.23	9.841E-04	+	2.955E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	3.295E-04	-	2.082E-04	X
		327.64	6.923E-04	@(	2.036E-04	G
Pb-212	N 5.0641E-04	238.62	4.813E-04	(	1.558E-05	G K
		77.11	5.687E-04	(	4.440E-05	Energy duplication
		74.81	0.000E+00	%	1.011E-04	Energy duplication
CS-137	7.5877E-05	661.66	7.588E-05	(	2.710E-06	G
Th-234	N 7.0395E-04	92.35	5.293E-04	(	1.546E-04	G
		63.29	9.525E-04	@(	1.905E-04	G

WI07-0601 D2 Grid C4 - 1 @ 6 inches Free Rel. 072707

Pb-214	N	3.4109E-04	351.92	3.142E-04	*(	1.135E-05	G K
			295.21	3.644E-04	@(	1.837E-05	G
			77.11	0.000E+00	%	1.346E-04	Energy duplication
			241.98	4.149E-04	(	1.142E-04	G
			74.81	1.409E-03	+	2.107E-04	Energy duplication
			87.30	6.361E-04	+	2.105E-04	X
Pb-210	N	9.4924E-04	46.50	9.492E-04	(	2.094E-04	G
AM-241		7.5570E-04	59.54	7.557E-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

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 27-JUL-2007 08:31:53 Page 5
4714781 Spectrum name: WI07-0617 D1 Box #130 #1 07270

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	9.3145E-01	2.405E-01	2.430E-01
K-40 #	5.1361E+00	1.712E+00	1.723E+00
Ac-228	1.9059E+00	4.655E-01	4.709E-01
Pb-212	1.6410E+00	2.200E-01	2.284E-01
CS-137	2.4587E-01	9.293E-02	9.341E-02
Th-234	2.2811E+00	9.811E-01	9.825E-01
Pb-214	1.1053E+00	2.580E-01	2.613E-01
Pb-210	3.0760E+00	1.930E+00	1.931E+00
AM-241	2.4488E+00	3.508E-01	3.623E-01

- All peaks for activity calculation had bad shape.

WI07-0601 D2 Grid C4 - 1 @ 6 inches Free Rel. 072707

* - 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) 1.8771528E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 4714781

WI07-0602 D2 Grid C4-2 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:49:03 Page 1
4714781 Spectrum name: Win00353.An1

Sample description
WI07-0602 D2 Grid # C4-2 Free Rel. 0-6

Spectrum Filename: C:\User\Win00353.An1

Acquisition information
Start time: 27-Jul-2007 08:38:53
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: 3.4070E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4070E+02) = 2.9351E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:49:03 Page 2
4714781 Spectrum name: Win00353.An1

WI07-0602 D2 Grid C4-2 6 inches F.R. 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: 0.1549

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.06	3.42	10582.	14315.	23.859	2.63	0.854	-	D
17.67	4.82	12180.	10916.	18.194	3.44	0.855	-	D
254.33	63.73	84.	25.	0.041	112.45	0.908	PA-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	185.60	46.58	45.	48.	0.080	62.92	0.887s
AM-241	237.80	59.63	68.	186.	0.311	21.78	0.621s
Th-234	252.46	63.29	59.	39.	0.065	63.93	0.907D
Pb-214	298.54	74.81	75.	107.	0.179	29.93	0.917D
Pb-212	298.56	74.81	110.	0.	0.000	253.86	0.416D
Pb-212	307.74	77.11	54.	161.	0.268	20.40	0.919D
Pb-214	307.74	77.11	168.	0.	0.000	335.00	0.228D
Pb-214	348.68	87.34	56.	57.	0.095	52.63	1.194s
Th-234	368.72	92.35	68.	52.	0.086	53.26	0.933D
Ac-228	380.72	95.35	30.	8.	0.013	211.78	0.935D
Ac-228	836.00	209.15	15.	51.	0.085	41.32	0.638s
Pb-212	953.94	238.62	19.	246.	0.410	13.72	1.057D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 08:49:03 Page 3
4714781 Spectrum name: Win00353.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	35.	49.	0.081	44.67	1.060D
Ac-228	1080.92	270.36	12.	26.	0.044	61.34	0.674s
Pb-214	1179.98	295.12	6.	54.	0.089	32.18	0.850
Ac-228	1304.97	326.36	22.	3.	0.006	469.04	0.429s
Ac-228	1353.28	338.43	5.	65.	0.108	28.38	0.429s

WI07-0602 D2 Grid C4-2 6 inches F.R. 072707

Pb-214	1407.39	351.96	17.	105.	0.174	26.83	1.007
Ac-228	1853.42	463.43	7.	25.	0.042	60.13	1.111
Bi-214	2437.66	609.45	0.	68.	0.113	24.25	0.900s
CS-137	2646.17	661.56	2.	18.	0.031	56.43	0.362s
Bi-214	3071.78	767.92	1.	1.	0.002	346.41	0.218s
Ac-228	3181.23	795.27	0.	26.	0.043	39.22	0.500s
Ac-228	3645.36	911.26	0.	59.	0.098	26.04	1.603
Bi-214	3737.00	934.16	8.	2.	0.002	600.00	0.000s
Ac-228	3858.81	964.60	1.	15.	0.024	57.28	1.595D
Ac-228	3876.86	969.11	2.	27.	0.044	42.18	1.598D
Bi-214	4481.33	1120.16	0.	9.	0.015	66.67	0.500s
Bi-214	4946.00	1236.27	0.	7.	0.012	75.59	0.250s
Bi-214	5513.75	1378.13	0.	7.	0.012	75.59	0.375s
K-40	5845.41	1461.00	0.	39.	0.065	32.03	0.729s
Ac-228	6356.00	1588.57	0.	7.	0.012	75.59	0.312s
Bi-214	7060.55	1764.60	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	3.1623E-04	609.31	3.162E-04	(	4.650E-06	G K
			1764.49	4.626E-04	+	2.001E-04	G
			1120.29	2.190E-04	-	1.161E-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	7.573E-04	+	4.625E-04	G
			934.06	0.000E+00	%	4.637E-04	G
K-40	N	1.7171E-03	1460.81	1.717E-03	?(	4.403E-05	G
Ac-228	N	6.4364E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	5.161E-04	(	5.351E-05	G
			338.32	7.579E-04	(	4.458E-05	G
			964.60	8.997E-04	+	3.814E-04	G
			794.70	1.529E-03	+	4.544E-04	G
			463.00	9.744E-04	+	3.319E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.079E-03	+	2.539E-04	G
		270.23	8.227E-04	(	1.673E-04	G
		1588.00	1.017E-03	+	6.209E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	0.000E+00	&	3.090E-04	G
Pb-212	N 5.7954E-04	238.62	5.649E-04	(	1.543E-05	G K
		77.11	6.158E-04	(	4.181E-05	Energy duplication
		74.81	0.000E+00	%	9.936E-05	Energy duplication
CS-137	5.0133E-05	661.66	5.013E-05	?(	7.564E-06	G
Th-234	N 6.8578E-04	92.35	6.432E-04	(	1.524E-04	G
		63.29	7.464E-04	$(	2.164E-04	G

WI07-0602 D2 Grid C4-2 6 inches F.R. 072707

Pb-214	N	3.6978E-04	351.92	3.877E-04	(	2.374E-05	G	K
			295.21	3.351E-04	(	2.593E-05	G	
			77.11	0.000E+00	%	1.236E-04	Energy duplication	
			241.98	6.757E-04	+	1.863E-04	G	
			74.81	1.195E-03	+	2.186E-04	Energy duplication	
			87.30	8.271E-04	+	2.255E-04	X	
Pb-210	N	9.7986E-04	46.50	9.799E-04	*(	2.041E-04	G	
AM-241		3.8369E-04	59.54	3.837E-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:
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 27-JUL-2007 08:49:03 Page 5
4714781 Spectrum name: Win00353.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		9.2818E-01	2.251E-01	2.278E-01
K-40	#	5.0399E+00	1.614E+00	1.625E+00
Ac-228		1.8892E+00	3.958E-01	4.021E-01
Pb-212		1.7010E+00	2.091E-01	2.186E-01
CS-137	#	1.4715E-01	8.304E-02	8.323E-02
Th-234		2.0129E+00	8.374E-01	8.387E-01
Pb-214		1.0853E+00	2.273E-01	2.310E-01
Pb-210	#	2.8760E+00	1.809E+00	1.811E+00
AM-241		1.1262E+00	2.453E-01	2.488E-01

- All peaks for activity calculation had bad shape.

WI07-0602 D2 Grid C4-2 6 inches F.R. 072707

* - 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) 1.6805784E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0603 D2 Grid C4-3 6 inches F.R. 072707

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:07:24 Page 1
4714781 Spectrum name: Win00354.An1

Sample description
WI07-0603 D2 Grid # C4-3 Free Rel. 0-6

Spectrum Filename: C:\User\Win00354.An1

Acquisition information
Start time: 27-Jul-2007 08:57:13
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: 3.2570E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2570E+02) = 3.0703E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:07:24 Page 2
4714781 Spectrum name: Win00354.An1

WI07-0603 D2 Grid C4-3 6 inches F.R. 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: 0.0757

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.69	3.86	4524.	19394.	32.323	2.00	2.236	CU-64	s
42.79	10.88	210.	32.	0.053	152.07	0.331	PB-214	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.12	46.46	28.	42.	0.070	54.73	0.423s
AM-241	238.42	59.78	56.	75.	0.125	43.14	1.086s
Th-234	253.82	63.63	47.	45.	0.076	62.53	1.575s
Pb-214	298.54	74.81	73.	124.	0.207	26.37	0.917D
Pb-212	298.56	74.81	146.	0.	0.000	933.03	0.214D
Pb-212	307.74	77.11	79.	126.	0.211	26.65	0.919D
Pb-214	307.74	77.11	143.	0.	0.000	1100.18	0.272D
Pb-214	348.33	87.25	72.	66.	0.109	54.56	0.559s
Th-234	368.72	92.35	51.	39.	0.065	60.50	0.933D
Ac-228	380.72	95.35	20.	3.	0.006	393.79	0.935D
Ac-228	836.60	209.30	24.	4.	0.006	429.84	0.350s
Pb-212	953.94	238.62	33.	200.	0.333	16.35	1.057D
Pb-214	967.37	241.98	32.	27.	0.045	71.13	1.060D

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:07:24 Page 3
4714781 Spectrum name: Win00354.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.25	269.94	24.	36.	0.061	66.38	0.443s
Pb-214	1180.04	295.14	14.	76.	0.126	30.09	0.955
Ac-228	1312.76	328.31	7.	37.	0.062	44.74	0.378s
Ac-228	1353.01	338.37	11.	54.	0.091	35.58	1.300
Pb-214	1407.45	351.97	3.	89.	0.148	22.58	1.553s

WI07-0603 D2 Grid C4-3 6 inches F.R. 072707

Ac-228	1850.50	462.70	7.	17.	0.029	78.45	0.423s
Bi-214	2436.12	609.06	0.	67.	0.112	24.43	0.391s
CS-137	2646.29	661.59	0.	24.	0.040	40.82	1.166
Bi-214	3065.71	766.41	0.	13.	0.022	55.47	0.500s
Ac-228	3179.94	794.95	4.	19.	0.031	67.47	0.315s
Ac-228	3645.70	911.34	0.	53.	0.088	27.47	0.750s
Bi-214	3736.00	933.91	0.	6.	0.010	81.65	0.500s
Ac-228	3858.81	964.60	2.	12.	0.020	68.76	1.595D
Ac-228	3876.86	969.11	0.	38.	0.063	32.65	1.598D
Bi-214	4478.25	1119.39	0.	15.	0.025	51.64	0.375s
Bi-214	4952.20	1237.82	0.	10.	0.017	63.25	0.875s
Bi-214	5510.33	1377.28	1.	0.	0.001	240.37	0.197s
K-40	5846.13	1461.18	0.	47.	0.078	29.17	0.417s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7059.50	1764.33	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	3.2380E-04	609.31	3.116E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	3.650E-04	&(	2.433E-05	G
			1238.11	6.779E-04	+	3.390E-04	G
			768.36	6.774E-04	&	2.930E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	5.830E-04	+	3.887E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	(	4.403E-05	G
Ac-228	N	6.4716E-04	911.07	5.837E-04	*(	1.101E-05	G K
			969.11	7.285E-04	(	1.942E-05	G
			338.32	6.368E-04	(	6.031E-05	G
			964.60	7.242E-04	(	1.659E-04	G
			794.70	1.107E-03	+	4.293E-04	G
			463.00	6.756E-04	?(	1.631E-04	G
			209.28	0.000E+00	%	1.693E-04	G

ORTEC g v - i (63) wan32 G53W2.06 27-JUL-2007 09:07:24 Page 4
4714781 Spectrum name: Win00354.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.140E-03	+	3.611E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.406E-04	X
		327.64	1.507E-03	&	4.029E-04	G
Pb-212	N 4.6595E-04	238.62	4.587E-04	(	1.996E-05	G K
		77.11	4.838E-04	(	4.996E-05	Energy duplication
		74.81	0.000E+00	%	1.139E-04	Energy duplication
CS-137	6.5037E-05	661.66	6.504E-05	?(	2.710E-06	G
Th-234	N 6.4379E-04	92.35	4.894E-04	(	1.321E-04	G
		63.29	8.636E-04	@(	1.938E-04	G

```
                WI07-0603  D2  Grid  C4-3   6 inches   F.R. 072707
Pb-214   N   3.3660E-04    351.92 3.296E-04 *(  1.111E-05        G K
                           295.21 4.750E-04 +   8.723E-05        G
                            77.11 0.000E+00 %   1.142E-04Energy duplication
                           241.98 3.712E-04  (  1.180E-04        G
                            74.81 1.389E-03 +   2.272E-04Energy duplication
                            87.30 9.505E-04 +   2.484E-04        X

Pb-210   N   8.5398E-04     46.50 8.540E-04  (  1.638E-04        G

AM-241       1.5444E-04     59.54 1.544E-04 @(  2.285E-05        G
   ( - This peak used in the nuclide activity average.

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

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

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     ORTEC g v - i (  63) wan32  G53W2.06  27-JUL-2007 09:07:24 Page    5
 4714781                          Spectrum name: Win00354.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	9.9417E-01	2.429E-01	2.458E-01
K-40	6.3534E+00	1.853E+00	1.869E+00
Ac-228	1.9870E+00	4.697E-01	4.756E-01
Pb-212	1.4306E+00	2.237E-01	2.300E-01
CS-137 #	1.9968E-01	8.152E-02	8.188E-02
Th-234	1.9766E+00	8.599E-01	8.611E-01
Pb-214	1.0335E+00	2.334E-01	2.366E-01
Pb-210	2.6220E+00	1.435E+00	1.436E+00
AM-241 #	4.7416E-01	2.045E-01	2.053E-01

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

WI07-0603 D2 Grid C4-3 6 inches F.R. 072707

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

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

Total Activity (2.7 to 1999.3 keV) 1.7071081E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0990 D2 Grid D0-1 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:52:42 Page 1
8905696 Spectrum name: Win00558.An1

Sample description
WI07-0990 D2 Grid D0-1 0-6' Free R. 080707

Spectrum Filename: C:\User\Win00558.An1

Acquisition information
Start time: 07-Aug-2007 10:42:30
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: 3.5470E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5470E+02) = 2.8193E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:52:42 Page 2
8905696 Spectrum name: Win00558.An1

WI07-0990 D2 Grid D0-1 0-6 in. F.R. 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: 0.1522

********** U N I D E N T I F I E D P E A K S U 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	6165.	10935.	18.225	2.79	0.854	-	D
17.78	4.42	16889.	8494.	14.157	4.84	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	185.52	46.56	113.	51.	0.084	74.15	0.956
AM-241	237.85	59.64	174.	208.	0.347	28.91	1.050
Th-234	254.07	63.69	103.	66.	0.111	60.94	0.848
Pb-214	298.54	74.81	123.	98.	0.164	37.64	0.917D
Pb-212	298.56	74.81	144.	0.	0.000	1013.25	0.331D
Pb-212	307.74	77.11	110.	131.	0.219	28.51	0.920D
Pb-214	307.74	77.11	218.	0.	0.000	241.45	0.532D
Pb-214	347.41	87.02	65.	91.	0.152	39.22	0.464s
Th-234	368.72	92.35	89.	47.	0.079	63.33	0.933D
Ac-228	380.72	95.35	57.	25.	0.041	95.13	0.935D
Ac-228	836.79	209.34	12.	29.	0.048	55.60	0.833
Pb-212	953.94	238.62	35.	160.	0.267	18.89	1.057D
Pb-214	967.37	241.98	28.	42.	0.070	46.94	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:52:42 Page 3
8905696 Spectrum name: Win00558.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1077.89	269.60	18.	12.	0.020	135.40	0.557s
Pb-214	1181.00	295.38	10.	71.	0.118	30.12	1.023
Ac-228	1312.19	328.16	0.	43.	0.072	30.50	0.500s
Ac-228	1352.72	338.29	11.	51.	0.084	38.29	0.865s
Pb-214	1408.00	352.11	4.	99.	0.166	21.73	0.982

WI07-0990 D2 Grid D0-1 0-6 in. F.R. 080707

Ac-228	1853.46	463.45	7.	21.	0.036	66.44	0.555s
Bi-214	2438.79	609.73	0.	73.	0.122	23.41	1.050s
CS-137	2644.60	661.17	0.	23.	0.038	41.70	0.250s
Bi-214	3074.33	768.56	0.	14.	0.023	53.45	0.375s
Ac-228	3178.62	794.62	0.	8.	0.013	70.71	0.750s
Ac-228	3646.02	911.43	0.	41.	0.068	31.23	0.500s
Bi-214	3733.50	933.28	0.	8.	0.013	70.71	0.375s
Ac-228	3858.81	964.60	3.	15.	0.026	58.74	1.595D
Ac-228	3876.86	969.11	0.	18.	0.031	46.59	1.598D
Bi-214	4484.00	1120.82	0.	16.	0.027	50.00	0.333s
Bi-214	4952.20	1237.82	0.	5.	0.008	89.44	0.292s
Bi-214	5512.00	1377.69	0.	2.	0.003	141.42	0.250s
K-40	5845.33	1460.98	22.	9.	0.015	187.69	0.279s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.71	4.	0.	0.001	568.62	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.5061E-04	609.31	3.395E-04	*(	4.650E-06	G K
			1764.49	0.000E+00	%	1.200E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	3.9625E-04	1460.81	3.962E-04	?(	3.149E-04	G
Ac-228	N	4.6104E-04	911.07	4.515E-04	?(	1.101E-05	G K
			969.11	3.579E-04	(	1.942E-05	G
			338.32	5.938E-04	(	6.196E-05	G
			964.60	9.531E-04	+	4.025E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	8.315E-04	+	3.118E-04	G
			209.28	6.136E-04	(	1.148E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:52:42 Page 4
8905696 Spectrum name: Win00558.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	3.749E-04	&(	2.037E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	4.778E-04	(	2.159E-04	X
		327.64	1.751E-03	+	3.986E-04	G
Pb-212	N 3.6868E-04	238.62	3.687E-04	(	2.029E-05	G K
		77.11	5.029E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	%	1.130E-04	Energy duplication
CS-137	6.2327E-05	661.66	6.233E-05	?(	2.710E-06	G
Th-234	N 8.6832E-04	92.35	5.906E-04	(	1.725E-04	G
		63.29	1.264E-03	$(	2.827E-04	G

WI07-0990 D2 Grid D0-1 0-6 in. F.R. 080707

Pb-214	N	3.9407E-04	351.92	3.679E-04	(	1.205E-05		G K
			295.21	4.448E-04	(	3.132E-05		G
			77.11	0.000E+00	%	1.405E-04	Energy duplication	
			241.98	5.828E-04	+	1.707E-04		G
			74.81	1.099E-03	+	2.403E-04	Energy duplication	
			87.30	1.320E-03	+	2.637E-04		X
Pb-210	N	1.0343E-03	46.50	1.034E-03	?(	3.177E-04		G
AM-241		4.2830E-04	59.54	4.283E-04	(	3.946E-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 10:52:42 Page 5
8905696 Spectrum name: Win00558.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 #	9.8848E-01	2.314E-01	2.343E-01
K-40 #C	1.1171E+00	2.097E+00	2.097E+00
Ac-228	1.2998E+00	3.718E-01	3.750E-01
Pb-212	1.0394E+00	1.963E-01	2.002E-01
CS-137 #	1.7572E-01	7.328E-02	7.359E-02
Th-234	2.4481E+00	1.076E+00	1.077E+00
Pb-214	1.1110E+00	2.063E-01	2.105E-01
Pb-210 #	2.9160E+00	2.162E+00	2.163E+00
AM-241	1.2075E+00	3.491E-01	3.519E-01

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

WI07-0990 D2 Grid D0-1 0-6 in. F.R. 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) 1.2303077E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0991 D1 Grid D0-2 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:55:31 Page 1
8905696 Spectrum name: Win00372.An1

Sample description
WI07-0990 D1 Grid D0-2 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00372.An1

Acquisition information
Start time: 07-Aug-2007 10:45:22
Live time: 600
Real time: 603
Dead time: 0.46 %
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: 2.5600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.5600E+02) = 3.9062E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:55:31 Page 2
8905696 Spectrum name: Win00372.An1

WI07 - 0991 D1 Grid D0-2 0-6in Free. R. 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: 0.1645

********** U N I D E N T I F I E D P E A K S U 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	227.	463.	0.772	15.76	1.329	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	185.99	46.66	50.	40.	0.066	67.88	0.585s
AM-241	237.63	59.57	114.	1068.	1.780	7.31	1.082
Th-234	253.94	63.65	54.	46.	0.077	71.25	0.355s
Pb-214	298.61	74.81	59.	60.	0.100	44.43	0.971D
Pb-212	298.63	74.81	54.	0.	0.000	165.03	0.426D
Pb-212	307.80	77.11	59.	101.	0.169	29.17	0.972D
Pb-214	307.80	77.11	149.	0.	0.000	171.43	0.671D
Pb-214	347.53	87.04	22.	47.	0.079	45.50	0.472s
Th-234	368.79	92.35	43.	38.	0.063	58.62	0.985D
Ac-228	380.79	95.35	39.	20.	0.033	100.85	0.987D
Ac-228	836.14	209.15	21.	23.	0.038	83.86	0.617s
Pb-212	954.08	238.62	26.	131.	0.218	20.72	1.099D
Pb-214	967.50	241.98	28.	19.	0.032	91.17	1.101D
Ac-228	1081.91	270.57	6.	16.	0.026	71.94	0.510s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:55:31 Page 3
8905696 Spectrum name: Win00372.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.64	295.00	11.	35.	0.059	48.84	0.758s
Ac-228	1314.53	328.71	12.	6.	0.009	255.19	0.343s
Ac-228	1352.41	338.18	3.	44.	0.073	34.91	0.899
Pb-214	1407.57	351.96	0.	65.	0.108	24.81	1.114
Ac-228	1845.67	461.44	4.	16.	0.026	72.13	0.321s

WI07 - 0991 D1 Grid D0-2 0-6in Free. R. 080707

Bi-214	2438.77	609.66	0.	56.	0.093	26.73	0.823s
CS-137	2648.29	662.02	0.	21.	0.035	43.64	0.364s
Bi-214	3072.00	767.91	0.	0.	0.001	223.61	0.100s
Ac-228	3179.00	794.64	0.	4.	0.007	100.00	0.750s
Ac-228	3642.81	910.55	9.	2.	0.003	561.43	0.204s
Bi-214	3737.33	934.16	0.	3.	0.005	115.47	0.375s
Ac-228	3859.13	964.60	3.	6.	0.011	106.58	1.589D
Ac-228	3877.18	969.11	1.	15.	0.025	56.49	1.591D
Bi-214	4479.80	1119.69	0.	10.	0.017	63.25	0.312s
Bi-214	4952.33	1237.77	1.	0.	0.001	240.37	0.197s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5846.96	1461.31	0.	26.	0.043	39.22	1.000s
Ac-228	6354.00	1587.99	0.	0.	0.001	223.61	0.100s
Bi-214	7061.20	1764.69	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	3.0122E-04	609.31	2.866E-04	(	5.117E-06	G K
			1764.49	3.783E-04	?(	3.783E-05	G
			1120.29	2.624E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	%	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	3.162E-04	?(	1.054E-04	G
K-40	N	1.2239E-03	1460.81	1.224E-03	?(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	6.237E-05	G K
			969.11	3.096E-04		1.300E-04	G
			338.32	5.752E-04		1.345E-04	G
			964.60	4.276E-04		3.191E-04	G
			794.70	2.565E-04	?	2.162E-04	G
			463.00	6.713E-04	&	2.895E-04	G
			209.28	5.572E-04		2.397E-04	G
			270.23	5.490E-04		2.479E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	4.428E-04		2.561E-04	X
		327.64	0.000E+00	&	2.988E-04	G
Pb-212	N 3.4212E-04	238.62	3.421E-04	(	2.034E-05	G K
		77.11	4.689E-04	+	8.508E-05	Energy duplication
		74.81	0.000E+00	?	8.563E-05	Energy duplication
CS-137	6.2443E-05	661.66	6.244E-05	(	2.973E-06	G
Th-234	N 7.6695E-04	92.35	5.580E-04	(	1.438E-04	G
		63.29	1.064E-03	$(	2.510E-04	G
Pb-214	N 2.6754E-04	351.92	2.702E-04	(	4.157E-06	G K

WI07 - 0991 D1 Grid D0-2 0-6in Free. R. 080707

			295.21	2.501E-04	?(	3.642E-05		G
			77.11	0.000E+00	?	1.408E-04	Energy duplication	
			241.98	2.991E-04	(	1.259E-04		G
			74.81	8.113E-04	+	2.153E-04	Energy duplication	
			87.30	8.172E-04	+	2.116E-04		X
Pb-210	N	9.2531E-04	46.50	9.253E-04	(	2.451E-04		G
AM-241		2.6478E-03	59.54	2.648E-03	(	3.869E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:55:31 Page 5
8905696 Spectrum name: Win00372.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		1.1766E+00	3.145E-01	3.164E-01
K-40	#	4.7810E+00	1.875E+00	1.881E+00
Ac-228	B<	2.4362E-01		
Pb-212		1.3364E+00	2.769E-01	2.797E-01
CS-137		2.4392E-01	1.065E-01	1.067E-01
Th-234		2.9959E+00	1.382E+00	1.384E+00
Pb-214		1.0451E+00	2.592E-01	2.611E-01
Pb-210		3.6145E+00	2.454E+00	2.455E+00
AM-241		1.0343E+01	7.561E-01	8.475E-01

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

WI07 - 0991 D1 Grid D0-2 0-6in Free. R. 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 1999.2 keV) 2.5536222E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0992 D2 Grid D0-3 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:22:50 Page 1
8905696 Spectrum name: Win00559.An1

Sample description
WI07-0992 D2 Grid D0-3 0-6' Free R. 080707

Spectrum Filename: C:\User\Win00559.An1

Acquisition information
Start time: 07-Aug-2007 11:12:39
Live time: 600
Real time: 602
Dead time: 0.41 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.9890E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9890E+02) = 2.5069E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:22:50 Page 2
8905696 Spectrum name: Win00559.An1

WI07-0992 D2 Grid D0-3 0-6 in. F.R. 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: 0.1264

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.87	2.92	5659.	12521.	20.868	2.47	0.854	-	D
17.95	4.44	17180.	9436.	15.727	4.44	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	185.99	46.68	288.	55.	0.091	113.44	1.694s
AM-241	237.55	59.56	393.	1325.	2.208	8.31	0.930
Th-234	252.32	63.25	176.	52.	0.087	93.95	1.423s
Pb-214	298.54	74.81	158.	99.	0.164	41.37	0.917D
Pb-212	298.56	74.81	200.	0.	0.000	4325.12	0.348D
Pb-212	307.74	77.11	158.	175.	0.292	25.25	0.919D
Pb-214	307.74	77.11	270.	0.	0.000	476.21	0.801D
Pb-214	348.25	87.23	120.	66.	0.110	68.16	1.226s
Th-234	368.72	92.35	124.	47.	0.078	73.52	0.933D
Ac-228	380.72	95.35	95.	4.	0.006	720.74	0.935D
Ac-228	836.36	209.24	24.	37.	0.062	60.43	0.652s
Pb-212	953.94	238.62	21.	228.	0.380	14.41	1.057D
Pb-214	967.37	241.98	35.	38.	0.063	54.83	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:22:50 Page 3
8905696 Spectrum name: Win00559.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.64	270.54	12.	44.	0.073	43.60	0.352s
Pb-214	1180.23	295.18	20.	71.	0.119	34.10	0.730s
Ac-228	1312.53	328.25	10.	26.	0.043	64.05	0.466s
Ac-228	1354.01	338.62	9.	68.	0.113	31.88	0.606s
Pb-214	1407.55	352.00	7.	108.	0.181	21.63	1.179s

WI07-0992 D2 Grid D0-3 0-6 in. F.R. 080707

Ac-228	1854.00	463.58	0.	21.	0.035	43.64	0.312s
Bi-214	2436.76	609.22	0.	92.	0.153	20.85	0.672s
CS-137	2647.62	661.92	0.	9.	0.015	66.67	0.312s
Bi-214	3072.00	767.98	0.	10.	0.017	63.25	0.250s
Ac-228	3180.87	795.18	0.	15.	0.025	51.64	0.292s
Ac-228	3646.40	911.52	0.	50.	0.083	28.28	0.541s
Bi-214	3738.67	934.58	0.	8.	0.013	70.71	0.312s
Ac-228	3858.81	964.60	3.	11.	0.018	78.03	1.595D
Ac-228	3876.86	969.11	0.	36.	0.061	33.18	1.598D
Bi-214	4483.33	1120.66	0.	22.	0.037	42.64	0.625s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5513.00	1377.94	2.	1.	0.001	478.42	0.000s
K-40	5845.31	1460.97	0.	47.	0.078	29.17	0.931s
Ac-228	6355.50	1588.45	0.	2.	0.003	141.42	0.500s
Bi-214	7061.33	1764.79	0.	12.	0.020	57.74	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	4.5313E-04	609.31	4.278E-04	@(	4.650E-06	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	5.353E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	5.211E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	3.246E-04	G
			934.06	7.773E-04	+	4.403E-04	G
K-40	N	2.0693E-03	1460.81	2.069E-03	?(	4.403E-05	G
Ac-228	N	6.8069E-04	911.07	5.506E-04	?(	1.101E-05	G K
			969.11	7.054E-04	(	1.942E-05	G
			338.32	7.969E-04	@(	5.593E-05	G
			964.60	6.587E-04	(	1.931E-04	G
			794.70	8.820E-04	?(	5.880E-05	G
			463.00	8.185E-04	(	3.898E-05	G
			209.28	7.829E-04	?(	1.576E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:22:50 Page 4
8905696 Spectrum name: Win00559.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.375E-03	+	3.466E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	2.808E-04	X
		327.64	1.059E-03	&	3.665E-04	G
Pb-212	N 5.2397E-04	238.62	5.240E-04	(	1.609E-05	G K
		77.11	6.717E-04	+	1.007E-04	Energy duplication
		74.81	0.000E+00	%	1.328E-04	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	2.710E-06	G
Th-234	N 7.5525E-04	92.35	5.832E-04	(	2.030E-04	G
		63.29	1.000E-03	(	3.666E-04	G

WI07-0992 D2 Grid D0-3 0-6 in. F.R. 080707

Pb-214	N	4.2906E-04	351.92	4.012E-04	@(	1.550E-05		G K
			295.21	4.458E-04	(	4.271E-05		G
			77.11	0.000E+00	%	1.558E-04	Energy duplication	
			241.98	5.244E-04	(	1.229E-04		G
			74.81	1.100E-03	+	2.587E-04	Energy duplication	
			87.30	9.577E-04	+	2.872E-04		X
Pb-210	N	1.1194E-03	46.50	1.119E-03	(	5.004E-04		G
AM-241		2.7277E-03	59.54	2.728E-03	(	5.879E-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:
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 07-AUG-2007 11:22:50 Page 5
8905696 Spectrum name: Win00559.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 #	1.1359E+00	2.369E-01	2.407E-01
K-40 #	5.1875E+00	1.513E+00	1.526E+00
Ac-228	1.7064E+00	3.200E-01	3.263E-01
Pb-212	1.3135E+00	1.893E-01	1.956E-01
CS-137 #	6.1141E-02	4.076E-02	4.083E-02
Th-234	1.8933E+00	1.129E+00	1.130E+00
Pb-214	1.0756E+00	2.326E-01	2.361E-01
Pb-210 #	2.8061E+00	3.183E+00	3.184E+00
AM-241	6.8380E+00	5.682E-01	6.220E-01

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

WI07-0992 D2 Grid D0-3 0-6 in. F.R. 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) 2.2017626E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07 - 0993 D1 Grid D0-4 0-6in Free. R. 080707

Sample description
WI07-0993 D1 Grid D0-4 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00373.An1

Acquisition information

Start time:	07-Aug-2007 10:59:13
Live time:	600
Real time:	603
Dead time:	0.43 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 1.6 g/cc

Energy Calibration

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

Efficiency Calibration

Created:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

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

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	2.9960E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 2.9960E+02) = 3.3378E+03
Detection limit method:	Traditional ORTEC method

WI07 - 0993 D1 Grid D0-4 0-6in Free. R. 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: 0.0842

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
28.57	7.32	122.	324.	0.540	17.35	1.348	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	184.49	46.29	31.	51.	0.085	51.34	0.371s
AM-241	237.72	59.59	53.	182.	0.303	22.37	0.865
Th-234	253.15	63.45	47.	28.	0.047	95.72	0.455s
Pb-214	298.61	74.81	69.	61.	0.102	45.99	0.971D
Pb-212	298.63	74.81	67.	0.	0.000	339.27	0.377D
Pb-212	307.80	77.11	64.	92.	0.153	32.41	0.972D
Pb-214	307.80	77.11	176.	0.	0.000	103.42	0.000D
Pb-214	348.25	87.22	24.	29.	0.049	67.43	0.926
Th-234	372.24	93.21	25.	63.	0.105	38.95	1.176s
Ac-228	380.79	95.35	4.	0.	0.000	0.00	0.000D
Ac-228	836.57	209.26	19.	35.	0.058	64.83	0.514s
Pb-212	954.08	238.62	23.	142.	0.237	19.23	1.099D
Pb-214	967.50	241.98	15.	36.	0.060	45.24	1.101D
Ac-228	1078.79	269.79	6.	27.	0.044	54.63	0.311s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:09:23 Page 3
8905696 Spectrum name: Win00373.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.79	295.03	6.	41.	0.069	38.42	0.546s
Ac-228	1309.53	327.46	0.	17.	0.028	48.51	0.562s
Ac-228	1352.89	338.30	2.	35.	0.058	37.59	0.748s
Pb-214	1408.08	352.09	8.	91.	0.152	24.81	0.958
Ac-228	1851.79	462.97	0.	14.	0.023	53.45	0.625s

WI07 - 0993 D1 Grid D0-4 0-6in Free. R. 080707

Bi-214	2437.89	609.44	0.	49.	0.082	28.57	1.187
CS-137	2642.75	660.64	0.	19.	0.032	45.88	0.275s
Bi-214	3070.50	767.53	0.	8.	0.013	70.71	0.500s
Ac-228	3177.33	794.23	0.	7.	0.012	75.59	0.375s
Ac-228	3643.00	910.59	10.	3.	0.005	363.11	0.000s
Bi-214	3734.78	933.53	1.	1.	0.002	346.41	0.218s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3877.00	969.07	2.	0.	0.000	0.00	0.000s
Bi-214	4482.56	1120.38	0.	12.	0.020	57.74	0.375s
Bi-214	4950.00	1237.18	0.	4.	0.007	100.00	0.250s
Bi-214	5511.33	1377.44	1.	0.	0.001	240.37	0.197s
K-40	5846.90	1461.29	0.	41.	0.068	31.23	1.073s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7061.17	1764.68	5.	2.	0.003	391.58	0.198s

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

***** S U M M A R Y O F L 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	2.6871E-04	609.31	2.508E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	1.617E-04	G
			1120.29	3.148E-04	?(	2.624E-05	G
			1238.11	2.914E-04	&(	7.286E-05	G
			768.36	4.551E-04	&	2.578E-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	%	2.699E-04	G
K-40	N	1.9300E-03	1460.81	1.930E-03	?(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	6.722E-05	G K
			969.11	0.000E+00	?	5.388E-05	G
			338.32	4.567E-04		1.201E-04	G
			964.60	0.000E+00	?	6.688E-05	G
			794.70	4.488E-04	?	2.741E-04	G
			463.00	6.063E-04	?	2.519E-04	G
			209.28	8.439E-04	@	2.642E-04	G
			270.23	9.445E-04	?	3.060E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:09:23 Page 4
8905696 Spectrum name: Win00373.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	?	7.593E-05	X
		327.64	7.791E-04	?	2.911E-04	G
Pb-212	N 3.8753E-04	238.62	3.729E-04	(	1.893E-05	G K
		77.11	4.237E-04	(	5.485E-05	Energy duplication
		74.81	0.000E+00	%	9.478E-05	Energy duplication
CS-137	5.6496E-05	661.66	5.650E-05	&(	2.973E-06	G
Th-234	N 9.2531E-04	92.35	9.253E-04	&(	1.115E-04	G
		63.29	6.532E-04	-	2.941E-04	G
Pb-214	N 3.9348E-04	351.92	3.797E-04	(	1.849E-05	G K

WI07 - 0993 D1 Grid D0-4 0-6in Free. R. 080707

			295.21	2.925E-04	-	7.225E-05		G
			77.11	0.000E+00	?	1.526E-04	Energy duplication	
			241.98	5.657E-04	+	1.670E-04		G
			74.81	8.282E-04	+	2.247E-04	Energy duplication	
			87.30	5.035E-04	(	1.281E-04		X
Pb-210	N	1.1908E-03	46.50	1.191E-03	(	1.970E-04		G
AM-241		4.5038E-04	59.54	4.504E-04	(	2.687E-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 07-AUG-2007 11:09:23 Page 5
8905696 Spectrum name: Win00373.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		8.9689E-01	2.563E-01	2.576E-01
K-40	#	6.4421E+00	2.012E+00	2.021E+00
Ac-228	B<	2.2438E-01		
Pb-212		1.2935E+00	2.437E-01	2.467E-01
CS-137	#	1.8857E-01	8.652E-02	8.671E-02
Th-234	#	3.0885E+00	1.203E+00	1.205E+00
Pb-214		1.3134E+00	3.259E-01	3.282E-01
Pb-210		3.9746E+00	2.041E+00	2.043E+00
AM-241		1.5033E+00	3.362E-01	3.408E-01

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

WI07 - 0993 D1 Grid DO-4 0-6in Free. R. 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 1999.2 keV) 1.8700747E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0994 D1 Grid D0-5 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:37:32 Page 1
8905696 Spectrum name: Win00374.An1

Sample description
WI07-0994 D1 Grid D0-5 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00374.An1

Acquisition information
Start time: 07-Aug-2007 11:27:21
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: 3.6220E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6220E+02) = 2.7609E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:37:32 Page 2
8905696 Spectrum name: Win00374.An1

WI07 - 0994 D1 Grid D0-5 0-6in Free. R. 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: 0.1482

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
28.89	7.40	108.	485.	0.809	12.35	1.658	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	186.39	46.76	35.	40.	0.067	62.58	1.301s
AM-241	237.72	59.59	43.	127.	0.212	26.46	1.054s
Th-234	251.59	63.06	33.	38.	0.064	63.31	0.595s
Pb-214	298.61	74.81	58.	51.	0.085	50.70	0.971D
Pb-212	298.63	74.81	70.	0.	0.000	213.22	0.234D
Pb-212	307.80	77.11	72.	112.	0.186	28.62	0.972D
Pb-214	307.80	77.11	180.	0.	0.000	113.00	0.215D
Pb-214	348.72	87.33	36.	25.	0.042	85.79	0.960
Th-234	371.19	92.95	27.	32.	0.054	62.91	0.926
Ac-228	380.79	95.35	30.	0.	0.000	0.00	0.256D
Ac-228	836.89	209.34	13.	27.	0.045	61.16	0.313s
Pb-212	954.08	238.62	24.	127.	0.211	20.86	1.099D
Pb-214	967.50	241.98	26.	27.	0.045	65.71	1.101D
Ac-228	1080.24	270.16	3.	35.	0.059	38.58	0.543s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 11:37:32 Page 3
8905696 Spectrum name: Win00374.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.27	295.15	8.	41.	0.069	42.84	0.972
Ac-228	1311.14	327.86	0.	15.	0.025	51.64	0.375s
Ac-228	1354.08	338.59	3.	43.	0.071	34.95	1.061s
Pb-214	1407.27	351.88	7.	60.	0.100	31.89	0.672s
Ac-228	1845.17	461.32	0.	18.	0.030	47.14	0.375s

WI07 - 0994 D1 Grid D0-5 0-6in Free. R. 080707

Bi-214	2438.03	609.48	0.	38.	0.063	32.44	1.125
CS-137	2647.94	661.94	0.	18.	0.030	47.14	0.365s
Bi-214	3074.00	768.40	1.	0.	0.000	0.00	0.000s
Ac-228	3178.00	794.39	0.	17.	0.028	48.51	0.375s
Ac-228	3644.00	910.84	9.	0.	0.000	0.00	0.000s
Bi-214	3736.20	933.88	0.	6.	0.010	81.65	0.375s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.375D
Ac-228	3877.14	969.10	0.	29.	0.048	37.14	0.718s
Bi-214	4478.83	1119.45	1.	1.	0.001	366.67	0.223s
Bi-214	4952.00	1237.68	0.	1.	0.002	200.00	0.250s
Bi-214	5511.00	1377.36	0.	2.	0.003	141.42	0.250s
K-40	5846.60	1461.21	0.	52.	0.087	27.74	1.705
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7061.80	1764.84	0.	10.	0.017	63.25	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	1.9750E-04	609.31	1.945E-04	(	5.117E-06	G K
			1764.49	3.783E-04	+	1.891E-04	G
			1120.29	0.000E+00	%	6.720E-05	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	0.000E+00	?	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?(	1.159E-04	G
			934.06	6.323E-04	+	4.215E-04	G
K-40	N	2.4479E-03	1460.81	2.448E-03	?(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.888E-05	G K
			969.11	6.100E-04	?	1.711E-04	G
			338.32	5.643E-04	*	1.331E-04	G
			964.60	0.000E+00	?	6.688E-05	G
			794.70	1.090E-03	?	4.073E-04	G
			463.00	7.796E-04	&	2.824E-04	G
			209.28	6.541E-04	?	2.291E-04	G
			270.23	1.246E-03	?	3.270E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	0.000E+00	!	1.870E-04	X
		327.64	6.874E-04	?	2.750E-04	G
Pb-212	N 3.3215E-04	238.62	3.321E-04	(	1.954E-05	G K
		77.11	5.173E-04	+	9.107E-05	Energy duplication
		74.81	0.000E+00	%	9.678E-05	Energy duplication
CS-137	5.3522E-05	661.66	5.352E-05	?(	2.973E-06	G
Th-234	N 6.4360E-04	92.35	4.749E-04	&(	1.149E-04	G
		63.29	8.838E-04	$(	1.982E-04	G
Pb-214	N 2.6410E-04	351.92	2.494E-04	@(	1.777E-05	G K

WI07 - 0994 D1 Grid D0-5 0-6in Free. R. 080707

			295.21	2.925E-04	(	3.148E-05	G	
			77.11	0.000E+00	?	1.544E-04	Energy duplication	
			241.98	4.257E-04	+	1.701E-04	G	
			74.81	6.888E-04	+	2.064E-04	Energy duplication	
			87.30	4.316E-04	+	1.995E-04	X	
Pb-210	N	9.3702E-04	46.50	9.370E-04	(	2.081E-04	G	
AM-241		3.1568E-04	59.54	3.157E-04	*(	2.417E-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 07-AUG-2007 11:37:32 Page 5
8905696 Spectrum name: Win00374.An1

R - Coincidence Corrected
H - Halflife limit exceeded
C - Coincidence Peak

- -

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

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214		5.4528E-01	1.769E-01	1.776E-01
K-40	#	6.7583E+00	1.874E+00	1.885E+00
Ac-228	B<	1.6256E-01		
Pb-212		9.1703E-01	1.913E-01	1.932E-01
CS-137	#	1.4777E-01	6.966E-02	6.980E-02
Th-234		1.7769E+00	7.929E-01	7.940E-01
Pb-214		7.2915E-01	1.947E-01	1.959E-01
Pb-210		2.5870E+00	1.619E+00	1.620E+00
AM-241	#	8.7157E-01	2.306E-01	2.329E-01

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

WI07 - 0994 D1 Grid D0-5 0-6in Free. R. 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 1999.2 keV) 1.4333032E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenx
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0974 D1 Grid D1-1 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:54:32 Page 1
8905696 Spectrum name: Win00360.An1

Sample description
WI07-0974 D1 Grid D1-1 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00360.An1

Acquisition information
Start time: 06-Aug-2007 16:44:24
Live time: 600
Real time: 602
Dead time: 0.29 %
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: 4.2410E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.2410E+02) = 2.3579E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:54:32 Page 2
8905696 Spectrum name: Win00360.An1

WI07 - 0974 D1 Grid D1-1 0-6in Free. R. 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: 0.2457

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
29.27	7.50	584.	689.	1.149	15.70	1.691	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	186.27	46.73	42.	18.	0.030	139.66	0.273s
AM-241	239.41	60.02	28.	10.	0.016	162.40	0.337s
Th-234	252.00	63.16	14.	0.	0.000	0.00	0.000s
Pb-214	298.61	74.81	82.	0.	0.000	0.00	0.000D
Pb-212	298.63	74.81	38.	0.	0.000	0.00	0.000D
Pb-212	313.71	78.58	91.	16.	0.027	218.00	0.303s
Pb-214	307.80	77.11	88.	0.	0.000	107.53	0.375D
Pb-214	351.55	88.04	39.	9.	0.016	213.81	0.239s
Th-234	368.79	92.35	65.	21.	0.035	115.78	0.985D
Ac-228	380.79	95.35	37.	17.	0.028	114.50	0.987D
Ac-228	836.50	209.24	7.	0.	0.000	0.00	0.292s
Pb-212	952.00	238.11	19.	0.	0.000	0.00	0.000s
Pb-214	967.50	241.98	11.	0.	0.000	0.00	0.193D
Ac-228	1080.00	270.10	5.	1.	0.002	663.32	0.220s

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1187.56	296.98	20.	18.	0.030	104.23	0.715s
Ac-228	1309.83	327.53	2.	12.	0.021	64.50	0.276s
Ac-228	1347.28	336.89	25.	58.	0.097	47.18	0.536s
Pb-214	1415.23	353.87	27.	21.	0.036	102.32	0.350s
Ac-228	1851.89	463.00	4.	1.	0.002	553.77	0.191s

WI07 - 0974 D1 Grid D1-1 0-6in Free. R. 080607

Bi-214	2436.00	608.97	2.	0.	0.000	0.00	0.042s
CS-137	2647.00	661.70	0.	0.	0.001	223.61	0.000s
Bi-214	3071.33	767.74	0.	3.	0.005	115.47	0.250s
Ac-228	3179.33	794.73	1.	0.	0.001	240.37	0.197s
Ac-228	3645.78	911.29	3.	3.	0.005	200.00	0.261s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	7.	10.	0.016	100.25	1.589D
Ac-228	3877.18	969.11	11.	8.	0.014	132.87	1.591D
Bi-214	4485.44	1121.10	0.	17.	0.028	48.51	0.500s
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	5836.99	1458.81	14.	7.	0.012	209.31	0.366s
Ac-228	6355.00	1588.24	0.	5.	0.008	89.44	0.375s
Bi-214	7060.00	1764.39	0.	3.	0.005	115.47	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	0.0000E+00	609.31	0.000E+00	?	1.311E-05	G K
			1764.49	1.135E-04	?	1.135E-04	G
			1120.29	4.460E-04	?	1.667E-04	G
			1238.11	0.000E+00	%	1.866E-04	G
			768.36	1.707E-04	?	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	&	3.295E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	4.782E-05	G K
			969.11	1.728E-04		1.406E-04	G
			338.32	7.640E-04	&	1.764E-04	G
			964.60	6.562E-04		4.248E-04	G
			794.70	0.000E+00	%	1.282E-04	G
			463.00	0.000E+00	%	1.603E-04	G
			209.28	0.000E+00	?	1.036E-04	G
			270.23	0.000E+00	%	1.417E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:54:32 Page 4
8905696 Spectrum name: Win00360.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	7.745E-04	?	5.733E-04	G
		95.35	3.758E-04		2.455E-04	X
		327.64	5.729E-04	?	2.665E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	?	1.750E-05	G K
		77.11	0.000E+00	&	7.001E-05	X
		74.81	0.000E+00	?	7.239E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	5.947E-06	G
Th-234	N 3.1155E-04	92.35	3.116E-04	(	1.747E-04	G
		63.29	0.000E+00	?	1.341E-04	G
Pb-214	N 1.0186E-04	351.92	8.868E-05	&(	3.251E-05	G K

```
                WI07 - 0974  D1  Grid D1-1    0-6in Free. R.  080607
                           295.21 1.274E-04 &(  4.844E-05         G
                            77.11 0.000E+00 &   1.092E-04Energy duplication
                           241.98 0.000E+00 %   8.100E-05         G
                            74.81 0.000E+00 ?   1.796E-04Energy duplication
                            87.30 0.000E+00 &   1.780E-04         X

Pb-210   N   4.2166E-04     46.50 4.217E-04  (  2.267E-04         G

AM-241       2.3965E-05     59.54 2.397E-05 ?(  1.994E-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 16:54:32 Page    5
8905696                          Spectrum name: Win00360.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<    3.0909E-02
 K-40    <    7.7698E-01
 Ac-228 B<    1.1275E-01
 Pb-212 B<    4.1262E-02
 CS-137  <    1.4022E-02
 Th-234       7.3462E-01    8.505E-01     8.507E-01
 Pb-214 #     2.4018E-01    1.754E-01     1.755E-01
 Pb-210       9.9425E-01    1.389E+00     1.389E+00
 AM-241 #C    5.6509E-02    9.177E-02     9.179E-02

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

WI07 - 0974 D1 Grid D1-1 0-6in Free. R. 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) 2.0255554E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0975 D2 Grid D1-2 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:07:46 Page 1
8905696 Spectrum name: Win00548.An1

Sample description
WI07-0975 D2 Grid D1-2 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00548.An1

Acquisition information
Start time: 06-Aug-2007 16:57:36
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: 3.6850E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6850E+02) = 2.7137E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:07:46 Page 2
8905696 Spectrum name: Win00548.An1

WI07-0975 D2 Grid D1-2 0-6 in. F.R. 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: 0.0941

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.56	2.91	8186.	11851.	19.752	2.84	0.854	-	D
15.57	3.91	15783.	10948.	18.246	3.77	0.855	-	D
358.81	89.80	49.	60.	0.099	42.24	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	185.73	46.61	65.	35.	0.058	88.68	0.541s
AM-241	237.37	59.52	117.	781.	1.302	8.69	0.974
Th-234	251.40	63.03	85.	61.	0.101	63.72	1.217s
Pb-214	298.54	74.81	91.	139.	0.231	25.88	0.917D
Pb-212	298.56	74.81	161.	0.	0.000	627.90	0.324D
Pb-212	307.74	77.11	70.	209.	0.348	17.87	0.919D
Pb-214	307.74	77.11	183.	0.	0.000	1044.39	0.504D
Pb-214	348.51	87.30	65.	75.	0.125	38.02	0.928D
Th-234	368.72	92.35	72.	67.	0.112	43.26	0.933D
Ac-228	380.72	95.35	28.	5.	0.009	305.57	0.935D
Ac-228	835.82	209.10	29.	61.	0.101	46.34	1.433s
Pb-212	953.94	238.62	27.	271.	0.452	13.29	1.057D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:07:46 Page 3
8905696 Spectrum name: Win00548.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	37.	37.	0.061	57.63	1.060D
Ac-228	1079.63	270.04	13.	55.	0.091	37.23	1.350s
Pb-214	1179.00	294.88	22.	82.	0.137	33.14	0.833
Ac-228	1312.91	328.35	0.	23.	0.038	41.70	0.500s
Ac-228	1353.32	338.44	16.	72.	0.120	34.25	1.446s

WI07-0975 D2 Grid D1-2 0-6 in. F.R. 080607

Pb-214	1407.35	351.95	8.	138.	0.231	18.89	1.043
Ac-228	1850.42	462.68	5.	26.	0.043	52.40	0.389s
Bi-214	2437.20	609.33	9.	86.	0.143	27.48	0.933s
CS-137	2650.78	662.71	11.	3.	0.005	386.62	0.181s
Bi-214	3072.88	768.20	0.	15.	0.025	51.64	0.312s
Ac-228	3179.80	794.92	0.	17.	0.028	48.51	0.312s
Ac-228	3645.13	911.20	0.	46.	0.077	29.49	0.506s
Bi-214	3733.50	933.28	0.	4.	0.007	100.00	0.500s
Ac-228	3858.81	964.60	5.	17.	0.029	60.12	1.595D
Ac-228	3876.86	969.11	4.	31.	0.052	40.00	1.598D
Bi-214	4480.33	1119.91	0.	19.	0.032	45.88	0.250s
Bi-214	4953.00	1238.02	2.	0.	0.001	450.92	0.333s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.57	1461.04	0.	65.	0.108	24.81	1.187s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1285E-04	609.31	3.984E-04	(	2.255E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.623E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.034E-04	G
			768.36	7.817E-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	2.8618E-03	1460.81	2.862E-03	(	4.403E-05	G
Ac-228	N	5.4350E-04	911.07	5.066E-04	(	1.101E-05	G K
			969.11	6.051E-04	(	6.438E-05	G
			338.32	8.438E-04	+	1.614E-04	G
			964.60	1.063E-03	+	4.415E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	1.000E-03	+	3.270E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:07:46 Page 4
8905696 Spectrum name: Win00548.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	1.284E-03	+	2.947E-04	G
		270.23	1.708E-03	+	3.803E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.664E-04	X
		327.64	9.366E-04	&	2.973E-04	G
Pb-212	N 6.2348E-04	238.62	6.235E-04	(	1.804E-05	G K
		77.11	8.004E-04	+	9.237E-05	Energy duplication
		74.81	0.000E+00	%	1.195E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.576E-05	G
Th-234	N 9.6893E-04	92.35	8.377E-04	(	1.559E-04	G
		63.29	1.156E-03	*(	2.586E-04	G

WI07-0975 D2 Grid D1-2 0-6 in. F.R. 080607

Pb-214	N	5.1240E-04	351.92	5.130E-04	(	1.723E-05	G K
			295.21	5.137E-04	(	4.480E-05	G
			77.11	0.000E+00	%	1.289E-04	Energy duplication
			241.98	5.064E-04	(	1.267E-04	G
			74.81	1.546E-03	+	2.450E-04	Energy duplication
			87.30	1.092E-03	+	2.502E-04	X
Pb-210	N	7.1448E-04	46.50	7.145E-04	(	2.432E-04	G
AM-241		1.6082E-03	59.54	1.608E-03	(	3.255E-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 06-AUG-2007 17:07:46 Page 5
8905696 Spectrum name: Win00548.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		1.1203E+00	3.079E-01	3.107E-01
K-40		7.7661E+00	1.927E+00	1.948E+00
Ac-228		1.4749E+00	3.665E-01	3.706E-01
Pb-212		1.6919E+00	2.249E-01	2.337E-01
CS-137	<	4.2763E-02		
Th-234		2.6294E+00	1.012E+00	1.014E+00
Pb-214		1.3905E+00	2.626E-01	2.678E-01
Pb-210		1.9389E+00	1.719E+00	1.720E+00
AM-241		4.3641E+00	3.792E-01	4.122E-01

< - MDA value printed.
A - Activity printed, but activity < MDA.

WI07-0975 D2 Grid D1-2 0-6 in. F.R. 080607

B - Activity < MDA and failed test.
C - Area < Critical level.
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) 2.2376198E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0976 D1 Grid D1-3 0-6in Free. R. 080607

Sample description
WI07-0976 D1 Grid D1-3 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00361.An1

Acquisition information
Start time: 06-Aug-2007 16:59:14
Live time: 600
Real time: 602
Dead time: 0.29 %
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: 4.2260E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.2260E+02) = 2.3663E+03
Detection limit method: Traditional ORTEC method

WI07 - 0976 D1 Grid D1-3 0-6in Free. R. 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: 0.0488

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
29.63	7.58	467.	477.	0.796	19.60	2.429	CU-64	s
959.57	239.91	68.	62.	0.104	45.12	1.100	RA-224	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.26	46.73	41.	23.	0.038	108.41	0.388s
AM-241	237.67	59.58	16.	1.	0.002	1000.00	0.437s
Th-234	259.29	64.98	61.	13.	0.022	215.00	0.297s
Pb-214	298.61	74.81	94.	0.	0.000	0.00	0.977D
Pb-212	298.63	74.81	87.	0.	0.000	257.89	0.918D
Pb-212	300.13	75.19	94.	32.	0.052	109.31	0.977
Pb-214	307.80	77.11	112.	0.	0.000	234.52	0.521D
Pb-214	348.00	87.15	46.	10.	0.018	214.44	0.000s
Th-234	368.79	92.35	58.	23.	0.038	104.58	0.985D
Ac-228	380.79	95.35	56.	14.	0.023	160.16	0.987D
Ac-228	830.92	207.85	18.	7.	0.011	229.67	0.234s
Pb-212	954.08	238.62	111.	39.	0.065	82.68	1.099D
Pb-214	967.50	241.98	24.	0.	0.000	0.00	0.222D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:13:14 Page 3
8905696 Spectrum name: Win00361.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.67	270.01	8.	0.	0.001	754.98	0.271s
Pb-214	1178.59	294.73	5.	2.	0.003	389.87	0.402s
Ac-228	1309.00	327.33	2.	0.	0.001	331.66	0.071s
Ac-228	1340.68	335.24	28.	15.	0.024	151.41	0.299s
Pb-214	1401.95	350.56	34.	21.	0.035	117.16	1.266

WI07 - 0976 D1 Grid D1-3 0-6in Free. R. 080607

Ac-228	1851.65	462.94	6.	13.	0.022	93.58	0.417s
Bi-214	2436.33	609.05	2.	0.	0.001	412.31	0.250s
CS-137	2645.00	661.20	0.	0.	0.001	223.61	0.100s
Bi-214	3080.11	769.93	3.	14.	0.023	72.84	0.549s
Ac-228	3168.94	792.13	2.	5.	0.008	151.19	0.237s
Ac-228	3646.91	911.57	0.	54.	0.090	27.22	0.312s
Bi-214	3736.00	933.83	0.	2.	0.003	141.42	0.250s
Ac-228	3859.13	964.60	2.	2.	0.003	259.65	1.589D
Ac-228	3877.18	969.11	15.	13.	0.021	103.74	1.591D
Bi-214	4491.50	1122.62	0.	16.	0.027	50.00	0.250s
Bi-214	4953.67	1238.10	1.	0.	0.001	240.37	0.197s
Bi-214	5503.75	1375.55	0.	13.	0.022	55.47	0.375s
K-40	5849.08	1461.83	16.	76.	0.126	34.65	0.788s
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	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	%	1.535E-05	G K
			1764.49	0.000E+00	?	3.783E-05	G
			1120.29	4.198E-04	&	1.621E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	7.964E-04	&	3.614E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	1.507E-03	&	6.517E-04	G
			934.06	2.108E-04	?	2.699E-04	G
K-40	N	3.5541E-03	1460.81	3.554E-03	&(	2.867E-04	G
Ac-228	N	6.3422E-04	911.07	6.455E-04	*(	1.195E-05	G K
			969.11	2.669E-04	-	1.683E-04	G
			338.32	1.932E-04	&	1.289E-04	G
			964.60	0.000E+00	%	2.255E-04	G
			794.70	2.992E-04	&	2.741E-04	G
			463.00	5.630E-04	(	1.732E-04	G
			209.28	0.000E+00	&	1.839E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:13:14 Page 4
8905696 Spectrum name: Win00361.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	%	1.605E-04	G
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	3.156E-04	-	2.779E-04	X
		327.64	0.000E+00	%	1.174E-04	G
Pb-212	N 1.1477E-04	238.62	1.023E-04	(	4.032E-05	G K
		77.11	1.457E-04	&(	6.560E-05	X
		74.81	0.000E+00	&	1.072E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	5.947E-06	G
Th-234	N 3.3166E-04	92.35	3.317E-04	(	1.663E-04	G
		63.29	0.000E+00	&	2.922E-04	G

```
Pb-214   N   8.7296E-05    351.92 8.730E-05 &(  3.642E-05         G K
                           295.21 0.000E+00 %   3.026E-05         G
                            77.11 0.000E+00 &   1.227E-04Energy duplication
                           241.98 0.000E+00 %   1.172E-04         G
                            74.81 0.000E+00 ?   1.916E-04Energy duplication
                            87.30 0.000E+00 %   1.932E-04         X

Pb-210   N   5.3488E-04     46.50 5.349E-04 ?(  2.246E-04         G

AM-241       0.0000E+00     59.54 0.000E+00 %   1.575E-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	B<	3.6328E-02		
K-40	#	8.4101E+00	2.914E+00	2.924E+00
Ac-228		1.5008E+00	4.085E-01	4.108E-01
Pb-212		2.7157E-01	1.861E-01	1.863E-01
CS-137	<	1.4072E-02		
Th-234		7.8480E-01	8.207E-01	8.209E-01
Pb-214		2.0657E-01	2.420E-01	2.421E-01
Pb-210	#	1.2657E+00	1.372E+00	1.372E+00
AM-241	<	3.7266E-02		

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

WI07 - 0976 D1 Grid D1-3 0-6in Free. R. 080607

& - 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) 1.2439485E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-09757 D2 Grid D1-4 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:27:57 Page 1
8905696 Spectrum name: Win00549.An1

Sample description
WI07-0977 D2 Grid D1-24 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00549.An1

Acquisition information
Start time: 06-Aug-2007 17:17:47
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.8660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8660E+02) = 2.5867E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:27:57 Page 2
8905696 Spectrum name: Win00549.An1

WI07-09757 D2 Grid D1-4 0-6 in. F.R. 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: 0.1033

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
11.79	2.92	4929.	11254.	18.756	2.58	0.854	- D
17.36	4.32	13214.	7859.	13.098	4.71	0.855	- D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.00	46.43	35.	57.	0.096	47.38	1.070s
AM-241	237.66	59.59	35.	79.	0.132	35.41	0.787
Th-234	252.73	63.36	35.	63.	0.105	42.55	1.147s
Pb-214	298.54	74.81	81.	71.	0.118	43.12	0.917D
Pb-212	298.56	74.81	70.	0.	0.000	291.90	0.449D
Pb-212	307.74	77.11	89.	84.	0.140	38.44	0.919D
Pb-214	307.74	77.11	124.	0.	0.000	420.74	0.356D
Pb-214	348.02	87.18	36.	41.	0.068	59.54	0.705
Th-234	368.72	92.35	43.	55.	0.092	43.00	0.933D
Ac-228	380.72	95.35	32.	7.	0.011	246.70	0.936D
Ac-228	833.37	208.49	24.	26.	0.043	84.96	0.283s
Pb-212	953.94	238.62	14.	144.	0.240	18.19	1.057D
Pb-214	967.37	241.98	27.	50.	0.083	40.98	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:27:57 Page 3
8905696 Spectrum name: Win00549.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.62	270.29	16.	22.	0.037	81.65	0.896
Pb-214	1180.43	295.23	18.	73.	0.121	34.62	1.048
Ac-228	1309.67	327.53	5.	13.	0.021	89.63	0.403s
Ac-228	1351.78	338.06	4.	63.	0.105	28.92	1.124s
Pb-214	1406.89	351.83	10.	90.	0.149	26.13	1.065

WI07-09757 D2 Grid D1-4 0-6 in. F.R. 080607

Ac-228	1852.00	463.08	0.	25.	0.042	40.00	0.562s
Bi-214	2437.75	609.47	0.	65.	0.108	24.81	0.400s
CS-137	2645.50	661.39	0.	18.	0.030	47.14	0.416s
Bi-214	3073.50	768.35	0.	5.	0.008	89.44	0.500s
Ac-228	3179.57	794.86	0.	14.	0.023	53.45	0.312s
Ac-228	3645.16	911.21	3.	28.	0.047	43.58	0.447s
Bi-214	3736.50	934.03	0.	11.	0.018	60.30	0.500s
Ac-228	3858.81	964.60	2.	1.	0.002	313.95	1.595D
Ac-228	3876.86	969.11	2.	14.	0.024	59.07	1.598D
Bi-214	4481.00	1120.08	1.	0.	0.000	0.00	0.000s
Bi-214	4951.50	1237.64	0.	8.	0.013	70.71	0.500s
Bi-214	5512.50	1377.82	0.	2.	0.003	141.42	0.500s
K-40	5845.16	1460.94	0.	86.	0.143	21.57	1.118s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7061.50	1764.83	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	Code	MDA Value microCi	Comments
Bi-214	N	2.9818E-04	609.31	3.023E-04	?(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	0.000E+00	?	4.867E-05	G
			1238.11	5.424E-04	+	3.072E-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	-	2.771E-04	G
			934.06	1.069E-03	+	5.069E-04	G
K-40	N	3.7864E-03	1460.81	3.786E-03	(	4.403E-05	G
Ac-228	N	3.1348E-04	911.07	3.120E-04	?(	3.153E-05	G K
			969.11	2.769E-04	(	4.721E-05	G
			338.32	7.383E-04	+	1.416E-04	G
			964.60	0.000E+00	%	1.852E-04	G
			794.70	8.232E-04	+	3.419E-04	G
			463.00	9.744E-04	+	2.958E-04	G
			209.28	5.501E-04	&	2.224E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:27:57 Page 4
8905696 Spectrum name: Win00549.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			270.23	6.873E-04	+	2.884E-04	G
			1588.00	0.000E+00	?	1.452E-04	G
			95.35	0.000E+00	%	1.800E-04	X
			327.64	5.158E-04	?(	1.549E-04	G
Pb-212	N	3.2864E-04	238.62	3.312E-04	(	1.331E-05	G K
			77.11	3.223E-04	(	5.297E-05	Energy duplication
			74.81	0.000E+00	%	7.995E-05	Energy duplication
CS-137		4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G
Th-234	N	8.9972E-04	92.35	6.887E-04	(	1.218E-04	G
			63.29	1.200E-03	(	1.692E-04	G

WI07-09757 D2 Grid D1-4 0-6 in. F.R. 080607

Pb-214	N	3.3148E-04	351.92	3.315E-04	(	1.893E-05	G	K
			295.21	4.552E-04	+	8.770E-05	G	
			77.11	0.000E+00	%	1.069E-04	Energy duplication	
			241.98	6.887E-04	+	1.786E-04	G	
			74.81	7.905E-04	+	2.002E-04	Energy duplication	
			87.30	5.950E-04	+	1.875E-04	X	
Pb-210	N	1.1704E-03	46.50	1.170E-03	*(	1.805E-04	G	
AM-241		1.6267E-04	59.54	1.627E-04	(	1.829E-05	G	

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	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 17:27:57 Page 5
8905696 Spectrum name: Win00549.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 #	7.7130E-01	1.913E-01	1.935E-01
K-40	9.7941E+00	2.112E+00	2.144E+00
Ac-228	8.1087E-01	3.131E-01	3.146E-01
Pb-212	8.5008E-01	1.547E-01	1.579E-01
CS-137 #	1.2617E-01	5.948E-02	5.967E-02
Th-234	2.3273E+00	7.039E-01	7.060E-01
Pb-214	8.5743E-01	2.241E-01	2.264E-01
Pb-210 #	3.0274E+00	1.434E+00	1.436E+00
AM-241	4.2078E-01	1.490E-01	1.498E-01

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

WI07-09757 D2 Grid D1-4 0-6 in. F.R. 080607

& - 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) 1.8985371E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0978 D1 Grid D1-5 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:40:45 Page 1
8905696 Spectrum name: Win00362.An1

Sample description
WI07-0978 D1 Grid D1-5 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00362.An1

Acquisition information
Start time: 06-Aug-2007 17:19:31
Live time: 600
Real time: 602
Dead time: 0.29 %
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: 4.0650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0650E+02) = 2.4600E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:40:45 Page 2
8905696 Spectrum name: Win00362.An1

WI07 - 0978 D1 Grid D1-5 0-6in Free. R. 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: 0.0995

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
26.36	6.77	244.	59.	0.098	79.28	0.470	CU-64 s
243.52	60.87	211.	170.	0.284	28.60	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	184.26	46.23	26.	7.	0.012	216.38	0.330s
AM-241	237.51	59.54	327.	98.	0.164	55.74	0.958D
Th-234	252.51	63.29	100.	0.	0.000	15444.03	0.961D
Pb-214	298.61	74.81	121.	0.	0.000	0.00	0.296D
Pb-212	298.63	74.81	106.	0.	0.000	110.36	0.271D
Pb-212	312.87	78.37	93.	32.	0.053	113.59	0.317s
Pb-214	307.80	77.11	100.	0.	0.000	145.77	0.267D
Pb-214	343.28	85.97	60.	42.	0.069	79.13	0.284s
Th-234	370.02	92.66	69.	19.	0.031	165.37	0.600s
Ac-228	380.79	95.35	14.	0.	0.000	0.00	0.000D
Ac-228	838.50	209.74	9.	2.	0.003	447.21	0.264s
Pb-212	949.91	237.58	68.	33.	0.055	93.30	0.597s
Pb-214	967.50	241.98	8.	0.	0.000	0.00	0.000D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:40:45 Page 3
8905696 Spectrum name: Win00362.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.00	270.35	2.	4.	0.007	141.42	0.458s
Pb-214	1179.25	294.90	8.	8.	0.013	129.10	0.382s
Ac-228	1311.17	327.87	3.	1.	0.001	498.89	0.198s
Ac-228	1351.17	337.86	4.	1.	0.002	553.77	0.191s
Pb-214	1407.17	351.86	12.	0.	0.000	0.00	0.191s

WI07 - 0978 D1 Grid D1-5 0-6in Free. R. 080607

Ac-228	1851.50	462.90	2.	0.	0.000	0.00	0.292s
Bi-214	2433.17	608.26	7.	33.	0.056	47.33	0.410s
CS-137	2647.86	661.91	1.	1.	0.002	281.40	0.461s
Bi-214	3072.00	767.91	0.	0.	0.001	223.61	0.100s
Ac-228	3180.50	795.02	0.	2.	0.003	141.42	0.500s
Ac-228	3648.48	911.96	4.	34.	0.057	43.23	0.358s
Bi-214	3730.50	932.46	0.	5.	0.008	89.44	0.500s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3872.23	967.87	2.	2.	0.004	200.00	0.219s
Bi-214	4475.25	1118.56	0.	8.	0.013	70.71	0.375s
Bi-214	4953.00	1237.93	0.	3.	0.005	115.47	0.250s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.71	1460.99	0.	65.	0.108	24.81	0.521s
Ac-228	6353.00	1587.74	0.	1.	0.002	200.00	0.250s
Bi-214	7060.80	1764.59	0.	5.	0.008	89.44	0.375s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	1.8467E-04	609.31	1.706E-04	&(	2.142E-05	G K
			1764.49	1.891E-04	?(	3.783E-05	G
			1120.29	2.099E-04	&(	2.624E-05	G
			1238.11	2.186E-04	?(	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	?	1.159E-04	G
			934.06	5.269E-04	&	3.901E-04	G
K-40	N	3.0598E-03	1460.81	3.060E-03	(	4.707E-05	G
Ac-228	N	4.0645E-04	911.07	4.064E-04	&(	4.031E-05	G K
			969.11	0.000E+00	&	7.093E-05	G
			338.32	0.000E+00	%	4.876E-05	G
			964.60	0.000E+00	&	6.688E-05	G
			794.70	1.282E-04	-	1.642E-04	G
			463.00	0.000E+00	?	1.109E-04	G
			209.28	0.000E+00	%	1.264E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 17:40:45 Page 4
8905696 Spectrum name: Win00362.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.417E-04	-	1.417E-04	G
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	1.316E-04	X
		327.64	0.000E+00	%	1.546E-04	G
Pb-212	N 1.0388E-04	238.62	8.639E-05	&(	3.187E-05	G K
		77.11	1.472E-04	&(	6.549E-05	X
		74.81	0.000E+00	&	1.182E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	7.617E-06	G
Th-234	N 2.7417E-04	92.35	2.742E-04	?(	1.805E-04	G
		63.29	0.000E+00	%	3.378E-04	G

Pb-214	N	0.0000E+00	351.92	0.000E+00	?	2.255E-05	G K	
			295.21	5.662E-05	?	4.373E-05	G	
			77.11	0.000E+00	&	1.160E-04	Energy duplication	
			241.98	0.000E+00	%	7.133E-05	G	
			74.81	0.000E+00	&	2.173E-04	Energy duplication	
			87.30	7.164E-04	&	2.541E-04	X	
Pb-210	N	0.0000E+00	46.50	0.000E+00	%	2.024E-04	G	
AM-241		2.4389E-04	59.54	2.439E-04	(	6.462E-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	4.5430E-01	1.920E-01	1.924E-01
K-40	7.5272E+00	1.867E+00	1.880E+00
Ac-228	9.9987E-01	4.322E-01	4.332E-01
Pb-212	2.5555E-01	1.878E-01	1.880E-01
CS-137 <	1.8737E-02		
Th-234 #C	6.7445E-01	1.115E+00	1.115E+00
Pb-214 B<	5.5472E-02		
Pb-210 <	4.9787E-01		
AM-241	5.9997E-01	3.344E-01	3.351E-01

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

WI07 - 0978 D1 Grid D1-5 0-6in Free. R. 080607

& - 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) 1.0511377E+01 pCi/g

The library has energies which are not separable.

Analyzed by: KC. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0979 D2 Grid D2-1 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:25:38 Page 1
8905696 Spectrum name: Win00552.An1

Sample description
WI07-0979 D2 Grid D2-1 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00552.An1

Acquisition information
Start time: 07-Aug-2007 08:15:28
Live time: 600
Real time: 602
Dead time: 0.28 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.3320E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.3320E+02) = 2.3084E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:25:38 Page 2
8905696 Spectrum name: Win00552.An1

WI07-0979 D2 Grid D2-1 0-6 in. F.R. 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: 0.1771

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.15	3.37	7296.	11366.	18.944	2.83	0.854	-	D
17.39	4.68	13180.	9572.	15.954	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	186.46	46.79	90.	23.	0.038	148.85	0.455s
AM-241	237.48	59.55	161.	792.	1.320	9.83	0.888
Th-234	253.07	63.44	75.	43.	0.072	78.90	0.988
Pb-214	298.54	74.81	93.	97.	0.161	34.83	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	449.04	0.527D
Pb-212	307.74	77.11	89.	171.	0.284	21.92	0.919D
Pb-214	307.74	77.11	175.	0.	0.000	1735.34	0.000D
Pb-214	348.61	87.32	57.	57.	0.095	51.68	0.666s
Th-234	368.72	92.35	51.	62.	0.103	41.55	0.933D
Ac-228	380.72	95.35	37.	10.	0.017	174.24	0.936D
Ac-228	834.66	208.81	24.	43.	0.072	53.23	0.315s
Pb-212	953.94	238.62	41.	208.	0.346	16.39	1.057D
Pb-214	967.37	241.98	47.	37.	0.061	62.44	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:25:38 Page 3
8905696 Spectrum name: Win00552.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.02	270.14	19.	63.	0.105	39.69	0.776s
Pb-214	1181.35	295.46	9.	98.	0.163	23.24	1.386s
Ac-228	1310.08	327.64	18.	25.	0.042	78.79	0.319s
Ac-228	1353.45	338.48	17.	58.	0.097	38.27	0.660s
Pb-214	1407.53	351.99	11.	151.	0.252	18.24	1.103s

WI07-0979 D2 Grid D2-1 0-6 in. F.R. 080707

Ac-228	1852.81	463.28	3.	8.	0.013	106.14	0.218s
Bi-214	2438.16	609.57	0.	105.	0.175	19.52	1.125
CS-137	2639.77	659.96	3.	12.	0.021	76.25	0.428s
Bi-214	3073.97	768.47	3.	13.	0.022	72.11	0.283s
Ac-228	3175.33	793.80	2.	6.	0.010	115.47	0.341s
Ac-228	3646.28	911.49	0.	60.	0.100	25.82	1.130s
Bi-214	3733.33	933.24	2.	1.	0.001	478.42	0.197s
Ac-228	3858.81	964.60	3.	10.	0.016	82.61	1.595D
Ac-228	3876.86	969.11	6.	28.	0.046	46.11	1.598D
Bi-214	4482.83	1120.53	0.	30.	0.050	36.51	0.750s
Bi-214	4955.83	1238.72	0.	13.	0.022	55.47	0.687s
Bi-214	5511.00	1377.44	0.	8.	0.013	70.71	0.250s
K-40	5846.04	1461.16	0.	79.	0.132	22.50	1.820
Ac-228	6355.83	1588.53	1.	1.	0.001	339.93	0.339s
Bi-214	7061.61	1764.86	0.	18.	0.030	47.14	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	4.8830E-04	609.31	4.883E-04	(	4.650E-06	G K
			1764.49	6.405E-04	+	2.320E-04	G
			1120.29	7.300E-04	+	2.010E-04	G
			1238.11	8.813E-04	+	3.812E-04	G
			768.36	6.948E-04	+	3.220E-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	&	2.915E-04	G
K-40	N	3.4782E-03	1460.81	3.478E-03	(	4.403E-05	G
Ac-228	N	6.2518E-04	911.07	6.608E-04	?(	1.101E-05	G K
			969.11	5.355E-04	(	7.998E-05	G
			338.32	6.797E-04	(	7.445E-05	G
			964.60	6.023E-04	(	1.911E-04	G
			794.70	3.528E-04	&	2.664E-04	G
			463.00	2.988E-04	-	2.033E-04	G
			209.28	9.099E-04	+	2.557E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:25:38 Page 4
8905696 Spectrum name: Win00552.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.963E-03	+	4.160E-04	G
		1588.00	0.000E+00	%	3.720E-04	G
		95.35	2.020E-04	-	1.966E-04	X
		327.64	1.018E-03	+	3.986E-04	G
Pb-212	N 4.7764E-04	238.62	4.776E-04	(	2.203E-05	G K
		77.11	6.531E-04	+	8.923E-05	Energy duplication
		74.81	0.000E+00	%	1.036E-04	Energy duplication
CS-137	3.3422E-05	661.66	3.342E-05	&(	7.758E-06	G
Th-234	N 7.9279E-04	92.35	7.698E-04	(	1.328E-04	G
		63.29	8.255E-04	(	2.425E-04	G

WI07-0979 D2 Grid D2-1 0-6 in. F.R. 080707

```
Pb-214   N   5.6970E-04    351.92 5.605E-04 @(  1.906E-05          G K
                           295.21 6.118E-04  (  3.038E-05          G
                            77.11 0.000E+00 %   1.260E-04Energy duplication
                           241.98 5.075E-04  (  1.416E-04          G
                            74.81 1.079E-03 +   2.232E-04Energy duplication
                            87.30 8.295E-04 +   2.265E-04          X

Pb-210   N   4.6952E-04     46.50 4.695E-04  (  2.843E-04          G

AM-241       1.6308E-03     59.54 1.631E-03  (  3.799E-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 08:25:38 Page 5
8905696 Spectrum name: Win00552.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	1.1272E+00	2.200E-01	2.240E-01
K-40	8.0291E+00	1.807E+00	1.832E+00
Ac-228	1.4432E+00	3.726E-01	3.765E-01
Pb-212	1.1026E+00	1.807E-01	1.854E-01
CS-137 #	7.7151E-02	5.883E-02	5.890E-02
Th-234	1.8301E+00	7.604E-01	7.616E-01
Pb-214	1.3151E+00	2.398E-01	2.449E-01
Pb-210	1.0838E+00	1.613E+00	1.613E+00
AM-241	3.7646E+00	3.702E-01	3.956E-01

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

WI07-0979 D2 Grid D2-1 0-6 in. F.R. 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) 1.9772804E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07 - 0980 D1 Grid D2-2 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:28:04 Page 1
8905696 Spectrum name: Win00367.An1

Sample description
WI07-0980 D1 Grid D2-2 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00367.An1

Acquisition information
Start time: 07-Aug-2007 08:17:52
Live time: 600
Real time: 603
Dead time: 0.52 %
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: 4.3500E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.3500E+02) = 2.2989E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:28:04 Page 2
8905696 Spectrum name: Win00367.An1

WI07 - 0980 D1 Grid D2-2 0-6in Free. R. 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: 0.1036

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
28.65	7.34	147.	593.	0.988	11.48	1.098	CU-64	s
64.21	16.23	36.	26.	0.043	89.04	0.458	Y-88	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	185.20	46.47	58.	35.	0.058	82.61	0.511s
AM-241	237.90	59.64	158.	704.	1.174	10.22	0.995
Th-234	252.65	63.32	44.	22.	0.036	106.16	0.912
Pb-214	298.61	74.81	75.	101.	0.169	31.24	0.971D
Pb-212	298.63	74.81	94.	0.	0.000	235.70	0.265D
Pb-212	307.80	77.11	92.	149.	0.248	24.49	0.972D
Pb-214	307.80	77.11	171.	0.	0.000	2072.44	0.419D
Pb-214	348.96	87.40	39.	28.	0.047	80.02	0.755
Th-234	368.79	92.35	66.	35.	0.058	74.50	0.985D
Ac-228	380.79	95.35	63.	5.	0.008	449.68	0.987D
Ac-228	837.00	209.37	8.	39.	0.065	40.70	1.430s
Pb-212	954.08	238.62	21.	178.	0.296	16.68	1.099D
Pb-214	967.50	241.98	34.	40.	0.067	51.80	1.101D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.94	269.83	15.	15.	0.025	109.54	0.318s
Pb-214	1180.34	295.17	11.	63.	0.105	33.95	0.588s
Ac-228	1310.46	327.69	7.	14.	0.023	85.89	0.328s
Ac-228	1352.92	338.30	15.	52.	0.087	40.70	0.473s
Pb-214	1407.66	351.98	13.	103.	0.171	24.68	1.287

WI07 - 0980 D1 Grid D2-2 0-6in Free. R. 080707

Ac-228	1852.36	463.12	5.	27.	0.046	53.66	0.979
Bi-214	2437.83	609.43	0.	75.	0.125	23.09	0.599s
CS-137	2645.00	661.20	0.	0.	0.000	0.00	0.000s
Bi-214	3074.22	768.46	2.	6.	0.010	109.32	0.332s
Ac-228	3179.00	794.64	2.	0.	0.000	0.00	0.000s
Ac-228	3645.44	911.20	0.	43.	0.072	30.50	1.000s
Bi-214	3737.00	934.08	1.	0.	0.000	0.00	0.000s
Ac-228	3858.00	964.32	0.	6.	0.010	81.65	0.250s
Ac-228	3877.18	969.11	21.	0.	0.000	0.00	1.591
Bi-214	4482.65	1120.41	0.	20.	0.033	44.72	0.500s
Bi-214	4953.38	1238.03	0.	10.	0.017	63.25	0.281s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.36	1461.41	0.	56.	0.093	26.73	0.875s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7061.00	1764.64	2.	0.	0.001	331.66	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	3.8056E-04	609.31	3.838E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	9.689E-05	G
			1120.29	5.247E-04	+	1.796E-04	G
			1238.11	7.286E-04	+	3.643E-04	G
			768.36	3.508E-04	?(	1.410E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	?	2.108E-04	G
K-40	N	2.6362E-03	1460.81	2.636E-03	(	4.707E-05	G
Ac-228	N	5.6568E-04	911.07	5.140E-04	(	1.195E-05	G K
			969.11	0.000E+00	%	1.472E-04	G
			338.32	6.850E-04	(	7.904E-05	G
			964.60	4.013E-04	-	2.675E-04	G
			794.70	0.000E+00	?	1.642E-04	G
			463.00	1.184E-03	+	3.688E-04	G
			209.28	9.449E-04	+	2.473E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:28:04 Page 4
8905696 Spectrum name: Win00367.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			270.23	5.313E-04	?(	2.125E-04	G
			1588.00	0.000E+00	?	1.549E-04	G
			95.35	0.000E+00	%	2.741E-04	X
			327.64	6.263E-04	?(	1.999E-04	G
Pb-212	N	4.6559E-04	238.62	4.656E-04	(	1.838E-05	G K
			77.11	6.892E-04	+	1.039E-04	Energy duplication
			74.81	0.000E+00	%	1.115E-04	Energy duplication
CS-137		0.0000E+00	661.66	0.000E+00	?	2.973E-06	G
Th-234	N	5.0408E-04	92.35	5.100E-04	(	1.766E-04	G
			63.29	4.957E-04	?(	2.269E-04	G

```
                WI07 - 0980  D1  Grid D2-2    0-6in Free. R.  080707
Pb-214   N   4.3712E-04    351.92 4.268E-04  (  2.365E-05         G K
                           295.21 4.459E-04  (  3.692E-05         G
                            77.11 0.000E+00 %   1.506E-04Energy duplication
                           241.98 6.313E-04 +   1.995E-04         G
                            74.81 1.370E-03 +   2.603E-04Energy duplication
                            87.30 4.834E-04 ?(  1.613E-04         X

Pb-210   N   8.1989E-04     46.50 8.199E-04 ?(  2.643E-04         G

AM-241       1.7462E-03     59.54 1.746E-03  (  4.528E-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        8.7486E-01    2.020E-01    2.037E-01
K-40          6.0601E+00    1.620E+00    1.629E+00
Ac-228        1.3004E+00    3.966E-01    3.985E-01
Pb-212        1.0703E+00    1.786E-01    1.813E-01
CS-137   <    6.8355E-03
Th-234        1.1588E+00    7.515E-01    7.519E-01
Pb-214        1.0049E+00    2.480E-01    2.497E-01
Pb-210 #      1.8848E+00    1.557E+00    1.558E+00
AM-241        4.0142E+00    4.103E-01    4.363E-01

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

WI07 - 0980 D1 Grid D2-2 0-6in Free. R. 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) 1.7368391E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fung
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0981 D2 Grid D2-3 0-6 in. F.R. 080707

Sample description
WI07-0981 D2 Grid D2-3 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00554.An1

Acquisition information
Start time: 07-Aug-2007 08:34:17
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: 3.9120E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9120E+02) = 2.5562E+03
Detection limit method: Traditional ORTEC method

WI07-0981 D2 Grid D2-3 0-6 in. F.R. 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: 0.1531

********** U N I D E N T I F I E D P E A K S U 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	2.91	5464.	12908.	21.513	2.39	0.854	-	D
18.08	4.47	13852.	9365.	15.608	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	185.60	46.58	103.	38.	0.063	93.97	0.558s
AM-241	237.72	59.61	157.	1447.	2.411	6.22	0.922
Th-234	252.76	63.37	74.	72.	0.121	52.08	0.913
Pb-214	298.54	74.81	94.	109.	0.182	31.65	0.917D
Pb-212	298.56	74.81	121.	0.	0.000	524.93	0.560D
Pb-212	307.74	77.11	86.	165.	0.275	22.24	0.919D
Pb-214	307.74	77.11	209.	0.	0.000	336.01	0.445D
Pb-214	347.20	86.97	64.	87.	0.145	41.23	1.134s
Th-234	368.72	92.35	37.	84.	0.140	29.80	0.933D
Ac-228	380.72	95.35	47.	12.	0.020	171.16	0.936D
Ac-228	835.69	209.07	24.	16.	0.027	113.18	0.571s
Pb-212	953.94	238.62	34.	250.	0.416	14.28	1.057D
Pb-214	967.37	241.98	44.	21.	0.035	98.64	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:44:28 Page 3
8905696 Spectrum name: Win00554.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.43	270.49	14.	38.	0.063	50.74	1.439s
Pb-214	1181.34	295.46	6.	79.	0.132	25.69	0.921
Ac-228	1313.75	328.55	12.	40.	0.068	48.41	0.420s
Ac-228	1353.32	338.44	10.	80.	0.133	27.76	1.335s
Pb-214	1407.34	351.95	11.	116.	0.193	22.30	1.547s

WI07-0981 D2 Grid D2-3 0-6 in. F.R. 080707

Ac-228	1850.00	462.58	10.	2.	0.003	565.69	0.000s
Bi-214	2437.31	609.36	0.	87.	0.145	21.44	1.214
CS-137	2645.00	661.27	5.	2.	0.003	450.78	0.000s
Bi-214	3072.36	768.07	0.	14.	0.023	53.45	0.500s
Ac-228	3180.40	795.07	0.	17.	0.028	48.51	0.541s
Ac-228	3646.53	911.55	0.	57.	0.095	26.49	0.569s
Bi-214	3737.33	934.24	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	10.	0.016	73.10	1.595D
Ac-228	3876.86	969.11	1.	21.	0.034	47.02	1.598D
Bi-214	4480.89	1120.05	0.	17.	0.028	48.51	0.417s
Bi-214	4951.42	1237.62	3.	1.	0.002	412.31	0.179s
Bi-214	5507.00	1376.44	0.	3.	0.005	115.47	0.250s
K-40	5846.55	1461.28	0.	44.	0.073	30.15	1.999
Ac-228	6354.00	1588.07	0.	5.	0.008	89.44	0.250s
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 microCi	Value Comments
Bi-214	N	4.0682E-04	609.31	4.046E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	4.137E-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	3.246E-04	&	3.246E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.9372E-03	1460.81	1.937E-03	(	4.403E-05	G
Ac-228	N	6.3241E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	3.997E-04	-	1.389E-04	G
			338.32	9.376E-04	+	1.632E-04	G
			964.60	5.941E-04	(	1.378E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	0.000E+00	%	2.114E-04	G
			209.28	3.421E-04	-	2.001E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:44:28 Page 4
8905696 Spectrum name: Win00554.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.182E-03	+	3.346E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	2.317E-04	-	2.191E-04	X
		327.64	1.649E-03	&	4.362E-04	G
Pb-212	N 5.9087E-04	238.62	5.743E-04	(	2.017E-05	G K
		77.11	6.320E-04	(	5.216E-05	Energy duplication
		74.81	0.000E+00	%	1.041E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.158E-05	G
Th-234	N 1.1863E-03	92.35	1.052E-03	(	1.133E-04	G
		63.29	1.378E-03	(	2.410E-04	G

WI07-0981 D2 Grid D2-3 0-6 in. F.R. 080707

Pb-214	N	4.5184E-04	351.92	4.296E-04	(	1.932E-05		G K
			295.21	4.949E-04	(	2.506E-05		G
			77.11	0.000E+00	%	1.376E-04	Energy duplication	
			241.98	2.925E-04	-	1.647E-04		G
			74.81	1.217E-03	+	2.307E-04	Energy duplication	
			87.30	1.262E-03	+	2.595E-04		X
Pb-210	N	7.6892E-04	46.50	7.689E-04	(	3.039E-04		G
AM-241		2.9789E-03	59.54	2.979E-03	(	3.757E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
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 08:44:28 Page 5
8905696 Spectrum name: Win00554.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		1.0399E+00	2.230E-01	2.264E-01
K-40		4.9520E+00	1.493E+00	1.505E+00
Ac-228		1.6166E+00	4.282E-01	4.325E-01
Pb-212		1.5104E+00	1.996E-01	2.075E-01
CS-137	<	2.9613E-02		
Th-234		3.0323E+00	9.037E-01	9.064E-01
Pb-214		1.1550E+00	1.965E-01	2.012E-01
Pb-210		1.9655E+00	1.847E+00	1.848E+00
AM-241		7.6147E+00	4.736E-01	5.511E-01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.

WI07-0981 D2 Grid D2-3 0-6 in. F.R. 080707

C - Area < Critical level.
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) 2.2886566E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0982 D2 Grid D2-4 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:00:48 Page 1
8905696 Spectrum name: Win00555.An1

Sample description
WI07-0982 D2 Grid D2-4 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00555.An1

Acquisition information
Start time: 07-Aug-2007 08:50:35
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: 4.1360E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.1360E+02) = 2.4178E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:00:48 Page 2
8905696 Spectrum name: Win00555.An1

WI07-0982 D2 Grid D2-4 0-6 in. F.R. 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: 0.1610

********** U N I D E N T I F I E D P E A K S U 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	5613.	12270.	20.450	2.50	0.854	-	D
18.03	4.47	16262.	8865.	14.776	4.59	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	186.30	46.76	108.	23.	0.038	144.20	0.239s
AM-241	237.68	59.60	105.	125.	0.208	32.20	1.004
Th-234	251.74	63.11	165.	68.	0.113	76.73	0.458s
Pb-214	298.54	74.81	131.	131.	0.219	30.20	0.917D
Pb-212	298.56	74.81	159.	0.	0.000	362.22	0.428D
Pb-212	307.74	77.11	134.	158.	0.263	26.17	0.919D
Pb-214	307.74	77.11	195.	0.	0.000	991.06	0.459D
Pb-214	348.08	87.19	96.	89.	0.149	45.23	1.170s
Th-234	368.72	92.35	96.	50.	0.084	61.76	0.933D
Ac-228	380.72	95.35	97.	19.	0.032	154.29	0.935D
Ac-228	834.98	208.89	32.	52.	0.087	51.88	0.560s
Pb-212	953.94	238.62	26.	207.	0.346	15.51	1.057D
Pb-214	967.37	241.98	33.	42.	0.071	49.02	1.060D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:00:48 Page 3
8905696 Spectrum name: Win00555.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.21	270.43	8.	29.	0.048	49.77	0.272s
Pb-214	1180.94	295.36	14.	71.	0.118	32.61	0.446s
Ac-228	1312.67	328.29	7.	25.	0.042	58.13	0.506s
Ac-228	1352.90	338.34	17.	55.	0.092	40.82	1.047s
Pb-214	1407.36	351.95	7.	117.	0.194	21.06	0.918

WI07-0982 D2 Grid D2-4 0-6 in. F.R. 080707

Ac-228	1851.70	463.00	2.	7.	0.012	93.60	0.479s
Bi-214	2438.46	609.65	0.	87.	0.145	21.44	0.996s
CS-137	2641.73	660.45	3.	2.	0.003	389.87	0.214s
Bi-214	3080.00	769.98	0.	8.	0.013	70.71	0.250s
Ac-228	3175.83	793.92	1.	1.	0.001	366.67	0.223s
Ac-228	3646.14	911.45	0.	58.	0.097	26.26	1.044s
Bi-214	3734.67	933.58	2.	1.	0.002	447.21	0.628s
Ac-228	3858.81	964.60	5.	11.	0.019	81.82	1.595D
Ac-228	3876.86	969.11	2.	27.	0.046	40.44	1.598D
Bi-214	4480.20	1119.88	4.	2.	0.002	401.85	0.300s
Bi-214	4954.67	1238.43	0.	4.	0.007	100.00	0.375s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5846.37	1461.24	0.	49.	0.082	28.57	1.006s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7062.47	1765.08	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	4.0580E-04	609.31	4.046E-04	@(	4.650E-06	G K
			1764.49	5.338E-04	+	2.135E-04	G
			1120.29	0.000E+00	%	9.007E-05	G
			1238.11	2.712E-04	-	2.286E-04	G
			768.36	4.169E-04	&(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.164E-04	G
			934.06	0.000E+00	%	2.915E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	(	4.403E-05	G
Ac-228	N	6.1562E-04	911.07	6.388E-04	?(	1.101E-05	G K
			969.11	5.315E-04	(	4.606E-05	G
			338.32	6.485E-04	@(	7.378E-05	G
			964.60	6.888E-04	(	2.254E-04	G
			794.70	0.000E+00	&	1.506E-04	G
			463.00	2.858E-04	-	1.860E-04	G
			209.28	1.107E-03	+	2.850E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:00:48 Page 4
8905696 Spectrum name: Win00555.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.956E-04	+	2.848E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	3.645E-04	-	3.032E-04	X
		327.64	1.032E-03	&	3.468E-04	G
Pb-212	N 4.7657E-04	238.62	4.766E-04	(	1.764E-05	G K
		77.11	6.040E-04	+	9.445E-05	Energy duplication
		74.81	0.000E+00	%	1.188E-04	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.003E-05	G
Th-234	N 9.0081E-04	92.35	6.281E-04	(	1.789E-04	G
		63.29	1.289E-03	*(	3.561E-04	G

WI07-0982 D2 Grid D2-4 0-6 in. F.R. 080707

Pb-214	N	4.3641E-04	351.92	4.321E-04	(	1.616E-05		G K
			295.21	4.448E-04	(	3.643E-05		G
			77.11	0.000E+00	%	1.329E-04	Energy duplication	
			241.98	5.854E-04	+	1.764E-04		G
			74.81	1.466E-03	+	2.612E-04	Energy duplication	
			87.30	1.296E-03	+	2.865E-04		X
Pb-210	N	4.6952E-04	46.50	4.695E-04	?(	3.104E-04		G
AM-241		2.5739E-04	59.54	2.574E-04	(	3.089E-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 09:00:48 Page 5
8905696 Spectrum name: Win00555.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 #	9.8113E-01	2.104E-01	2.136E-01
K-40	5.2161E+00	1.490E+00	1.503E+00
Ac-228	1.4884E+00	3.847E-01	3.887E-01
Pb-212	1.1522E+00	1.787E-01	1.839E-01
CS-137 <	2.4252E-02		
Th-234	2.1780E+00	1.073E+00	1.074E+00
Pb-214	1.0552E+00	2.048E-01	2.086E-01
Pb-210 #C	1.1352E+00	1.637E+00	1.637E+00
AM-241	6.2232E-01	2.004E-01	2.017E-01

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

WI07-0982 D2 Grid D2-4 0-6 in. F.R. 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) 1.3828494E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0983 D1 Grid D2-5 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:43:21 Page 1
8905696 Spectrum name: Win00368.An1

Sample description
WI07-0983 D1 Grid D2-5 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00368.An1

Acquisition information
Start time: 07-Aug-2007 08:33:10
Live time: 600
Real time: 603
Dead time: 0.58 %
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: 4.0480E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0480E+02) = 2.4704E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:43:21 Page 2
8905696 Spectrum name: Win00368.An1

WI07 - 0983 D1 Grid D2-5 0-6in Free. R. 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: 0.1559

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
28.71	7.36	178.	464.	0.774	14.59	1.338	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	186.86	46.88	37.	44.	0.073	59.39	0.538s
AM-241	237.65	59.58	80.	126.	0.210	32.50	1.294s
Th-234	253.48	63.53	68.	36.	0.059	92.87	0.522s
Pb-214	298.61	74.81	83.	77.	0.129	40.31	0.971D
Pb-212	298.63	74.81	86.	0.	0.000	290.19	0.221D
Pb-212	307.80	77.11	86.	127.	0.211	27.35	0.972D
Pb-214	307.80	77.11	180.	0.	0.000	223.61	0.521D
Pb-214	347.46	87.02	38.	41.	0.068	60.73	0.780
Th-234	368.79	92.35	50.	43.	0.071	55.91	0.985D
Ac-228	380.79	95.35	38.	10.	0.016	190.64	0.987D
Ac-228	834.16	208.66	22.	36.	0.059	60.22	0.984
Pb-212	954.08	238.62	35.	168.	0.281	18.30	1.099D
Pb-214	967.50	241.98	28.	23.	0.039	76.01	1.101D
Ac-228	1081.11	270.37	17.	35.	0.058	57.19	1.104

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:43:21 Page 3
8905696 Spectrum name: Win00368.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.66	295.25	8.	76.	0.127	26.50	1.075
Ac-228	1312.10	328.10	5.	25.	0.041	53.92	1.152s
Ac-228	1353.98	338.57	6.	45.	0.075	36.92	0.728s
Pb-214	1407.94	352.05	5.	72.	0.121	25.92	0.424s
Ac-228	1853.79	463.47	3.	17.	0.029	61.68	0.920s

WI07 - 0983 D1 Grid D2-5 0-6in Free. R. 080707

Bi-214	2437.60	609.37	0.	82.	0.137	22.09	0.987s
CS-137	2645.87	661.42	0.	15.	0.025	51.64	0.541s
Bi-214	3072.00	767.91	0.	10.	0.017	63.25	0.250s
Ac-228	3179.00	794.64	2.	0.	0.001	450.92	0.333s
Ac-228	3646.69	911.51	0.	43.	0.072	30.50	0.906s
Bi-214	3737.33	934.16	0.	9.	0.015	66.67	0.500s
Ac-228	3859.13	964.60	3.	15.	0.025	60.80	1.589D
Ac-228	3877.18	969.11	4.	26.	0.043	45.48	1.591D
Bi-214	4483.58	1120.64	0.	12.	0.020	57.74	0.687s
Bi-214	4955.00	1238.43	1.	0.	0.000	260.34	0.000s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5847.33	1461.40	4.	60.	0.099	29.16	1.006s
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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1962E-04	609.31	4.196E-04	@(	5.117E-06	G K
			1764.49	0.000E+00	?	7.565E-05	G
			1120.29	3.148E-04	-	1.423E-04	G
			1238.11	0.000E+00	%	1.457E-04	G
			768.36	5.689E-04	+	2.844E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	9.485E-04	+	5.029E-04	G
K-40	N	2.8009E-03	1460.81	2.801E-03	?(	1.503E-04	G
Ac-228	N	5.5335E-04	911.07	5.140E-04	?(	1.195E-05	G K
			969.11	5.415E-04	(	7.280E-05	G
			338.32	5.928E-04	@(	5.269E-05	G
			964.60	1.007E-03	+	4.361E-04	G
			794.70	0.000E+00	%	1.923E-04	G
			463.00	7.435E-04	?(	1.270E-04	G
			209.28	8.601E-04	&	2.733E-04	G
			270.23	1.240E-03	+	3.793E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 08:43:21 Page 4
8905696 Spectrum name: Win00368.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	2.194E-04	-	2.322E-04	X
		327.64	1.130E-03	+	3.786E-04	G
Pb-212	N 4.4091E-04	238.62	4.409E-04	(	2.312E-05	G K
		77.11	5.853E-04	+	9.780E-05	Energy duplication
		74.81	0.000E+00	%	1.070E-04	Energy duplication
CS-137	4.4602E-05	661.66	4.460E-05	?(	2.973E-06	G
Th-234	N 7.0702E-04	92.35	6.287E-04	(	1.547E-04	G
		63.29	8.185E-04	@(	2.797E-04	G
Pb-214	N 3.1186E-04	351.92	3.007E-04	(	1.495E-05	G K

```
                WI07 - 0983  D1  Grid D2-5    0-6in Free. R.  080707
                           295.21 5.414E-04 +   9.534E-05         G
                            77.11 0.000E+00 %   1.545E-04Energy duplication
                           241.98 3.674E-04  (  1.252E-04         G
                            74.81 1.044E-03 +   2.485E-04Energy duplication
                            87.30 7.078E-04 +   2.258E-04         X

Pb-210   N   1.0229E-03     46.50 1.023E-03  (  2.145E-04         G

AM-241       3.1238E-04     59.54 3.124E-04 *(  3.262E-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 08:43:21 Page    5
8905696                          Spectrum name: Win00368.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 #     1.0366E+00    2.290E-01    2.310E-01
K-40   #     6.9192E+00    2.018E+00    2.028E+00
Ac-228       1.3670E+00    3.088E-01    3.114E-01
Pb-212       1.0892E+00    1.994E-01    2.019E-01
CS-137 #     1.1018E-01    5.690E-02    5.700E-02
Th-234       1.7466E+00    9.467E-01    9.475E-01
Pb-214       7.7041E-01    1.997E-01    2.010E-01
Pb-210       2.5270E+00    1.501E+00    1.502E+00
AM-241 #     7.7168E-01    2.508E-01    2.524E-01

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

WI07 - 0983 D1 Grid D2-5 0-6in Free. R. 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 1999.2 keV) 1.6337866E+01 pCi/g

The library has energies which are not separable.

Analyzed by: KC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0965 D1 Grid D3-1 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:35:41 Page 1
8905696 Spectrum name: Win00359.An1

Sample description
WI07-0965 D1 Grid D3-1 0-6" Free r. 080607

Spectrum Filename: C:\User\Win00359.An1

Acquisition information
Start time: 06-Aug-2007 16:21:06
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: 4.0450E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0450E+02) = 2.4722E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:35:41 Page 2
8905696 Spectrum name: Win00359.An1

WI07 - 0965 D1 Grid D3-1 0-6in Free. R. 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: 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	
231.90	58.22	362.	387.	0.645	17.24	0.957	TA-182	D
243.09	61.02	357.	453.	0.754	15.10	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	186.40	46.77	72.	11.	0.018	243.26	0.437s
AM-241	237.51	59.54	701.	277.	0.462	29.53	0.958D
Th-234	252.51	63.29	72.	0.	0.000	0.00	0.298D
Pb-214	298.61	74.81	200.	0.	0.000	0.00	0.337D
Pb-212	298.63	74.81	102.	0.	0.000	1177.51	0.000D
Pb-212	313.52	78.54	72.	40.	0.067	75.44	0.600s
Pb-214	307.80	77.11	128.	0.	0.000	158.67	0.543D
Pb-214	347.16	86.95	57.	11.	0.018	225.26	0.617s
Th-234	368.79	92.35	81.	36.	0.059	78.90	0.985D
Ac-228	380.79	95.35	49.	14.	0.023	155.09	0.987D
Ac-228	838.35	209.70	37.	38.	0.064	75.51	0.332s
Pb-212	955.00	238.86	39.	0.	0.000	0.00	0.000s
Pb-214	968.36	242.19	98.	0.	0.000	0.00	1.102

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:35:41 Page 3
8905696 Spectrum name: Win00359.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1083.29	270.92	20.	24.	0.041	75.81	0.959
Pb-214	1175.68	294.01	25.	41.	0.068	59.47	0.816s
Ac-228	1312.00	328.08	3.	1.	0.002	529.15	0.298s
Ac-228	1352.00	338.07	4.	0.	0.000	0.00	0.000s
Pb-214	1408.00	352.07	10.	0.	0.000	0.00	0.000s

WI07 - 0965 D1 Grid D3-1 0-6in Free. R. 080607

Ac-228	1852.00	463.03	3.	2.	0.003	334.66	0.250s
Bi-214	2432.52	608.10	6.	82.	0.136	26.57	0.918s
CS-137	2648.00	661.95	0.	17.	0.028	48.51	0.500s
Bi-214	3073.00	768.16	0.	5.	0.008	89.44	0.250s
Ac-228	3181.24	795.20	2.	7.	0.011	108.31	0.233s
Ac-228	3643.57	910.74	8.	2.	0.003	391.58	0.328s
Bi-214	3735.00	933.58	0.	1.	0.002	200.00	0.250s
Ac-228	3859.13	964.60	6.	8.	0.013	119.33	1.589D
Ac-228	3877.18	969.11	18.	18.	0.030	81.69	1.591D
Bi-214	4483.00	1120.49	1.	0.	0.000	0.00	0.000s
Bi-214	4948.14	1236.72	0.	10.	0.017	63.25	0.375s
Bi-214	5512.00	1377.61	0.	0.	0.001	223.61	0.100s
K-40	5842.85	1460.28	0.	57.	0.095	26.49	0.337s
Ac-228	6353.00	1587.74	0.	0.	0.000	0.00	0.000s
Bi-214	7054.00	1762.89	0.	5.	0.008	89.44	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	4.1706E-04	609.31	4.171E-04	&(	1.972E-05	G K
			1764.49	1.891E-04	&	1.400E-04	G
			1120.29	0.000E+00	?	5.247E-05	G
			1238.11	7.286E-04	&	3.643E-04	G
			768.36	2.844E-04	-	2.106E-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	%	2.108E-04	G
K-40	N	2.6832E-03	1460.81	2.683E-03	?(	4.707E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	5.977E-05	G K
			969.11	3.785E-04		1.893E-04	G
			338.32	0.000E+00	?	4.442E-05	G
			964.60	5.066E-04		3.889E-04	G
			794.70	4.381E-04	?	3.060E-04	G
			463.00	0.000E+00	%	1.603E-04	G
			209.28	9.287E-04	@	3.091E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:35:41 Page 4
8905696 Spectrum name: Win00359.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.677E-04	&	3.504E-04	G
		1588.00	0.000E+00	?	1.549E-04	G
		95.35	3.077E-04		2.642E-04	X
		327.64	0.000E+00	%	1.546E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	%	2.486E-05	G K
		77.11	1.865E-04	&	7.157E-05	X
		74.81	0.000E+00	%	1.158E-04	Energy duplication
CS-137	5.0549E-05	661.66	5.055E-05	?(	2.973E-06	G
Th-234	N 5.2431E-04	92.35	5.243E-04	(	1.948E-04	G
		63.29	0.000E+00	&	2.884E-04	G

```
                WI07 - 0965  D1  Grid D3-1    0-6in Free. R.  080607
Pb-214   N   0.0000E+00    351.92 0.000E+00 ?   2.078E-05         G K
                           295.21 2.878E-04 &   8.493E-05         G
                            77.11 0.000E+00 &   1.308E-04Energy duplication
                           241.98 0.000E+00     2.285E-04         G
                            74.81 0.000E+00 &   2.767E-04Energy duplication
                            87.30 0.000E+00 %   2.101E-04         X

Pb-210   N   0.0000E+00     46.50 0.000E+00 %   3.138E-04         G

AM-241       6.8787E-04     59.54 6.879E-04  (  9.405E-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 16:35:41 Page    5
8905696                          Spectrum name: Win00359.An1

   R - Coincidence Corrected            C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
         Time of Count   Uncertainty  2 Sigma
Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

Bi-214 #     1.0311E+00    2.740E-01    2.757E-01
K-40   #     6.6334E+00    1.757E+00    1.768E+00
Ac-228 B<    1.4777E-01
Pb-212 B<    6.1452E-02
CS-137 #     1.2497E-01    6.062E-02    6.074E-02
Th-234       1.2962E+00    1.023E+00    1.023E+00
Pb-214 B<    5.1384E-02
Pb-210  <    7.7567E-01
AM-241       1.7005E+00    5.022E-01    5.061E-01

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

WI07 - 0965 D1 Grid D3-1 0-6in Free. R. 080607

& - 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) 1.0786207E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0929 D2 Grid D3-2 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:40:48 Page 1
8905696 Spectrum name: Win00540.An1

Sample description
WI07-0929 D2 Grid D3-2 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00540.An1

Acquisition information
Start time: 06-Aug-2007 13:30:37
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: 3.9570E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9570E+02) = 2.5272E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:40:48 Page 2
8905696 Spectrum name: Win00540.An1

WI07-0929 D2 Grid D3-2 0-6 in. F.R. 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: 0.0852

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.80	3.89	5274.	21997.	36.662	1.89	2.391	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	184.93	46.41	28.	39.	0.064	55.28	0.312s
AM-241	237.29	59.50	78.	94.	0.157	39.29	0.888
Th-234	251.27	62.99	99.	71.	0.118	60.87	0.661s
Pb-214	298.54	74.81	84.	134.	0.223	25.98	0.917D
Pb-212	298.56	74.81	109.	0.	0.000	211.49	0.252D
Pb-212	307.74	77.11	77.	217.	0.362	17.71	0.919D
Pb-214	307.74	77.11	202.	0.	0.000	1095.82	0.565D
Pb-214	348.13	87.20	68.	88.	0.147	40.73	1.334s
Th-234	368.72	92.35	69.	58.	0.097	48.33	0.933D
Ac-228	380.72	95.35	52.	0.	0.000	8679.96	0.935D
Ac-228	836.43	209.25	26.	46.	0.076	52.61	0.906
Pb-212	953.94	238.62	45.	276.	0.460	13.87	1.057D
Pb-214	967.37	241.98	40.	41.	0.069	52.95	1.060D
Ac-228	1075.71	269.06	18.	13.	0.021	123.88	0.380s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:40:48 Page 3
8905696 Spectrum name: Win00540.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.31	295.20	9.	62.	0.103	31.93	0.566s
Ac-228	1310.36	327.71	8.	22.	0.038	62.06	0.451s
Ac-228	1352.58	338.26	6.	42.	0.071	37.38	0.784s
Pb-214	1406.97	351.85	8.	125.	0.208	20.55	0.945
Ac-228	1850.08	462.60	13.	25.	0.041	73.62	0.300s

WI07-0929 D2 Grid D3-2 0-6 in. F.R. 080607

Bi-214	2437.22	609.34	3.	74.	0.123	25.06	1.453
CS-137	2647.17	661.81	0.	15.	0.025	51.64	0.375s
Bi-214	3072.47	768.09	0.	18.	0.030	47.14	0.562s
Ac-228	3182.41	795.57	0.	18.	0.030	47.14	0.500s
Ac-228	3645.01	911.17	0.	67.	0.112	24.43	1.133s
Bi-214	3736.75	934.10	0.	12.	0.020	57.74	0.625s
Ac-228	3858.81	964.60	0.	12.	0.020	57.41	1.595D
Ac-228	3876.86	969.11	3.	42.	0.070	32.81	1.598D
Bi-214	4480.50	1119.95	0.	17.	0.028	48.51	0.500s
Bi-214	4953.11	1238.04	0.	13.	0.022	55.47	0.500s
Bi-214	5512.00	1377.69	1.	0.	0.000	0.00	0.000s
K-40	5845.88	1461.12	0.	51.	0.085	28.01	0.999s
Ac-228	6353.00	1587.82	0.	4.	0.007	100.00	0.250s
Bi-214	7058.00	1763.96	0.	12.	0.020	57.74	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	3.7469E-04	609.31	3.441E-04	(	1.395E-05	G K
			1764.49	4.270E-04	?(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	8.813E-04	+	3.812E-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	?	2.164E-04	G
			934.06	1.166E-03	+	5.271E-04	G
K-40	N	2.2454E-03	1460.81	2.245E-03	?(	4.403E-05	G
Ac-228	N	8.0201E-04	911.07	7.379E-04	(	1.101E-05	G K
			969.11	8.187E-04	(	5.696E-05	G
			338.32	4.981E-04	-	1.220E-04	G
			964.60	7.490E-04	(	6.173E-05	G
			794.70	1.058E-03	&	3.834E-04	G
			463.00	9.614E-04	(	2.217E-04	G
			209.28	9.628E-04	?(	1.621E-04	G
			270.23	3.957E-04	&	2.621E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:40:48 Page 4
8905696 Spectrum name: Win00540.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	5.810E-04	-	4.898E-04	G
			95.35	0.000E+00	%	2.063E-04	X
			327.64	9.163E-04	(	1.794E-04	G
Pb-212	N	6.3402E-04	238.62	6.340E-04	(	2.301E-05	G K
			77.11	8.323E-04	+	9.476E-05	Energy duplication
			74.81	0.000E+00	%	9.900E-05	Energy duplication
CS-137		4.0648E-05	661.66	4.065E-05	?(	2.710E-06	G
Th-234	N	9.8272E-04	92.35	7.229E-04	(	1.530E-04	G
			63.29	1.353E-03	*(	2.778E-04	G
Pb-214	N	4.3758E-04	351.92	4.630E-04	(	1.678E-05	G K

WI07-0929 D2 Grid D3-2 0-6 in. F.R. 080607

			295.21	3.884E-04	@(	2.989E-05	G
			77.11	0.000E+00	%	1.352E-04	Energy duplication
			241.98	5.734E-04	+	1.830E-04	G
			74.81	1.494E-03	+	2.387E-04	Energy duplication
			87.30	1.284E-03	+	2.637E-04	X
Pb-210	N	7.8933E-04	46.50	7.893E-04	(	1.642E-04	G
AM-241		1.9356E-04	59.54	1.936E-04	(	2.677E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:
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 06-AUG-2007 13:40:48 Page 5
8905696 Spectrum name: Win00540.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	9.4691E-01	2.373E-01	2.400E-01
K-40 #	5.6745E+00	1.589E+00	1.603E+00
Ac-228	2.0268E+00	4.406E-01	4.471E-01
Pb-212	1.6023E+00	2.223E-01	2.302E-01
CS-137 #	1.0273E-01	5.305E-02	5.319E-02
Th-234	2.4835E+00	9.652E-01	9.669E-01
Pb-214	1.1058E+00	2.100E-01	2.140E-01
Pb-210	1.9948E+00	1.103E+00	1.104E+00
AM-241	4.8916E-01	1.922E-01	1.930E-01

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

WI07-0929 D2 Grid D3-2 0-6 in. F.R. 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) 1.6426525E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fuse
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0930 D1 Grid D3-3 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:15:10 Page 1
8905696 Spectrum name: Win00358.An1

Sample description
WI07-0930 D1 Grid D3-3 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00358.An1

Acquisition information
Start time: 06-Aug-2007 16:05:01
Live time: 600
Real time: 602
Dead time: 0.29 %
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: 3.9350E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9350E+02) = 2.5413E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:15:10 Page 2
8905696 Spectrum name: Win00358.An1

WI07 - 0930 D1 Grid D3-3 0-6in Free. R. 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: 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	
27.63	7.09	387.	227.	0.379	32.03	1.093	CU-64	
47.32	12.01	372.	118.	0.197	59.54	0.571	SE-75	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	184.10	46.19	50.	21.	0.035	126.41	0.220s
AM-241	239.48	60.03	231.	79.	0.131	81.90	0.708s
Th-234	255.46	64.03	54.	19.	0.032	130.63	0.423s
Pb-214	298.61	74.81	147.	0.	0.000	0.00	0.389D
Pb-212	298.63	74.81	62.	0.	0.000	620.95	0.398D
Pb-212	311.73	78.09	114.	29.	0.048	132.84	0.720s
Pb-214	307.80	77.11	128.	0.	0.000	126.20	0.735D
Pb-214	352.59	88.30	82.	19.	0.031	179.09	0.305s
Th-234	368.00	92.15	21.	1.	0.002	897.22	0.000s
Ac-228	380.79	95.35	10.	0.	0.000	0.00	0.000D
Ac-228	837.00	209.37	3.	0.	0.000	0.00	0.000s
Pb-212	954.08	238.62	115.	0.	0.000	0.00	1.099
Pb-214	967.50	241.98	140.	0.	0.000	0.00	1.101

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:15:10 Page 3
8905696 Spectrum name: Win00358.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.67	270.26	4.	0.	0.000	0.00	0.234s
Pb-214	1179.52	294.97	24.	59.	0.098	45.35	0.421s
Ac-228	1302.10	325.60	2.	16.	0.027	60.91	0.235s
Ac-228	1349.29	337.40	21.	26.	0.043	79.42	0.420s
Pb-214	1412.41	353.17	33.	45.	0.075	62.70	0.980

WI07 - 0930 D1 Grid D3-3 0-6in Free. R. 080607

Ac-228	1851.43	462.88	2.	2.	0.004	198.98	0.312s
Bi-214	2430.43	607.58	24.	5.	0.008	351.00	0.723s
CS-137	2645.00	661.20	4.	2.	0.003	316.23	0.083s
Bi-214	3073.29	768.23	3.	2.	0.003	282.84	1.116s
Ac-228	3177.67	794.31	2.	1.	0.002	416.33	0.225s
Ac-228	3644.50	910.97	2.	0.	0.000	0.00	0.292s
Bi-214	3736.00	933.83	0.	3.	0.005	115.47	0.250s
Ac-228	3859.13	964.60	0.	0.	0.000	0.00	0.000D
Ac-228	3877.17	969.11	3.	1.	0.001	498.89	0.198s
Bi-214	4483.00	1120.49	1.	0.	0.000	0.00	0.000s
Bi-214	4954.25	1238.25	0.	11.	0.018	60.30	0.312s
Bi-214	5511.00	1377.36	0.	0.	0.000	0.00	0.000s
K-40	5845.67	1460.98	2.	0.	0.001	412.31	0.500s
Ac-228	6353.25	1587.81	0.	4.	0.007	100.00	0.375s
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	0.0000E+00	609.31	0.000E+00	&	4.162E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	0.000E+00	?	5.247E-05	G
			1238.11	8.015E-04	?	3.801E-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	?	1.159E-04	G
			934.06	3.162E-04	?	3.162E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	1.412E-04	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	?	3.062E-05	G K
			969.11	0.000E+00	%	7.093E-05	G
			338.32	3.381E-04	&	1.345E-04	G
			964.60	0.000E+00	?	6.688E-05	G
			794.70	0.000E+00	%	1.923E-04	G
			463.00	1.011E-04	?	1.461E-04	G
			209.28	0.000E+00	?	7.268E-05	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:15:10 Page 4
8905696 Spectrum name: Win00358.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	?	1.194E-04	G
		1588.00	6.196E-04	?	5.223E-04	G
		95.35	0.000E+00	?	1.126E-04	X
		327.64	7.562E-04	&	3.064E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00		4.103E-05	G K
		77.11	1.341E-04	&	8.056E-05	X
		74.81	0.000E+00	%	9.168E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.189E-05	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.050E-04	G
		63.29	4.380E-04	&	2.903E-04	G

```
                WI07 - 0930  D1  Grid D3-3    0-6in Free. R.  080607
Pb-214    N   2.6987E-04     351.92 1.871E-04 &(  3.591E-05          G K
                             295.21 4.176E-04 *(  5.270E-05          G
                              77.11 0.000E+00 &   1.308E-04Energy duplication
                             241.98 0.000E+00 %   2.714E-04          G
                              74.81 0.000E+00 &   2.388E-04Energy duplication
                              87.30 3.223E-04 &(  2.303E-04          X

Pb-210    N   4.9584E-04      46.50 4.958E-04 ?(  2.459E-04          G

AM-241        1.9544E-04      59.54 1.954E-04 @(  5.456E-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 16:15:10 Page    5
 8905696                          Spectrum name: Win00358.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<    1.0576E-01
 K-40    <    3.5889E-01
 Ac-228 B<    7.7819E-02
 Pb-212 B<    1.0427E-01
 CS-137  <    3.0226E-02
 Th-234  <    2.6695E-01
 Pb-214 #     6.8583E-01    3.110E-01     3.117E-01
 Pb-210 #     1.2601E+00    1.593E+00     1.593E+00
 AM-241 #     4.9668E-01    4.068E-01     4.072E-01

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

WI07 - 0930 D1 Grid D3-3 0-6in Free. R. 080607

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

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

Total Activity (2.7 to 1999.2 keV) 2.4425840E+00 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0931 D2 Grid D3-4 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:59:27 Page 1
8905696 Spectrum name: Win00541.An1

Sample description
WI07-0931 D2 Grid D3-4 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00541.An1

Acquisition information
Start time: 06-Aug-2007 13:49:16
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: 4.1210E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.1210E+02) = 2.4266E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:59:27 Page 2
8905696 Spectrum name: Win00541.An1

WI07-0931 D2 Grid D3-4 0-6 in. F.R. 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: 0.0970

********** U N I D E N T I F I E D P E A K S U 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	3.33	7033.	12003.	20.005	2.69	0.854	-	D
17.48	4.66	13069.	9412.	15.687	4.01	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	184.73	46.36	77.	50.	0.083	70.05	0.813s
AM-241	237.63	59.59	110.	399.	0.665	14.04	0.876
Th-234	251.17	62.97	74.	58.	0.097	58.55	0.365s
Pb-214	298.54	74.81	74.	127.	0.212	26.10	0.917D
Pb-212	298.56	74.81	121.	0.	0.000	200.78	0.475D
Pb-212	307.74	77.11	69.	195.	0.325	18.74	0.919D
Pb-214	307.74	77.11	199.	0.	0.000	927.36	0.392D
Pb-214	348.41	87.27	61.	81.	0.136	40.66	1.301s
Th-234	368.72	92.35	47.	82.	0.136	32.41	0.933D
Ac-228	380.72	95.35	39.	13.	0.022	143.60	0.936D
Ac-228	837.63	209.55	31.	42.	0.070	60.72	0.981s
Pb-212	953.94	238.62	51.	233.	0.389	15.69	1.057D
Pb-214	967.37	241.98	38.	27.	0.045	75.23	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:59:27 Page 3
8905696 Spectrum name: Win00541.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.11	270.16	27.	36.	0.061	63.75	1.416s
Pb-214	1180.13	295.16	11.	71.	0.118	30.23	1.246s
Ac-228	1311.29	327.94	12.	7.	0.012	169.03	0.701s
Ac-228	1352.75	338.30	18.	68.	0.113	36.59	1.061
Pb-214	1407.87	352.08	8.	145.	0.241	18.94	1.024s

WI07-0931 D2 Grid D3-4 0-6 in. F.R. 080607

Ac-228	1852.01	463.08	3.	28.	0.046	46.03	0.766s
Bi-214	2436.79	609.23	4.	70.	0.116	26.57	0.571s
CS-137	2646.53	661.65	0.	26.	0.043	39.22	0.500s
Bi-214	3072.71	768.16	0.	19.	0.032	45.88	0.625s
Ac-228	3183.50	795.84	0.	15.	0.025	51.64	0.375s
Ac-228	3645.51	911.30	0.	57.	0.095	26.49	1.374
Bi-214	3733.00	933.16	0.	5.	0.008	89.44	0.250s
Ac-228	3858.81	964.60	3.	11.	0.018	75.92	1.595D
Ac-228	3876.86	969.11	6.	32.	0.053	41.98	1.598D
Bi-214	4482.67	1120.49	0.	22.	0.037	42.64	1.125s
Bi-214	4950.40	1237.37	2.	8.	0.013	107.50	0.447s
Bi-214	5512.67	1377.86	4.	2.	0.003	336.65	0.179s
K-40	5845.70	1461.07	0.	71.	0.118	23.74	2.124
Ac-228	6352.56	1587.71	3.	1.	0.002	412.31	0.322s
Bi-214	7059.00	1764.21	2.	0.	0.000	0.00	0.042s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.2321E-04	609.31	3.232E-04	(	1.485E-05	G K
			1764.49	0.000E+00	?	9.115E-05	G
			1120.29	5.353E-04	+	1.740E-04	G
			1238.11	5.085E-04	+	3.390E-04	G
			768.36	9.901E-04	+	3.483E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	4.328E-04	G
			934.06	4.858E-04	&	3.597E-04	G
K-40	N	3.1260E-03	1460.81	3.126E-03	(	4.403E-05	G
Ac-228	N	6.8809E-04	911.07	6.277E-04	(	1.101E-05	G K
			969.11	6.157E-04	(	7.928E-05	G
			338.32	7.930E-04	(	7.707E-05	G
			964.60	6.725E-04	(	1.878E-04	G
			794.70	8.820E-04	&(	5.880E-05	G
			463.00	1.085E-03	+	3.270E-04	G
			209.28	8.852E-04	*(	1.780E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:59:27 Page 4
8905696 Spectrum name: Win00541.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.135E-03	+	3.667E-04	G
		1588.00	0.000E+00	%	4.898E-04	G
		95.35	2.555E-04	-	2.063E-04	X
		327.64	2.851E-04	-	2.722E-04	G
Pb-212	N 5.3594E-04	238.62	5.359E-04	(	2.434E-05	G K
		77.11	7.457E-04	+	8.990E-05	Energy duplication
		74.81	0.000E+00	%	1.041E-04	Energy duplication
CS-137	7.0457E-05	661.66	7.046E-05	?(	2.710E-06	G
Th-234	N 1.0587E-03	92.35	1.022E-03	(	1.275E-04	G
		63.29	1.111E-03	(	2.410E-04	G

WI07-0931 D2 Grid D3-4 0-6 in. F.R. 080607

Pb-214	N	5.3580E-04	351.92	5.358E-04	@(	1.709E-05		G K
			295.21	4.427E-04	-	8.342E-05		G
			77.11	0.000E+00	%	1.341E-04	Energy duplication	
			241.98	3.731E-04	-	1.647E-04		G
			74.81	1.418E-03	+	2.294E-04	Energy duplication	
			87.30	1.180E-03	+	2.519E-04		X
Pb-210	N	1.0207E-03	46.50	1.021E-03	@(	2.637E-04		G
AM-241		8.2160E-04	59.54	8.216E-04	(	3.159E-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 13:59:27 Page 5
8905696 Spectrum name: Win00541.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	7.8429E-01	2.084E-01	2.105E-01
K-40	7.5855E+00	1.800E+00	1.823E+00
Ac-228	1.6697E+00	3.511E-01	3.567E-01
Pb-212	1.3005E+00	2.041E-01	2.098E-01
CS-137 #	1.7097E-01	6.706E-02	6.738E-02
Th-234	2.5689E+00	8.327E-01	8.348E-01
Pb-214	1.3002E+00	2.463E-01	2.511E-01
Pb-210 #	2.4768E+00	1.735E+00	1.736E+00
AM-241	1.9937E+00	2.798E-01	2.894E-01

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

WI07-0931 D2 Grid D3-4 0-6 in. F.R. 080607

& - 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) 1.9850569E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Ferro
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0932 D2 Grid D3-5 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 14:21:15 Page 1
8905696 Spectrum name: Win00542.An1

Sample description
WI07-0932 D2 Grid D3-5 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00542.An1

Acquisition information
Start time: 06-Aug-2007 14:11:04
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: 3.2540E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2540E+02) = 3.0731E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 14:21:15 Page 2
8905696 Spectrum name: Win00542.An1

WI07-0932 D2 Grid D3-5 0-6 in. F.R. 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: 0.1659

********** U N I D E N T I F I E D P E A K S U 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	3555.	25076.	41.793	1.58	2.284	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	185.14	46.47	92.	54.	0.091	71.37	0.549s
AM-241	237.39	59.52	190.	1304.	2.173	7.07	0.870
Th-234	251.64	63.09	52.	69.	0.115	43.48	0.764
Pb-214	298.54	74.81	58.	136.	0.227	23.27	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	185.86	0.367D
Pb-212	307.74	77.11	44.	182.	0.304	17.99	0.919D
Pb-214	307.74	77.11	251.	0.	0.000	119.26	0.000D
Pb-214	347.26	86.99	67.	69.	0.116	51.10	0.835s
Th-234	368.72	92.35	74.	51.	0.086	54.93	0.933D
Ac-228	380.72	95.35	30.	15.	0.026	111.48	0.935D
Ac-228	834.69	208.82	27.	42.	0.070	58.32	1.288s
Pb-212	953.94	238.62	11.	227.	0.379	13.86	1.057D
Pb-214	967.37	241.98	23.	34.	0.057	52.55	1.060D
Ac-228	1080.32	270.21	8.	45.	0.075	38.32	0.719s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 14:21:15 Page 3
8905696 Spectrum name: Win00542.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.77	295.32	7.	75.	0.125	27.52	1.687s
Ac-228	1310.74	327.80	2.	23.	0.038	48.69	0.313s
Ac-228	1353.28	338.44	4.	61.	0.102	29.51	0.971s
Pb-214	1407.37	351.95	10.	99.	0.165	23.39	0.860s
Ac-228	1850.04	462.59	4.	28.	0.046	47.83	0.445s

WI07-0932 D2 Grid D3-5 0-6 in. F.R. 080607

Bi-214	2437.70	609.46	0.	74.	0.123	23.25	0.916s
CS-137	2647.47	661.88	0.	31.	0.052	35.92	0.458s
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	3646.88	911.64	0.	59.	0.098	26.04	0.571s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	10.	0.017	73.37	1.595D
Ac-228	3876.86	969.11	3.	23.	0.039	46.43	1.598D
Bi-214	4482.08	1120.35	0.	13.	0.022	55.47	0.375s
Bi-214	4954.80	1238.47	0.	8.	0.013	70.71	0.625s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5841.73	1460.08	10.	4.	0.007	276.89	0.311s
Ac-228	6356.06	1588.59	0.	16.	0.027	50.00	0.333s
Bi-214	7058.83	1764.17	0.	7.	0.012	75.59	0.281s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.3729E-04	609.31	3.441E-04	(	4.650E-06	G K
			1764.49	2.491E-04	-	1.521E-04	G
			1120.29	3.163E-04	?(	2.433E-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	?	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	%	2.560E-04	G
Ac-228	N	6.9883E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	4.494E-04	-	1.501E-04	G
			338.32	7.149E-04	@(	3.952E-05	G
			964.60	6.263E-04	(	1.537E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	1.072E-03	+	3.270E-04	G
			209.28	8.887E-04	(	1.664E-04	G
			270.23	1.406E-03	+	3.377E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	2.324E-03	+	8.974E-04	G
		95.35	2.983E-04	-	1.926E-04	X
		327.64	9.231E-04	(	1.107E-04	G
Pb-212	N 5.2272E-04	238.62	5.227E-04	(	1.176E-05	G K
		77.11	6.986E-04	+	8.333E-05	Energy duplication
		74.81	0.000E+00	?	9.179E-05	Energy duplication
CS-137	8.4007E-05	661.66	8.401E-05	?(	2.710E-06	G
Th-234	N 9.1850E-04	92.35	6.403E-04	(	1.578E-04	G
		63.29	1.315E-03	?(	2.040E-04	G
Pb-214	N 4.0985E-04	351.92	3.667E-04	(	1.852E-05	G K

```
                WI07-0932  D2  Grid  D3-5   0-6 in.   F.R. 080607
                          295.21 4.698E-04 *(  2.678E-05          G
                           77.11 0.000E+00 ?   1.504E-04Energy duplication
                          241.98 4.706E-04  (  1.009E-04          G
                           74.81 1.521E-03 +   2.255E-04Energy duplication
                           87.30 1.006E-03 +   2.467E-04          X

Pb-210   N   1.1126E-03     46.50 1.113E-03  (  2.881E-04          G

AM-241       2.6851E-03     59.54 2.685E-03  (  4.118E-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 14:21:15 Page    5
 8905696                          Spectrum name: Win00542.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		1.0366E+00	2.410E-01	2.441E-01
K-40	<	7.8680E-01		
Ac-228		2.1476E+00	4.841E-01	4.908E-01
Pb-212		1.6064E+00	2.227E-01	2.307E-01
CS-137	#	2.5816E-01	9.274E-02	9.326E-02
Th-234		2.8227E+00	9.887E-01	9.909E-01
Pb-214		1.2595E+00	2.677E-01	2.718E-01
Pb-210		3.4190E+00	2.440E+00	2.441E+00
AM-241		8.2517E+00	5.837E-01	6.588E-01

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

WI07-0932 D2 Grid D3-5 0-6 in. F.R. 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) 2.0801685E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0962 D2 Grid D4-1 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:24:15 Page 1
8905696 Spectrum name: Win00539.An1

Sample description
WI07-0962 D2 Grid D4-1 0-6" Free Rel. 080607

Spectrum Filename: C:\User\Win00539.An1

Acquisition information
Start time: 06-Aug-2007 13:14:03
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: 3.7430E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7430E+02) = 2.6717E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:24:15 Page 2
8905696 Spectrum name: Win00539.An1

WI07-0962 D2 Grid D4-1 0-6 in. F.R. 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: 0.0902

********** U N I D E N T I F I E D P E A K S U 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	2.93	5814.	11241.	18.735	2.69	0.854	-	D
16.77	4.17	16150.	9099.	15.165	4.47	0.855	-	D
2332.64	583.20	0.	95.	0.158	20.52	1.288	TL-208	

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.30	46.50	20.	39.	0.065	50.45	0.669
AM-241	237.26	59.49	61.	65.	0.108	52.63	0.410s
Th-234	252.02	63.18	75.	56.	0.094	64.51	0.833s
Pb-214	298.54	74.81	97.	112.	0.187	31.10	0.917D
Pb-212	298.56	74.81	113.	0.	0.000	237.84	0.610D
Pb-212	307.74	77.11	64.	161.	0.268	21.12	0.919D
Pb-214	307.74	77.11	148.	0.	0.000	619.86	0.795D
Pb-214	348.31	87.25	55.	35.	0.058	78.94	1.086
Th-234	368.72	92.35	65.	54.	0.091	49.89	0.933D
Ac-228	380.72	95.35	38.	3.	0.004	666.79	0.935D
Ac-228	836.69	209.32	29.	44.	0.073	56.32	1.033
Pb-212	953.94	238.62	28.	247.	0.411	14.11	1.057D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:24:15 Page 3
8905696 Spectrum name: Win00539.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	32.	29.	0.048	66.34	1.060D
Ac-228	1079.53	270.02	11.	30.	0.051	54.95	0.669s
Pb-214	1181.46	295.49	8.	70.	0.117	27.90	1.355s
Ac-228	1311.28	327.94	14.	26.	0.043	69.31	0.383s
Ac-228	1352.84	338.33	3.	65.	0.108	27.25	0.789s

WI07-0962 D2 Grid D4-1 0-6 in. F.R. 080607

Pb-214	1406.63	351.77	10.	94.	0.157	24.93	0.928
Ac-228	1852.50	463.20	0.	13.	0.022	55.47	0.750s
Bi-214	2437.47	609.40	0.	57.	0.095	26.49	0.731s
CS-137	2646.28	661.59	2.	19.	0.032	52.63	0.504s
Bi-214	3062.96	765.72	3.	11.	0.018	90.50	0.472s
Ac-228	3179.62	794.87	0.	13.	0.022	55.47	0.281s
Ac-228	3645.92	911.40	0.	59.	0.098	26.04	0.878s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	6.	0.010	112.12	1.595D
Ac-228	3876.86	969.11	0.	38.	0.063	32.63	1.598D
Bi-214	4481.07	1120.09	0.	17.	0.028	48.51	0.333s
Bi-214	4953.00	1238.02	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.86	1460.86	0.	44.	0.073	30.15	1.176s
Ac-228	6353.67	1587.99	1.	0.	0.001	240.37	0.197s
Bi-214	7062.50	1765.08	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.6101E-04	609.31	2.651E-04	(	4.650E-06	G K
			1764.49	2.491E-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	5.645E-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	0.000E+00	?	9.716E-05	G
K-40	N	1.9372E-03	1460.81	1.937E-03	?(	4.403E-05	G
Ac-228	N	7.2995E-04	911.07	6.498E-04	(	1.101E-05	G K
			969.11	7.351E-04	(	2.396E-05	G
			338.32	7.598E-04	(	3.593E-05	G
			964.60	3.531E-04	-	2.797E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	5.067E-04	-	2.192E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 13:24:15 Page 4
8905696 Spectrum name: Win00539.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.240E-04	(	1.730E-04	G
		270.23	9.477E-04	@(	1.608E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.843E-04	X
		327.64	1.052E-03	+	3.852E-04	G
Pb-212	N 5.8140E-04	238.62	5.673E-04	(	1.843E-05	G K
		77.11	6.164E-04	(	4.526E-05	Energy duplication
		74.81	0.000E+00	%	1.007E-04	Energy duplication
CS-137	5.1488E-05	661.66	5.149E-05	?(	6.942E-06	G
Th-234	N 8.4097E-04	92.35	6.778E-04	(	1.483E-04	G
		63.29	1.073E-03	@(	2.425E-04	G

WI07-0962 D2 Grid D4-1 0-6 in. F.R. 080607

Pb-214	N	3.9108E-04	351.92	3.481E-04	(	1.852E-05	G	K
			295.21	4.416E-04	*(	2.760E-05	G	
			77.11	0.000E+00	%	1.163E-04	Energy duplication	
			241.98	4.018E-04	(	1.176E-04	G	
			74.81	1.255E-03	+	2.338E-04	Energy duplication	
			87.30	5.079E-04	(	1.596E-04	X	
Pb-210	N	7.9274E-04	46.50	7.927E-04	(	1.403E-04	G	
AM-241		1.3316E-04	59.54	1.332E-04	(	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:	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 06-AUG-2007 13:24:15 Page 5
8905696 Spectrum name: Win00539.An1

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

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214	6.9732E-01	1.847E-01	1.866E-01
K-40 #	5.1756E+00	1.560E+00	1.573E+00
Ac-228	1.9502E+00	3.524E-01	3.599E-01
Pb-212	1.5533E+00	1.972E-01	2.056E-01
CS-137 #	1.3756E-01	7.240E-02	7.259E-02
Th-234	2.2468E+00	9.161E-01	9.176E-01
Pb-214	1.0448E+00	2.605E-01	2.634E-01
Pb-210	2.1179E+00	1.069E+00	1.070E+00
AM-241	3.5575E-01	1.872E-01	1.877E-01

\# - All peaks for activity calculation had bad shape.

WI07-0962 D2 Grid D4-1 0-6 in. F.R. 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) 1.5279186E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0963 D2 Grid D4-2 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:51:48 Page 1
8905696 Spectrum name: Win00547.An1

Sample description
WI07-0963 D2 Grid D4-2 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00547.An1

Acquisition information
Start time: 06-Aug-2007 16:41:36
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: 3.7230E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7230E+02) = 2.6860E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:51:48 Page 2
8905696 Spectrum name: Win00547.An1

WI07-0963 D2 Grid D4-2 0-6 in. F.R. 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: 0.1066

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.56	3.83	6471.	25632.	42.720	1.77	2.111	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	185.63	46.59	70.	54.	0.090	64.04	1.620s
AM-241	237.92	59.66	79.	56.	0.093	68.15	0.681
Th-234	251.88	63.15	75.	51.	0.085	69.44	0.951s
Pb-214	298.54	74.81	101.	117.	0.194	30.63	0.917D
Pb-212	298.56	74.81	129.	0.	0.000	541.60	0.295D
Pb-212	307.74	77.11	91.	191.	0.318	20.28	0.919D
Pb-214	307.74	77.11	278.	0.	0.000	168.45	0.226D
Pb-214	347.50	87.05	65.	55.	0.092	58.73	0.581s
Th-234	368.72	92.35	74.	39.	0.064	71.11	0.933D
Ac-228	380.72	95.35	36.	14.	0.023	136.29	0.935D
Ac-228	835.53	209.03	32.	49.	0.082	52.64	1.291s
Pb-212	953.94	238.62	25.	276.	0.461	13.07	1.057D
Pb-214	967.37	241.98	45.	25.	0.042	84.40	1.060D
Ac-228	1080.82	270.34	16.	39.	0.065	50.68	0.400s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:51:48 Page 3
8905696 Spectrum name: Win00547.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1179.20	294.92	32.	72.	0.121	40.38	0.639s
Ac-228	1312.27	328.18	6.	30.	0.049	50.47	0.561s
Ac-228	1352.70	338.29	8.	73.	0.122	27.72	1.002s
Pb-214	1407.39	351.96	7.	134.	0.223	19.20	1.264s
Ac-228	1851.58	462.98	6.	18.	0.029	65.73	0.348s

WI07-0963 D2 Grid D4-2 0-6 in. F.R. 080607

Bi-214	2436.99	609.28	4.	89.	0.148	23.46	0.393s
CS-137	2646.66	661.68	6.	24.	0.041	55.78	0.639s
Bi-214	3071.67	767.89	2.	1.	0.002	447.21	0.628s
Ac-228	3179.00	794.72	3.	1.	0.001	520.68	0.125s
Ac-228	3645.80	911.37	0.	69.	0.115	24.08	0.828s
Bi-214	3735.33	933.74	1.	0.	0.001	240.37	0.197s
Ac-228	3858.81	964.60	1.	8.	0.014	73.87	1.595D
Ac-228	3876.86	969.11	0.	39.	0.066	31.82	1.598D
Bi-214	4482.50	1120.45	0.	28.	0.047	37.80	0.625s
Bi-214	4953.89	1238.24	0.	9.	0.015	66.67	0.500s
Bi-214	5512.00	1377.69	0.	5.	0.008	89.44	0.250s
K-40	5846.12	1461.18	0.	56.	0.093	26.73	0.462s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7059.54	1764.34	8.	2.	0.003	509.90	0.310s

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

***** S U M M A R Y O F L 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	4.2425E-04	609.31	4.139E-04	@(	1.568E-05	G K
			1764.49	0.000E+00	%	1.779E-04	G
			1120.29	6.813E-04	+	1.947E-04	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.4656E-03	1460.81	2.466E-03	?(	4.403E-05	G
Ac-228	N	7.7428E-04	911.07	7.599E-04	(	1.101E-05	G K
			969.11	7.669E-04	(	1.942E-05	G
			338.32	8.555E-04	*(	5.310E-05	G
			964.60	5.180E-04	-	2.946E-04	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	6.821E-04	?(	1.502E-04	G
			209.28	1.037E-03	+	2.801E-04	G
			270.23	1.218E-03	+	3.437E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:51:48 Page 4
8905696 Spectrum name: Win00547.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			1588.00	0.000E+00	%	2.905E-04	G
			95.35	2.627E-04	-	2.025E-04	X
			327.64	1.208E-03	+	3.665E-04	G
Pb-212	N	6.6232E-04	238.62	6.352E-04	(	1.739E-05	G K
			77.11	7.295E-04	(	5.372E-05	Energy duplication
			74.81	0.000E+00	%	1.073E-04	Energy duplication
CS-137		6.5941E-05	661.66	6.594E-05	(	1.058E-05	G
Th-234	N	6.8311E-04	92.35	4.805E-04	(	1.587E-04	G
			63.29	9.716E-04	(	2.430E-04	G
Pb-214	N	4.8195E-04	351.92	4.963E-04	(	1.583E-05	G K

WI07-0963 D2 Grid D4-2 0-6 in. F.R. 080607

			295.21	4.542E-04	(	5.295E-05	G
			77.11	0.000E+00	?	1.581E-04	Energy duplication
			241.98	3.508E-04	-	1.707E-04	G
			74.81	1.302E-03	+	2.387E-04	Energy duplication
			87.30	7.981E-04	+	2.322E-04	X
Pb-210	N	1.1023E-03	46.50	1.102E-03	(	2.520E-04	G
AM-241		1.1463E-04	59.54	1.146E-04	(	2.699E-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 16:51:48 Page 5
8905696 Spectrum name: Win00547.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 #	1.1395E+00	2.674E-01	2.707E-01
K-40 #	6.6225E+00	1.770E+00	1.787E+00
Ac-228	2.0797E+00	4.250E-01	4.321E-01
Pb-212	1.7790E+00	2.146E-01	2.247E-01
CS-137	1.7712E-01	9.879E-02	9.903E-02
Th-234	1.8348E+00	9.118E-01	9.128E-01
Pb-214	1.2945E+00	2.486E-01	2.533E-01
Pb-210	2.9609E+00	1.896E+00	1.897E+00
AM-241	3.0788E-01	2.098E-01	2.101E-01

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

WI07-0963 D2 Grid D4-2 0-6 in. F.R. 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) 1.8196009E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0964 D2 Grid D4-3 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:29:42 Page 1
8905696 Spectrum name: Win00546.An1

Sample description
WI07-0964 D2 Grid D4-3 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00546.An1

Acquisition information
Start time: 06-Aug-2007 16:19:30
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: 3.6190E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6190E+02) = 2.7632E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:29:42 Page 2
8905696 Spectrum name: Win00546.An1

WI07-0964 D2 Grid D4-3 0-6 in. F.R. 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: 0.1225

********** U N I D E N T I F I E D P E A K S U 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	5442.	11290.	18.816	2.64	0.854	-	D
16.90	4.21	15014.	8813.	14.689	4.47	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	124.	66.	0.109	65.25	0.694
AM-241	237.89	59.65	168.	188.	0.313	31.20	1.001
Th-234	254.00	63.68	102.	66.	0.109	62.89	0.788s
Pb-214	298.54	74.81	132.	82.	0.137	45.08	0.917D
Pb-212	298.56	74.81	98.	0.	0.000	205.41	0.522D
Pb-212	307.74	77.11	111.	164.	0.274	23.91	0.919D
Pb-214	307.74	77.11	170.	0.	0.000	683.21	0.372D
Pb-214	347.08	86.94	75.	37.	0.062	83.22	0.708
Th-234	368.72	92.35	48.	74.	0.123	35.23	0.933D
Ac-228	380.72	95.35	57.	14.	0.023	164.62	0.936D
Ac-228	835.97	209.14	21.	39.	0.065	53.54	0.762s
Pb-212	953.94	238.62	21.	260.	0.434	13.36	1.057D
Pb-214	967.37	241.98	27.	49.	0.082	41.29	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:29:42 Page 3
8905696 Spectrum name: Win00546.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.65	270.29	3.	34.	0.057	38.69	1.239
Pb-214	1181.41	295.48	15.	60.	0.101	37.62	0.620s
Ac-228	1310.00	327.62	18.	1.	0.002	1356.47	0.000s
Ac-228	1352.80	338.32	8.	60.	0.101	31.89	0.569s
Pb-214	1407.24	351.92	7.	88.	0.146	25.19	1.198s

WI07-0964 D2 Grid D4-3 0-6 in. F.R. 080607

Ac-228	1852.21	463.13	2.	14.	0.024	58.92	0.316s
Bi-214	2436.49	609.16	7.	58.	0.097	32.62	1.406
CS-137	2647.36	661.86	2.	40.	0.066	34.73	0.408s
Bi-214	3073.19	768.27	3.	11.	0.018	90.50	0.290s
Ac-228	3177.00	794.22	0.	17.	0.028	48.51	0.417s
Ac-228	3646.24	911.48	0.	51.	0.085	28.01	0.521s
Bi-214	3736.25	933.97	0.	6.	0.010	81.65	0.375s
Ac-228	3858.81	964.60	1.	4.	0.006	141.08	1.595D
Ac-228	3876.86	969.11	3.	38.	0.063	34.99	1.598D
Bi-214	4483.83	1120.78	0.	12.	0.020	57.74	0.375s
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	5844.23	1460.70	0.	48.	0.080	28.87	0.693s
Ac-228	6355.00	1588.32	1.	0.	0.000	0.00	0.000s
Bi-214	7059.33	1764.29	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	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0669E-04	609.31	2.697E-04	(	1.988E-05	G K
			1764.49	3.914E-04	?(	3.558E-05	G
			1120.29	2.920E-04	?(	2.433E-05	G
			1238.11	4.068E-04	?(	6.779E-05	G
			768.36	5.645E-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	5.830E-04	+	3.887E-04	G
K-40	N	2.1133E-03	1460.81	2.113E-03	?(	4.403E-05	G
Ac-228	N	6.5099E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	7.368E-04	(	5.869E-05	G
			338.32	7.090E-04	(	5.453E-05	G
			964.60	2.216E-04	-	2.285E-04	G
			794.70	9.995E-04	+	3.735E-04	G
			463.00	5.652E-04	?(	8.976E-05	G
			209.28	8.252E-04	?(	1.481E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:29:42 Page 4
8905696 Spectrum name: Win00546.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.073E-03	+	2.848E-04	G
		1588.00	0.000E+00	?	2.905E-04	G
		95.35	2.650E-04	-	2.394E-04	X
		327.64	0.000E+00	%	2.722E-04	G
Pb-212	N 6.0683E-04	238.62	5.979E-04	(	1.609E-05	G K
		77.11	6.289E-04	(	5.892E-05	Energy duplication
		74.81	0.000E+00	%	9.374E-05	Energy duplication
CS-137	1.0749E-04	661.66	1.075E-04	(	7.364E-06	G
Th-234	N 1.0573E-03	92.35	9.234E-04	(	1.286E-04	G
		63.29	1.248E-03	@(	2.825E-04	G

WI07-0964 D2 Grid D4-3 0-6 in. F.R. 080607

Pb-214	N	3.4282E-04	351.92	3.247E-04	*(	1.616E-05		G K
			295.21	3.779E-04	(	3.720E-05		G
			77.11	0.000E+00	%	1.245E-04	Energy duplication	
			241.98	6.793E-04	+	1.775E-04		G
			74.81	9.203E-04	+	2.365E-04	Energy duplication	
			87.30	5.369E-04	+	2.246E-04		X
Pb-210	N	1.3371E-03	46.50	1.337E-03	(	3.312E-04		G
AM-241		3.8712E-04	59.54	3.871E-04	(	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

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:29:42 Page 5
8905696 Spectrum name: Win00546.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		8.4744E-01	2.569E-01	2.588E-01
K-40	#	5.8395E+00	1.686E+00	1.700E+00
Ac-228		1.7988E+00	3.481E-01	3.546E-01
Pb-212		1.6768E+00	2.241E-01	2.327E-01
CS-137		2.9702E-01	1.032E-01	1.038E-01
Th-234		2.9214E+00	1.029E+00	1.032E+00
Pb-214		9.4728E-01	2.144E-01	2.173E-01
Pb-210		3.6947E+00	2.411E+00	2.412E+00
AM-241		1.0697E+00	3.337E-01	3.361E-01

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

WI07-0964 D2 Grid D4-3 0-6 in. F.R. 080607

& - 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) 1.9092670E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0571 D2 Grid E0-1 0-6 in. Free Release 072507

Sample description
WI07- 0571 D2 Grid E0-1 0-6" Free Rel. 072507

Spectrum Filename: C:\User\Win00323.An1

Acquisition information
Start time: 25-Jul-2007 15:38:40
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: 3.4100E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4100E+02) = 2.9326E+03
Detection limit method: Traditional ORTEC method

WI07-0571 D2 Grid E0-1 0-6 in. Free Release 072507

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1685

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
14.84	3.90	3879.	15541.	25.902	2.27	2.335	CU-64 s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.52	46.56	31.	50.	0.083	52.22	1.034
AM-241	237.34	59.51	62.	76.	0.126	45.44	0.393s
Th-234	251.71	63.10	69.	46.	0.077	78.02	0.757
Pb-214	298.54	74.81	71.	72.	0.120	40.78	0.917D
Pb-212	298.56	74.81	70.	0.	0.000	260.42	0.333D
Pb-212	307.74	77.11	75.	121.	0.202	27.18	0.919D
Pb-214	307.74	77.11	144.	0.	0.000	764.20	0.258D
Pb-214	346.62	86.83	35.	54.	0.090	45.65	0.660s
Th-234	368.72	92.35	46.	49.	0.082	47.99	0.933D
Ac-228	380.72	95.35	32.	11.	0.019	154.97	0.935D
Ac-228	837.62	209.55	17.	34.	0.057	58.58	0.413s
Pb-212	953.94	238.62	23.	163.	0.271	17.76	1.057D
Pb-214	967.37	241.98	21.	37.	0.061	48.34	1.060D
Ac-228	1080.82	270.34	3.	35.	0.058	39.79	0.569s

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 15:48:51 Page 3
EnergySolutions Spectrum name: Win00323.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.17	295.42	2.	46.	0.078	31.97	0.687s
Ac-228	1307.03	326.87	12.	14.	0.024	101.80	0.239s
Ac-228	1352.63	338.27	5.	36.	0.061	39.65	1.394s
Pb-214	1406.91	351.84	4.	98.	0.164	21.85	1.154s
Ac-228	1847.00	461.83	13.	3.	0.005	443.05	0.000s

WI07-0571 D2 Grid E0-1 0-6 in. Free Release 072507

Bi-214	2437.59	609.43	0.	61.	0.102	25.61	0.993s
CS-137	2641.00	660.27	0.	20.	0.033	44.72	0.250s
Bi-214	3070.33	767.56	2.	1.	0.001	478.42	0.197s
Ac-228	3177.00	794.22	0.	0.	0.000	0.00	0.000s
Ac-228	3645.27	911.24	0.	32.	0.053	35.36	0.469s
Bi-214	3735.00	933.66	0.	0.	0.001	223.61	0.100s
Ac-228	3858.81	964.60	2.	8.	0.013	88.71	1.595D
Ac-228	3876.86	969.11	3.	18.	0.029	55.89	1.598D
Bi-214	4482.00	1120.33	0.	13.	0.022	55.47	0.625s
Bi-214	4950.60	1237.42	0.	13.	0.022	55.47	0.375s
Bi-214	5510.00	1377.19	0.	1.	0.002	200.00	0.250s
K-40	5844.40	1460.75	0.	69.	0.115	24.08	1.495
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.50	1764.33	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.8298E-04	609.31	2.837E-04	(	4.650E-06	G K
			1764.49	2.491E-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	0.000E+00	&	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	3.0379E-03	1460.81	3.038E-03	?(	4.403E-05	G
Ac-228	N	3.7487E-04	911.07	3.524E-04	?(	1.101E-05	G K
			969.11	3.429E-04	(	6.085E-05	G
			338.32	4.258E-04	(	4.214E-05	G
			964.60	4.850E-04	(	1.623E-04	G
			794.70	0.000E+00	?	5.880E-05	G
			463.00	0.000E+00	&	2.408E-04	G
			209.28	7.194E-04	+	2.245E-04	G
			270.23	1.088E-03	+	2.884E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	2.150E-04	-	1.885E-04	X
		327.64	5.837E-04	&	3.147E-04	G
Pb-212	N 3.7426E-04	238.62	3.743E-04	(	1.683E-05	G K
		77.11	4.636E-04	+	7.773E-05	Energy duplication
		74.81	0.000E+00	%	7.995E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	&(	2.710E-06	G
Th-234	N 7.2374E-04	92.35	6.165E-04	(	1.255E-04	G
		63.29	8.763E-04	$(	2.335E-04	G
Pb-214	N 3.6420E-04	351.92	3.642E-04	*(	1.205E-05	G K

WI07-0571 D2 Grid E0-1 0-6 in. Free Release 072507

			295.21	2.913E-04	-	6.522E-05	G
			77.11	0.000E+00	%	1.147E-04	Energy duplication
			241.98	5.090E-04	+	1.560E-04	G
			74.81	8.011E-04	+	1.944E-04	Energy duplication
			87.30	7.860E-04	+	2.010E-04	X
Pb-210	N	1.0173E-03	46.50	1.017E-03	(	1.717E-04	G
AM-241		1.5546E-04	59.54	1.555E-04	@(	2.407E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 15:48:51 Page 5
EnergySolutions Spectrum name: Win00323.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	8.2986E-01	2.125E-01	2.148E-01
K-40 #	8.9088E+00	2.145E+00	2.171E+00
Ac-228	1.0993E+00	3.230E-01	3.256E-01
Pb-212	1.0975E+00	1.949E-01	1.992E-01
CS-137 #	1.5894E-01	7.108E-02	7.134E-02
Th-234	2.1224E+00	9.720E-01	9.733E-01
Pb-214	1.0680E+00	2.334E-01	2.368E-01
Pb-210	2.9832E+00	1.558E+00	1.559E+00
AM-241 #	4.5591E-01	2.072E-01	2.079E-01

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

WI07-0571 D2 Grid E0-1 0-6 in. Free Release 072507

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 1.8724060E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0572 D2 Grid E0-2 0-6 in. Free Release 072507

Sample description
WI07- 0572 D2 Grid E0-2 Free Rel 072507

Spectrum Filename: C:\User\Win00324.An1

Acquisition information

Start time:	25-Jul-2007 16:07:03
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:	3.0950E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.0950E+02) = 3.2310E+03
Detection limit method:	Traditional ORTEC method

WI07-0572 D2 Grid E0-2 0-6 in. Free Release 072507

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1002

********** U N I D E N T I F I E D P E A K S U 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	5605.	13179.	21.965	2.37	0.854	-	D
17.84	4.43	16142.	9610.	16.016	4.26	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	185.41	46.53	18.	29.	0.048	59.33	0.575s
AM-241	235.55	59.06	7.	2.	0.004	314.29	0.315s
Th-234	250.07	62.69	53.	48.	0.079	65.44	0.612s
Pb-214	298.54	74.81	73.	86.	0.144	35.19	0.917D
Pb-212	298.56	74.81	82.	0.	0.000	455.27	0.612D
Pb-212	307.74	77.11	58.	140.	0.234	22.80	0.919D
Pb-214	307.74	77.11	171.	0.	0.000	157.92	0.000D
Pb-214	347.31	87.00	56.	59.	0.098	53.13	1.263s
Th-234	371.16	92.96	38.	84.	0.139	35.10	0.786s
Ac-228	382.17	95.71	26.	0.	0.000	0.00	0.936
Ac-228	836.71	209.32	12.	37.	0.062	46.77	0.419s
Pb-212	953.94	238.62	23.	190.	0.316	16.19	1.057D
Pb-214	967.37	241.98	27.	35.	0.059	53.66	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.87	270.10	10.	28.	0.047	57.90	0.596s
Pb-214	1181.18	295.42	9.	67.	0.112	30.30	1.179
Ac-228	1311.00	327.87	4.	0.	0.000	0.00	0.000s
Ac-228	1351.85	338.08	10.	58.	0.097	34.71	0.796s
Pb-214	1407.53	351.99	5.	86.	0.144	23.38	1.297

WI07-0572 D2 Grid E0-2 0-6 in. Free Release 072507

Ac-228	1850.72	462.76	3.	21.	0.035	53.47	0.720s
Bi-214	2437.67	609.45	0.	61.	0.102	25.61	0.950s
CS-137	2646.67	661.68	0.	20.	0.033	44.72	0.729s
Bi-214	3069.00	767.23	0.	9.	0.015	66.67	0.250s
Ac-228	3180.97	795.21	4.	19.	0.032	65.74	0.320s
Ac-228	3646.72	911.60	0.	36.	0.060	33.33	0.562s
Bi-214	3735.00	933.66	0.	4.	0.007	100.00	0.750s
Ac-228	3858.81	964.60	2.	8.	0.014	81.61	1.595D
Ac-228	3876.86	969.11	3.	20.	0.033	51.27	1.598D
Bi-214	4482.80	1120.53	0.	15.	0.025	51.64	0.562s
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	5845.19	1460.94	0.	54.	0.090	27.22	0.791s
Ac-228	6354.50	1588.20	0.	5.	0.008	89.44	0.500s
Bi-214	7059.67	1764.38	0.	9.	0.015	66.67	0.625s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1032E-04	609.31	2.837E-04	(	4.650E-06	G K
			1764.49	3.203E-04	?(	3.558E-05	G
			1120.29	3.650E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	1.356E-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	?(	9.716E-05	G
K-40	N	2.3775E-03	1460.81	2.377E-03	?(	4.403E-05	G
Ac-228	N	4.0579E-04	911.07	3.965E-04	?(	1.101E-05	G K
			969.11	3.868E-04	(	5.887E-05	G
			338.32	6.797E-04	+	1.427E-04	G
			964.60	5.161E-04	(	1.468E-04	G
			794.70	1.117E-03	+	4.293E-04	G
			463.00	8.250E-04	+	2.902E-04	G
			209.28	7.900E-04	+	2.203E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.904E-04	+	2.884E-04	G
		1588.00	7.262E-04	+	5.376E-04	G
		95.35	0.000E+00		1.489E-04	X
		327.64	0.000E+00	?	1.373E-04	G
Pb-212	N 4.3633E-04	238.62	4.363E-04	(	1.682E-05	G K
		77.11	5.371E-04	+	7.812E-05	Energy duplication
		74.81	0.000E+00	%	8.650E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 9.8664E-04	92.35	1.042E-03	&(	1.145E-04	G
		63.29	9.081E-04	&(	2.065E-04	G

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                WI07-0572  D2  Grid  E0-2  0-6 in. Free Release  072507
Pb-214    N   3.1975E-04     351.92 3.198E-04  (  1.332E-05          G K
                             295.21 4.197E-04 +   8.043E-05          G
                              77.11 0.000E+00 ?   1.247E-04Energy duplication
                             241.98 4.858E-04 +   1.610E-04          G
                              74.81 9.650E-04 +   2.047E-04Energy duplication
                              87.30 8.561E-04 +   2.274E-04          X

Pb-210    N   5.9200E-04      46.50 5.920E-04  (  1.331E-04          G

AM-241        0.0000E+00      59.54 0.000E+00 %   9.826E-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
```

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     ORTEC g v - i (  63) wan32  G53W2.06  25-JUL-2007 16:17:14 Page    5
EnergySolutions                    Spectrum name: Win00324.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        1.0027E+00     2.568E-01    2.595E-01
K-40    #     7.6817E+00     2.091E+00    2.110E+00
Ac-228        1.3111E+00     4.370E-01    4.398E-01
Pb-212        1.4098E+00     2.282E-01    2.342E-01
CS-137  #     1.7511E-01     7.831E-02    7.860E-02
Th-234  #     3.1879E+00     1.119E+00    1.121E+00
Pb-214        1.0331E+00     2.416E-01    2.447E-01
Pb-210        1.9128E+00     1.135E+00    1.136E+00
AM-241  <     3.1749E-02

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

WI07-0572 D2 Grid E0-2 0-6 in. Free Release 072507

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

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

Total Activity (2.7 to 1999.3 keV) 1.7714172E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07-0573 D2 Grid E0-3 0-6 in. Free Release 072507

Sample description
WI07- 0573 D2 Grid E0-3 Free Rel. 072507

Spectrum Filename: C:\User\Win00325.An1

Acquisition information
Start time: 25-Jul-2007 16:20:23
Live time: 600
Real time: 602
Dead time: 0.27 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 2.9380E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.9380E+02) = 3.4037E+03
Detection limit method: Traditional ORTEC method

WI07-0573 D2 Grid E0-3 0-6 in. Free Release 072507

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

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

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

Energy Calibration
Normalized diff: 0.1536

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.79	2.92	4855.	11877.	19.794	2.47	0.854	-	D
17.81	4.42	14368.	8652.	14.420	4.47	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	184.90	46.40	37.	41.	0.068	63.19	0.316s
AM-241	236.68	59.35	60.	84.	0.141	41.85	0.607s
Th-234	253.50	63.55	48.	36.	0.061	75.33	0.387s
Pb-214	298.54	74.81	61.	76.	0.126	37.15	0.917D
Pb-212	298.56	74.81	78.	0.	0.000	320.16	0.392D
Pb-212	307.74	77.11	50.	118.	0.196	25.05	0.919D
Pb-214	307.74	77.11	106.	0.	0.000	271.51	0.806D
Pb-214	347.29	86.99	28.	77.	0.128	33.90	0.937s
Th-234	371.31	93.00	54.	75.	0.125	46.05	1.092s
Ac-228	380.72	95.35	7.	0.	0.000	0.00	0.257D
Ac-228	836.52	209.28	11.	38.	0.064	44.61	0.391s
Pb-212	953.94	238.62	24.	172.	0.287	17.20	1.057D
Pb-214	967.37	241.98	24.	41.	0.069	45.43	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.19	269.93	5.	12.	0.021	85.64	0.333s
Pb-214	1180.01	295.13	4.	62.	0.103	29.21	1.342s
Ac-228	1312.15	328.16	6.	16.	0.027	79.06	0.267s
Ac-228	1352.34	338.20	3.	50.	0.083	31.50	0.953
Pb-214	1407.39	351.96	7.	95.	0.158	23.99	1.300s

WI07-0573 D2 Grid E0-3 0-6 in. Free Release 072507

Ac-228	1852.60	463.23	0.	14.	0.023	53.45	0.375s
Bi-214	2437.19	609.33	0.	65.	0.108	24.81	0.437s
CS-137	2646.15	661.55	0.	30.	0.050	36.51	0.729s
Bi-214	3074.33	768.56	0.	13.	0.022	55.47	0.500s
Ac-228	3181.70	795.39	0.	12.	0.020	57.74	0.500s
Ac-228	3645.00	911.17	20.	0.	0.000	0.00	0.000s
Bi-214	3736.20	933.96	0.	5.	0.008	89.44	0.312s
Ac-228	3858.81	964.60	0.	0.	0.000	0.00	0.250D
Ac-228	3875.61	968.80	0.	18.	0.030	47.14	1.062s
Bi-214	4484.52	1120.96	5.	2.	0.004	302.37	0.421s
Bi-214	4951.00	1237.52	0.	13.	0.022	55.47	0.250s
Bi-214	5510.50	1377.32	0.	4.	0.007	100.00	0.999s
K-40	5845.20	1460.95	0.	64.	0.107	25.00	1.699
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.00	1764.21	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	3.0228E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	7.117E-05	-	9.115E-05	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	8.813E-04	+	3.812E-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	2.8178E-03	1460.81	2.818E-03	(	4.403E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	7.877E-05	G K
			969.11	3.495E-04	?	1.266E-04	G
			338.32	5.860E-04	$	1.267E-04	G
			964.60	0.000E+00	?	6.173E-05	G
			794.70	7.056E-04	?	3.189E-04	G
			463.00	5.457E-04	?	2.267E-04	G
			209.28	8.076E-04	$	2.203E-04	G

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 16:30:33 Page 4
EnergySolutions Spectrum name: Win00325.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	3.853E-04	$	1.985E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	8.062E-05	X
		327.64	6.516E-04	$	2.913E-04	G
Pb-212	N 4.1196E-04	238.62	3.961E-04	(	1.699E-05	G K
		77.11	4.513E-04	(	4.027E-05	Energy duplication
		74.81	0.000E+00	%	8.420E-05	Energy duplication
CS-137	8.1297E-05	661.66	8.130E-05	?(	2.710E-06	G
Th-234	N 8.3648E-04	92.35	9.378E-04	&(	1.359E-04	G
		63.29	6.922E-04	$(	1.958E-04	G

WI07-0573 D2 Grid E0-3 0-6 in. Free Release 072507

Pb-214	N	3.6347E-04	351.92	3.506E-04	(	1.616E-05	G K
			295.21	3.884E-04	@(	2.113E-05	G
			77.11	0.000E+00	%	9.889E-05	Energy duplication
			241.98	5.728E-04	+	1.647E-04	G
			74.81	8.459E-04	+	1.904E-04	Energy duplication
			87.30	1.117E-03	+	2.177E-04	X
Pb-210	N	8.3016E-04	46.50	8.302E-04	(	1.869E-04	G
AM-241		1.7400E-04	59.54	1.740E-04	(	2.352E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 25-JUL-2007 16:30:33 Page 5
EnergySolutions Spectrum name: Win00325.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	1.0289E+00	2.552E-01	2.581E-01
K-40	9.5908E+00	2.398E+00	2.425E+00
Ac-228 B<	2.6809E-01		
Pb-212	1.4022E+00	2.130E-01	2.194E-01
CS-137 #	2.7671E-01	1.010E-01	1.016E-01
Th-234	2.8471E+00	1.257E+00	1.259E+00
Pb-214	1.2372E+00	2.338E-01	2.384E-01
Pb-210	2.8256E+00	1.786E+00	1.787E+00
AM-241	5.9223E-01	2.478E-01	2.488E-01

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

WI07-0573 D2 Grid E0-3 0-6 in. Free Release 072507

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

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

Total Activity (2.7 to 1999.3 keV) 1.9800642E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Finn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: EnergySolutions

WI07 - 0989 D1 Grid E0-4 0-6in Free. R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:09:21 Page 1
8905696 Spectrum name: Win00371.An1

Sample description
WI07-0989 D1 Grid E0-4 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00371.An1

Acquisition information
Start time: 07-Aug-2007 09:55:19
Live time: 600
Real time: 603
Dead time: 0.50 %
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: 3.4600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4600E+02) = 2.8902E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:09:21 Page 2
8905696 Spectrum name: Win00371.An1

WI07 - 0989 D1 Grid E0-4 0-6in Free. R. 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: 0.1179

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
28.83	7.39	96.	493.	0.821	11.92	1.326	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	185.80	46.62	28.	37.	0.061	65.74	0.486s
AM-241	237.99	59.66	51.	39.	0.066	76.29	0.465s
Th-234	250.62	62.82	52.	40.	0.066	75.65	0.401s
Pb-214	298.61	74.81	53.	55.	0.092	45.76	0.971D
Pb-212	298.63	74.81	88.	0.	0.000	794.03	0.347D
Pb-212	307.80	77.11	76.	110.	0.183	29.46	0.972D
Pb-214	307.80	77.11	192.	0.	0.000	110.75	0.215D
Pb-214	347.74	87.09	32.	48.	0.081	50.74	1.346s
Th-234	368.79	92.35	31.	43.	0.071	47.91	0.985D
Ac-228	380.79	95.35	33.	5.	0.008	372.80	0.987D
Ac-228	838.92	209.85	20.	8.	0.014	197.21	0.231s
Pb-212	954.08	238.62	26.	154.	0.257	18.60	1.099D
Pb-214	967.50	241.98	35.	23.	0.039	82.73	1.101D
Ac-228	1080.00	270.10	15.	5.	0.009	256.78	0.000s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:09:21 Page 3
8905696 Spectrum name: Win00371.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1181.66	295.50	6.	56.	0.093	32.55	0.562s
Ac-228	1309.65	327.49	12.	32.	0.052	59.25	0.660s
Ac-228	1352.83	338.28	6.	45.	0.074	37.74	1.044
Pb-214	1407.71	351.99	2.	66.	0.109	26.31	0.641s
Ac-228	1852.35	463.11	0.	23.	0.038	41.70	0.625s

WI07 - 0989 D1 Grid E0-4 0-6in Free. R. 080707

Bi-214	2437.62	609.37	0.	47.	0.078	29.17	0.687s
CS-137	2647.00	661.70	0.	18.	0.030	47.14	0.312s
Bi-214	3072.00	767.91	0.	0.	0.001	223.61	0.100s
Ac-228	3180.36	794.98	0.	14.	0.023	53.45	0.375s
Ac-228	3646.17	911.38	0.	45.	0.075	29.81	0.604s
Bi-214	3735.00	933.58	0.	0.	0.000	0.00	0.000s
Ac-228	3859.13	964.60	2.	8.	0.014	81.52	1.589D
Ac-228	3877.18	969.11	0.	19.	0.031	47.20	1.591D
Bi-214	4482.64	1120.40	0.	22.	0.037	42.64	0.312s
Bi-214	4958.00	1239.18	0.	8.	0.013	70.71	0.250s
Bi-214	5512.00	1377.61	1.	0.	0.000	0.00	0.000s
K-40	5845.61	1460.97	0.	38.	0.063	32.44	1.312s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	0.250s
Bi-214	7059.47	1764.26	2.	1.	0.002	447.21	0.184s

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

***** S U M M A R Y O F L 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	2.4052E-04	609.31	2.405E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	1.135E-04	G
			1120.29	5.772E-04	+	1.876E-04	G
			1238.11	5.829E-04	&	3.301E-04	G
			768.36	0.000E+00	%	1.138E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	2.318E-04	G
			934.06	0.000E+00	?	1.054E-04	G
K-40	N	1.7888E-03	1460.81	1.789E-03	?(	4.707E-05	G
Ac-228	N	5.5348E-04	911.07	5.379E-04	(	1.195E-05	G K
			969.11	3.921E-04	-	1.406E-04	G
			338.32	5.884E-04	(	5.393E-05	G
			964.60	5.596E-04	(	1.588E-04	G
			794.70	8.976E-04	+	3.728E-04	G
			463.00	9.961E-04	+	3.162E-04	G
			209.28	2.059E-04	&	1.938E-04	G
			270.23	0.000E+00	%	2.424E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 10:09:21 Page 4
8905696 Spectrum name: Win00371.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	2.079E-04	X
		327.64	1.444E-03	+	4.485E-04	G
Pb-212	N 4.0382E-04	238.62	4.038E-04	(	2.014E-05	G K
		77.11	5.083E-04	+	9.155E-05	Energy duplication
		74.81	0.000E+00	%	1.077E-04	Energy duplication
CS-137	5.3522E-05	661.66	5.352E-05	?(	2.973E-06	G
Th-234	N 7.4511E-04	92.35	6.288E-04	(	1.236E-04	G
		63.29	9.107E-04	?(	2.481E-04	G
Pb-214	N 2.8807E-04	351.92	2.723E-04	(	1.160E-05	G K

WI07 - 0989 D1 Grid E0-4 0-6in Free. R. 080707

			295.21	3.940E-04	+	8.243E-05		G
			77.11	0.000E+00	?	1.594E-04	Energy duplication	
			241.98	3.665E-04	(	1.393E-04		G
			74.81	7.484E-04	+	2.054E-04	Energy duplication	
			87.30	8.373E-04	+	2.285E-04		X
Pb-210	N	8.5894E-04	46.50	8.589E-04	*(	1.884E-04		G
AM-241		9.7515E-05	59.54	9.751E-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 07-AUG-2007 10:09:21 Page 5
8905696 Spectrum name: Win00371.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		6.9513E-01	2.028E-01	2.038E-01
K-40	#	5.1700E+00	1.677E+00	1.684E+00
Ac-228		1.5996E+00	4.769E-01	4.792E-01
Pb-212		1.1671E+00	2.170E-01	2.198E-01
CS-137	#	1.5469E-01	7.292E-02	7.307E-02
Th-234		2.1535E+00	9.642E-01	9.655E-01
Pb-214		8.3256E-01	2.191E-01	2.204E-01
Pb-210	#	2.4825E+00	1.632E+00	1.633E+00
AM-241	#	2.8183E-01	2.150E-01	2.153E-01

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

WI07 - 0989 D1 Grid E0-4 0-6in Free. R. 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 1999.2 keV) 1.4536938E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0574 D2 Grid E0-5 0-6 in.Free rel. 072607

Sample description
WI07-0574 D2 Grid E0-5 0-6" Free Rel. 072607

Spectrum Filename: C:\User\Win00337.An1

Acquisition information
Start time: 26-Jul-2007 07:46:26
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: 3.2080E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2080E+02) = 3.1172E+03
Detection limit method: Traditional ORTEC method

WI07-0574 D2 Grid E0-5 0-6 in.Free rel. 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: 0.1197

********** U N I D E N T I F I E D P E A K S U 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	5339.	12430.	20.716	2.45	0.854	-	D
18.00	4.46	15560.	9139.	15.232	4.39	0.855	-	D
2332.92	583.27	2.	70.	0.116	25.46	0.967	TL-208	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.71	46.86	32.	38.	0.062	65.59	0.934
AM-241	237.96	59.67	35.	17.	0.029	114.35	0.889
Th-234	252.84	63.39	55.	51.	0.085	61.19	1.047s
Pb-214	298.54	74.81	71.	123.	0.205	26.51	0.917D
Pb-212	298.56	74.81	120.	0.	0.000	350.66	0.411D
Pb-212	307.74	77.11	48.	165.	0.275	19.59	0.919D
Pb-214	307.74	77.11	185.	0.	0.000	244.71	0.000D
Pb-214	347.58	87.07	58.	74.	0.123	44.45	0.869
Th-234	368.72	92.35	51.	47.	0.078	51.84	0.933D
Ac-228	380.72	95.35	16.	19.	0.032	74.41	0.935D
Ac-228	835.94	209.13	15.	21.	0.035	74.38	0.473s
Pb-212	953.94	238.62	24.	223.	0.371	14.76	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	19.	37.	0.062	46.78	1.060D
Ac-228	1079.70	270.06	12.	30.	0.050	58.88	0.983s
Pb-214	1180.27	295.19	7.	61.	0.102	30.11	0.496s
Ac-228	1310.13	327.65	4.	18.	0.030	60.86	0.644s
Ac-228	1352.85	338.33	16.	39.	0.065	52.36	1.255

WI07-0574 D2 Grid E0-5 0-6 in.Free rel. 072607

Pb-214	1407.70	352.04	7.	90.	0.151	24.17	1.379
Ac-228	1850.65	462.74	6.	19.	0.031	71.92	0.719s
Bi-214	2437.21	609.34	0.	66.	0.110	24.62	1.022s
CS-137	2648.64	662.18	3.	17.	0.029	61.68	0.851s
Bi-214	3074.00	768.48	0.	1.	0.002	200.00	0.250s
Ac-228	3179.00	794.72	0.	0.	0.001	223.61	0.000s
Ac-228	3645.24	911.23	0.	34.	0.057	34.30	0.937s
Bi-214	3736.00	933.91	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	11.	0.018	70.56	1.595D
Ac-228	3876.86	969.11	6.	22.	0.037	53.12	1.598D
Bi-214	4483.40	1120.67	0.	25.	0.042	40.00	0.375s
Bi-214	4954.00	1238.27	0.	9.	0.015	66.67	0.312s
Bi-214	5512.25	1377.76	0.	5.	0.008	89.44	0.375s
K-40	5845.12	1460.93	0.	48.	0.080	28.87	0.625s
Ac-228	6354.00	1588.07	0.	8.	0.013	70.71	0.250s
Bi-214	7053.83	1762.92	5.	3.	0.005	269.43	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	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.0693E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	0.000E+00	&	1.612E-04	G
			1120.29	6.083E-04	+	1.847E-04	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	0.000E+00	%	1.042E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	2.1133E-03	1460.81	2.113E-03	(	4.403E-05	G
Ac-228	N	4.0773E-04	911.07	3.744E-04	?(	1.101E-05	G K
			969.11	4.265E-04	(	7.787E-05	G
			338.32	4.590E-04	(	7.207E-05	G
			964.60	6.780E-04	+	3.471E-04	G
			794.70	0.000E+00	%	1.176E-04	G
			463.00	7.276E-04	+	2.958E-04	G

ORTEC g v - i (63) wan32 G53W2.06 26-JUL-2007 07:59:17 Page 4
EnergySolutions Spectrum name: Win00337.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.443E-04	?(	1.270E-04	G
		270.23	9.373E-04	+	3.024E-04	G
		1588.00	1.162E-03	+	6.581E-04	G
		95.35	3.692E-04	(	1.185E-04	X
		327.64	7.330E-04	+	2.913E-04	G
Pb-212	N 5.1193E-04	238.62	5.119E-04	(	1.706E-05	G K
		77.11	6.308E-04	+	8.088E-05	Energy duplication
		74.81	0.000E+00	%	1.036E-04	Energy duplication
CS-137	4.6520E-05	661.66	4.652E-05	(	7.947E-06	G
Th-234	N 7.4590E-04	92.35	5.874E-04	(	1.323E-04	G
		63.29	9.716E-04	*(	2.096E-04	G

WI07-0574 D2 Grid E0-5 0-6 in.Free rel. 072607

Pb-214	N	3.5076E-04	351.92	3.346E-04	(	1.550E-05		G K
			295.21	3.821E-04	(	2.678E-05		G
			77.11	0.000E+00	%	1.297E-04	Energy duplication	
			241.98	5.119E-04	+	1.534E-04		G
			74.81	1.371E-03	+	2.255E-04	Energy duplication	
			87.30	1.069E-03	+	2.431E-04		X
Pb-210	N	7.6552E-04	46.50	7.655E-04	?(	1.751E-04		G
AM-241		3.5692E-05	59.54	3.569E-05	?(	1.821E-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 26-JUL-2007 07:59:17 Page 5
EnergySolutions Spectrum name: Win00337.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		9.5676E-01	2.355E-01	2.383E-01
K-40	#	6.5877E+00	1.902E+00	1.918E+00
Ac-228		1.2710E+00	3.392E-01	3.426E-01
Pb-212		1.5958E+00	2.356E-01	2.431E-01
CS-137		1.4501E-01	8.944E-02	8.961E-02
Th-234		2.3251E+00	9.324E-01	9.340E-01
Pb-214		1.0934E+00	2.111E-01	2.150E-01
Pb-210	#	2.3863E+00	1.565E+00	1.566E+00
AM-241	#	1.1126E-01	1.272E-01	1.273E-01

- All peaks for activity calculation had bad shape.

WI07-0574 D2 Grid E0-5 0-6 in.Free rel. 072607

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

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

Total Activity (2.7 to 1999.3 keV) 1.6472277E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: EnergySolutions

WI07-1026 D2 Grid E1-1 0-6 in. Free .R. 080707

Sample description
WI07-1026 D2 Grid E1-1 (re-sample) Free R.080707

Spectrum Filename: C:\User\Win00563.An1

Acquisition information
Start time: 07-Aug-2007 14:06:44
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.0090E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0090E+02) = 2.4944E+03
Detection limit method: Traditional ORTEC method

WI07-1026 D2 Grid E1-1 0-6 in. Free .R. 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: 0.0893

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
14.49	3.81	2910.	23177.	38.628	1.61	2.156	CU-64 s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.37	46.52	86.	41.	0.068	89.13	0.355s
AM-241	237.39	59.52	126.	770.	1.283	8.96	0.820
Th-234	251.97	63.17	78.	52.	0.087	68.54	0.326s
Pb-214	298.54	74.81	90.	105.	0.175	32.15	0.917D
Pb-212	298.56	74.81	118.	0.	0.000	390.51	0.305D
Pb-212	307.74	77.11	78.	164.	0.274	21.74	0.919D
Pb-214	307.74	77.11	274.	0.	0.000	75.99	0.000D
Pb-214	348.18	87.22	60.	44.	0.072	67.40	0.497s
Th-234	371.88	93.14	73.	106.	0.177	38.13	1.026s
Ac-228	380.72	95.35	39.	0.	0.000	0.00	0.935
Ac-228	836.19	209.19	20.	45.	0.075	48.75	0.916s
Pb-212	953.94	238.62	13.	264.	0.439	12.94	1.057D
Pb-214	967.37	241.98	32.	35.	0.059	56.59	1.060D
Ac-228	1080.36	270.22	11.	25.	0.042	63.38	1.011s

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:16:56 Page 3
8905696 Spectrum name: Win00563.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.04	295.14	17.	78.	0.129	33.59	0.789s
Ac-228	1310.67	327.78	3.	17.	0.028	58.23	0.354s
Ac-228	1353.05	338.38	10.	56.	0.093	34.07	1.107
Pb-214	1407.20	351.91	15.	99.	0.165	25.47	1.151
Ac-228	1850.92	462.81	0.	37.	0.062	32.88	1.000

WI07-1026 D2 Grid E1-1 0-6 in. Free .R. 080707

Bi-214	2437.72	609.46	7.	68.	0.113	28.11	1.887s
CS-137	2647.38	661.86	2.	10.	0.016	89.94	0.296s
Bi-214	3075.00	768.73	0.	13.	0.022	55.47	0.562s
Ac-228	3178.80	794.67	3.	9.	0.016	93.68	0.297s
Ac-228	3645.24	911.23	0.	74.	0.123	23.25	1.249
Bi-214	3736.56	934.05	2.	3.	0.004	208.42	0.289s
Ac-228	3858.81	964.60	0.	6.	0.010	80.13	1.595D
Ac-228	3876.86	969.11	0.	32.	0.054	35.14	1.598D
Bi-214	4483.63	1120.73	0.	19.	0.032	45.88	0.542s
Bi-214	4952.33	1237.85	1.	1.	0.001	339.93	0.197s
Bi-214	5512.67	1377.86	1.	0.	0.001	240.37	0.197s
K-40	5845.43	1461.00	0.	46.	0.077	29.49	0.337s
Ac-228	6354.00	1588.07	0.	4.	0.007	100.00	0.250s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.1623E-04	609.31	3.162E-04	(	1.988E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.623E-04	+	1.627E-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	0.000E+00	%	2.164E-04	G
			934.06	0.000E+00	%	3.597E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	(	4.403E-05	G
Ac-228	N	8.1862E-04	911.07	8.150E-04	(	1.101E-05	G K
			969.11	6.289E-04	-	1.663E-04	G
			338.32	6.563E-04	-	1.406E-04	G
			964.60	3.845E-04	-	2.509E-04	G
			794.70	5.488E-04	-	3.189E-04	G
			463.00	1.442E-03	+	3.554E-04	G
			209.28	9.557E-04	(	1.443E-04	G
			270.23	7.915E-04	@(	1.608E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 14:16:56 Page 4
8905696 Spectrum name: Win00563.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	5.810E-04	-	4.898E-04	G
		95.35	0.000E+00	%	1.799E-04	X
		327.64	6.923E-04	?(	1.222E-04	G
Pb-212 N	6.1246E-04	238.62	6.056E-04	(	1.314E-05	G K
		77.11	6.296E-04	(	4.963E-05	Energy duplication
		74.81	0.000E+00	%	1.028E-04	Energy duplication
CS-137	2.5744E-05	661.66	2.574E-05	?(	7.564E-06	G
Th-234 N	1.1908E-03	92.35	1.325E-03	&(	1.570E-04	G
		63.29	1.000E-03	@(	2.469E-04	G
Pb-214 N	4.1666E-04	351.92	3.667E-04	(	2.222E-05	G K

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                WI07-1026  D2  Grid  E1-1   0-6 in.   Free .R. 080707
                           295.21 4.865E-04  (  4.015E-05          G
                            77.11 0.000E+00 ?   1.569E-04Energy duplication
                           241.98 4.859E-04  (  1.175E-04          G
                            74.81 1.172E-03 +   2.261E-04Energy duplication
                            87.30 6.312E-04 +   2.167E-04          X

Pb-210   N   8.3016E-04     46.50 8.302E-04 *(  2.786E-04          G

AM-241       1.5855E-03     59.54 1.586E-03  (  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  07-AUG-2007 14:16:56 Page    5
8905696                          Spectrum name: Win00563.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       7.8880E-01    2.217E-01    2.237E-01
K-40         5.0518E+00    1.490E+00    1.502E+00
Ac-228       2.0419E+00    4.747E-01    4.809E-01
Pb-212       1.5277E+00    1.932E-01    2.016E-01
CS-137 #     6.4215E-02    5.775E-02    5.781E-02
Th-234 #     2.9702E+00    1.132E+00    1.135E+00
Pb-214       1.0393E+00    2.445E-01    2.475E-01
Pb-210 #     2.0707E+00    1.846E+00    1.846E+00
AM-241       3.9549E+00    3.544E-01    3.834E-01

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

WI07-1026 D2 Grid E1-1 0-6 in. Free .R. 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) 1.9509724E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0941 D2 Grid E1-2 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:02:21 Page 1
8905696 Spectrum name: Win00530.An1

Sample description
WI07-0941 D2 Grid E1-2 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00530.An1

Acquisition information
Start time: 06-Aug-2007 08:52:10
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: 3.2160E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2160E+02) = 3.1095E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:02:21 Page 2
8905696 Spectrum name: Win00530.An1

WI07-0941 D2 Grid E1-2 0-6 in. F.R. 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: 0.0839

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
12.17	3.36	6848.	11046.	18.410	2.85	0.854	-	D
17.50	4.70	12660.	9216.	15.359	4.03	0.855	-	D
359.64	89.91	36.	47.	0.079	45.85	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	185.69	46.60	28.	62.	0.103	38.98	1.106s
AM-241	237.89	59.65	75.	134.	0.224	29.15	0.794
Th-234	251.52	63.06	54.	44.	0.073	65.24	0.559s
Pb-214	298.54	74.81	62.	78.	0.130	36.35	0.917D
Pb-212	298.56	74.81	82.	0.	0.000	648.07	0.411D
Pb-212	307.74	77.11	61.	130.	0.217	24.32	0.919D
Pb-214	307.74	77.11	126.	0.	0.000	1658.31	0.652D
Pb-214	348.51	87.30	60.	31.	0.051	80.11	0.928D
Th-234	368.72	92.35	54.	61.	0.102	42.59	0.933D
Ac-228	380.72	95.35	30.	9.	0.015	181.01	0.935D
Ac-228	836.26	209.21	14.	23.	0.038	70.11	0.373s
Pb-212	953.94	238.62	26.	202.	0.337	15.75	1.057D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:02:21 Page 3
8905696 Spectrum name: Win00530.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	35.	36.	0.059	58.09	1.060D
Ac-228	1081.12	270.41	12.	19.	0.032	78.93	0.613s
Pb-214	1181.01	295.38	7.	64.	0.107	30.54	0.489s
Ac-228	1312.86	328.33	10.	22.	0.038	74.24	0.367s
Ac-228	1353.75	338.55	9.	59.	0.098	33.04	1.405s

WI07-0941 D2 Grid E1-2 0-6 in. F.R. 080607

Pb-214	1407.00	351.86	4.	92.	0.153	22.64	0.824s
Ac-228	1850.67	462.75	0.	19.	0.032	45.88	0.250s
Bi-214	2436.94	609.27	0.	66.	0.110	24.62	0.494s
CS-137	2645.90	661.49	0.	22.	0.037	42.64	0.500s
Bi-214	3075.57	768.87	0.	10.	0.017	63.25	0.625s
Ac-228	3180.29	795.04	0.	12.	0.020	57.74	0.375s
Ac-228	3646.17	911.46	0.	49.	0.082	28.57	1.543
Bi-214	3737.00	934.16	0.	1.	0.002	200.00	0.250s
Ac-228	3858.81	964.60	2.	11.	0.018	71.50	1.595D
Ac-228	3876.86	969.11	0.	33.	0.055	34.67	1.598D
Bi-214	4482.00	1120.33	4.	2.	0.004	296.65	0.000s
Bi-214	4952.00	1237.77	1.	0.	0.000	0.00	0.083s
Bi-214	5511.00	1377.44	0.	4.	0.007	100.00	0.750s
K-40	5846.38	1461.24	0.	42.	0.070	30.86	0.437s
Ac-228	6354.00	1588.07	0.	0.	0.001	223.61	0.000s
Bi-214	7059.33	1764.29	1.	1.	0.001	339.93	0.197s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0693E-04	609.31	3.069E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	0.000E+00	?	1.356E-04	G
			768.36	5.211E-04	+	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	+	3.649E-04	G
			934.06	0.000E+00	%	1.943E-04	G
K-40	N	1.8492E-03	1460.81	1.849E-03	(	4.403E-05	G
Ac-228	N	6.1448E-04	911.07	5.396E-04	?(	1.101E-05	G K
			969.11	6.461E-04	(	1.942E-05	G
			338.32	6.915E-04	*(	5.593E-05	G
			964.60	6.715E-04	(	1.617E-04	G
			794.70	7.056E-04	?(	5.880E-05	G
			463.00	7.406E-04	?(	3.898E-05	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	4.867E-04	(	1.230E-04	G
		270.23	6.040E-04	@(	1.673E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	1.766E-04	-	1.800E-04	X
		327.64	9.163E-04	&	3.518E-04	G
Pb-212	N 4.7468E-04	238.62	4.647E-04	(	1.769E-05	G K
		77.11	4.993E-04	(	4.410E-05	Energy duplication
		74.81	0.000E+00	%	8.625E-05	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 7.9319E-04	92.35	7.616E-04	(	1.360E-04	G
		63.29	8.382E-04	(	2.077E-04	G

WI07-0941 D2 Grid E1-2 0-6 in. F.R. 080607

Pb-214	N	3.6655E-04	351.92	3.389E-04	(	1.182E-05		G K
			295.21	4.009E-04	*(	2.678E-05		G
			77.11	0.000E+00	%	1.075E-04	Energy duplication	
			241.98	4.912E-04	+	1.718E-04		G
			74.81	8.723E-04	+	1.924E-04	Energy duplication	
			87.30	4.456E-04	(	1.668E-04		X
Pb-210	N	1.2657E-03	46.50	1.266E-03	(	1.633E-04		G
AM-241		2.7661E-04	59.54	2.766E-04	(	2.621E-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 06-AUG-2007 09:02:21 Page 5
8905696 Spectrum name: Win00530.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	9.5438E-01	2.350E-01	2.377E-01
K-40	5.7499E+00	1.774E+00	1.788E+00
Ac-228	1.9107E+00	3.762E-01	3.829E-01
Pb-212	1.4760E+00	2.139E-01	2.209E-01
CS-137 #	1.8538E-01	7.905E-02	7.936E-02
Th-234	2.4664E+00	9.608E-01	9.625E-01
Pb-214	1.1398E+00	2.580E-01	2.615E-01
Pb-210	3.9355E+00	1.534E+00	1.537E+00
AM-241	8.6011E-01	2.507E-01	2.527E-01

\# - All peaks for activity calculation had bad shape.

WI07-0941 D2 Grid E1-2 0-6 in. F.R. 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) 1.8678127E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0942 D2 Grid E1-3 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:16:06 Page 1
8905696 Spectrum name: Win00531.An1

Sample description
WI07-0942 D2 Grid E1-3 0-6 Free R. 080607

Spectrum Filename: C:\User\Win00531.An1

Acquisition information
Start time: 06-Aug-2007 09:05:56
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: 3.8110E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8110E+02) = 2.6240E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:16:06 Page 2
8905696 Spectrum name: Win00531.An1

WI07-0942 D2 Grid E1-3 0-6 in. F.R. 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: 0.0753

********** U N I D E N T I F I E D P E A K S U 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	4383.	21803.	36.338	1.82	2.184	CU-64	s
2333.31	583.37	5.	61.	0.102	29.05	0.730	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	185.21	46.48	48.	56.	0.093	56.24	0.872s
AM-241	237.27	59.49	85.	92.	0.153	44.44	0.682s
Th-234	252.29	63.25	85.	64.	0.107	59.42	1.171s
Pb-214	298.54	74.81	65.	123.	0.205	25.86	0.917D
Pb-212	298.56	74.81	118.	0.	0.000	774.60	0.142D
Pb-212	307.74	77.11	82.	191.	0.319	19.71	0.919D
Pb-214	307.74	77.11	330.	0.	0.000	73.03	0.547D
Pb-214	348.26	87.24	58.	77.	0.128	41.15	1.110
Th-234	368.72	92.35	84.	51.	0.085	57.69	0.933D
Ac-228	380.72	95.35	43.	4.	0.006	512.33	0.935D
Ac-228	836.52	209.27	16.	43.	0.071	46.19	1.010
Pb-212	953.94	238.62	35.	223.	0.372	15.32	1.057D
Pb-214	967.37	241.98	46.	32.	0.054	68.59	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:16:06 Page 3
8905696 Spectrum name: Win00531.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1078.31	269.71	13.	27.	0.044	65.19	0.854s
Pb-214	1181.01	295.38	6.	62.	0.104	29.42	0.909s
Ac-228	1309.75	327.56	8.	26.	0.044	58.01	0.702s
Ac-228	1352.85	338.33	18.	59.	0.098	40.94	0.797s
Pb-214	1407.73	352.04	3.	103.	0.172	20.82	1.090s

WI07-0942 D2 Grid E1-3 0-6 in. F.R. 080607

Ac-228	1852.90	463.31	4.	21.	0.034	56.75	0.812s
Bi-214	2436.89	609.26	0.	92.	0.153	20.85	0.703s
CS-137	2647.29	661.84	0.	21.	0.035	43.64	0.625s
Bi-214	3066.01	766.48	5.	10.	0.016	111.84	0.202s
Ac-228	3180.62	795.12	0.	16.	0.027	50.00	0.416s
Ac-228	3645.41	911.27	0.	51.	0.085	28.01	0.458s
Bi-214	3737.00	934.16	1.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	0.	13.	0.022	55.38	1.595D
Ac-228	3876.86	969.11	0.	38.	0.063	32.49	1.598D
Bi-214	4482.00	1120.33	2.	0.	0.001	331.66	0.000s
Bi-214	4952.00	1237.77	2.	0.	0.001	368.18	0.000s
Bi-214	5507.67	1376.61	3.	1.	0.002	583.10	0.210s
K-40	5846.41	1461.25	0.	37.	0.062	32.88	1.037s
Ac-228	6354.67	1588.24	0.	8.	0.013	70.71	0.375s
Bi-214	7061.50	1764.83	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	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.3529E-04	609.31	4.278E-04	(	4.650E-06	G K
			1764.49	2.491E-04	-	1.521E-04	G
			1120.29	0.000E+00	%	6.233E-05	G
			1238.11	0.000E+00	%	1.737E-04	G
			768.36	5.037E-04	&(	1.982E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	&	3.649E-04	G
			934.06	0.000E+00	?	1.943E-04	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	6.8639E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	7.358E-04	(	1.942E-05	G
			338.32	6.875E-04	@(	7.707E-05	G
			964.60	8.051E-04	(	6.173E-05	G
			794.70	9.408E-04	+	3.633E-04	G
			463.00	8.055E-04	(	1.359E-04	G
			209.28	9.028E-04	(	1.320E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:16:06 Page 4
8905696 Spectrum name: Win00531.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.331E-04	*(	1.777E-04	G
		1588.00	1.162E-03	+	6.581E-04	G
		95.35	0.000E+00	%	1.966E-04	X
		327.64	1.079E-03	+	3.617E-04	G
Pb-212	N 5.1313E-04	238.62	5.131E-04	(	2.033E-05	G K
		77.11	7.317E-04	+	9.139E-05	Energy duplication
		74.81	0.000E+00	%	1.028E-04	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	(	2.710E-06	G
Th-234	N 8.7880E-04	92.35	6.397E-04	(	1.678E-04	G
		63.29	1.219E-03	$(	2.581E-04	G

WI07-0942 D2 Grid E1-3 0-6 in. F.R. 080607

Pb-214	N	3.9201E-04	351.92	3.815E-04	@(	1.111E-05	G K
			295.21	3.905E-04	@(	2.445E-05	G
			77.11	0.000E+00	?	1.719E-04	Energy duplication
			241.98	4.482E-04	(	1.391E-04	G
			74.81	1.373E-03	+	2.221E-04	Energy duplication
			87.30	1.117E-03	+	2.458E-04	X
Pb-210	N	1.1432E-03	46.50	1.143E-03	@(	2.105E-04	G
AM-241		1.8944E-04	59.54	1.894E-04	*(	2.790E-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 09:16:06 Page 5
8905696 Spectrum name: Win00531.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	1.1422E+00	2.382E-01	2.420E-01
K-40 #	4.2745E+00	1.405E+00	1.415E+00
Ac-228	1.8011E+00	3.274E-01	3.342E-01
Pb-212	1.3465E+00	2.063E-01	2.124E-01
CS-137 #	1.4932E-01	6.517E-02	6.542E-02
Th-234	2.3060E+00	9.549E-01	9.564E-01
Pb-214	1.0286E+00	2.142E-01	2.176E-01
Pb-210 #	2.9997E+00	1.687E+00	1.689E+00
AM-241 #	4.9709E-01	2.209E-01	2.217E-01

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

WI07-0942 D2 Grid E1-3 0-6 in. F.R. 080607

& - 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) 1.5544925E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Lenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0943 D2 Grid E1-4 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:31:06 Page 1
8905696 Spectrum name: Win00532.An1

Sample description
WI07-0943 D2 Grid E1-4 0-6 Free R. 080607

Spectrum Filename: C:\User\Win00532.An1

Acquisition information
Start time: 06-Aug-2007 09:20:56
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: 3.9810E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.9810E+02) = 2.5119E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:31:06 Page 2
8905696 Spectrum name: Win00532.An1

WI07-0943 D2 Grid E1-4 0-6 in. F.R. 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: 0.1530

********** U N I D E N T I F I E D P E A K S U 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	4728.	19074.	31.790	2.04	2.346	CU-64 s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.30	46.50	38.	48.	0.079	56.29	0.861s
AM-241	237.58	59.57	44.	10.	0.016	228.93	0.665s
Th-234	252.22	63.23	51.	49.	0.081	60.92	0.422s
Pb-214	298.54	74.81	89.	73.	0.122	43.37	0.917D
Pb-212	298.56	74.81	90.	0.	0.000	305.51	0.351D
Pb-212	307.74	77.11	76.	143.	0.238	24.09	0.919D
Pb-214	307.74	77.11	183.	0.	0.000	0.00	0.451D
Pb-214	348.26	87.24	52.	60.	0.100	48.99	1.162s
Th-234	368.72	92.35	61.	46.	0.077	56.45	0.933D
Ac-228	380.72	95.35	32.	6.	0.010	275.78	0.935D
Ac-228	836.38	209.24	22.	36.	0.061	58.82	0.473s
Pb-212	953.94	238.62	26.	169.	0.282	17.56	1.057D
Pb-214	967.37	241.98	31.	26.	0.043	72.53	1.060D
Ac-228	1081.16	270.42	21.	33.	0.055	65.56	0.315s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:31:06 Page 3
8905696 Spectrum name: Win00532.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.31	295.20	15.	63.	0.105	34.12	1.218s
Ac-228	1311.86	328.08	13.	15.	0.024	108.71	0.230s
Ac-228	1352.81	338.32	9.	48.	0.080	38.19	0.603s
Pb-214	1408.03	352.12	16.	77.	0.129	31.01	1.057
Ac-228	1850.63	462.74	3.	19.	0.032	58.61	0.270s

WI07-0943 D2 Grid E1-4 0-6 in. F.R. 080607

Bi-214	2438.14	609.57	5.	75.	0.125	27.05	0.819s
CS-137	2646.00	661.52	0.	21.	0.035	43.64	0.666s
Bi-214	3071.60	767.88	0.	6.	0.010	81.65	0.250s
Ac-228	3180.91	795.19	0.	11.	0.018	60.30	0.500s
Ac-228	3646.73	911.60	0.	45.	0.075	29.81	0.950s
Bi-214	3737.00	934.16	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	4.	10.	0.017	84.38	1.595D
Ac-228	3876.86	969.11	2.	27.	0.045	41.47	1.598D
Bi-214	4482.00	1120.33	0.	24.	0.040	40.82	0.645s
Bi-214	4946.00	1236.27	0.	11.	0.018	60.30	0.250s
Bi-214	5514.29	1378.26	0.	8.	0.013	70.71	0.312s
K-40	5845.90	1461.12	0.	68.	0.113	24.25	1.234s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
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	3.4594E-04	609.31	3.496E-04	(	1.697E-05	G K
			1764.49	0.000E+00	%	9.115E-05	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	7.457E-04	&	3.537E-04	G
			768.36	3.127E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	8.655E-04	+	4.902E-04	G
			934.06	1.943E-04	-	2.489E-04	G
K-40	N	2.9939E-03	1460.81	2.994E-03	(	4.403E-05	G
Ac-228	N	5.6229E-04	911.07	4.956E-04	(	1.101E-05	G K
			969.11	5.223E-04	(	5.070E-05	G
			338.32	5.625E-04	@(	5.593E-05	G
			964.60	6.200E-04	(	2.072E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	7.406E-04	(	1.169E-04	G
			209.28	7.723E-04	@(	1.529E-04	G
			270.23	1.031E-03	+	3.407E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:31:06 Page 4
8905696 Spectrum name: Win00532.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	0.000E+00	%	1.778E-04	X
		327.64	5.973E-04	?(	2.316E-04	G
Pb-212	N 3.8884E-04	238.62	3.888E-04	(	1.770E-05	G K
		77.11	5.461E-04	+	8.206E-05	Energy duplication
		74.81	0.000E+00	%	9.020E-05	Energy duplication
CS-137	5.6908E-05	661.66	5.691E-05	?(	2.710E-06	G
Th-234	N 7.1916E-04	92.35	5.731E-04	(	1.443E-04	G
		63.29	9.271E-04	(	2.028E-04	G
Pb-214	N 3.2697E-04	351.92	2.858E-04	(	2.278E-05	G K

WI07-0943 D2 Grid E1-4 0-6 in. F.R. 080607

			295.21	3.947E-04	@(	3.759E-05	G	
			77.11	0.000E+00	?	1.289E-04	Energy duplication	
			241.98	3.579E-04	(	1.162E-04	G	
			74.81	8.153E-04	+	2.065E-04	Energy duplication	
			87.30	8.707E-04	+	2.246E-04	X	
Pb-210	N	9.6966E-04	46.50	9.697E-04	*(	1.873E-04	G	
AM-241		0.0000E+00	59.54	0.000E+00	%	2.225E-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 09:31:06 Page 5
8905696 Spectrum name: Win00532.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	8.6897E-01	2.351E-01	2.373E-01
K-40	7.5204E+00	1.824E+00	1.846E+00
Ac-228	1.4124E+00	3.233E-01	3.276E-01
Pb-212	9.7675E-01	1.716E-01	1.754E-01
CS-137 #	1.4295E-01	6.239E-02	6.263E-02
Th-234	1.8065E+00	7.502E-01	7.514E-01
Pb-214	8.2132E-01	2.353E-01	2.373E-01
Pb-210 #	2.4357E+00	1.371E+00	1.372E+00
AM-241 <	5.5902E-02		

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

WI07-0943 D2 Grid E1-4 0-6 in. F.R. 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) 1.5985034E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Lynn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0944 D2 Grid E1-5 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:44:11 Page 1
8905696 Spectrum name: Win00533.An1

Sample description
WI07-0944 D2 Grid E1-5 0-6 Free R. 080607

Spectrum Filename: C:\User\Win00533.An1

Acquisition information
Start time: 06-Aug-2007 09:33:59
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: 3.2400E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2400E+02) = 3.0864E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:44:11 Page 2
8905696 Spectrum name: Win00533.An1

WI07-0944 D2 Grid E1-5 0-6 in. F.R. 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: 0.1239

********** U N I D E N T I F I E D P E A K S U 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	5319.	11439.	19.065	2.60	0.854	-	D
17.33	4.31	14091.	8204.	13.674	4.65	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	185.56	46.57	58.	39.	0.065	74.84	0.535s
AM-241	238.04	59.69	112.	635.	1.058	10.18	1.043
Th-234	253.28	63.50	70.	49.	0.082	69.99	0.833
Pb-214	298.54	74.81	77.	102.	0.169	31.54	0.917D
Pb-212	298.56	74.81	106.	0.	0.000	249.44	0.287D
Pb-212	307.74	77.11	55.	162.	0.269	20.43	0.919D
Pb-214	307.74	77.11	262.	0.	0.000	75.37	0.216D
Pb-214	348.62	87.33	50.	50.	0.084	57.49	1.012
Th-234	371.16	92.96	51.	86.	0.143	39.02	1.563s
Ac-228	380.72	95.35	32.	0.	0.000	0.00	0.935
Ac-228	834.93	208.88	12.	31.	0.052	57.34	0.589s
Pb-212	953.94	238.62	17.	205.	0.341	15.10	1.057D
Pb-214	967.37	241.98	28.	40.	0.067	48.84	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:44:11 Page 3
8905696 Spectrum name: Win00533.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.51	270.01	12.	28.	0.047	57.87	0.408s
Pb-214	1180.67	295.29	8.	48.	0.081	37.13	0.532s
Ac-228	1311.63	328.03	7.	26.	0.044	56.44	0.736s
Ac-228	1353.47	338.48	5.	43.	0.072	36.18	0.919s
Pb-214	1407.73	352.04	7.	67.	0.112	29.14	0.985

WI07-0944 D2 Grid E1-5 0-6 in. F.R. 080607

Ac-228	1851.50	462.95	3.	21.	0.034	57.34	0.769s
Bi-214	2437.41	609.38	2.	64.	0.108	26.54	1.484
CS-137	2636.83	659.22	9.	3.	0.006	332.87	0.223s
Bi-214	3074.93	768.71	0.	18.	0.030	47.14	0.375s
Ac-228	3178.20	794.52	0.	9.	0.015	66.67	0.312s
Ac-228	3645.18	911.21	0.	50.	0.083	28.28	0.852s
Bi-214	3737.80	934.36	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	2.	6.	0.010	102.58	1.595D
Ac-228	3876.86	969.11	5.	25.	0.042	46.86	1.598D
Bi-214	4483.58	1120.72	0.	14.	0.023	53.45	0.937s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5514.33	1378.28	0.	6.	0.010	81.65	0.375s
K-40	5845.70	1461.07	0.	53.	0.088	27.47	1.000s
Ac-228	6354.33	1588.15	1.	0.	0.001	240.37	0.197s
Bi-214	7059.00	1764.21	0.	0.	0.000	0.00	0.000s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	3.0996E-04	609.31	3.000E-04	(	1.298E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	3.407E-04	?(	2.433E-05	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	6.492E-04	+	4.328E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.3335E-03	1460.81	2.333E-03	?(	4.403E-05	G
Ac-228	N	5.3223E-04	911.07	5.506E-04	?(	1.101E-05	G K
			969.11	4.890E-04	(	7.076E-05	G
			338.32	5.039E-04	@(	4.338E-05	G
			964.60	3.782E-04	-	2.797E-04	G
			794.70	5.292E-04	?(	5.880E-05	G
			463.00	8.055E-04	+	2.902E-04	G
			209.28	6.559E-04	(	1.148E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 09:44:11 Page 4
8905696 Spectrum name: Win00533.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.852E-04	+	2.955E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00		1.640E-04	X
		327.64	1.072E-03	+	3.518E-04	G
Pb-212	N 4.6999E-04	238.62	4.700E-04	(	1.461E-05	G K
		77.11	6.185E-04	+	8.169E-05	Energy duplication
		74.81	0.000E+00	%	9.760E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	&	1.470E-05	G
Th-234	N 1.0154E-03	92.35	1.073E-03	&(	1.324E-04	G
		63.29	9.335E-04	$(	2.351E-04	G

WI07-0944 D2 Grid E1-5 0-6 in. F.R. 080607

Pb-214	N	2.6791E-04	351.92	2.494E-04	(	1.550E-05		G K
			295.21	3.038E-04	(	2.915E-05		G
			77.11	0.000E+00	?	1.535E-04	Energy duplication	
			241.98	5.545E-04	+	1.683E-04		G
			74.81	1.133E-03	+	2.168E-04	Energy duplication	
			87.30	7.280E-04	+	2.126E-04		X
Pb-210	N	7.9614E-04	46.50	7.961E-04	?(	2.303E-04		G
AM-241		1.3076E-03	59.54	1.308E-03	(	3.187E-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 09:44:11 Page 5
8905696 Spectrum name: Win00533.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		9.5668E-01	2.539E-01	2.564E-01
K-40	#	7.2021E+00	1.979E+00	1.997E+00
Ac-228		1.6427E+00	3.605E-01	3.657E-01
Pb-212		1.4506E+00	2.191E-01	2.258E-01
CS-137	<	4.5369E-02		
Th-234		3.1341E+00	1.223E+00	1.225E+00
Pb-214		8.2690E-01	1.951E-01	1.976E-01
Pb-210	#	2.4572E+00	1.839E+00	1.840E+00
AM-241		4.0357E+00	4.110E-01	4.373E-01

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

WI07-0944 D2 Grid E1-5 0-6 in. F.R. 080607

& - 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) 2.1705877E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0966 D2 Grid E2-1 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:37:23 Page 1
8905696 Spectrum name: Win00543.An1

Sample description
WI07-0966 D2 Grid E2-1 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00543.An1

Acquisition information
Start time: 06-Aug-2007 15:27:11
Live time: 600
Real time: 602
Dead time: 0.34 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0300E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0300E+02) = 3.3003E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:37:23 Page 2
8905696 Spectrum name: Win00543.An1

WI07-0966 D2 Grid E2-1 0-6 in. F.R. 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: 0.1579

********** U N I D E N T I F I E D P E A K S U 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	5840.	13870.	23.117	2.30	0.854	-	D
17.84	4.43	17022.	9790.	16.317	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	185.35	46.52	105.	62.	0.103	65.48	0.615s
AM-241	236.25	59.24	86.	56.	0.093	66.58	0.560s
Th-234	252.04	63.19	68.	54.	0.090	57.95	0.969
Pb-214	298.54	74.81	94.	107.	0.178	32.14	0.917D
Pb-212	298.56	74.81	114.	0.	0.000	610.57	0.326D
Pb-212	307.74	77.11	79.	142.	0.236	24.43	0.919D
Pb-214	307.74	77.11	229.	0.	0.000	99.70	0.216D
Pb-214	346.14	86.71	67.	51.	0.085	63.87	1.304s
Th-234	368.72	92.35	64.	47.	0.078	56.65	0.933D
Ac-228	380.72	95.35	58.	6.	0.009	393.95	0.935D
Ac-228	835.88	209.12	21.	28.	0.047	70.71	0.773s
Pb-212	953.94	238.62	22.	225.	0.376	14.57	1.057D
Pb-214	967.37	241.98	30.	45.	0.075	45.34	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:37:23 Page 3
8905696 Spectrum name: Win00543.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.41	270.24	9.	31.	0.051	51.26	0.675s
Pb-214	1180.79	295.32	6.	53.	0.088	31.80	0.977
Ac-228	1312.13	328.15	2.	15.	0.025	61.10	0.390s
Ac-228	1353.90	338.59	21.	58.	0.097	42.58	0.708s
Pb-214	1407.74	352.04	0.	87.	0.145	21.44	1.041s

WI07-0966 D2 Grid E2-1 0-6 in. F.R. 080607

Ac-228	1849.56	462.47	0.	23.	0.038	41.70	0.333s
Bi-214	2437.46	609.40	3.	62.	0.103	28.29	0.502s
CS-137	2646.90	661.74	0.	39.	0.065	32.03	0.906s
Bi-214	3072.00	767.98	0.	0.	0.001	223.61	0.100s
Ac-228	3179.00	794.72	5.	0.	0.000	0.00	0.000s
Ac-228	3646.53	911.55	0.	49.	0.082	28.57	0.337s
Bi-214	3735.50	933.78	0.	4.	0.007	100.00	1.000s
Ac-228	3858.81	964.60	12.	0.	0.000	0.00	1.595
Ac-228	3876.86	969.11	22.	0.	0.000	0.00	1.598
Bi-214	4482.89	1120.55	0.	19.	0.032	45.88	0.781s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5509.33	1377.03	0.	3.	0.005	115.47	0.250s
K-40	5845.42	1461.00	0.	36.	0.060	33.33	0.750s
Ac-228	6352.50	1587.70	0.	6.	0.010	81.65	0.999s
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	2.9577E-04	609.31	2.868E-04	@(	1.456E-05	G K
			1764.49	0.000E+00	?	3.558E-05	G
			1120.29	4.623E-04	+	1.627E-04	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	3.246E-04	?(	1.082E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.5850E-03	1460.81	1.585E-03	?(	4.403E-05	G
Ac-228	N	5.8369E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	0.000E+00	%	1.403E-04	G
			338.32	6.797E-04	(	8.204E-05	G
			964.60	0.000E+00		3.338E-04	G
			794.70	0.000E+00	%	2.295E-04	G
			463.00	8.965E-04	+	2.846E-04	G
			209.28	5.925E-04	(	1.481E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:37:23 Page 4
8905696 Spectrum name: Win00543.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	9.581E-04	+	2.955E-04	G
		1588.00	8.715E-04	+	5.810E-04	G
		95.35	0.000E+00	%	2.278E-04	X
		327.64	6.109E-04	?(	1.043E-04	G
Pb-212	N 5.2530E-04	238.62	5.182E-04	(	1.648E-05	G K
		77.11	5.430E-04	(	5.012E-05	Energy duplication
		74.81	0.000E+00	%	1.011E-04	Energy duplication
CS-137	1.0569E-04	661.66	1.057E-04	(	2.710E-06	G
Th-234	N 7.6829E-04	92.35	5.831E-04	(	1.478E-04	G
		63.29	1.032E-03	$(	2.316E-04	G

WI07-0966 D2 Grid E2-1 0-6 in. F.R. 080607

Pb-214	N	3.2555E-04	351.92	3.222E-04	@(	3.704E-06		G K
			295.21	3.320E-04	(	2.506E-05		G
			77.11	0.000E+00	?	1.438E-04	Energy duplication	
			241.98	6.245E-04	+	1.764E-04		G
			74.81	1.193E-03	+	2.294E-04	Energy duplication	
			87.30	7.376E-04	&	2.303E-04		X
Pb-210	N	1.2657E-03	46.50	1.266E-03	(	3.062E-04		G
AM-241		1.1463E-04	59.54	1.146E-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
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:37:23 Page 5
8905696 Spectrum name: Win00543.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 #	9.7615E-01	2.762E-01	2.786E-01
K-40 #	5.2310E+00	1.744E+00	1.755E+00
Ac-228	1.9264E+00	5.134E-01	5.184E-01
Pb-212	1.7337E+00	2.465E-01	2.550E-01
CS-137	3.4880E-01	1.117E-01	1.125E-01
Th-234	2.5356E+00	1.027E+00	1.029E+00
Pb-214	1.0744E+00	2.060E-01	2.099E-01
Pb-210 #	4.1771E+00	2.735E+00	2.737E+00
AM-241	3.7830E-01	2.519E-01	2.523E-01

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

WI07-0966 D2 Grid E2-1 0-6 in. F.R. 080607

& - 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) 1.8381458E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fury
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07 - 0967 D1 Grid E2-2 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:41:41 Page 1
8905696 Spectrum name: Win00356.An1

Sample description
WI07-0967 D1 Grid E2-2 0-6" Free R 080607

Spectrum Filename: C:\User\Win00356.An1

Acquisition information
Start time: 06-Aug-2007 15:31:31
Live time: 600
Real time: 602
Dead time: 0.33 %
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: 3.3610E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3610E+02) =
2.9753E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:41:41 Page 2
8905696 Spectrum name: Win00356.An1

WI07 - 0967 D1 Grid E2-2 0-6in Free. R. 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: 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	
200.79	50.36	215.	43.	0.072	115.47	0.447	TH-227	s
231.86	58.01	743.	835.	1.391	11.54	0.957	TA-182	D
243.26	60.86	789.	861.	1.435	11.47	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	180.08	45.19	122.	36.	0.060	111.39	0.419s
AM-241	237.51	59.54	1337.	626.	1.043	18.36	0.958D
Th-234	252.51	63.29	30.	0.	0.000	0.00	0.187D
Pb-214	298.61	74.81	123.	39.	0.065	86.20	0.970D
Pb-212	298.63	74.81	41.	0.	0.000	796.87	0.137D
Pb-212	307.80	77.11	109.	52.	0.086	63.78	0.972D
Pb-214	307.80	77.11	80.	0.	0.000	429.47	0.268D
Pb-214	350.00	87.65	12.	0.	0.000	0.00	0.000s
Th-234	368.79	92.35	86.	29.	0.049	96.33	0.985D
Ac-228	380.79	95.35	63.	8.	0.013	304.88	0.987D
Ac-228	829.00	207.37	22.	32.	0.053	72.53	0.225s
Pb-212	954.08	238.62	104.	64.	0.106	51.69	1.099D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:41:41 Page 3
8905696 Spectrum name: Win00356.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.50	241.98	67.	16.	0.027	150.45	1.101D
Ac-228	1082.00	270.60	4.	0.	0.000	0.00	0.000s
Pb-214	1185.30	296.41	18.	44.	0.074	49.90	0.342s
Ac-228	1310.00	327.58	2.	0.	0.000	0.00	0.000s
Ac-228	1353.00	338.32	6.	0.	0.000	0.00	0.000s

WI07 - 0967 D1 Grid E2-2 0-6in Free. R. 080607

Pb-214	1405.30	351.39	24.	26.	0.043	82.13	0.333s
Ac-228	1853.00	463.28	1.	0.	0.000	0.00	0.000s
Bi-214	2436.35	609.06	5.	47.	0.078	37.88	0.488s
CS-137	2649.48	662.32	4.	9.	0.015	101.84	0.258s
Bi-214	3073.80	768.35	0.	5.	0.008	89.44	0.312s
Ac-228	3176.80	794.09	0.	10.	0.017	63.25	0.500s
Ac-228	3644.89	911.06	4.	1.	0.002	553.77	0.234s
Bi-214	3735.00	933.58	0.	0.	0.001	223.61	0.100s
Ac-228	3857.00	964.07	0.	0.	0.000	0.00	0.000s
Ac-228	3877.18	969.11	18.	0.	0.000	0.00	1.591
Bi-214	4483.50	1120.62	0.	2.	0.003	141.42	0.500s
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	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.	1.	0.002	200.00	0.250s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.4406E-04	609.31	2.397E-04	*(	1.921E-05	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	5.247E-05	~	6.720E-05	G
			1238.11	0.000E+00	?	7.286E-05	G
			768.36	2.844E-04	?(	5.689E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.159E-04	G
			934.06	0.000E+00	%	2.108E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	9.415E-05	G
Ac-228	N	0.0000E+00	911.07	0.000E+00	%	4.425E-05	G K
			969.11	0.000E+00	%	1.372E-04	G
			338.32	0.000E+00	?	5.269E-05	G
			964.60	0.000E+00	?	6.688E-05	G
			794.70	6.411E-04	?	3.206E-04	G
			463.00	0.000E+00	?	8.662E-05	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:41:41 Page 4
8905696 Spectrum name: Win00356.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	7.753E-04	&	2.642E-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	%	2.798E-04	X
		327.64	0.000E+00	?	1.174E-04	G
Pb-212 N	1.8764E-04	238.62	1.671E-04	(	3.912E-05	G K
		77.11	2.385E-04	(	7.077E-05	Energy duplication
		74.81	0.000E+00	%	7.504E-05	Energy duplication
CS-137	2.6761E-05	661.66	2.676E-05	?(	1.003E-05	G
Th-234 N	4.3187E-04	92.35	4.319E-04	(	1.997E-04	G
		63.29	0.000E+00	?	1.905E-04	G

```
Pb-214   N   2.1785E-04    351.92 1.081E-04 ?(  3.095E-05          G K
                           295.21 3.150E-04 &(  4.556E-05          G
                            77.11 0.000E+00 %   1.043E-04Energy duplication
                           241.98 2.561E-04  (  1.899E-04          G
                            74.81 5.291E-04  (  2.186E-04Energy duplication
                            87.30 0.000E+00 ?   9.365E-05          X

Pb-210   N   8.4332E-04     46.50 8.433E-04 &(  3.778E-04          G

AM-241       1.5516E-03     59.54 1.552E-03  (  1.295E-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 06-AUG-2007 15:41:41 Page 5
8905696 Spectrum name: Win00356.An1

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

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	7.2615E-01	2.751E-01	2.759E-01
K-40 <	2.8012E-01		
Ac-228 B<	1.3166E-01		
Pb-212	5.5828E-01	2.292E-01	2.297E-01
CS-137 #	7.9623E-02	8.108E-02	8.112E-02
Th-234	1.2849E+00	1.238E+00	1.238E+00
Pb-214	6.4817E-01	3.212E-01	3.218E-01
Pb-210 #	2.5091E+00	2.795E+00	2.795E+00
AM-241	4.6164E+00	8.475E-01	8.645E-01

\# - All peaks for activity calculation had bad shape.

WI07 - 0967 D1 Grid E2-2 0-6in Free. R. 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 1999.2 keV) 1.0422688E+01 pCi/g

The library has energies which are not separable.

Analyzed by: SC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0968 D2 Grid E2-3 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:57:04 Page 1
8905696 Spectrum name: Win00544.An1

Sample description
WI07-0968 D2 Grid E2-3 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00544.An1

Acquisition information
Start time: 06-Aug-2007 15:46:53
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: 3.1190E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.1190E+02) = 3.2062E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:57:04 Page 2
8905696 Spectrum name: Win00544.An1

WI07-0968 D2 Grid E2-3 0-6 in. F.R. 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: 0.1036

********** U N I D E N T I F I E D P E A K S U 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	3.29	7540.	12659.	21.099	2.63	0.854	-	D
17.33	4.61	12730.	9644.	16.074	3.89	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	185.87	46.65	42.	37.	0.062	69.01	0.900
AM-241	237.06	59.44	108.	68.	0.114	64.19	0.731s
Th-234	252.55	63.31	54.	59.	0.098	50.39	0.559s
Pb-214	298.54	74.81	90.	88.	0.146	37.39	0.917D
Pb-212	298.56	74.81	99.	0.	0.000	710.63	0.253D
Pb-212	307.74	77.11	78.	190.	0.316	19.63	0.919D
Pb-214	307.74	77.11	208.	0.	0.000	371.68	0.328D
Pb-214	347.42	87.03	46.	80.	0.134	36.16	1.081
Th-234	368.72	92.35	64.	50.	0.084	53.22	0.933D
Ac-228	380.72	95.35	33.	3.	0.004	625.09	0.935D
Ac-228	837.02	209.40	19.	36.	0.061	54.65	0.749s
Pb-212	953.94	238.62	28.	224.	0.373	14.94	1.057D
Pb-214	967.37	241.98	37.	29.	0.048	71.14	1.060D

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:57:04 Page 3
8905696 Spectrum name: Win00544.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.06	269.90	12.	17.	0.029	80.31	0.496s
Pb-214	1180.63	295.28	14.	58.	0.097	37.93	0.972
Ac-228	1311.15	327.91	13.	17.	0.028	97.16	0.426s
Ac-228	1352.71	338.29	5.	54.	0.091	30.77	1.187s
Pb-214	1407.37	351.95	9.	139.	0.232	19.03	0.906

WI07-0968 D2 Grid E2-3 0-6 in. F.R. 080607

Ac-228	1851.25	462.89	0.	28.	0.047	37.80	0.687s
Bi-214	2436.70	609.21	0.	73.	0.122	23.41	1.250
CS-137	2645.00	661.27	4.	2.	0.002	476.10	0.000s
Bi-214	3074.50	768.60	0.	4.	0.007	100.00	0.500s
Ac-228	3179.50	794.84	0.	8.	0.013	70.71	1.000s
Ac-228	3645.67	911.34	0.	49.	0.082	28.57	1.166s
Bi-214	3737.25	934.22	0.	4.	0.007	100.00	0.375s
Ac-228	3858.81	964.60	4.	17.	0.028	59.50	1.595D
Ac-228	3876.86	969.11	2.	43.	0.071	31.97	1.598D
Bi-214	4483.69	1120.75	0.	18.	0.030	47.14	0.312s
Bi-214	4952.67	1237.93	3.	2.	0.003	308.22	0.177s
Bi-214	5511.00	1377.44	0.	2.	0.003	141.42	0.250s
K-40	5845.41	1461.00	0.	40.	0.067	31.62	0.286s
Ac-228	6354.50	1588.20	0.	3.	0.005	115.47	0.500s
Bi-214	7060.09	1764.48	0.	12.	0.020	57.74	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	3.7714E-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	0.000E+00	%	2.509E-04	G
			768.36	2.084E-04	-	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	-	2.771E-04	G
			934.06	3.887E-04	?(	9.716E-05	G
K-40	N	1.7611E-03	1460.81	1.761E-03	?(	4.403E-05	G
Ac-228	N	5.8060E-04	911.07	5.396E-04	(	1.101E-05	G K
			969.11	8.302E-04	+	1.936E-04	G
			338.32	6.368E-04	(	4.214E-05	G
			964.60	1.025E-03	+	4.275E-04	G
			794.70	4.704E-04	?(	5.880E-05	G
			463.00	1.091E-03	+	3.118E-04	G
			209.28	7.688E-04	(	1.403E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:57:04 Page 4
8905696 Spectrum name: Win00544.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	5.415E-04	?(	1.673E-04	G
		1588.00	4.357E-04	-	4.357E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	6.787E-04	?(	2.316E-04	G
Pb-212	N 5.1472E-04	238.62	5.147E-04	(	1.839E-05	G K
		77.11	7.260E-04	+	9.057E-05	Energy duplication
		74.81	0.000E+00	%	9.444E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.084E-05	G
Th-234	N 8.3107E-04	92.35	6.253E-04	(	1.474E-04	G
		63.29	1.124E-03	(	2.077E-04	G

WI07-0968 D2 Grid E2-3 0-6 in. F.R. 080607

Pb-214	N	5.1481E-04	351.92	5.148E-04	(	1.767E-05	G K	
			295.21	3.633E-04	-	7.837E-05	G	
			77.11	0.000E+00	%	1.372E-04	Energy duplication	
			241.98	3.953E-04	-	1.659E-04	G	
			74.81	9.780E-04	+	2.162E-04	Energy duplication	
			87.30	1.163E-03	+	2.377E-04	X	
Pb-210	N	7.5531E-04	46.50	7.553E-04	(	1.976E-04	G	
AM-241		1.4071E-04	59.54	1.407E-04	*(	3.126E-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 15:57:04 Page 5
8905696 Spectrum name: Win00544.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		1.2092E+00	2.830E-01	2.867E-01
K-40	#	5.6464E+00	1.786E+00	1.798E+00
Ac-228		1.8615E+00	4.968E-01	5.017E-01
Pb-212		1.6503E+00	2.466E-01	2.542E-01
CS-137	<	3.4753E-02		
Th-234		2.6645E+00	9.765E-01	9.784E-01
Pb-214		1.6506E+00	3.142E-01	3.202E-01
Pb-210		2.4216E+00	1.671E+00	1.672E+00
AM-241	#	4.5113E-01	2.896E-01	2.901E-01

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

WI07-0968 D2 Grid E2-3 0-6 in. F.R. 080607

& - 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) 1.7555208E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0969 D2 Grid E2-4 0-6 in. F.R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:12:38 Page 1
8905696 Spectrum name: Win00545.An1

Sample description
WI07-0969 D2 Grid E2-4 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00545.An1

Acquisition information
Start time: 06-Aug-2007 16:02:25
Live time: 600
Real time: 602
Dead time: 0.29 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: 250 ml Soil ReGe.Clb
250ml.soil

Energy Calibration
Created: 17-May-2007 15:02:20
Zero offset: 0.187 keV
Gain: 0.250 keV/channel
Quadratic: -8.670E-09 keV/channel^2

Efficiency Calibration
Created: 17-May-2007 15:44:56
Knee Energy: 140.00 keV
Above the Knee: Quadratic Uncertainty = 2.56 %
Log(Eff): -7.345271E-01 + (-1.332721E-01*Log(E)) + (-5.539954E-02*Log(E)^2)
Below the Knee: Quadratic Uncertainty = 0.16 %
Log(Eff): -1.026413E+01 + (3.289732E+00*Log(E)) + (-3.579367E-01*Log(E)^2)

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

Analysis parameters
Analysis engine: wan32 G53W2.06
Start channel: 10 (2.69keV)
Stop channel: 8000 (1999.30keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.0940E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.0940E+02) = 3.2321E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:12:38 Page 2
8905696 Spectrum name: Win00545.An1

WI07-0969 D2 Grid E2-4 0-6 in. F.R. 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: 0.1042

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.59	3.84	4017.	22802.	38.003	1.73	2.220	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	184.23	46.24	37.	51.	0.085	54.21	0.473s
AM-241	237.90	59.65	67.	123.	0.206	32.92	0.675s
Th-234	253.17	63.47	42.	39.	0.065	64.80	0.424s
Pb-214	298.54	74.81	76.	94.	0.156	33.49	0.917D
Pb-212	298.56	74.81	94.	0.	0.000	921.35	0.383D
Pb-212	307.74	77.11	76.	169.	0.281	21.22	0.919D
Pb-214	307.74	77.11	294.	0.	0.000	71.56	0.153D
Pb-214	347.83	87.13	63.	60.	0.100	53.51	1.319s
Th-234	368.72	92.35	67.	50.	0.083	54.43	0.933D
Ac-228	380.72	95.35	27.	7.	0.011	228.07	0.935D
Ac-228	836.65	209.31	18.	31.	0.052	59.48	0.514s
Pb-212	953.94	238.62	21.	238.	0.396	14.08	1.057D
Pb-214	967.37	241.98	37.	28.	0.046	73.21	1.060D
Ac-228	1079.21	269.93	13.	21.	0.035	75.09	0.838

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:12:38 Page 3
8905696 Spectrum name: Win00545.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.42	295.23	7.	94.	0.157	23.84	1.007s
Ac-228	1310.05	327.63	6.	19.	0.032	69.03	0.437s
Ac-228	1352.85	338.33	6.	67.	0.112	28.48	0.787s
Pb-214	1407.21	351.91	6.	127.	0.211	19.53	0.903
Ac-228	1850.64	462.74	2.	12.	0.020	68.49	0.543s

WI07-0969 D2 Grid E2-4 0-6 in. F.R. 080607

Bi-214	2437.00	609.28	4.	81.	0.135	24.60	0.473s
CS-137	2647.67	661.93	4.	1.	0.002	642.91	0.583s
Bi-214	3074.28	768.55	8.	2.	0.003	482.08	0.256s
Ac-228	3177.20	794.27	2.	1.	0.002	314.25	0.208s
Ac-228	3645.65	911.33	0.	55.	0.092	26.97	0.666s
Bi-214	3736.71	934.09	0.	7.	0.012	75.59	0.625s
Ac-228	3858.81	964.60	6.	8.	0.014	105.92	1.595D
Ac-228	3876.86	969.11	0.	44.	0.073	30.19	1.598D
Bi-214	4481.93	1120.31	0.	14.	0.023	53.45	0.812s
Bi-214	4952.50	1237.89	2.	0.	0.000	0.00	0.292s
Bi-214	5509.78	1377.14	1.	1.	0.002	346.41	0.217s
K-40	5844.46	1460.76	0.	50.	0.083	28.28	0.677s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7059.00	1764.21	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	3.6841E-04	609.31	3.775E-04	(	1.541E-05	G K
			1764.49	2.135E-04	-	1.423E-04	G
			1120.29	3.407E-04	?(	2.433E-05	G
			1238.11	0.000E+00	?	1.737E-04	G
			768.36	0.000E+00	%	2.606E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.771E-04	G
			934.06	6.802E-04	+	4.154E-04	G
K-40	N	2.2014E-03	1460.81	2.201E-03	(	4.403E-05	G
Ac-228	N	6.6508E-04	911.07	6.057E-04	?(	1.101E-05	G K
			969.11	8.519E-04	+	1.919E-04	G
			338.32	7.852E-04	(	4.688E-05	G
			964.60	5.165E-04	-	3.590E-04	G
			794.70	0.000E+00	%	1.764E-04	G
			463.00	4.742E-04	-	2.267E-04	G
			209.28	6.559E-04	(	1.380E-04	G
			270.23	6.561E-04	?(	1.757E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 16:12:38 Page 4
8905696 Spectrum name: Win00545.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.688E-04	X
		327.64	7.737E-04	*(	1.629E-04	G
Pb-212	N 5.4641E-04	238.62	5.464E-04	(	1.617E-05	G K
		77.11	6.464E-04	+	8.665E-05	Energy duplication
		74.81	0.000E+00	%	9.211E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	1.003E-05	G
Th-234	N 6.7070E-04	92.35	6.222E-04	(	1.509E-04	G
		63.29	7.398E-04	(	1.847E-04	G
Pb-214	N 4.6914E-04	351.92	4.691E-04	(	1.516E-05	G K

WI07-0969 D2 Grid E2-4 0-6 in. F.R. 080607

			295.21	5.888E-04	+	9.222E-05	G
			77.11	0.000E+00	?	1.625E-04	Energy duplication
			241.98	3.821E-04	-	1.647E-04	G
			74.81	1.045E-03	+	2.112E-04	Energy duplication
			87.30	8.731E-04	+	2.350E-04	X
Pb-210	N	1.0445E-03	46.50	1.045E-03	(	1.857E-04	G
AM-241		2.5396E-04	59.54	2.540E-04	(	2.483E-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 16:12:38 Page 5
8905696 Spectrum name: Win00545.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		1.1907E+00	2.930E-01	2.963E-01
K-40		7.1150E+00	2.012E+00	2.030E+00
Ac-228		2.1496E+00	5.349E-01	5.409E-01
Pb-212		1.7660E+00	2.487E-01	2.573E-01
CS-137	<	3.2420E-02		
Th-234		2.1678E+00	9.172E-01	9.186E-01
Pb-214		1.5163E+00	2.962E-01	3.016E-01
Pb-210		3.3759E+00	1.830E+00	1.832E+00
AM-241	#	8.2082E-01	2.702E-01	2.719E-01

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

WI07-0969 D2 Grid E2-4 0-6 in. F.R. 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) 2.0102135E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0970 D1 Grid E2-5 0-6in Free. R. 080607

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:58:49 Page 1
8905696 Spectrum name: Win00357.An1

Sample description
WI07-0970 D1 Grid E2-5 0-6" Free R. 080607

Spectrum Filename: C:\User\Win00357.An1

Acquisition information
Start time: 06-Aug-2007 15:48:39
Live time: 600
Real time: 602
Dead time: 0.29 %
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: 2.8520E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8520E+02) = 3.5063E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:58:49 Page 2
8905696 Spectrum name: Win00357.An1

WI07 - 0970 D1 Grid E2-5 0-6in Free. R. 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: 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	
27.21	7.03	302.	355.	0.591	17.47	0.916	CU-64	D
39.07	9.99	734.	178.	0.297	45.51	0.918	AU-198	D
231.81	58.20	561.	510.	0.851	15.83	0.957	TA-182	D
242.88	60.97	472.	610.	1.017	12.93	0.959	AM-241	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.00	46.42	52.	4.	0.007	459.35	0.000s
AM-241	237.51	59.54	943.	427.	0.712	22.52	0.958D
Th-234	252.51	63.29	172.	26.	0.044	145.88	0.961D
Pb-214	298.61	74.81	103.	25.	0.042	121.56	0.971D
Pb-212	298.63	74.81	65.	0.	0.000	736.86	0.000D
Pb-212	307.80	77.11	131.	40.	0.067	86.41	0.972D
Pb-214	307.80	77.11	90.	0.	0.000	102.56	0.333D
Pb-214	350.00	87.65	18.	0.	0.000	0.00	0.000s
Th-234	367.17	91.95	39.	7.	0.012	269.37	0.418s
Ac-228	380.79	95.35	21.	0.	0.000	0.00	0.215D
Ac-228	841.54	210.50	16.	31.	0.052	63.25	0.420s

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:58:49 Page 3
8905696 Spectrum name: Win00357.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-212	954.08	238.62	87.	13.	0.022	204.32	1.099D
Pb-214	967.50	241.98	87.	4.	0.006	727.70	1.101D
Ac-228	1079.25	269.91	5.	1.	0.002	583.10	0.187s
Pb-214	1183.43	295.94	25.	27.	0.045	79.26	0.484s
Ac-228	1307.50	326.95	3.	5.	0.009	127.48	0.889

WI07 - 0970 D1 Grid E2-5 0-6in Free. R. 080607

Ac-228	1346.00	336.57	18.	18.	0.031	96.54	1.022
Pb-214	1408.75	352.25	13.	1.	0.002	1039.23	0.339s
Ac-228	1851.00	462.78	2.	0.	0.000	0.00	0.000s
Bi-214	2436.00	608.97	12.	0.	0.001	932.14	0.000s
CS-137	2646.00	661.45	2.	0.	0.000	0.00	0.000s
Bi-214	3076.11	768.93	1.	3.	0.005	149.07	0.350s
Ac-228	3179.33	794.73	1.	0.	0.001	240.37	0.197s
Ac-228	3651.20	912.64	7.	27.	0.046	54.86	0.297s
Bi-214	3736.67	934.00	0.	3.	0.005	115.47	0.375s
Ac-228	3859.13	964.60	1.	0.	0.000	0.00	0.000D
Ac-228	3876.90	969.04	5.	3.	0.006	220.00	0.389s
Bi-214	4482.33	1120.33	2.	1.	0.002	416.33	0.197s
Bi-214	4953.33	1238.02	0.	3.	0.005	115.47	0.375s
Bi-214	5511.00	1377.36	0.	2.	0.003	141.42	0.250s
K-40	5843.50	1460.44	2.	0.	0.000	0.00	0.292s
Ac-228	6355.00	1588.24	0.	1.	0.002	200.00	0.250s
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	0.0000E+00	609.31	0.000E+00	%	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	2.186E-04	?	2.186E-04	G
			768.36	1.707E-04	?	1.918E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.318E-04	?	2.969E-04	G
			934.06	3.162E-04	?	3.162E-04	G
K-40	N	0.0000E+00	1460.81	0.000E+00	?	1.206E-04	G
Ac-228	N	2.9814E-04	911.07	3.268E-04	&(	5.004E-05	G K
			969.11	0.000E+00	%	9.531E-05	G
			338.32	2.437E-04	&(	8.480E-05	G
			964.60	0.000E+00	?	1.338E-04	G
			794.70	0.000E+00	%	1.282E-04	G

ORTEC g v - i (63) wan32 G53W2.06 06-AUG-2007 15:58:49 Page 4
8905696 Spectrum name: Win00357.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		463.00	0.000E+00	?	1.109E-04	G
		209.28	7.551E-04	&	2.473E-04	G
		270.23	0.000E+00	%	1.417E-04	G
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	1.576E-04	X
		327.64	2.444E-04	&(	1.312E-04	G
Pb-212	N 0.0000E+00	238.62	0.000E+00	%	3.835E-05	G K
		77.11	1.860E-04		8.788E-05	Energy duplication
		74.81	0.000E+00	%	9.341E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	?	7.617E-06	G
Th-234	N 0.0000E+00	92.35	0.000E+00	%	1.484E-04	G

```
                WI07 - 0970  D1  Grid E2-5    0-6in Free. R.  080607
                                63.29 6.077E-04     4.705E-04          G

Pb-214   N   0.0000E+00     351.92 0.000E+00 %   2.417E-05          G K
                            295.21 1.911E-04 &   7.580E-05          G
                             77.11 0.000E+00 &   1.104E-04Energy duplication
                            241.98 0.000E+00 %   2.204E-04          G
                             74.81 3.379E-04     2.230E-04Energy duplication
                             87.30 0.000E+00 %   1.154E-04          X

Pb-210   N   0.0000E+00      46.50 0.000E+00 %   2.599E-04          G

AM-241       1.0589E-03      59.54 1.059E-03  (  1.089E-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  06-AUG-2007 15:58:49 Page    5
8905696                          Spectrum name: Win00357.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 B<    9.7331E-02
K-40    <    4.2280E-01
Ac-228       1.0454E+00    5.735E-01    5.744E-01
Pb-212 B<    1.3448E-01
CS-137  <    2.6706E-02
Th-234  <    5.2038E-01
Pb-214 B<    8.4758E-02
Pb-210  <    9.1130E-01
AM-241       3.7127E+00    8.361E-01    8.473E-01
  < - MDA value printed.
```

WI07 - 0970 D1 Grid E2-5 0-6in Free. R. 080607

A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
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) 4.7580605E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0917 D2 Grid E3-1 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:35:33 Page 1
8905696 Spectrum name: Win00520.An1

Sample description
WI07-0917 D2 Grid E3-1 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00520.An1

Acquisition information
Start time: 05-Aug-2007 14:25:23
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: 3.5330E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5330E+02) = 2.8305E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:35:33 Page 2
8905696 Spectrum name: Win00520.An1

WI07-0917 D2 Grid E3-1 0-6 in. F.R. 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: 0.1609

********** U N I D E N T I F I E D P E A K S U 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	6928.	10961.	18.268	2.87	0.854	-	D
15.86	3.96	14739.	9982.	16.637	3.98	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	186.25	46.74	52.	48.	0.081	62.84	0.511s
AM-241	237.84	59.64	97.	316.	0.527	17.14	0.840
Th-234	253.65	63.59	56.	53.	0.088	58.42	0.704
Pb-214	298.54	74.81	84.	137.	0.229	25.39	0.917D
Pb-212	298.56	74.81	143.	0.	0.000	569.60	0.143D
Pb-212	307.74	77.11	101.	178.	0.297	21.91	0.919D
Pb-214	307.74	77.11	302.	0.	0.000	79.45	0.347D
Pb-214	347.50	87.05	75.	44.	0.074	77.25	0.387s
Th-234	368.72	92.35	86.	63.	0.106	48.40	0.933D
Ac-228	380.72	95.35	30.	5.	0.008	336.56	0.935D
Ac-228	835.09	208.92	26.	19.	0.032	105.96	0.792
Pb-212	953.94	238.62	35.	269.	0.449	13.66	1.057D
Pb-214	967.37	241.98	52.	27.	0.046	83.62	1.060D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:35:33 Page 3
8905696 Spectrum name: Win00520.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.41	269.99	20.	41.	0.068	55.12	0.500s
Pb-214	1179.52	295.01	0.	82.	0.137	22.09	0.423s
Ac-228	1311.55	328.00	5.	27.	0.044	50.99	0.892
Ac-228	1353.35	338.45	4.	61.	0.101	28.43	0.903
Pb-214	1407.35	351.95	15.	113.	0.189	23.79	1.413s

WI07-0917 D2 Grid E3-1 0-6 in. F.R. 080507

Ac-228	1852.17	463.12	4.	28.	0.047	47.59	0.984s
Bi-214	2437.77	609.48	0.	84.	0.140	21.82	0.750s
CS-137	2641.70	660.44	4.	20.	0.033	63.25	0.367s
Bi-214	3074.60	768.63	0.	14.	0.023	53.45	0.250s
Ac-228	3179.54	794.85	0.	14.	0.023	53.45	1.000s
Ac-228	3645.75	911.36	0.	69.	0.115	24.08	0.609s
Bi-214	3737.20	934.21	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	1.	10.	0.016	74.26	1.595D
Ac-228	3876.86	969.11	0.	36.	0.060	33.31	1.598D
Bi-214	4482.00	1120.33	2.	1.	0.001	478.42	0.000s
Bi-214	4951.33	1237.60	0.	7.	0.012	75.59	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.22	1460.70	0.	37.	0.062	32.88	0.417s
Ac-228	6355.33	1588.40	0.	5.	0.008	89.44	0.250s
Bi-214	7059.33	1764.29	1.	0.	0.001	240.37	0.197s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.0514E-04	609.31	3.906E-04	(	4.650E-06	G K
			1764.49	0.000E+00	%	7.117E-05	G
			1120.29	0.000E+00	%	7.300E-05	G
			1238.11	4.746E-04	?(	6.779E-05	G
			768.36	7.296E-04	+	3.030E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	?	1.082E-04	G
			934.06	4.858E-04	?(	9.716E-05	G
K-40	N	1.6290E-03	1460.81	1.629E-03	?(	4.403E-05	G
Ac-228	N	7.3829E-04	911.07	7.599E-04	(	1.101E-05	G K
			969.11	7.000E-04	(	1.942E-05	G
			338.32	7.110E-04	(	4.086E-05	G
			964.60	5.874E-04	-	3.220E-04	G
			794.70	8.232E-04	?(	5.880E-05	G
			463.00	1.104E-03	+	3.319E-04	G
			209.28	4.020E-04	-	2.116E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:35:33 Page 4
8905696 Spectrum name: Win00520.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.281E-03	+	3.611E-04	G
		1588.00	7.262E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.711E-04	X
		327.64	1.086E-03	+	3.468E-04	G
Pb-212	N 6.3708E-04	238.62	6.192E-04	(	2.029E-05	G K
		77.11	6.813E-04	(	5.637E-05	Energy duplication
		74.81	0.000E+00	%	1.128E-04	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	&(	9.139E-06	G
Th-234	N 8.8056E-04	92.35	7.899E-04	(	1.697E-04	G
		63.29	1.010E-03	(	2.114E-04	G

WI07-0917 D2 Grid E3-1 0-6 in. F.R. 080507

Pb-214	N	4.4308E-04	351.92	4.198E-04	(	2.200E-05		G K
			295.21	5.137E-04	(	6.264E-06		G
			77.11	0.000E+00	?	1.646E-04	Energy duplication	
			241.98	3.780E-04	(	1.476E-04		G
			74.81	1.534E-03	+	2.403E-04	Energy duplication	
			87.30	6.433E-04	+	2.312E-04		X
Pb-210	N	9.9007E-04	46.50	9.901E-04	(	2.196E-04		G
AM-241		6.5137E-04	59.54	6.514E-04	(	2.968E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 14:35:33 Page 5
8905696 Spectrum name: Win00520.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	1.1467E+00	2.502E-01	2.539E-01
K-40 #	4.6109E+00	1.516E+00	1.526E+00
Ac-228	2.0897E+00	4.830E-01	4.893E-01
Pb-212	1.8032E+00	2.328E-01	2.424E-01
CS-137 #	1.5340E-01	9.702E-02	9.720E-02
Th-234	2.4924E+00	9.454E-01	9.472E-01
Pb-214	1.2541E+00	2.770E-01	2.810E-01
Pb-210	2.8023E+00	1.761E+00	1.762E+00
AM-241	1.8437E+00	3.161E-01	3.234E-01

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

WI07-0917 D2 Grid E3-1 0-6 in. F.R. 080507

& - 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) 1.8196482E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Ferr
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0984 D2 Grid E3-2 0-6 in. F.R. 080707

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:14:46 Page 1
8905696 Spectrum name: Win00556.An1

Sample description
WI07-0984 D2 Grid E3-2 0-6" Free R. 080707

Spectrum Filename: C:\User\Win00556.An1

Acquisition information
Start time: 07-Aug-2007 09:04:34
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: 3.8690E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8690E+02) = 2.5846E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:14:46 Page 2
8905696 Spectrum name: Win00556.An1

WI07-0984 D2 Grid E3-2 0-6 in. F.R. 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: 0.0995

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.54	3.82	4122.	20923.	34.872	1.85	2.163	CU-64	s
252.93	63.41	64.	40.	0.067	64.33	0.907	PA-234	D
2333.23	583.35	6.	73.	0.122	26.59	0.802	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	183.17	45.97	48.	48.	0.081	60.43	0.396s
AM-241	237.70	59.60	108.	153.	0.256	32.00	0.935
Th-234	252.46	63.29	95.	9.	0.015	309.05	0.907D
Pb-214	298.54	74.81	83.	152.	0.253	23.48	0.918D
Pb-212	298.56	74.81	170.	0.	0.000	581.51	0.407D
Pb-212	307.74	77.11	80.	198.	0.330	19.11	0.920D
Pb-214	307.74	77.11	190.	0.	0.000	347.96	0.462D
Pb-214	348.60	87.32	58.	68.	0.113	45.75	1.057s
Th-234	368.72	92.35	72.	66.	0.109	44.27	0.933D
Ac-228	380.72	95.35	60.	1.	0.001	3347.71	0.935D
Ac-228	833.75	208.58	27.	44.	0.073	56.04	0.633s
Pb-212	953.94	238.62	19.	239.	0.399	13.90	1.057D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:14:46 Page 3
8905696 Spectrum name: Win00556.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	41.	40.	0.067	54.93	1.060D
Ac-228	1079.86	270.10	27.	32.	0.053	73.95	0.727s
Pb-214	1181.25	295.44	14.	83.	0.138	29.12	1.264s
Ac-228	1313.93	328.60	11.	28.	0.046	60.96	0.347s
Ac-228	1353.20	338.41	11.	51.	0.085	36.14	1.292

WI07-0984 D2 Grid E3-2 0-6 in. F.R. 080707

Pb-214	1407.00	351.86	18.	116.	0.193	25.28	0.885
Ac-228	1851.64	462.99	3.	29.	0.049	42.64	0.528s
Bi-214	2437.51	609.41	4.	93.	0.155	23.04	0.992s
CS-137	2647.68	661.94	0.	22.	0.037	42.64	0.750s
Bi-214	3075.10	768.75	0.	12.	0.020	57.74	0.375s
Ac-228	3178.00	794.47	6.	0.	0.000	715.70	0.000s
Ac-228	3645.62	911.32	0.	76.	0.127	22.94	0.568s
Bi-214	3738.23	934.47	0.	14.	0.023	53.45	0.375s
Ac-228	3858.81	964.60	6.	12.	0.019	85.40	1.595D
Ac-228	3876.86	969.11	0.	35.	0.059	33.70	1.598D
Bi-214	4480.94	1120.06	0.	28.	0.047	37.80	0.937s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5511.75	1377.63	0.	4.	0.007	100.00	0.375s
K-40	5845.09	1460.92	0.	46.	0.077	29.49	0.600s
Ac-228	6353.00	1587.82	0.	1.	0.002	200.00	0.250s
Bi-214	7061.29	1764.78	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	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.4764E-04	609.31	4.317E-04	(	1.595E-05	G K
			1764.49	4.982E-04	?(	3.558E-05	G
			1120.29	6.813E-04	+	1.947E-04	G
			1238.11	0.000E+00	?	6.779E-05	G
			768.36	6.253E-04	+	2.827E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	1.360E-03	+	5.650E-04	G
K-40	N	2.0253E-03	1460.81	2.025E-03	?(	4.403E-05	G
Ac-228	N	7.9913E-04	911.07	8.370E-04	(	1.101E-05	G K
			969.11	6.840E-04	(	1.942E-05	G
			338.32	5.997E-04	-	1.365E-04	G
			964.60	7.144E-04	(	2.543E-04	G
			794.70	0.000E+00	%	2.352E-04	G
			463.00	1.143E-03	+	3.319E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:14:46 Page 4
8905696 Spectrum name: Win00556.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	9.310E-04	&(	1.664E-04	G
		270.23	9.998E-04	(	2.457E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	2.226E-04	X
		327.64	1.127E-03	&	3.806E-04	G
Pb-212	N 5.5023E-04	238.62	5.502E-04	(	1.524E-05	G K
		77.11	7.581E-04	+	9.220E-05	Energy duplication
		74.81	0.000E+00	%	1.228E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	(	2.710E-06	G
Th-234	N 8.1777E-04	92.35	8.178E-04	(	1.566E-04	G
		63.29	0.000E+00	%	2.844E-04	G

```
Pb-214   N   4.7154E-04    351.92 4.296E-04  (  2.415E-05        G K
                           295.21 5.199E-04 *(  3.643E-05        G
                            77.11 0.000E+00 %   1.313E-04Energy duplication
                           241.98 5.556E-04  (  1.320E-04        G
                            74.81 1.695E-03 +   2.476E-04Energy duplication
                            87.30 9.867E-04 +   2.377E-04        X

Pb-210   N   9.9007E-04     46.50 9.901E-04 &(  2.094E-04        G

AM-241       3.1573E-04     59.54 3.157E-04  (  3.126E-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 09:14:46 Page 5
8905696 Spectrum name: Win00556.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	1.1570E+00	2.666E-01	2.701E-01
K-40 #	5.2346E+00	1.544E+00	1.556E+00
Ac-228	2.0655E+00	4.738E-01	4.801E-01
Pb-212	1.4222E+00	1.976E-01	2.047E-01
CS-137	1.5409E-01	6.570E-02	6.597E-02
Th-234	2.1136E+00	9.357E-01	9.369E-01
Pb-214	1.2188E+00	2.727E-01	2.765E-01
Pb-210 #	2.5590E+00	1.546E+00	1.548E+00
AM-241	8.1606E-01	2.612E-01	2.629E-01

- All peaks for activity calculation had bad shape.

WI07-0984 D2 Grid E3-2 0-6 in. F.R. 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 1999.3 keV) 1.6740761E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07 - 0985 D1 Grid E3-3 0-6in Free. R. 080707

Sample description
WI07-0985 D1 Grid E3-3 0-6" Free R. 080707

Spectrum Filename: C:\User\D2 Samples\WI07-0984 D2 E3-2 0-6in. Fre
e Rel. 080607.An1

Acquisition information

Start time:	07-Aug-2007 09:06:53
Live time:	600
Real time:	603
Dead time:	0.48 %
Detector ID:	1

Detector system
MCB 07044698

Calibration
Filename: 250 ml Soil LeGe.Clb
250 ml Soil Standard; 1.6 g/cc

Energy Calibration

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

Efficiency Calibration

Created:	17-May-2007 12:57:41
Knee Energy:	120.00 keV
Above the Knee:	Quadratic Uncertainty = 1.58 %
Log(Eff):	-1.143846E+00 + (-7.027109E-02*Log(E)) + (-5.759660E-02*Log(E)^2)
Below the Knee:	Linear Uncertainty = 0.15 %
Log(Eff):	-4.039622E+00 + (2.584107E-01*Log(E)) + (0.000000E+00*Log(E)^2)

Library Files

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

Analysis parameters

Analysis engine:	wan32 G53W2.06
Start channel:	10 (2.68keV)
Stop channel:	8000 (1999.24keV)
Peak rejection level:	100.000%
Peak search sensitivity:	4
Sample Size:	3.8710E+02
Activity scaling factor:	1.0000E+06/(1.0000E+00* 3.8710E+02) = 2.5833E+03

Detection limit method: Traditional ORTEC method

WI07 - 0985 D1 Grid E3-3 0-6in Free. R. 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: 0.1087

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
28.76	7.37	178.	550.	0.916	12.78	1.492	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	184.85	46.38	42.	33.	0.055	76.42	0.279s
AM-241	237.56	59.55	94.	274.	0.458	18.33	0.963
Th-234	253.52	63.54	36.	42.	0.070	54.71	0.801
Pb-214	298.61	74.81	65.	100.	0.167	30.26	0.971D
Pb-212	298.63	74.81	112.	0.	0.000	444.41	0.428D
Pb-212	307.80	77.11	88.	152.	0.254	23.74	0.972D
Pb-214	307.80	77.11	172.	0.	0.000	672.75	0.280D
Pb-214	348.91	87.38	54.	41.	0.068	69.50	0.551s
Th-234	368.79	92.35	52.	34.	0.057	68.66	0.985D
Ac-228	380.79	95.35	61.	8.	0.013	288.91	0.987D
Ac-228	836.89	209.34	19.	28.	0.047	67.17	0.290s
Pb-212	954.08	238.62	24.	208.	0.346	15.43	1.099D
Pb-214	967.50	241.98	44.	35.	0.059	62.64	1.101D

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:17:04 Page 3
8905696 Spectrum name: WI07-0984 D2 E3-2 0-6in. Free

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.61	270.50	9.	30.	0.050	54.16	0.469s
Pb-214	1180.33	295.17	19.	55.	0.092	40.21	0.761s
Ac-228	1310.34	327.66	7.	16.	0.026	77.07	0.564s
Ac-228	1352.78	338.27	16.	48.	0.080	47.14	1.291
Pb-214	1407.43	351.92	3.	80.	0.133	23.98	0.930s

WI07 - 0985 D1 Grid E3-3 0-6in Free. R. 080707

Ac-228	1851.08	462.80	4.	15.	0.024	72.66	0.676s
Bi-214	2438.07	609.49	0.	73.	0.122	23.41	1.075
CS-137	2648.00	661.95	0.	15.	0.025	51.64	0.375s
Bi-214	3077.17	769.20	0.	11.	0.018	60.30	0.437s
Ac-228	3179.50	794.77	0.	14.	0.023	53.45	0.416s
Ac-228	3647.19	911.64	0.	52.	0.087	27.74	1.074s
Bi-214	3738.57	934.47	0.	8.	0.013	70.71	0.625s
Ac-228	3859.13	964.60	3.	7.	0.012	101.11	1.589D
Ac-228	3877.18	969.11	5.	25.	0.041	47.87	1.591D
Bi-214	4483.75	1120.68	0.	18.	0.030	47.14	0.375s
Bi-214	4953.57	1238.08	2.	1.	0.002	416.33	0.328s
Bi-214	5511.00	1377.36	0.	1.	0.002	200.00	0.250s
K-40	5846.67	1461.23	0.	41.	0.068	31.23	0.700s
Ac-228	6354.33	1588.08	1.	0.	0.001	240.37	0.197s
Bi-214	7059.33	1764.22	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	3.9783E-04	609.31	3.736E-04	(	5.117E-06	G K
			1764.49	0.000E+00	%	7.565E-05	G
			1120.29	4.722E-04	?(	2.624E-05	G
			1238.11	0.000E+00	%	2.186E-04	G
			768.36	6.258E-04	&	2.968E-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	1.9300E-03	1460.81	1.930E-03	?(	4.707E-05	G
Ac-228	N	5.9901E-04	911.07	6.216E-04	?(	1.195E-05	G K
			969.11	5.215E-04	(	7.921E-05	G
			338.32	6.323E-04	(	8.140E-05	G
			964.60	4.751E-04	(	1.978E-04	G
			794.70	8.976E-04	+	3.728E-04	G
			463.00	6.352E-04	?(	1.510E-04	G
			209.28	6.864E-04	?(	1.606E-04	G

ORTEC g v - i (63) wan32 G53W2.06 07-AUG-2007 09:17:04 Page 4
8905696 Spectrum name: WI07-0984 D2 E3-2 0-6in. Free

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.063E-03	+	3.310E-04	G
		1588.00	0.000E+00	%	3.098E-04	G
		95.35	0.000E+00	%	2.760E-04	X
		327.64	7.180E-04	?(	1.999E-04	G
Pb-212	N 5.4327E-04	238.62	5.433E-04	(	1.967E-05	G K
		77.11	7.052E-04	+	1.037E-04	Energy duplication
		74.81	0.000E+00	%	1.213E-04	Energy duplication
CS-137	4.4602E-05	661.66	4.460E-05	?(	2.973E-06	G
Th-234	N 6.9453E-04	92.35	5.022E-04	(	1.570E-04	G
		63.29	9.683E-04	$(	2.075E-04	G

WI07 - 0985 D1 Grid E3-3 0-6in Free. R. 080707

Pb-214	N	3.5267E-04	351.92	3.326E-04	@(	1.247E-05		G K
			295.21	3.916E-04	(	4.693E-05		G
			77.11	0.000E+00	%	1.511E-04	Energy duplication	
			241.98	5.566E-04	+	2.059E-04		G
			74.81	1.354E-03	+	2.523E-04	Energy duplication	
			87.30	7.078E-04	+	2.468E-04		X
Pb-210	N	7.7304E-04	46.50	7.730E-04	(	2.267E-04		G
AM-241		6.8054E-04	59.54	6.805E-04	(	3.516E-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 07-AUG-2007 09:17:04 Page 5
8905696 Spectrum name: WI07-0984 D2 E3-2 0-6in. Free

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		1.0277E+00	2.406E-01	2.425E-01
K-40	#	4.9859E+00	1.557E+00	1.564E+00
Ac-228		1.5474E+00	3.907E-01	3.933E-01
Pb-212		1.4034E+00	2.166E-01	2.205E-01
CS-137	#	1.1522E-01	5.950E-02	5.960E-02
Th-234		1.7942E+00	7.876E-01	7.887E-01
Pb-214		9.1105E-01	2.133E-01	2.150E-01
Pb-210		1.9970E+00	1.526E+00	1.527E+00
AM-241		1.7580E+00	3.222E-01	3.287E-01

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

WI07 - 0985 D1 Grid E3-3 0-6in Free. R. 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) 1.5539960E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0920 D2 Grid E3-4 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 13:19:27 Page 1
8905696 Spectrum name: Win00518.An1

Sample description
WI07-0920 D2 Grid E3-4 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00518.An1

Acquisition information
Start time: 05-Aug-2007 13:09:15
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: 2.8150E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 2.8150E+02) = 3.5524E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 13:19:27 Page 2
8905696 Spectrum name: Win00518.An1

WI07-0920 D2 Grid E3-4 0-6 in. F.R. 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: 0.0722

********** U N I D E N T I F I E D P E A K S U 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	2.91	4953.	11039.	18.398	2.62	0.854	- D
17.97	4.45	14424.	8490.	14.150	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	184.09	46.20	47.	54.	0.091	53.33	0.992
AM-241	237.40	59.53	117.	439.	0.731	13.88	0.948
Th-234	252.79	63.37	51.	57.	0.096	54.39	0.360s
Pb-214	298.54	74.81	63.	97.	0.162	30.77	0.917D
Pb-212	298.56	74.81	93.	0.	0.000	255.19	0.501D
Pb-212	307.74	77.11	60.	170.	0.283	20.04	0.919D
Pb-214	307.74	77.11	284.	0.	0.000	72.02	0.290D
Pb-214	347.84	87.13	65.	60.	0.100	56.52	0.865
Th-234	368.72	92.35	41.	41.	0.069	53.78	0.933D
Ac-228	380.72	95.35	27.	4.	0.007	344.52	0.935D
Ac-228	836.47	209.26	17.	41.	0.068	50.26	0.871
Pb-212	953.94	238.62	18.	220.	0.367	14.52	1.057D
Pb-214	967.37	241.98	34.	34.	0.056	59.79	1.060D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.33	270.22	11.	38.	0.063	43.77	0.798s
Pb-214	1180.30	295.20	10.	64.	0.106	31.98	1.113
Ac-228	1311.49	327.99	8.	22.	0.038	65.97	0.338s
Ac-228	1353.10	338.39	17.	64.	0.107	38.13	0.630s
Pb-214	1407.05	351.87	3.	100.	0.166	21.44	1.293s

WI07-0920 D2 Grid E3-4 0-6 in. F.R. 080507

Ac-228	1851.60	462.98	0.	15.	0.025	51.64	0.875s
Bi-214	2437.33	609.37	3.	39.	0.065	36.62	0.597s
CS-137	2647.71	661.94	0.	28.	0.047	37.80	0.521s
Bi-214	3073.56	768.37	3.	1.	0.002	412.31	0.322s
Ac-228	3178.00	794.47	5.	0.	0.000	0.00	0.000s
Ac-228	3645.68	911.34	0.	41.	0.068	31.23	1.312
Bi-214	3735.50	933.78	0.	3.	0.005	115.47	0.500s
Ac-228	3858.81	964.60	4.	11.	0.018	78.93	1.595D
Ac-228	3876.86	969.11	0.	35.	0.059	33.67	1.598D
Bi-214	4481.20	1120.13	0.	10.	0.017	63.25	0.562s
Bi-214	4953.60	1238.17	0.	6.	0.010	81.65	0.375s
Bi-214	5510.00	1377.19	0.	2.	0.003	141.42	0.250s
K-40	5845.41	1461.00	0.	32.	0.053	35.36	0.337s
Ac-228	6355.00	1588.32	0.	1.	0.002	200.00	0.250s
Bi-214	7060.38	1764.55	0.	16.	0.027	50.00	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	Peak Activity microCi	Code	Peak MDA Value microCi	Comments
Bi-214	N	2.0222E-04	609.31	1.814E-04	(	1.395E-05	G K
			1764.49	5.693E-04	+	2.199E-04	G
			1120.29	2.433E-04	?(	2.433E-05	G
			1238.11	4.068E-04	+	2.712E-04	G
			768.36	0.000E+00	%	1.757E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	2.164E-04	?(	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	4.6978E-04	911.07	4.515E-04	(	1.101E-05	G K
			969.11	6.852E-04	+	1.731E-04	G
			338.32	7.540E-04	+	1.551E-04	G
			964.60	6.811E-04	+	3.704E-04	G
			794.70	0.000E+00	?	2.176E-04	G
			463.00	5.847E-04	?(	3.898E-05	G
			209.28	8.675E-04	+	2.387E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 13:19:27 Page 4
8905696 Spectrum name: Win00518.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.187E-03	+	3.253E-04	G
		1588.00	0.000E+00	%	2.905E-04	G
		95.35	0.000E+00	%	1.616E-04	X
		327.64	9.163E-04	+	3.417E-04	G
Pb-212	N 5.0613E-04	238.62	5.061E-04	(	1.490E-05	G K
		77.11	6.504E-04	+	8.403E-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 7.5269E-04	92.35	5.142E-04	(	1.191E-04	G
		63.29	1.092E-03	$(	2.015E-04	G

WI07-0920 D2 Grid E3-4 0-6 in. F.R. 080507

Pb-214	N	3.8928E-04	351.92	3.691E-04	*(	1.159E-05		G K
			295.21	3.978E-04	(	3.062E-05		G
			77.11	0.000E+00	?	1.597E-04	Energy duplication	
			241.98	4.675E-04	(	1.215E-04		G
			74.81	1.083E-03	+	2.053E-04	Energy duplication	
			87.30	8.707E-04	+	2.368E-04		X
Pb-210	N	1.1091E-03	46.50	1.109E-03	?(	2.077E-04		G
AM-241		9.0362E-04	59.54	9.036E-04	(	3.257E-05		G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 13:19:27 Page 5
8905696 Spectrum name: Win00518.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		7.1837E-01	2.631E-01	2.645E-01
K-40	#	5.0049E+00	1.770E+00	1.779E+00
Ac-228		1.6688E+00	5.036E-01	5.075E-01
Pb-212		1.7980E+00	2.611E-01	2.697E-01
CS-137		2.6955E-01	1.019E-01	1.024E-01
Th-234		2.6738E+00	1.023E+00	1.024E+00
Pb-214		1.3829E+00	2.964E-01	3.009E-01
Pb-210	#	3.9401E+00	2.101E+00	2.103E+00
AM-241		3.2100E+00	4.454E-01	4.610E-01

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

WI07-0920 D2 Grid E3-4 0-6 in. F.R. 080507

& - 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) 2.0666531E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Ferr
EnergySolutions

Reviewed by:
Supervisor

Laboratory: 8905696

WI07-0921 D2 Grid E3-5 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:29:04 Page 1
8905696 Spectrum name: Win00523.An1

Sample description
WI07-0921 D2 Grid E3-5 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00523.An1

Acquisition information
Start time: 05-Aug-2007 15:18:53
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: 3.4160E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4160E+02) = 2.9274E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:29:04 Page 2
8905696 Spectrum name: Win00523.An1

WI07-09201 D2 Grid E3-5 0-6 in. F.R. 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: 0.0752

********** U N I D E N T I F I E D P E A K S U 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	6952.	10741.	17.902	2.92	0.854	-	D
15.98	3.99	14731.	9772.	16.287	4.05	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	184.27	46.25	54.	66.	0.110	51.52	0.751s
AM-241	237.27	59.49	56.	220.	0.367	18.75	0.876
Th-234	251.20	62.98	42.	62.	0.103	45.85	0.523s
Pb-214	298.54	74.81	46.	135.	0.224	22.39	0.917D
Pb-212	298.56	74.81	152.	0.	0.000	3629.20	0.371D
Pb-212	307.74	77.11	48.	182.	0.303	18.35	0.919D
Pb-214	307.74	77.11	168.	0.	0.000	768.37	0.674D
Pb-214	346.56	86.81	48.	60.	0.101	48.18	1.115s
Th-234	368.72	92.35	58.	42.	0.070	59.91	0.933D
Ac-228	380.72	95.35	37.	8.	0.013	227.51	0.935D
Ac-228	836.24	209.21	11.	45.	0.076	40.54	0.403s
Pb-212	953.94	238.62	21.	224.	0.373	14.60	1.057D
Pb-214	967.37	241.98	22.	34.	0.057	51.13	1.060D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:29:04 Page 3
8905696 Spectrum name: Win00523.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.42	269.99	12.	26.	0.044	57.56	0.439s
Pb-214	1181.05	295.39	8.	46.	0.078	38.25	1.060
Ac-228	1312.13	328.15	12.	32.	0.052	62.24	0.399s
Ac-228	1353.69	338.54	0.	71.	0.118	23.74	1.100s
Pb-214	1407.40	351.96	8.	83.	0.139	26.33	0.946

WI07-09201 D2 Grid E3-5 0-6 in. F.R. 080507

Ac-228	1851.27	462.90	2.	15.	0.025	59.50	0.572s
Bi-214	2436.96	609.27	4.	49.	0.082	33.47	0.958s
CS-137	2647.47	661.88	0.	38.	0.063	32.44	0.825s
Bi-214	3073.00	768.23	0.	7.	0.012	75.59	0.250s
Ac-228	3180.00	794.97	0.	14.	0.023	53.45	0.250s
Ac-228	3644.24	910.98	0.	51.	0.085	28.01	1.062s
Bi-214	3732.00	932.91	0.	2.	0.003	141.42	0.250s
Ac-228	3858.81	964.60	0.	11.	0.018	62.59	1.595D
Ac-228	3876.86	969.11	0.	43.	0.071	30.67	1.598D
Bi-214	4478.97	1119.57	5.	2.	0.003	450.78	0.360s
Bi-214	4954.50	1238.39	0.	5.	0.008	89.44	0.500s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5845.67	1461.06	0.	42.	0.070	30.86	0.594s
Ac-228	6347.00	1586.32	0.	4.	0.007	100.00	0.250s
Bi-214	7056.67	1763.63	2.	1.	0.002	447.21	0.187s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.3848E-04	609.31	2.286E-04	?(	1.541E-05	G K
			1764.49	0.000E+00	%	1.068E-04	G
			1120.29	0.000E+00	%	1.040E-04	G
			1238.11	3.390E-04	?(	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	?	1.082E-04	G
			934.06	1.943E-04	&(	9.716E-05	G
K-40	N	1.8492E-03	1460.81	1.849E-03	(	4.403E-05	G
Ac-228	N	5.7931E-04	911.07	5.617E-04	?(	1.101E-05	G K
			969.11	8.256E-04	+	1.890E-04	G
			338.32	8.321E-04	+	1.456E-04	G
			964.60	6.622E-04	(	8.587E-05	G
			794.70	8.232E-04	+	3.419E-04	G
			463.00	5.912E-04	?(	9.663E-05	G
			209.28	9.592E-04	+	2.348E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:29:04 Page 4
8905696 Spectrum name: Win00523.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.227E-04	+	2.884E-04	G
		1588.00	5.810E-04	&(	1.452E-04	G
		95.35	0.000E+00	%	1.926E-04	X
		327.64	1.283E-03	+	4.029E-04	G
Pb-212	N 5.1382E-04	238.62	5.138E-04	(	1.623E-05	G K
		77.11	6.961E-04	+	8.404E-05	Energy duplication
		74.81	0.000E+00	%	1.161E-04	Energy duplication
CS-137	1.0298E-04	661.66	1.030E-04	(	2.710E-06	G
Th-234	N 7.9492E-04	92.35	5.236E-04	(	1.408E-04	G
		63.29	1.181E-03	@(	1.844E-04	G

WI07-09201 D2 Grid E3-5 0-6 in. F.R. 080507

Pb-214	N	3.0273E-04	351.92	3.086E-04	(	1.647E-05	G K
			295.21	2.913E-04	(	2.915E-05	G
			77.11	0.000E+00	%	1.236E-04	Energy duplication
			241.98	4.763E-04	+	1.534E-04	G
			74.81	1.503E-03	+	2.180E-04	Energy duplication
			87.30	8.755E-04	+	2.206E-04	X
Pb-210	N	1.3507E-03	46.50	1.351E-03	*(	2.223E-04	G
AM-241		4.5301E-04	59.54	4.530E-04	(	2.285E-05	G

(- This peak used in the nuclide activity average.

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

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:29:04 Page 5
8905696 Spectrum name: Win00523.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 #	6.9812E-01	2.337E-01	2.351E-01
K-40	5.4132E+00	1.671E+00	1.683E+00
Ac-228	1.6959E+00	4.749E-01	4.792E-01
Pb-212	1.5042E+00	2.196E-01	2.267E-01
CS-137 #	3.0145E-01	9.780E-02	9.848E-02
Th-234	2.3270E+00	8.777E-01	8.794E-01
Pb-214	8.8623E-01	2.058E-01	2.084E-01
Pb-210 #	3.9541E+00	2.037E+00	2.039E+00
AM-241	1.3261E+00	2.486E-01	2.534E-01

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

WI07-09201 D2 Grid E3-5 0-6 in. F.R. 080507

& - 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) 1.8106358E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0922 D2 Grid E4-1 0-6 in. F.R. 080507

Sample description
WI07-0922 D2 Grid E4-1 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00524.An1

Acquisition information
Start time: 05-Aug-2007 15:40:09
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: 3.7030E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7030E+02) = 2.7005E+03
Detection limit method: Traditional ORTEC method

WI07-0922 D2 Grid E4-1 0-6 in. F.R. 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: 0.0878

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.64	3.85	6039.	23590.	39.317	1.85	2.197	CU-64	s
169.16	42.47	153.	29.	0.049	130.16	0.302	EU-155	s
2332.60	583.19	0.	106.	0.177	19.43	1.103	TL-208	

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.11	46.46	190.	74.	0.124	63.00	0.645s
AM-241	237.37	59.52	294.	734.	1.224	12.06	0.882s
Th-234	252.53	63.31	208.	94.	0.157	62.27	0.397s
Pb-214	298.54	74.81	178.	131.	0.219	33.64	0.917D
Pb-212	298.56	74.81	196.	0.	0.000	665.00	0.277D
Pb-212	307.74	77.11	169.	169.	0.281	26.72	0.919D
Pb-214	307.74	77.11	285.	0.	0.000	791.28	0.243D
Pb-214	347.99	87.17	149.	78.	0.129	61.77	0.757s
Th-234	368.72	92.35	117.	74.	0.123	47.48	0.933D
Ac-228	380.72	95.35	78.	17.	0.028	156.48	0.935D
Ac-228	835.67	209.06	40.	39.	0.065	74.73	0.617s
Pb-212	953.94	238.62	18.	259.	0.432	13.25	1.057D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:50:20 Page 3
8905696 Spectrum name: Win00524.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	43.	45.	0.074	51.37	1.060D
Ac-228	1079.88	270.10	16.	28.	0.046	65.50	0.382s
Pb-214	1180.36	295.22	8.	84.	0.139	26.91	0.721s
Ac-228	1309.00	327.37	13.	2.	0.003	687.02	0.000s
Ac-228	1353.03	338.37	18.	62.	0.103	40.93	0.845s

WI07-0922 D2 Grid E4-1 0-6 in. F.R. 080507

Pb-214	1407.10	351.89	4.	115.	0.192	20.21	0.578s
Ac-228	1851.79	463.03	0.	29.	0.048	37.14	0.400s
Bi-214	2437.22	609.34	0.	79.	0.132	22.50	0.737s
CS-137	2646.80	661.71	2.	15.	0.026	58.01	0.276s
Bi-214	3073.83	768.43	0.	23.	0.038	41.70	0.333s
Ac-228	3180.62	795.12	0.	8.	0.013	70.71	0.750s
Ac-228	3645.39	911.27	0.	67.	0.112	24.43	1.671
Bi-214	3737.50	934.28	0.	9.	0.015	66.67	0.250s
Ac-228	3858.81	964.60	4.	14.	0.024	65.96	1.595D
Ac-228	3876.86	969.11	0.	42.	0.069	31.00	1.598D
Bi-214	4481.81	1120.28	0.	16.	0.027	50.00	0.583s
Bi-214	4955.33	1238.60	0.	5.	0.008	89.44	0.250s
Bi-214	5510.14	1377.23	1.	1.	0.002	281.40	0.440s
K-40	5846.00	1461.15	0.	33.	0.055	34.82	0.812s
Ac-228	6352.00	1587.57	0.	0.	0.000	0.00	0.000s
Bi-214	7059.85	1764.42	3.	4.	0.007	149.95	0.432s

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

***** S U M M A R Y O F L 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	3.6980E-04	609.31	3.674E-04	(	4.650E-06	G K
			1764.49	1.542E-04	-	1.521E-04	G
			1120.29	3.893E-04	?(	2.433E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	1.199E-03	+	3.804E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.771E-04	G
			934.06	8.745E-04	+	4.637E-04	G
K-40	N	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	7.7550E-04	911.07	7.379E-04	(	1.101E-05	G K
			969.11	8.084E-04	(	1.942E-05	G
			338.32	7.266E-04	(	7.642E-05	G
			964.60	8.745E-04	(	2.045E-04	G
			794.70	4.704E-04	-	2.664E-04	G
			463.00	1.130E-03	+	3.170E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 15:50:20 Page 4
8905696 Spectrum name: Win00524.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		209.28	8.252E-04	?(	2.001E-04	G
		270.23	8.644E-04	(	1.949E-04	G
		1588.00	0.000E+00	?	1.452E-04	G
		95.35	3.240E-04	-	2.753E-04	X
		327.64	0.000E+00	%	2.443E-04	G
Pb-212	N 6.0992E-04	238.62	5.956E-04	(	1.493E-05	G K
		77.11	6.455E-04	(	7.240E-05	Energy duplication
		74.81	0.000E+00	%	1.315E-04	Energy duplication
CS-137	4.1552E-05	661.66	4.155E-05	?(	6.485E-06	G
Th-234	N 9.2237E-04	92.35	9.224E-04	(	1.973E-04	G
		63.29	1.791E-03	+	4.778E-04	G

WI07-0922 D2 Grid E4-1 0-6 in. F.R. 080507

Pb-214	N	4.5935E-04	351.92	4.259E-04	(	1.249E-05		G K
			295.21	5.241E-04	@(	2.890E-05		G
			77.11	0.000E+00	%	1.600E-04	Energy duplication	
			241.98	6.170E-04	+	1.905E-04		G
			74.81	1.464E-03	+	2.831E-04	Energy duplication	
			87.30	1.127E-03	+	3.165E-04		X
Pb-210	N	1.5208E-03	46.50	1.521E-03	(	4.088E-04		G
AM-241		1.5124E-03	59.54	1.512E-03	@(	5.101E-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 05-AUG-2007 15:50:20 Page 5
8905696 Spectrum name: Win00524.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		9.9864E-01	2.247E-01	2.278E-01
K-40	#	3.9236E+00	1.366E+00	1.374E+00
Ac-228		2.0942E+00	4.612E-01	4.678E-01
Pb-212		1.6471E+00	2.183E-01	2.268E-01
CS-137	#	1.1221E-01	6.509E-02	6.523E-02
Th-234		2.4909E+00	1.183E+00	1.184E+00
Pb-214		1.2405E+00	2.087E-01	2.138E-01
Pb-210		4.1070E+00	2.587E+00	2.589E+00
AM-241	#	4.0844E+00	4.926E-01	5.152E-01

- All peaks for activity calculation had bad shape.

WI07-0922 D2 Grid E4-1 0-6 in. F.R. 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) 2.0698545E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Finn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0923 D2 Grid E4-2 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:08:40 Page 1
8905696 Spectrum name: Win00525.An1

Sample description
WI07-0923 D2 Grid E4-2 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00525.An1

Acquisition information
Start time: 05-Aug-2007 15:58:30
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: 3.5160E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5160E+02) = 2.8441E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:08:40 Page 2
8905696 Spectrum name: Win00525.An1

WI07-0923 D2 Grid E4-2 0-6 in. F.R. 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: 0.1256

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.74	2.92	6287.	12095.	20.158	2.60	0.854	-	D
16.99	4.23	14776.	10154.	16.923	3.92	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	184.87	46.40	63.	82.	0.136	38.76	1.011
AM-241	237.41	59.53	241.	1865.	3.109	5.74	0.943
Th-234	252.95	63.41	70.	42.	0.070	79.02	0.890
Pb-214	298.54	74.81	75.	105.	0.175	30.46	0.917D
Pb-212	298.56	74.81	88.	0.	0.000	181.22	0.517D
Pb-212	307.74	77.11	71.	140.	0.234	23.90	0.919D
Pb-214	307.74	77.11	136.	0.	0.000	3442.38	0.384D
Pb-214	348.40	87.27	50.	50.	0.083	55.66	0.475s
Th-234	368.72	92.35	60.	40.	0.066	63.48	0.933D
Ac-228	380.72	95.35	42.	10.	0.016	199.46	0.935D
Ac-228	836.30	209.22	33.	26.	0.043	96.69	0.961
Pb-212	953.94	238.62	19.	235.	0.391	14.10	1.057D
Pb-214	967.37	241.98	37.	32.	0.053	65.08	1.060D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:08:40 Page 3
8905696 Spectrum name: Win00525.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1081.37	270.47	12.	26.	0.043	66.17	0.384s
Pb-214	1180.69	295.30	13.	51.	0.084	41.11	0.625s
Ac-228	1311.27	327.93	8.	28.	0.047	57.08	1.193
Ac-228	1352.65	338.28	6.	50.	0.084	32.19	0.668s
Pb-214	1406.79	351.81	9.	84.	0.140	26.08	1.421s

WI07-0923 D2 Grid E4-2 0-6 in. F.R. 080507

Ac-228	1852.11	463.11	0.	18.	0.030	47.14	0.500s
Bi-214	2437.04	609.29	4.	54.	0.089	32.65	0.342s
CS-137	2649.12	662.29	0.	17.	0.028	48.51	0.312s
Bi-214	3073.25	768.29	1.	2.	0.003	200.00	0.452s
Ac-228	3178.69	794.64	0.	16.	0.027	50.00	0.281s
Ac-228	3645.78	911.36	0.	58.	0.097	26.26	0.379s
Bi-214	3735.00	933.66	0.	0.	0.000	0.00	0.000s
Ac-228	3858.81	964.60	2.	17.	0.029	52.79	1.595D
Ac-228	3876.86	969.11	5.	38.	0.064	36.06	1.598D
Bi-214	4482.00	1120.33	2.	0.	0.000	0.00	0.000s
Bi-214	4951.33	1237.60	0.	5.	0.008	89.44	0.250s
Bi-214	5513.00	1377.94	0.	4.	0.007	100.00	0.250s
K-40	5844.82	1460.85	0.	33.	0.055	34.82	0.394s
Ac-228	6355.00	1588.32	0.	6.	0.010	81.65	0.250s
Bi-214	7055.67	1763.38	0.	10.	0.017	63.25	0.375s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.8205E-04	609.31	2.496E-04	@(	1.621E-05	G K
			1764.49	3.558E-04	&(	3.558E-05	G
			1120.29	0.000E+00	?	6.233E-05	G
			1238.11	3.390E-04	?(	6.779E-05	G
			768.36	0.000E+00	%	1.563E-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	1.4529E-03	1460.81	1.453E-03	?(	4.403E-05	G
Ac-228	N	6.7413E-04	911.07	6.388E-04	?(	1.101E-05	G K
			969.11	7.437E-04	(	7.002E-05	G
			338.32	5.918E-04	?(	4.517E-05	G
			964.60	1.065E-03	+	4.126E-04	G
			794.70	9.408E-04	+	3.633E-04	G
			463.00	7.016E-04	?(	3.898E-05	G
			209.28	5.501E-04	(	1.828E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:08:40 Page 4
8905696 Spectrum name: Win00525.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	8.123E-04	(	1.695E-04	G
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	1.875E-04	-	2.063E-04	X
		327.64	1.154E-03	+	3.665E-04	G
Pb-212	N 5.3860E-04	238.62	5.390E-04	(	1.552E-05	G K
		77.11	5.375E-04	(	4.744E-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 6.2231E-04	92.35	4.974E-04	(	1.432E-04	G
		63.29	8.001E-04	$(	2.351E-04	G

WI07-0923 D2 Grid E4-2 0-6 in. F.R. 080507

Pb-214	N	3.1325E-04	351.92	3.111E-04	(	1.767E-05		G K
			295.21	3.174E-04	(	3.563E-05		G
			77.11	0.000E+00	%	1.118E-04	Energy duplication	
			241.98	4.381E-04	+	1.695E-04		G
			74.81	1.171E-03	+	2.174E-04	Energy duplication	
			87.30	7.183E-04	+	2.116E-04		X
Pb-210	N	1.6671E-03	46.50	1.667E-03	(	2.402E-04		G
AM-241		3.8410E-03	59.54	3.841E-03	(	4.622E-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 05-AUG-2007 16:08:40 Page 5
8905696 Spectrum name: Win00525.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 #	8.0220E-01	2.620E-01	2.637E-01
K-40 #	4.1323E+00	1.439E+00	1.447E+00
Ac-228	1.9173E+00	4.386E-01	4.445E-01
Pb-212	1.5319E+00	2.126E-01	2.202E-01
CS-137 #	1.3102E-01	6.356E-02	6.375E-02
Th-234	1.7699E+00	8.970E-01	8.979E-01
Pb-214	8.9092E-01	2.169E-01	2.194E-01
Pb-210	4.7415E+00	1.838E+00	1.841E+00
AM-241	1.0924E+01	6.273E-01	7.463E-01

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

WI07-0923 D2 Grid E4-2 0-6 in. F.R. 080507

& - 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) 2.6841412E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: [signature]
Supervisor

Laboratory: 8905696

WI07-0924 D2 Grid E4-3 0-6 in. F.R. 080507

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:42:22 Page 1
8905696 Spectrum name: Win00526.An1

Sample description
WI07-0924 D2 Grid E4-3 0-6" Free R. 080507

Spectrum Filename: C:\User\Win00526.An1

Acquisition information
Start time: 05-Aug-2007 16:32:10
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: 3.3950E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.3950E+02) = 2.9455E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:42:22 Page 2
8905696 Spectrum name: Win00526.An1

WI07-0924 D2 Grid E4-3 0-6 in. F.R. 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: 0.0637

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
11.76	2.90	3507.	13862.	23.103	2.08	0.854	-	D
17.99	4.46	17822.	10674.	17.789	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	184.48	46.30	28.	64.	0.106	39.81	1.299s
AM-241	237.00	59.43	61.	115.	0.191	32.14	1.050s
Th-234	252.29	63.25	60.	50.	0.083	64.50	0.420s
Pb-214	298.54	74.81	78.	102.	0.170	31.55	0.917D
Pb-212	298.56	74.81	122.	0.	0.000	1568.44	0.339D
Pb-212	307.74	77.11	71.	166.	0.277	21.16	0.919D
Pb-214	307.74	77.11	163.	0.	0.000	599.35	0.000D
Pb-214	347.71	87.10	35.	65.	0.108	42.13	0.895s
Th-234	368.72	92.35	72.	50.	0.084	55.14	0.933D
Ac-228	380.72	95.35	41.	11.	0.019	170.10	0.935D
Ac-228	837.45	209.51	24.	42.	0.071	58.16	0.621s
Pb-212	953.94	238.62	27.	228.	0.380	14.71	1.057D
Pb-214	967.37	241.98	26.	27.	0.045	65.38	1.060D

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:42:22 Page 3
8905696 Spectrum name: Win00526.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1076.38	269.23	9.	3.	0.004	370.81	0.260s
Pb-214	1179.88	295.09	12.	57.	0.095	35.95	0.963s
Ac-228	1310.50	327.74	0.	38.	0.063	32.44	0.667s
Ac-228	1353.62	338.52	11.	48.	0.080	41.53	0.588s
Pb-214	1407.20	351.91	12.	69.	0.116	30.01	0.863s

WI07-0924 D2 Grid E4-3 0-6 in. F.R. 080507

Ac-228	1852.94	463.31	3.	21.	0.035	56.00	1.073
Bi-214	2436.80	609.23	4.	67.	0.112	27.30	0.444s
CS-137	2645.56	661.40	0.	18.	0.030	47.14	0.500s
Bi-214	3075.00	768.73	0.	9.	0.015	66.67	0.250s
Ac-228	3176.50	794.09	3.	2.	0.003	282.84	0.202s
Ac-228	3644.63	911.08	0.	60.	0.100	25.82	1.041s
Bi-214	3735.33	933.74	1.	1.	0.001	339.93	0.197s
Ac-228	3858.81	964.60	3.	10.	0.016	82.82	1.595D
Ac-228	3876.86	969.11	3.	22.	0.037	46.67	1.598D
Bi-214	4477.50	1119.20	0.	10.	0.017	63.25	0.375s
Bi-214	4952.00	1237.77	0.	1.	0.002	200.00	0.250s
Bi-214	5510.00	1377.19	0.	3.	0.005	115.47	0.750s
K-40	5845.39	1460.99	0.	49.	0.082	28.57	0.619s
Ac-228	6354.00	1588.07	0.	6.	0.010	81.65	0.375s
Bi-214	7057.20	1763.76	0.	10.	0.017	63.25	0.375s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	3.2403E-04	609.31	3.131E-04	@(	1.513E-05	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	2.433E-04	&	1.217E-04	G
			1238.11	0.000E+00	%	1.356E-04	G
			768.36	4.690E-04	+	2.487E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	3.246E-04	?(	1.082E-04	G
			934.06	0.000E+00	%	2.489E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	?(	4.403E-05	G
Ac-228	N	6.6026E-04	911.07	6.608E-04	(	1.101E-05	G K
			969.11	4.365E-04	-	1.474E-04	G
			338.32	5.625E-04	?(	6.114E-05	G
			964.60	6.011E-04	(	1.915E-04	G
			794.70	0.000E+00	%	2.176E-04	G
			463.00	8.120E-04	(	1.195E-04	G
			209.28	8.993E-04	+	2.557E-04	G

ORTEC g v - i (63) wan32 G53W2.06 05-AUG-2007 16:42:22 Page 4
8905696 Spectrum name: Win00526.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	0.000E+00	&	1.695E-04	G
		1588.00	8.715E-04	?(	1.452E-04	G
		95.35	2.199E-04	-	2.079E-04	X
		327.64	1.547E-03	+	3.760E-04	G
Pb-212 N	5.2443E-04	238.62	5.244E-04	(	1.801E-05	G K
		77.11	6.351E-04	+	8.528E-05	Energy duplication
		74.81	0.000E+00	%	1.045E-04	Energy duplication
CS-137	4.8778E-05	661.66	4.878E-05	?(	2.710E-06	G
Th-234 N	7.6282E-04	92.35	6.296E-04	(	1.556E-04	G
		63.29	9.525E-04	@(	2.184E-04	G

WI07-0924 D2 Grid E4-3 0-6 in. F.R. 080507

Pb-214	N	3.0085E-04	351.92	2.568E-04	(	1.984E-05		G K
			295.21	3.571E-04	(	3.398E-05		G
			77.11	0.000E+00	%	1.219E-04	Energy duplication	
			241.98	3.755E-04	(	1.066E-04		G
			74.81	1.137E-03	+	2.174E-04	Energy duplication	
			87.30	9.432E-04	+	2.126E-04		X
Pb-210	N	1.2963E-03	46.50	1.296E-03	*(	1.619E-04		G
AM-241		2.3611E-04	59.54	2.361E-04	(	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:	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 05-AUG-2007 16:42:22 Page 5
8905696 Spectrum name: Win00526.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 #	9.5444E-01	2.605E-01	2.630E-01
K-40 #	6.3545E+00	1.816E+00	1.831E+00
Ac-228	1.9448E+00	5.021E-01	5.074E-01
Pb-212	1.5447E+00	2.273E-01	2.345E-01
CS-137 #	1.4368E-01	6.773E-02	6.795E-02
Th-234	2.2469E+00	9.533E-01	9.547E-01
Pb-214	8.8614E-01	2.376E-01	2.399E-01
Pb-210 #	3.8182E+00	1.520E+00	1.523E+00
AM-241 #	6.9548E-01	2.235E-01	2.250E-01

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

WI07-0924 D2 Grid E4-3 0-6 in. F.R. 080507

& - 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) 1.8588829E+01 pCi/g

The library has energies which are not separable.

Analyzed by: L.C. Fern
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 8905696

WI07-0769 D2 Bag# S-092 Grid C2-3,5 080107

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 10:57:30 Page 1
4714781 Spectrum name: Win00457.An1

Sample description
WI07-0769 D2 Bag # S-092 Grid C4-2 080107

Spectrum Filename: C:\User\Win00457.An1

Acquisition information
Start time: 01-Aug-2007 10:47:20
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: 3.5200E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5200E+02) = 2.8409E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 10:57:30 Page 2
4714781 Spectrum name: Win00457.An1

WI07-0769 D2 Bag# S-092 Grid C2-3,5 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: 0.0672

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
11.71	2.91	7136.	14063.	23.439	2.39	0.854	- D
17.04	4.24	16781.	11355.	18.926	3.73	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	184.52	46.31	177.	34.	0.056	148.49	0.587s
AM-241	237.55	59.56	374.	3908.	6.514	3.78	0.866
Th-234	252.93	63.41	72.	42.	0.069	78.88	0.389s
Pb-214	298.54	74.81	93.	114.	0.190	30.31	0.917D
Pb-212	298.56	74.81	130.	0.	0.000	254.20	0.615D
Pb-212	307.74	77.11	70.	190.	0.317	19.10	0.919D
Pb-214	307.74	77.11	209.	0.	0.000	1210.01	0.403D
Pb-214	346.98	86.92	63.	64.	0.107	50.56	1.232s
Th-234	368.72	92.35	66.	47.	0.078	57.36	0.933D
Ac-228	380.72	95.35	41.	18.	0.030	111.26	0.935D
Ac-228	833.59	208.54	33.	44.	0.073	62.82	0.338s
Pb-212	953.94	238.62	22.	263.	0.438	13.32	1.057D
Pb-214	967.37	241.98	38.	49.	0.082	45.64	1.060D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 10:57:30 Page 3
4714781 Spectrum name: Win00457.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.62	270.04	24.	35.	0.058	71.14	0.583s
Pb-214	1179.87	295.09	6.	83.	0.138	25.27	0.802s
Ac-228	1311.39	327.97	8.	22.	0.038	62.06	0.336s
Ac-228	1353.74	338.55	13.	63.	0.106	34.03	0.812s
Pb-214	1407.29	351.93	9.	139.	0.232	19.03	1.140

WI07-0769 D2 Bag# S-092 Grid C2-3,5 080107

Ac-228	1849.73	462.51	2.	19.	0.031	53.83	0.353s
Bi-214	2437.13	609.32	0.	91.	0.152	20.97	1.154
CS-137	2645.50	661.39	0.	22.	0.037	42.64	0.750s
Bi-214	3068.80	767.18	0.	16.	0.027	50.00	0.500s
Ac-228	3178.17	794.51	0.	13.	0.022	55.47	0.292s
Ac-228	3645.02	911.17	0.	51.	0.085	28.01	0.621s
Bi-214	3737.71	934.34	0.	10.	0.017	63.25	0.292s
Ac-228	3858.81	964.60	1.	9.	0.016	69.98	1.595D
Ac-228	3876.86	969.11	0.	43.	0.071	30.61	1.598D
Bi-214	4478.71	1119.50	0.	21.	0.035	43.64	0.312s
Bi-214	4949.00	1237.02	0.	5.	0.008	89.44	0.250s
Bi-214	5510.50	1377.32	0.	4.	0.007	100.00	0.500s
K-40	5844.71	1460.82	0.	58.	0.097	26.26	1.861
Ac-228	6354.33	1588.15	0.	4.	0.007	100.00	0.250s
Bi-214	7059.50	1764.33	0.	8.	0.013	70.71	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	4.4403E-04	609.31	4.232E-04	(	4.650E-06	G K
			1764.49	2.847E-04	-	1.612E-04	G
			1120.29	5.110E-04	?(	2.433E-05	G
			1238.11	3.390E-04	&	2.509E-04	G
			768.36	8.338E-04	&	3.220E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	4.328E-04	?(	1.082E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	2.5536E-03	1460.81	2.554E-03	(	4.403E-05	G
Ac-228	N	6.3020E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	8.291E-04	+	1.894E-04	G
			338.32	7.422E-04	(	6.514E-05	G
			964.60	5.762E-04	(	1.085E-04	G
			794.70	7.644E-04	?(	5.880E-05	G
			463.00	7.341E-04	?(	1.029E-04	G
			209.28	9.240E-04	&	2.734E-04	G

D

ORTEC g v - i (63) wan32 G53W2.06 01-AUG-2007 10:57:30 Page 4
4714781 Spectrum name: Win00457.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.093E-03	+	3.554E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	3.463E-04	-	2.191E-04	X
		327.64	9.163E-04	+	3.365E-04	G
Pb-212	N 6.0396E-04	238.62	6.040E-04	(	1.632E-05	G K
		77.11	7.271E-04	+	8.914E-05	Energy duplication
		74.81	0.000E+00	%	1.077E-04	Energy duplication
CS-137	5.9618E-05	661.66	5.962E-05	?(	2.710E-06	G
Th-234	N 6.6837E-04	92.35	5.825E-04	(	1.501E-04	G
		63.29	7.906E-04	$(	2.375E-04	G

```
                    WI07-0769   D2 Bag# S-092   Grid C2-3,5  080107
Pb-214   N   5.1585E-04    351.92 5.148E-04  (  1.767E-05         G K
                           295.21 5.178E-04  (  2.565E-05         G
                            77.11 0.000E+00 %   1.376E-04Energy duplication
                           241.98 6.775E-04 +   1.894E-04         G
                            74.81 1.275E-03 +   2.327E-04Energy duplication
                            87.30 9.311E-04 +   2.386E-04         X

Pb-210   N   6.8726E-04     46.50 6.873E-04 ?(  3.948E-04         G

AM-241       8.0478E-03     59.54 8.048E-03  (  5.733E-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 10:57:30 Page    5
4714781                          Spectrum name: Win00457.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        1.2614E+00    2.645E-01    2.687E-01
K-40          7.2546E+00    1.905E+00    1.924E+00
Ac-228        1.7903E+00    4.507E-01    4.557E-01
Pb-212        1.7158E+00    2.285E-01    2.373E-01
CS-137 #      1.6937E-01    7.222E-02    7.251E-02
Th-234        1.8988E+00    9.260E-01    9.270E-01
Pb-214        1.4655E+00    2.318E-01    2.382E-01
Pb-210 #      1.9525E+00    2.899E+00    2.900E+00
AM-241        2.2863E+01    8.649E-01    1.210E+00

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

WI07-0769 D2 Bag# S-092 Grid C2-3,5 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) 4.0371284E+01 pCi/g

The library has energies which are not separable.

Analyzed by: R.C. Fann
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0729 D2 Bag# S-093 Grid C2-4 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 14:33:43 Page 1
4714781 Spectrum name: Win00436.An1

Sample description
WI07- 0729 D2 Bag S-093 Grid C2-4 073107

Spectrum Filename: C:\User\Win00436.An1

Acquisition information
Start time: 31-Jul-2007 14:23:32
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: 3.7050E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7050E+02) =
2.6991E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 14:33:43 Page 2
4714781 Spectrum name: Win00436.An1

WI07-0729 D2 Bag# S-093 Grid C2-4 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: 0.0708

********** U N I D E N T I F I E D P E A K S U 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	3795.	21369.	35.615	1.79	2.247	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	184.72	46.36	38.	38.	0.062	64.57	0.917
AM-241	237.44	59.54	138.	684.	1.140	10.28	0.840
Th-234	252.59	63.32	56.	36.	0.059	82.04	0.742
Pb-214	298.54	74.81	65.	133.	0.221	24.42	0.917D
Pb-212	298.56	74.81	105.	0.	0.000	180.49	0.370D
Pb-212	307.74	77.11	63.	180.	0.300	19.40	0.919D
Pb-214	307.74	77.11	172.	0.	0.000	184.43	0.425D
Pb-214	347.11	86.95	48.	56.	0.094	51.11	0.619s
Th-234	368.72	92.35	74.	39.	0.065	70.36	0.933D
Ac-228	380.72	95.35	29.	7.	0.011	241.43	0.935D
Ac-228	840.23	210.20	22.	34.	0.056	66.41	0.578s
Pb-212	953.94	238.62	26.	234.	0.390	14.45	1.057D
Pb-214	967.37	241.98	29.	40.	0.067	49.42	1.060D
Ac-228	1079.52	270.01	11.	32.	0.054	52.28	1.485s

D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 14:33:43 Page 3
4714781 Spectrum name: Win00436.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.57	295.27	13.	74.	0.123	30.06	0.483s
Ac-228	1309.89	327.59	4.	28.	0.047	47.59	0.848s
Ac-228	1352.48	338.24	15.	71.	0.118	34.05	1.172
Pb-214	1406.99	351.86	8.	117.	0.196	21.18	0.943
Ac-228	1851.42	462.93	2.	25.	0.041	46.18	0.514s

WI07-0729 D2 Bag# S-093 Grid C2-4 073107

Bi-214	2436.70	609.21	3.	88.	0.147	22.57	1.235
CS-137	2646.57	661.66	0.	7.	0.012	75.59	0.750s
Bi-214	3075.41	768.83	1.	6.	0.009	104.57	0.441s
Ac-228	3171.00	792.72	0.	9.	0.015	66.67	0.250s
Ac-228	3645.26	911.23	0.	41.	0.068	31.23	0.662s
Bi-214	3731.25	932.72	0.	8.	0.013	70.71	0.312s
Ac-228	3858.81	964.60	1.	7.	0.011	92.79	1.595D
Ac-228	3876.86	969.11	1.	23.	0.039	42.30	1.598D
Bi-214	4482.00	1120.33	5.	0.	0.000	0.00	0.000s
Bi-214	4952.33	1237.85	0.	8.	0.013	70.71	0.250s
Bi-214	5512.50	1377.82	0.	3.	0.005	115.47	0.500s
K-40	5845.26	1460.96	0.	50.	0.083	28.28	0.318s
Ac-228	6355.00	1588.32	0.	3.	0.005	115.47	0.250s
Bi-214	7057.67	1763.88	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	Peak MDA Value microCi	Comments
Bi-214	N	4.1001E-04	609.31	4.100E-04	(	1.364E-05	G K
			1764.49	3.203E-04	-	1.698E-04	G
			1120.29	0.000E+00	?	9.007E-05	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	2.953E-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	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	4.5384E-04	911.07	4.515E-04	(	1.101E-05	G K
			969.11	4.551E-04	(	3.250E-05	G
			338.32	8.282E-04	+	1.597E-04	G
			964.60	4.078E-04	(	1.385E-04	G
			794.70	5.292E-04	&(	5.880E-05	G
			463.00	9.614E-04	+	3.066E-04	G
			209.28	7.159E-04	&	2.348E-04	G
			270.23	1.010E-03	+	3.058E-04	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1588.00	4.357E-04	?(	1.452E-04	G
		95.35	0.000E+00	%	1.734E-04	X
		327.64	1.154E-03	+	3.468E-04	G
Pb-212	N 5.3793E-04	238.62	5.379E-04	(	1.774E-05	G K
		77.11	6.900E-04	+	8.633E-05	Energy duplication
		74.81	0.000E+00	?	9.716E-05	Energy duplication
CS-137	1.8969E-05	661.66	1.897E-05	?(	2.710E-06	G
Th-234	N 5.6533E-04	92.35	4.851E-04	(	1.583E-04	G
		63.29	6.795E-04	?(	2.120E-04	G
Pb-214	N 4.5663E-04	351.92	4.346E-04	(	1.647E-05	G K

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                    WI07-0729   D2 Bag# S-093   Grid C2-4  073107
                              295.21 4.615E-04  (  3.563E-05          G
                               77.11 0.000E+00 ?   1.249E-04Energy duplication
                              241.98 5.538E-04  (  1.123E-04          G
                               74.81 1.483E-03 +   2.278E-04Energy duplication
                               87.30 8.175E-04 +   2.167E-04          X

Pb-210   N   7.6552E-04      46.50 7.655E-04  (  1.896E-04          G

AM-241       1.4085E-03      59.54 1.408E-03  (  3.525E-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 14:33:43 Page    5
 4714781                                Spectrum name: Win00436.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       1.1067E+00    2.498E-01    2.532E-01
 K-40   #     5.9417E+00    1.681E+00    1.695E+00
 Ac-228       1.2249E+00    3.826E-01    3.854E-01
 Pb-212       1.4519E+00    2.098E-01    2.167E-01
 CS-137 #     5.1199E-02    3.870E-02    3.875E-02
 Th-234       1.5259E+00    8.246E-01    8.253E-01
 Pb-214       1.2325E+00    2.530E-01    2.572E-01
 Pb-210       2.0662E+00    1.334E+00    1.335E+00
 AM-241       3.8015E+00    3.908E-01    4.153E-01

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

WI07-0729 D2 Bag# S-093 Grid C2-4 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) 1.8402340E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0730 D2 Bag# S-094 Grid C2-4 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:08:55 Page 1
4714781 Spectrum name: Win00439.An1

Sample description
WI07- 0730 D2 Bag S-094 Grid C2-4 073107

Spectrum Filename: C:\User\Win00439.An1

Acquisition information
Start time: 31-Jul-2007 14:58:45
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: 3.6490E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6490E+02) = 2.7405E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:08:55 Page 2
4714781 Spectrum name: Win00439.An1

WI07-0730 D2 Bag# S-094 Grid C2-4 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: 0.0923

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.45	3.80	3645.	20547.	34.245	1.82	2.033	CU-64	s
104.37	26.27	16.	65.	0.108	34.22	0.675	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	184.80	46.38	100.	25.	0.042	136.63	0.340s
AM-241	237.38	59.52	190.	2894.	4.823	4.12	0.870
Th-234	250.89	62.90	37.	62.	0.104	43.02	0.723s
Pb-214	298.54	74.81	64.	85.	0.142	34.24	0.917D
Pb-212	298.56	74.81	100.	0.	0.000	283.15	0.368D
Pb-212	307.74	77.11	58.	113.	0.189	26.74	0.919D
Pb-214	307.74	77.11	172.	0.	0.000	114.01	0.000D
Pb-214	348.95	87.41	44.	37.	0.062	70.27	0.807
Th-234	368.72	92.35	49.	37.	0.062	62.20	0.933D
Ac-228	380.72	95.35	24.	6.	0.010	240.59	0.935D
Ac-228	835.75	209.08	11.	30.	0.051	54.95	0.450s
Pb-212	953.94	238.62	9.	166.	0.277	16.35	1.057D
Pb-214	967.37	241.98	29.	32.	0.053	60.29	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:08:55 Page 3
4714781 Spectrum name: Win00439.Anl

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1079.49	270.00	6.	37.	0.061	43.31	0.736s
Pb-214	1180.84	295.34	12.	48.	0.081	42.07	1.059
Ac-228	1308.73	327.30	7.	17.	0.028	74.72	0.551s
Ac-228	1353.06	338.38	4.	33.	0.056	39.67	0.444s
Pb-214	1407.41	351.96	6.	94.	0.157	23.11	1.198

WI07-0730 D2 Bag# S-094 Grid C2-4 073107

Ac-228	1851.62	462.99	3.	18.	0.030	59.31	0.353s
Bi-214	2437.00	609.28	0.	52.	0.087	27.74	1.583
CS-137	2646.50	661.64	0.	4.	0.007	100.00	1.000s
Bi-214	3072.14	768.01	2.	0.	0.001	412.31	0.150s
Ac-228	3181.60	795.37	0.	11.	0.018	60.30	0.250s
Ac-228	3645.47	911.29	0.	43.	0.072	30.50	0.367s
Bi-214	3735.33	933.74	1.	1.	0.001	339.93	0.197s
Ac-228	3858.81	964.60	9.	3.	0.005	323.44	1.595D
Ac-228	3876.86	969.11	16.	0.	0.001	3106.99	1.598D
Bi-214	4483.78	1120.77	0.	13.	0.022	55.47	0.375s
Bi-214	4954.00	1238.27	0.	11.	0.018	60.30	0.417s
Bi-214	5513.00	1377.94	0.	5.	0.008	89.44	0.500s
K-40	5846.22	1461.20	12.	2.	0.003	547.72	0.243s
Ac-228	6355.00	1588.32	0.	2.	0.003	141.42	0.250s
Bi-214	7060.75	1764.65	0.	10.	0.017	63.25	0.375s

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

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

Nuclide Name	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.6014E-04	609.31	2.418E-04	(	4.650E-06	G K
			1764.49	3.558E-04	+	1.779E-04	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	7.457E-04	+	3.537E-04	G
			768.36	0.000E+00	%	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	5.410E-04	+	4.005E-04	G
			934.06	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	4.9874E-04	911.07	4.736E-04	?(	1.101E-05	G K
			969.11	0.000E+00	%	1.204E-04	G
			338.32	3.907E-04	(	3.813E-05	G
			964.60	0.000E+00	%	3.285E-04	G
			794.70	6.468E-04	?(	5.880E-05	G
			463.00	7.081E-04	+	2.728E-04	G
			209.28	6.418E-04	(	1.089E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:08:55 Page 4
4714781 Spectrum name: Win00439.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.146E-03	+	3.058E-04	G
		1588.00	2.905E-04	-	3.720E-04	G
		95.35	0.000E+00	%	1.591E-04	X
		327.64	6.923E-04	(	1.741E-04	G
Pb-212	N 3.9630E-04	238.62	3.814E-04	(	1.099E-05	G K
		77.11	4.332E-04	(	4.313E-05	Energy duplication
		74.81	0.000E+00	%	9.505E-05	Energy duplication
CS-137	1.0840E-05	661.66	1.084E-05	?(	2.710E-06	G
Th-234	N 7.6215E-04	92.35	4.656E-04	(	1.295E-04	G
		63.29	1.184E-03	(	1.733E-04	G

WI07-0730 D2 Bag# S-094 Grid C2-4 073107

Pb-214	N	3.3306E-04	351.92	3.481E-04	(	1.481E-05	G K	
			295.21	3.038E-04	(	3.334E-05	G	
			77.11	0.000E+00	?	1.252E-04	Energy duplication	
			241.98	4.362E-04	+	1.598E-04	G	
			74.81	9.510E-04	+	1.983E-04	Energy duplication	
			87.30	5.369E-04	+	1.921E-04	X	
Pb-210	N	5.1034E-04	46.50	5.103E-04	?(	2.991E-04	G	
AM-241		5.9591E-03	59.54	5.959E-03	(	4.118E-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 15:08:55 Page 5
4714781 Spectrum name: Win00439.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		7.1292E-01	1.977E-01	1.995E-01
K-40	<	7.0163E-01		
Ac-228		1.3668E+00	3.319E-01	3.358E-01
Pb-212		1.0860E+00	1.702E-01	1.750E-01
CS-137	#	2.9706E-02	2.971E-02	2.973E-02
Th-234		2.0886E+00	7.898E-01	7.913E-01
Pb-214		9.1274E-01	2.110E-01	2.137E-01
Pb-210	#	1.3986E+00	1.911E+00	1.911E+00
AM-241		1.6331E+01	6.733E-01	9.049E-01

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

WI07-0730 D2 Bag# S-094 Grid C2-4 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) 2.3926332E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Fenn
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0731 D2 Bag# S-095 Grid C2-5 073107

Sample description
WI07- 0731 D2 Bag S-095 Grid C2-5 073107

Spectrum Filename: C:\User\Win00440.An1

Acquisition information
Start time: 31-Jul-2007 15:12:54
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: 3.8670E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8670E+02) = 2.5860E+03
Detection limit method: Traditional ORTEC method

WI07-0731 D2 Bag# S-095 Grid C2-5 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: 0.0455

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.56	3.83	3900.	23545.	39.242	1.68	2.182	CU-64	s

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.30	46.51	82.	42.	0.071	76.20	0.684s
AM-241	237.23	59.48	247.	1522.	2.537	6.69	0.975
Th-234	252.47	63.29	60.	44.	0.074	66.04	0.714
Pb-214	298.54	74.81	83.	103.	0.171	31.90	0.917D
Pb-212	298.56	74.81	94.	0.	0.000	305.01	0.000D
Pb-212	307.74	77.11	78.	163.	0.272	21.87	0.919D
Pb-214	307.74	77.11	202.	0.	0.000	4502.22	0.293D
Pb-214	348.31	87.25	48.	48.	0.081	58.41	0.576s
Th-234	368.72	92.35	45.	54.	0.091	44.07	0.933D
Ac-228	380.72	95.35	28.	4.	0.006	430.69	0.935D
Ac-228	835.39	208.99	22.	54.	0.090	46.36	1.063s
Pb-212	953.94	238.62	20.	203.	0.339	15.32	1.057D
Pb-214	967.37	241.98	24.	42.	0.069	45.75	1.060D
Ac-228	1079.62	270.04	10.	30.	0.050	57.09	0.526s

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:23:04 Page 3
4714781 Spectrum name: Win00440.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.69	295.30	6.	64.	0.107	29.32	0.755s
Ac-228	1303.26	325.93	8.	22.	0.036	68.41	0.281s
Ac-228	1352.74	338.30	10.	43.	0.072	41.08	1.396s
Pb-214	1407.11	351.89	14.	91.	0.152	27.27	1.302
Ac-228	1860.39	465.18	6.	8.	0.013	141.32	0.411s

WI07-0731 D2 Bag# S-095 Grid C2-5 073107

Bi-214	2437.09	609.31	3.	57.	0.096	28.58	0.767s
CS-137	2646.07	661.53	0.	20.	0.033	44.72	0.417s
Bi-214	3075.33	768.81	0.	3.	0.005	115.47	0.375s
Ac-228	3175.42	793.82	3.	4.	0.007	169.56	0.286s
Ac-228	3645.68	911.34	0.	34.	0.057	34.30	0.791s
Bi-214	3736.25	933.97	0.	5.	0.008	89.44	0.375s
Ac-228	3858.81	964.60	5.	8.	0.014	99.82	1.595D
Ac-228	3876.86	969.11	1.	22.	0.036	45.11	1.598D
Bi-214	4479.43	1119.68	0.	13.	0.022	55.47	0.312s
Bi-214	4951.20	1237.57	0.	9.	0.015	66.67	0.375s
Bi-214	5510.33	1377.28	1.	1.	0.001	339.93	0.197s
K-40	5844.98	1460.89	0.	49.	0.082	28.57	0.770s
Ac-228	6352.00	1587.57	0.	1.	0.002	200.00	0.250s
Bi-214	7059.50	1764.33	0.	10.	0.017	63.25	0.375s

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

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

Nuclide Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	2.9460E-04	609.31	2.666E-04	(	1.331E-05	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	3.163E-04	?(	2.433E-05	G
			1238.11	6.101E-04	+	3.235E-04	G
			768.36	1.563E-04	-	1.563E-04	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	0.000E+00	%	2.771E-04	G
			934.06	4.858E-04	+	3.597E-04	G
K-40	N	2.1574E-03	1460.81	2.157E-03	?(	4.403E-05	G
Ac-228	N	4.2437E-04	911.07	3.744E-04	?(	1.101E-05	G K
			969.11	4.235E-04	(	4.123E-05	G
			338.32	5.039E-04	(	5.860E-05	G
			964.60	5.188E-04	(	2.205E-04	G
			794.70	2.352E-04	&	2.514E-04	G
			463.00	2.923E-04	&	2.267E-04	G
			209.28	1.143E-03	+	2.717E-04	G
			270.23	9.373E-04	+	2.955E-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	%	1.640E-04	X
		327.64	8.756E-04	&	3.365E-04	G
Pb-212	N 4.6741E-04	238.62	4.674E-04	(	1.559E-05	G K
		77.11	6.250E-04	+	8.598E-05	Energy duplication
		74.81	0.000E+00	%	9.219E-05	Energy duplication
CS-137	5.4198E-05	661.66	5.420E-05	?(	2.710E-06	G
Th-234	N 7.4834E-04	92.35	6.785E-04	(	1.243E-04	G
		63.29	8.478E-04	(	2.193E-04	G
Pb-214	N 3.5878E-04	351.92	3.370E-04	(	2.154E-05	G K

WI07-0731 D2 Bag# S-095 Grid C2-5 073107

			295.21	4.009E-04	*(	2.506E-05	G
			77.11	0.000E+00	%	1.354E-04	Energy duplication
			241.98	5.748E-04	+	1.659E-04	G
			74.81	1.148E-03	+	2.209E-04	Energy duplication
			87.30	7.014E-04	+	2.085E-04	X
Pb-210	N	8.6418E-04	46.50	8.642E-04	(	2.713E-04	G
AM-241		3.1347E-03	59.54	3.135E-03	(	4.678E-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
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 31-JUL-2007 15:23:04 Page 5
4714781 Spectrum name: Win00440.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		7.6184E-01	2.177E-01	2.196E-01
K-40	#	5.5789E+00	1.594E+00	1.608E+00
Ac-228		1.0974E+00	3.345E-01	3.370E-01
Pb-212		1.2087E+00	1.851E-01	1.906E-01
CS-137	#	1.4015E-01	6.268E-02	6.291E-02
Th-234		1.9352E+00	7.682E-01	7.696E-01
Pb-214		9.2781E-01	1.857E-01	1.890E-01
Pb-210	#	2.2348E+00	1.703E+00	1.704E+00
AM-241		8.1063E+00	5.421E-01	6.196E-01

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

WI07-0731 D2 Bag# S-095 Grid C2-5 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) 2.1991066E+01 pCi/g

The library has energies which are not separable.

Analyzed by: B.C. Fenix
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0732 D2 Bag# S-096 Grid C2-3,5 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:36:11 Page 1
4714781 Spectrum name: Win00441.An1

Sample description
WI07- 0732 D2 Bag S-096 Grid C2-3,5 073107

Spectrum Filename: C:\User\Win00441.An1

Acquisition information
Start time: 31-Jul-2007 15:26:01
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: 3.8650E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8650E+02) = 2.5873E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:36:11 Page 2
4714781 Spectrum name: Win00441.An1

WI07-0732 D2 Bag# S-096 Grid C2-3,5 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: 0.0719

********** U N I D E N T I F I E D P E A K S U 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	2.93	4936.	12219.	20.364	2.43	0.854	-	D
17.79	4.42	14561.	8387.	13.979	4.62	0.855	-	D

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

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
Pb-210	185.74	46.61	97.	17.	0.029	191.38	0.432s
AM-241	237.24	59.49	228.	2183.	3.638	5.10	0.982
Th-234	253.09	63.45	68.	52.	0.086	65.88	1.251s
Pb-214	298.54	74.81	72.	78.	0.129	38.49	0.917D
Pb-212	298.56	74.81	92.	0.	0.000	459.47	0.574D
Pb-212	307.74	77.11	59.	173.	0.288	19.76	0.919D
Pb-214	307.74	77.11	161.	0.	0.000	1250.48	0.624D
Pb-214	346.73	86.86	54.	47.	0.078	61.52	0.595s
Th-234	368.72	92.35	50.	36.	0.059	65.73	0.933D
Ac-228	380.72	95.35	33.	15.	0.024	123.12	0.936D
Ac-228	836.58	209.29	9.	32.	0.054	47.82	0.924
Pb-212	953.94	238.62	23.	192.	0.320	16.10	1.057D
Pb-214	967.37	241.98	24.	27.	0.046	63.04	1.060D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:36:11 Page 3
4714781 Spectrum name: Win00441.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	1080.30	270.21	19.	34.	0.057	62.58	0.623s
Pb-214	1180.09	295.15	9.	54.	0.090	33.19	1.183
Ac-228	1309.33	327.45	2.	0.	0.001	412.31	0.250s
Ac-228	1352.91	338.34	13.	55.	0.092	37.58	0.413s
Pb-214	1407.17	351.90	8.	104.	0.173	22.21	1.414s

WI07-0732 D2 Bag# S-096 Grid C2-3,5 073107

Ac-228	1850.44	462.69	4.	30.	0.050	47.14	0.489s
Bi-214	2436.75	609.22	4.	67.	0.111	28.13	1.775s
CS-137	2648.83	662.22	3.	1.	0.002	360.56	0.339s
Bi-214	3075.51	768.85	3.	10.	0.017	86.80	0.711s
Ac-228	3171.20	792.77	0.	15.	0.025	51.64	0.312s
Ac-228	3644.86	911.13	0.	50.	0.083	28.28	0.625s
Bi-214	3740.14	934.94	3.	2.	0.004	250.71	1.213
Ac-228	3858.81	964.60	6.	9.	0.015	105.90	1.595D
Ac-228	3876.86	969.11	3.	37.	0.061	36.11	1.598D
Bi-214	4482.65	1120.49	0.	20.	0.033	44.72	1.749
Bi-214	4954.00	1238.27	0.	8.	0.013	70.71	0.250s
Bi-214	5511.00	1377.44	0.	5.	0.008	89.44	0.250s
K-40	5844.92	1460.88	0.	38.	0.063	32.44	0.583s
Ac-228	6351.00	1587.32	0.	4.	0.007	100.00	0.250s
Bi-214	7053.00	1762.71	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	3.1080E-04	609.31	3.108E-04	(	1.595E-05	G K
			1764.49	1.779E-04	&	1.317E-04	G
			1120.29	4.867E-04	+	1.665E-04	G
			1238.11	5.424E-04	+	3.072E-04	G
			768.36	5.385E-04	+	2.930E-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	&	3.597E-04	G
K-40	N	1.6731E-03	1460.81	1.673E-03	(	4.403E-05	G
Ac-228	N	6.1423E-04	911.07	5.506E-04	(	1.101E-05	G K
			969.11	7.092E-04	(	6.182E-05	G
			338.32	6.485E-04	(	6.514E-05	G
			964.60	5.379E-04	(	2.519E-04	G
			794.70	8.820E-04	&	3.528E-04	G
			463.00	1.169E-03	+	3.415E-04	G
			209.28	6.842E-04	(	9.931E-05	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:36:11 Page 4
4714781 Spectrum name: Win00441.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.23	1.062E-03	+	3.377E-04	G
		1588.00	5.810E-04	?(	1.452E-04	G
		95.35	2.822E-04	-	1.986E-04	X
		327.64	0.000E+00	%	1.222E-04	G
Pb-212	N 4.4068E-04	238.62	4.407E-04	(	1.686E-05	G K
		77.11	6.613E-04	+	8.440E-05	Energy duplication
		74.81	0.000E+00	%	9.116E-05	Energy duplication
CS-137	0.0000E+00	661.66	0.000E+00	%	9.139E-06	G
Th-234	N 6.6529E-04	92.35	4.434E-04	(	1.317E-04	G
		63.29	9.811E-04	@(	2.311E-04	G

```
                    WI07-0732   D2 Bag# S-096   Grid C2-3,5  073107
Pb-214   N   3.7004E-04     351.92 3.852E-04 @(  1.678E-05          G K
                            295.21 3.372E-04  (  3.014E-05          G
                             77.11 0.000E+00 %   1.211E-04Energy duplication
                            241.98 3.789E-04  (  1.022E-04          G
                             74.81 8.650E-04 +   1.990E-04Energy duplication
                             87.30 6.820E-04 +   2.136E-04          X

Pb-210   N   3.5384E-04      46.50 3.538E-04 ?(  2.942E-04          G

AM-241       4.4951E-03      59.54 4.495E-03  (  4.501E-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  31-JUL-2007 15:36:11 Page    5
4714781                          Spectrum name: Win00441.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        8.0415E-01     2.262E-01    2.282E-01
K-40          4.3287E+00     1.404E+00    1.414E+00
Ac-228        1.5892E+00     4.354E-01    4.394E-01
Pb-212        1.1402E+00     1.836E-01    1.885E-01
CS-137   <    2.3644E-02
Th-234        1.7213E+00     8.010E-01    8.019E-01
Pb-214        9.5740E-01     2.126E-01    2.156E-01
Pb-210 #C     9.1550E-01     1.752E+00    1.752E+00
AM-241        1.1630E+01     5.928E-01    7.326E-01

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

WI07-0732 D2 Bag# S-096 Grid C2-3,5 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) 2.3086773E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0737 D2 Bag# S-097 Grid C2-1,3,5 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:51:45 Page 1
4714781 Spectrum name: Win00442.An1

Sample description
WI07- 0737 D2 Bag S-097 Grid C2-1,3,5 073107

Spectrum Filename: C:\User\Win00442.An1

Acquisition information
Start time: 31-Jul-2007 15:41:33
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: 3.6790E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6790E+02) = 2.7181E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:51:45 Page 2
4714781 Spectrum name: Win00442.An1

WI07-0737 D2 Bag# S-097 Grid C2-1,3,5 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: 0.1318

********** U N I D E N T I F I E D P E A K S U 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	5424.	10747.	17.912	2.73	0.854	-	D
16.76	4.19	14928.	7755.	12.925	5.00	0.855	-	D
55.04	13.94	581.	78.	0.130	93.75	0.692	PU-239	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	184.27	46.25	262.	53.	0.088	106.78	0.676
AM-241	237.27	59.49	437.	5640.	9.399	3.02	0.902
Th-234	250.12	62.71	100.	50.	0.083	74.83	0.357s
Pb-214	298.54	74.81	101.	94.	0.157	36.64	0.917D
Pb-212	298.56	74.81	135.	0.	0.000	2060.67	0.333D
Pb-212	307.74	77.11	91.	147.	0.244	24.77	0.919D
Pb-214	307.74	77.11	278.	0.	0.000	116.66	0.294D
Pb-214	347.11	86.95	80.	70.	0.117	53.45	0.837s
Th-234	368.72	92.35	84.	30.	0.050	93.28	0.933D
Ac-228	380.72	95.35	53.	9.	0.015	242.30	0.935D
Ac-228	835.27	208.96	23.	32.	0.054	67.54	0.331s
Pb-212	953.94	238.62	27.	221.	0.369	14.96	1.057D

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	967.37	241.98	27.	46.	0.077	43.54	1.060D
Ac-228	1082.18	270.68	21.	23.	0.038	89.95	0.370s
Pb-214	1179.73	295.06	9.	83.	0.139	27.32	0.818s
Ac-228	1311.14	327.90	8.	14.	0.023	87.67	0.461s
Ac-228	1352.03	338.12	8.	50.	0.083	35.63	1.156

WI07-0737 D2 Bag# S-097 Grid C2-1,3,5 073107

Pb-214	1407.21	351.91	15.	95.	0.158	26.21	0.668s
Ac-228	1850.43	462.69	2.	15.	0.025	62.80	0.309s
Bi-214	2436.82	609.24	6.	51.	0.085	33.96	0.370s
CS-137	2646.50	661.64	0.	7.	0.012	75.59	0.500s
Bi-214	3073.08	768.25	0.	12.	0.020	57.74	0.500s
Ac-228	3181.20	795.27	0.	12.	0.020	57.74	0.312s
Ac-228	3645.38	911.26	0.	39.	0.065	32.03	1.260
Bi-214	3735.57	933.80	0.	8.	0.013	70.71	0.500s
Ac-228	3858.81	964.60	3.	6.	0.010	114.00	1.595D
Ac-228	3876.86	969.11	2.	15.	0.025	57.42	1.598D
Bi-214	4481.20	1120.13	0.	18.	0.030	47.14	1.062s
Bi-214	4952.00	1237.77	0.	0.	0.000	0.00	0.000s
Bi-214	5512.33	1377.78	1.	0.	0.001	240.37	0.197s
K-40	5844.90	1460.87	0.	31.	0.052	35.92	0.375s
Ac-228	6353.75	1588.01	0.	5.	0.008	89.44	0.375s
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	Nuclide Code	Average Activity microCi	Peak Energy keV	Peak Activity microCi	Peak Code	Peak MDA Value microCi	Comments
Bi-214	N	2.3717E-04	609.31	2.372E-04	@(	1.860E-05	G K
			1764.49	0.000E+00	?	7.117E-05	G
			1120.29	4.380E-04	+	1.587E-04	G
			1238.11	0.000E+00	?	6.779E-05	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	7.773E-04	+	4.403E-04	G
K-40	N	1.3649E-03	1460.81	1.365E-03	?(	4.403E-05	G
Ac-228	N	5.2030E-04	911.07	4.295E-04	?(	1.101E-05	G K
			969.11	2.938E-04	-	1.233E-04	G
			338.32	5.860E-04	(	5.310E-05	G
			964.60	3.742E-04	(	1.837E-04	G
			794.70	7.056E-04	+	3.189E-04	G
			463.00	5.782E-04	?(	1.029E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 15:51:45 Page 4
4714781 Spectrum name: Win00442.An1

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA	Comments
			209.28	6.842E-04	(	1.534E-04	G
			270.23	7.186E-04	*(	2.187E-04	G
			1588.00	7.262E-04	?(	1.452E-04	G
			95.35	0.000E+00	%	2.236E-04	X
			327.64	5.566E-04	?(	1.879E-04	G
Pb-212	N	5.2391E-04	238.62	5.090E-04	(	1.793E-05	G K
			77.11	5.610E-04	(	5.369E-05	Energy duplication
			74.81	0.000E+00	&	1.098E-04	Energy duplication
CS-137		1.8969E-05	661.66	1.897E-05	?(	2.710E-06	G
Th-234	N	6.1403E-04	92.35	3.763E-04	(	1.679E-04	G
			63.29	9.525E-04	&(	2.791E-04	G

```
Pb-214   N   3.5185E-04    351.92 3.519E-04  (  2.222E-05          G K
                           295.21 5.220E-04 +   8.816E-05          G
                            77.11 0.000E+00 ?   1.581E-04Energy duplication
                           241.98 6.352E-04 +   1.741E-04          G
                            74.81 1.048E-03 +   2.261E-04Energy duplication
                            87.30 1.016E-03 +   2.587E-04          X

Pb-210   N   1.0785E-03     46.50 1.079E-03 ?(  4.778E-04          G

AM-241       1.1613E-02     59.54 1.161E-02  (  6.194E-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 15:51:45 Page    5
4714781                          Spectrum name: Win00442.An1

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

- -

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

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
Bi-214 #	6.4467E-01	2.189E-01	2.203E-01
K-40 #	3.7099E+00	1.333E+00	1.340E+00
Ac-228	1.4142E+00	3.856E-01	3.892E-01
Pb-212	1.4241E+00	2.060E-01	2.128E-01
CS-137 #	5.1561E-02	3.898E-02	3.903E-02
Th-234	1.6690E+00	9.980E-01	9.987E-01
Pb-214	9.5638E-01	2.507E-01	2.532E-01
Pb-210 #	2.9316E+00	3.130E+00	3.131E+00
AM-241	3.1565E+01	9.527E-01	1.508E+00

- All peaks for activity calculation had bad shape.

WI07-0737 D2 Bag# S-097 Grid C2-1,3,5 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) 4.4366615E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

WI07-0738 D2 Bag# S-098 Grid C2-1,3,5 073107

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:06:50 Page 1
4714781 Spectrum name: Win00443.An1

Sample description
WI07- 0738 D2 Bag S-098 Grid C2-1,3,5 073107

Spectrum Filename: C:\User\Win00443.An1

Acquisition information
Start time: 31-Jul-2007 15:56:37
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: 4.0660E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.0660E+02) = 2.4594E+03
Detection limit method: Traditional ORTEC method

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:06:50 Page 2
4714781 Spectrum name: Win00443.An1

WI07-0738 D2 Bag# S-098 Grid C2-1,3,5 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: 0.1435

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
14.40	3.79	3300.	20583.	34.305	1.79	2.110	CU-64	s
104.40	26.28	27.	41.	0.069	49.24	0.790	U-237	s
127.11	31.96	79.	275.	0.458	17.52	1.057	XE-138	s
145.50	36.56	67.	112.	0.187	33.63	1.389	XE-133M	s
214.93	53.91	208.	23.	0.039	186.47	0.535	LU-177	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	86.	11.	0.018	263.65	0.270s
AM-241	237.25	59.49	417.	4367.	7.279	3.60	0.926
Th-234	251.92	63.16	44.	31.	0.052	80.49	0.964s
Pb-214	298.54	74.81	86.	97.	0.161	33.92	0.917D
Pb-212	298.56	74.81	109.	0.	0.000	597.33	0.303D
Pb-212	307.74	77.11	95.	126.	0.209	28.31	0.919D
Pb-214	307.74	77.11	198.	0.	0.000	104.93	0.526D
Pb-214	347.51	87.05	58.	64.	0.108	49.00	1.261s
Th-234	368.72	92.35	53.	47.	0.078	52.71	0.933D
Ac-228	380.72	95.35	31.	15.	0.025	114.92	0.935D

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:06:50 Page 3
4714781 Spectrum name: Win00443.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Ac-228	834.52	208.78	20.	23.	0.038	79.22	0.469s
Pb-212	953.94	238.62	28.	170.	0.283	17.67	1.057D
Pb-214	967.37	241.98	27.	38.	0.063	51.22	1.060D
Ac-228	1079.00	269.88	8.	40.	0.066	42.99	0.852s
Pb-214	1180.58	295.27	4.	66.	0.111	27.28	0.494s

WI07-0738 D2 Bag# S-098 Grid C2-1,3,5 073107

Ac-228	1309.77	327.56	18.	26.	0.044	77.43	0.254s
Ac-228	1352.26	338.18	6.	53.	0.088	33.76	1.086s
Pb-214	1406.43	351.72	4.	106.	0.177	20.76	0.799s
Ac-228	1849.18	462.37	0.	21.	0.035	43.64	0.500s
Bi-214	2437.63	609.44	0.	65.	0.108	24.81	0.859s
CS-137	2646.98	661.76	2.	13.	0.022	67.06	0.313s
Bi-214	3072.00	767.98	0.	8.	0.013	70.71	0.250s
Ac-228	3169.00	792.22	0.	11.	0.018	60.30	0.250s
Ac-228	3645.43	911.28	0.	51.	0.085	28.01	1.291
Bi-214	3735.29	933.73	0.	10.	0.017	63.25	0.312s
Ac-228	3858.81	964.60	3.	11.	0.019	73.02	1.595D
Ac-228	3876.86	969.11	1.	20.	0.033	46.76	1.598D
Bi-214	4479.00	1119.58	0.	17.	0.028	48.51	0.250s
Bi-214	4954.00	1238.27	2.	1.	0.001	478.42	0.000s
Bi-214	5513.00	1377.94	0.	6.	0.010	81.65	0.375s
K-40	5844.42	1460.75	0.	62.	0.103	25.40	1.149s
Ac-228	6350.67	1587.24	2.	1.	0.002	447.21	0.187s
Bi-214	7057.50	1763.83	0.	10.	0.017	63.25	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	3.4004E-04	609.31	3.023E-04	(	4.650E-06	G K
			1764.49	3.558E-04	?(	3.558E-05	G
			1120.29	4.137E-04	?(	2.433E-05	G
			1238.11	0.000E+00	%	2.034E-04	G
			768.36	4.169E-04	?(	5.211E-05	G
			2204.20	0.000E+00	=	0.000E+00	G
			1377.67	6.492E-04	+	4.328E-04	G
			934.06	9.716E-04	+	4.858E-04	G
K-40	N	2.7297E-03	1460.81	2.730E-03	(	4.403E-05	G
Ac-228	N	6.0509E-04	911.07	5.617E-04	(	1.101E-05	G K
			969.11	3.892E-04	-	1.359E-04	G
			338.32	6.172E-04	@(	4.798E-05	G
			964.60	6.926E-04	(	1.797E-04	G

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:06:50 Page 4
4714781 Spectrum name: Win00443.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		794.70	6.468E-04	&(	5.880E-05	G
		463.00	8.185E-04	&(	3.898E-05	G
		209.28	4.867E-04	(	1.448E-04	G
		270.23	1.234E-03	+	3.221E-04	G
		1588.00	0.000E+00	%	4.357E-04	G
		95.35	2.937E-04	-	1.946E-04	X
		327.64	1.079E-03	+	4.029E-04	G
Pb-212	N 3.9087E-04	238.62	3.909E-04	(	1.836E-05	G K
		77.11	4.810E-04	+	8.242E-05	Energy duplication
		74.81	0.000E+00	%	9.893E-05	Energy duplication
CS-137	3.5229E-05	661.66	3.523E-05	?(	6.942E-06	G

```
                    WI07-0738   D2 Bag# S-098   Grid C2-1,3,5  073107
Th-234    N   5.8768E-04      92.35 5.857E-04  (  1.349E-04          G
                             63.29 5.906E-04  (  1.885E-04          G

Pb-214    N   4.0198E-04     351.92 3.944E-04  (  1.182E-05          G K
                            295.21 4.166E-04 @(  2.000E-05          G
                             77.11 0.000E+00 ?   1.339E-04Energy duplication
                            241.98 5.191E-04 +   1.647E-04          G
                             74.81 1.080E-03 +   2.192E-04Energy duplication
                             87.30 9.360E-04 +   2.350E-04          X

Pb-210    N   0.0000E+00      46.50 0.000E+00 %   2.947E-04          G

AM-241        8.9929E-03      59.54 8.993E-03  (  6.048E-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
0

      ORTEC g v - i (  63) wan32  G53W2.06  31-JUL-2007 16:06:50 Page    5
 4714781                          Spectrum name: Win00443.An1

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

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
          Time of Count   Uncertainty  2 Sigma
 Nuclide    Activity        Counting     Total
              pCi/g          pCi/g        pCi/g

 ------------------------------------------------------------------------
 Bi-214       8.3630E-01     2.075E-01     2.098E-01
 K-40         6.7135E+00     1.705E+00     1.724E+00
 Ac-228       1.4882E+00     3.425E-01     3.471E-01
 Pb-212       9.6132E-01     1.699E-01     1.737E-01
 CS-137 #     8.6642E-02     5.810E-02     5.820E-02
 Th-234       1.4454E+00     6.954E-01     6.962E-01
 Pb-214       9.8863E-01     1.695E-01     1.735E-01
 Pb-210  <    7.2484E-01
 AM-241       2.2117E+01     7.958E-01     1.142E+00
```

WI07-0738 D2 Bag# S-098 Grid C2-1,3,5 073107

- 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) 3.4637390E+01 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: 4714781

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

```
     ORTEC g v - i (  63) wan32  G53W2.06  31-JUL-2007 16:21:39 Page    1
4714781                          Spectrum name: Win00444.An1

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


Spectrum Filename: C:\User\Win00444.An1

Acquisition information
       Start time:                 31-Jul-2007 16:11:27
       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:                4.1080E+02
       Activity scaling factor:    1.0000E+06/(  1.0000E+00*  4.1080E+02) =
                                   2.4343E+03
       Detection limit method:     Traditional ORTEC method

0

     ORTEC g v - i (  63) wan32  G53W2.06  31-JUL-2007 16:21:39 Page    2
4714781                          Spectrum name: Win00444.An1
```

WI07-0739 D2 Bag# S-099 Grid C2-2,3 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: 0.1487

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
14.31	3.76	2853.	21675.	36.125	1.68	1.993	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	105.	18.	0.030	174.09	0.391s
AM-241	237.24	59.49	381.	3623.	6.038	3.96	0.931
Th-234	251.53	63.06	70.	49.	0.082	68.58	0.694
Pb-214	298.54	74.81	64.	116.	0.194	26.86	0.917D
Pb-212	298.56	74.81	107.	0.	0.000	982.06	0.374D
Pb-212	307.74	77.11	68.	179.	0.299	19.79	0.919D
Pb-214	307.74	77.11	184.	0.	0.000	193.13	0.137D
Pb-214	346.95	86.91	48.	60.	0.101	48.18	1.194s
Th-234	368.72	92.35	56.	58.	0.096	45.31	0.933D
Ac-228	380.72	95.35	41.	8.	0.013	247.34	0.935D
Ac-228	836.25	209.21	18.	34.	0.056	54.97	0.763s
Pb-212	953.94	238.62	29.	262.	0.436	13.67	1.057D
Pb-214	967.37	241.98	44.	38.	0.064	58.30	1.060D
Ac-228	1078.44	269.74	13.	31.	0.052	58.54	0.543s

0

ORTEC g v - i (63) wan32 G53W2.06 31-JUL-2007 16:21:39 Page 3
4714781 Spectrum name: Win00444.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
Pb-214	1180.00	295.13	18.	70.	0.117	34.05	0.875
Ac-228	1311.23	327.92	7.	28.	0.047	53.40	0.303s
Ac-228	1352.44	338.22	15.	74.	0.123	33.00	0.899
Pb-214	1406.97	351.85	24.	97.	0.162	30.37	1.031
Ac-228	1852.19	463.13	2.	16.	0.026	60.18	0.361s

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

Bi-214	2436.92	609.26	0.	90.	0.150	21.08	0.448s
CS-137	2646.67	661.68	0.	9.	0.015	66.67	0.500s
Bi-214	3075.00	768.73	1.	0.	0.000	0.00	0.000s
Ac-228	3180.00	794.97	4.	0.	0.001	568.62	0.000s
Ac-228	3645.42	911.27	0.	38.	0.063	32.44	0.750s
Bi-214	3737.50	934.28	0.	6.	0.010	81.65	0.500s
Ac-228	3858.81	964.60	2.	8.	0.013	86.05	1.595D
Ac-228	3876.86	969.11	1.	27.	0.045	40.02	1.598D
Bi-214	4480.38	1119.92	0.	24.	0.040	40.82	0.375s
Bi-214	4934.00	1233.27	0.	11.	0.018	60.30	0.250s
Bi-214	5510.00	1377.19	0.	0.	0.000	0.00	0.000s
K-40	5844.21	1460.70	0.	29.	0.048	37.14	0.656s
Ac-228	6352.50	1587.70	0.	2.	0.003	141.42	0.500s
Bi-214	7057.83	1763.92	0.	9.	0.015	66.67	0.292s

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

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

- Nuclide - Name	Code	Average Activity microCi	Peak Energy keV	Activity microCi	Code	MDA Value microCi	Comments
Bi-214	N	4.1854E-04	609.31	4.185E-04	(	4.650E-06	G K
			1764.49	3.203E-04	-	1.698E-04	G
			1120.29	5.840E-04	+	1.812E-04	G
			1238.11	7.457E-04	&	3.537E-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	5.830E-04	+	3.887E-04	G
K-40	N	1.2768E-03	1460.81	1.277E-03	?(	4.403E-05	G
Ac-228	N	4.7443E-04	911.07	4.185E-04	?(	1.101E-05	G K
			969.11	5.231E-04	(	3.959E-05	G
			338.32	8.633E-04	+	1.623E-04	G
			964.60	4.962E-04	(	1.570E-04	G
			794.70	0.000E+00	%	1.983E-04	G
			463.00	6.171E-04	(	1.029E-04	G
			209.28	7.124E-04	+	2.266E-04	G
			270.23	9.789E-04	+	3.091E-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	%	2.006E-04	X
		327.64	1.154E-03	+	3.617E-04	G
Pb-212	N 6.2599E-04	238.62	6.017E-04	(	1.875E-05	G K
		77.11	6.862E-04	(	4.652E-05	Energy duplication
		74.81	0.000E+00	%	9.805E-05	Energy duplication
CS-137	2.4389E-05	661.66	2.439E-05	?(	2.710E-06	G
Th-234	N 8.0743E-04	92.35	7.189E-04	(	1.389E-04	G
		63.29	9.335E-04	$(	2.351E-04	G
Pb-214	N 4.0326E-04	351.92	3.593E-04	(	2.758E-05	G K