

Analysis Report for NRC SAMPLE # 4
SOIL

GAMMA SPECTRUM ANALYSIS

Sample Identification : NRC SAMPLE # 4
Sample Description : SOIL
Sample Type : Silt
Unit :
Sample Point :

Sample Size : 2.982E+03 grams
Facility : Diaryland_NPP

Sample Taken On : 9/13/2017 1:45:00PM
Acquisition Started : 9/13/2017 2:44:02PM

Procedure : Silt
Operator : Administrator
Detector Name : DET01-ENV
Geometry : 1.5L Marinelli
Live Time : 600.0 seconds
Real Time : 627.7 seconds

Dead Time : 4.41 %

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 100 - 4096
Peak Area Range (in channels) : 100 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 6/3/2014
Efficiency Calibration Used Done On : 6/3/2014
Efficiency Calibration Description : 1.5 Marinelli

Sample Number : 3393

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 9/13/2017 2:54:35PM
Peak Analysis From Channel : 100
Peak Analysis To Channel : 4096

Analysis Report for NRC SAMPLE # 4

SOIL

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
F	1	59.45	112 -	123	119.73	5.95E+02	86.87	1.29E+04	1.22
F	2	661.24	1312 -	1335	1323.75	3.09E+05	557.66	6.40E+03	2.07
F	3	1172.63	2334 -	2360	2346.94	2.54E+04	162.01	1.32E+03	2.69
F	4	1331.86	2652 -	2677	2665.52	2.34E+04	154.08	5.54E+02	2.85
F	5	1460.04	2910 -	2933	2922.00	6.67E+02	28.75	1.98E+02	3.21
F	6	1763.72	3522 -	3537	3529.63	4.59E+01	10.34	6.59E+01	2.62

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 9/13/2017 2:54:35PM

Env. Background File : C:\Canberra\Apex\Root\Diaryland_NPP\Data\0000003388.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
F	1	59.45	5.95E+02	86.87			5.95E+02	8.69E+01
F	2	661.24	3.09E+05	557.66	2.30E+00	7.29E-01	3.09E+05	5.58E+02
F	3	1172.63	2.54E+04	162.01			2.54E+04	1.62E+02
F	4	1331.86	2.34E+04	154.08			2.34E+04	1.54E+02
F	5	1460.04	6.67E+02	28.75	9.64E+00	7.66E-01	6.57E+02	2.88E+01
F	6	1763.72	4.59E+01	10.34	2.29E+00	3.89E-01	4.36E+01	1.03E+01

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 1.000sigma

Analysis Report for NRC SAMPLE # 4

SOIL

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Diaryland_NPP\Library\ENVLIB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty
K-40	0.91	1460.81 *	10.67	6.30E+00	3.26E-01
CO-60	0.94	1173.22 * 1332.49 *	100.00	2.24E+01	5.53E-01
CS-137	0.97	661.65 *	85.12	2.10E+02	5.70E+00
AM-241	0.99	59.54 *	36.30	2.60E+00	3.96E-01

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 1.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.910	6.30E+00	3.26E-01	
CO-60	0.943	2.24E+01	4.05E-01	
CS-137	0.974	2.10E+02	5.70E+00	
AM-241	0.999	2.60E+00	3.96E-01	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 1.000sigma

Analysis Report for NRC SAMPLE # 4

SOIL

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/13/2017 2:54:35PM
 Peak Locate From Channel : 100
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
F 6	1763.72	7.26342E-02	23.75	Tol.	BI-214

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 1.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Diaryland_NPP\Library\ENVLIB.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
+	K-40	1460.81	* 10.67	6.30E+00	9.18E-01	9.18E-01
+	MN-54	834.83	99.97	-5.44E-02	1.99E-01	1.99E-01
+	CO-60	1173.22	* 100.00	2.24E+01	1.57E-01	2.22E-01
		1332.49	* 100.00	2.25E+01		1.57E-01
+	ZN-65	1115.52	50.75	-2.72E-02	4.78E-01	4.78E-01
+	KR-85	513.99	0.43	5.87E+01	7.94E+01	7.94E+01
+	CD-109	88.03	3.72	3.96E+00	1.19E+01	1.19E+01
+	CS-134	604.70	97.60	1.37E-01	2.13E-01	2.92E-01
		795.84	85.40	-5.52E-02		2.13E-01
+	CS-137	661.65	* 85.12	2.10E+02	3.56E-01	3.56E-01
+	EU-154	123.07	40.40	7.45E-01	3.96E-01	8.13E-01
		722.30	20.00	4.28E-01		8.40E-01
		873.20	12.09	-1.10E+00		1.84E+00
		996.30	10.34	-3.42E+00		2.31E+00
		1004.76	17.90	-7.53E-01		1.34E+00
		1274.51	34.40	1.68E-02		3.96E-01
+	EU-155	86.54	32.80	8.85E-01	1.38E+00	1.38E+00

Analysis Report for NRC SAMPLE # 4

SOIL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	EU-155	105.31	21.80	-5.26E-01	1.38E+00	1.63E+00
+	TL-208	72.80	2.02	1.71E+07	5.95E+05	5.21E+07
		74.97	3.41	-1.14E+07		2.86E+07
		84.90	1.51	4.14E+07		5.01E+07
		277.36	6.31	8.93E+06		8.86E+06
		583.19	84.50	4.81E+05		5.95E+05
		763.13	1.81	5.02E+06		1.69E+07
		860.56	12.42	-1.23E+06		3.04E+06
		1093.90	0.40	1.35E+05		1.06E+08
+	BI-214	609.31	46.30	1.70E-01	5.54E-01	6.14E-01
		768.36	5.04	4.81E-01		3.50E+00
		806.17	1.23	-1.39E+01		1.50E+01
		934.06	3.21	-2.05E+00		7.83E+00
		1120.29	15.10	1.79E+00		1.58E+00
		1155.19	1.69	-4.55E+01		1.27E+01
		1238.11	5.94	2.84E+00		2.50E+00
		1280.96	1.47	-7.32E-01		9.30E+00
		1377.67	4.11	-1.11E+00		2.52E+00
		1401.50	1.39	4.85E-01		7.14E+00
		1407.98	2.48	5.29E-01		3.99E+00
		1509.19	2.19	3.21E+00		4.26E+00
		1661.28	1.15	2.38E+00		7.18E+00
		1729.60	3.05	2.16E+00		2.73E+00
		1764.49	15.80	2.48E-01		5.54E-01
		1847.44	2.12	-4.74E+00		3.78E+00
+	PB-214	74.81	6.33	-3.57E+00	9.03E-01	8.93E+00
		77.11	10.70	-1.67E+00		4.93E+00
		87.20	3.70	2.06E+00		1.21E+01
		89.80	1.03	-1.26E+01		4.15E+01
		241.98	7.49	2.96E-01		4.36E+00
		295.21	19.20	1.89E+00		1.67E+00
		351.92	37.20	6.50E-01		9.03E-01
		785.91	1.10	6.12E+00		1.64E+01
+	RA-223	81.07	15.00	-1.33E+00	1.80E+00	3.16E+00
		83.78	24.80	1.09E+00		1.80E+00
		94.90	11.30	2.44E+00		3.52E+00
		122.31	1.19	2.32E+01		2.77E+01
		144.20	3.26	2.25E+00		9.39E+00
		154.19	5.59	3.73E+00		5.40E+00
		269.41	13.60	-7.77E-01		2.39E+00
		323.89	3.90	-5.96E+00		8.47E+00
		338.32	2.78	7.76E+00		1.20E+01
		444.94	1.27	8.50E+00		3.19E+01
+	RA-226	186.21	3.28	1.36E+01	1.04E+01	1.04E+01
+	AC-228	129.08	2.80	-3.54E+00	8.72E-01	1.15E+01
		209.28	4.40	-2.73E+00		7.86E+00
		270.23	3.60	-4.14E+00		8.99E+00
		327.64	3.20	-4.58E+00		1.03E+01
		338.32	11.40	1.89E+00		2.91E+00
		409.51	2.13	1.26E+01		1.73E+01
		463.00	4.40	1.22E+01		9.89E+00

Analysis Report for NRC SAMPLE # 4

SOIL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)
	AC-228	794.70	4.60	2.83E-01	8.72E-01	3.96E+00
		911.60	27.70	1.42E-01		8.72E-01
		964.60	5.20	-3.05E+00		4.86E+00
		969.11	16.60	1.88E-01		1.50E+00
		1587.90	3.71	5.71E-01		2.50E+00
+	Th-230	12.30	8.43	0.00E+00	2.02E+02	5.31E+11
		67.60	0.37	-3.07E+02		2.02E+02
		168.10	0.07	-3.73E+02		4.32E+02
+	PA-234M	766.36	0.29	-4.70E-01	2.86E+01	5.99E+01
		1001.03	0.84	-6.61E+00		2.86E+01
+	TH-234	63.29	4.50	-2.31E+01	1.57E+01	2.13E+01
		92.38	2.60	5.32E+00		1.58E+01
		92.80	2.60	1.41E+00		1.57E+01
+	AM-241	59.54	* 36.30	2.60E+00	2.60E+00	2.60E+00
+	CM-243	99.55	14.30	-3.54E-01	1.57E+00	2.62E+00
		103.76	23.00	4.76E-02		1.57E+00
		117.00	10.80	1.88E+00		3.10E+00
		228.18	10.60	4.80E-01		3.17E+00
		277.60	14.00	1.55E+00		2.29E+00

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level