```
*********************************************************************
*****        G A M M A   S P E C T R U M   A N A L Y S I S        *****
*********************************************************************
```

Filename: ERT01,C:\GENIE2K\CAMFILES\SMP-HTC-A02-S002-0612-01.CNF

Report Generated On	: 6/27/2017 8:59:00 PM
Sample Title	: HTC-A02-S002-0612-01
Sample Description	: 450 cc Soil
Sample Identification	:
Sample Type	:
Sample Geometry	:
Peak Locate Threshold	: 3.00
Peak Locate Range (in channels)	: 100 - 8192
Peak Area Range (in channels)	: 100 - 8192
Identification Energy Tolerance	: 1.000 keV
Sample Size	: 9.696E+002 GWET
Sample Taken On	: 5/15/2017 11:54:00 AM
Acquisition Started	: 6/27/2017 6:58:54 PM
Live Time	: 7200.0 seconds
Real Time	: 7203.1 seconds
Dead Time	: 0.04 %

Energy Calibration Used Done On	: 5/10/2017
Efficiency Calibration Used Done On	: 12/14/2016
Efficiency ID	: ERT0101

****
***** P E A K A N A L Y S I S R E P O R T *****
****

Detector Name: ERT01
Sample Title: HTC-A02-S002-0612-01
Peak Analysis Performed on: 6/27/2017 8:59:00 PM
Peak Analysis From Channel: 100
Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
	1	99-	110	105.17	26.17	0.28	1.55E+001	53.30	1.12E+003
M	2	288-	316	300.17	74.90	0.93	4.78E+002	32.65	8.89E+002
m	3	288-	316	309.17	77.15	0.94	7.80E+002	38.59	9.11E+002
M	4	344-	387	349.70	87.28	1.15	2.88E+002	32.12	9.98E+002
m	5	344-	387	360.78	90.05	1.15	1.31E+002	27.46	1.08E+003
m	6	344-	387	371.98	92.85	1.16	4.97E+002	35.46	9.31E+002
	7	568-	579	575.89	143.81	0.55	6.29E+001	44.72	7.74E+002
	8	732-	752	744.87	186.04	1.08	6.08E+002	68.78	1.14E+003
	9	826-	841	837.94	209.30	0.99	1.63E+002	46.03	6.52E+002
M	10	949-	977	955.30	238.63	1.10	1.67E+003	46.56	5.54E+002
m	11	949-	977	968.41	241.91	1.11	6.16E+002	30.65	4.93E+002
	12	1173-	1187	1181.57	295.18	1.07	1.29E+003	49.38	3.97E+002
	13	1195-	1208	1200.97	300.03	1.24	1.52E+002	34.02	3.64E+002
	14	1308-	1317	1312.42	327.88	0.73	8.05E+001	25.20	2.43E+002
	15	1345-	1361	1353.97	338.27	0.93	3.61E+002	38.26	3.53E+002
	16	1399-	1419	1408.45	351.89	1.28	2.24E+003	59.33	3.55E+002
	17	1616-	1625	1620.39	404.85	0.35	7.58E+000	19.47	1.63E+002
	18	1847-	1860	1851.85	462.70	1.05	6.62E+001	24.99	1.99E+002
	19	1945-	1963	1949.43	487.09	0.37	4.64E+001	26.27	1.89E+002
	20	2028-	2058	2042.85	510.43	1.54	4.41E+002	46.18	3.46E+002
	21	2325-	2343	2333.58	583.09	1.44	6.12E+002	35.53	1.93E+002
	22	2429-	2447	2438.09	609.21	1.29	1.69E+003	48.16	1.88E+002
	23	2657-	2668	2663.17	665.46	1.25	3.22E+001	17.37	1.08E+002
	24	2903-	2917	2909.80	727.10	1.31	1.07E+002	21.57	1.23E+002
M	25	3061-	3096	3073.99	768.13	1.47	1.67E+002	16.29	1.07E+002
m	26	3061-	3096	3091.34	772.47	1.48	3.35E+001	9.88	8.12E+001
	27	3140-	3151	3144.80	785.83	0.67	1.48E+001	16.42	1.01E+002
	28	3174-	3192	3180.94	794.86	1.05	7.78E+001	21.90	1.18E+002
	29	3435-	3451	3444.01	860.61	0.91	9.78E+001	20.44	1.02E+002
	30	3632-	3657	3647.09	911.36	1.48	4.74E+002	31.96	1.29E+002
	31	3729-	3749	3738.72	934.26	0.39	1.00E+002	20.97	9.36E+001
M	32	3852-	3887	3859.69	964.50	1.38	6.28E+001	11.45	9.86E+001
m	33	3852-	3887	3877.31	968.90	1.38	2.31E+002	18.20	1.13E+002
	34	4000-	4013	4005.71	1000.99	0.56	3.35E+001	14.28	6.15E+001
	35	4471-	4495	4483.90	1120.50	1.48	3.87E+002	32.12	1.56E+002
	36	4942-	4969	4955.39	1238.33	1.20	1.72E+002	30.92	1.74E+002
	37	5506-	5524	5514.98	1378.19	1.41	8.75E+001	15.42	4.45E+001
M	38	5607-	5645	5612.15	1402.47	1.21	1.59E+001	6.63	3.75E+001
m	39	5607-	5645	5636.34	1408.52	1.22	3.52E+001	8.88	4.92E+001
	40	5837-	5861	5848.28	1461.48	1.66	2.57E+003	52.67	5.00E+001
	41	6033-	6052	6042.01	1509.90	1.05	6.34E+001	11.96	2.26E+001
	42	6352-	6366	6359.37	1589.22	0.98	3.98E+001	8.50	1.13E+001

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
43	6522-	6535	6528.12	1631.39	0.71	2.87E+001	7.91	1.23E+001
44	6918-	6933	6925.72	1730.76	0.67	5.68E+001	11.95	2.82E+001
45	7055-	7078	7065.74	1765.75	1.70	2.99E+002	20.64	3.21E+001
46	7392-	7406	7398.61	1848.94	0.58	3.23E+001	10.31	2.37E+001

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.000 sigma

****
***** N U C L I D E M D A R E P O R T *****
****

Detector Name: ERT01
Sample Geometry:
Sample Title: HTC-A02-S002-0612-01
Nuclide Library Used: C:\GENIE2K\CAMFILES\ERT_LIBRARY_LMDA.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GWET)	Nuclide MDA (pCi/GWET)	Activity (pCi/GWET)
+	K-40	1460.82*	10.55	4.7356E-001	4.74E-001	1.6448E+001
	Co-60	1173.23	99.85	6.8745E-002	5.72E-002	2.7699E-002
		1332.49	99.98	5.7187E-002		1.0418E-002
>		2505.71	0.10	0.0000E+000		0.0000E+000
	Cs-137	32.06	5.54	3.7046E+003	5.93E-002	-7.8240E+002
		661.66	84.99	5.9342E-002		2.5402E-002
+	Tl-208	72.80	2.02	6.2324E+000	5.24E-002	5.6284E-001
		74.97*	3.41	2.0970E+000		5.0418E+000
		84.90	1.51	5.4835E+000		7.2864E-001
		277.36	6.31	7.7173E-001		-4.0275E-001
		510.77*	22.60	3.0406E-001		4.0165E-001
		583.19*	84.50	5.2378E-002		2.5895E-001
		763.13	1.81	3.3673E+000		-6.2287E-001
		860.56*	12.42	3.2623E-001		3.7156E-001
+	Bi-212	39.86	1.06	6.7788E+002	5.61E-001	2.6963E+002
		727.33*	6.74	5.6116E-001		6.6296E-001
		785.37*	1.11	3.0557E+000		5.8675E-001
		1620.74	1.51	3.3205E+000		4.2463E-001
		1806.00	0.09	4.4924E+001		2.3126E+001
+	Pb-212	74.81*	10.40	6.8758E-001	8.25E-002	1.6531E+000
		77.11*	17.50	3.8011E-001		1.4743E+000
		87.30*	7.81	6.7496E-001		9.2291E-001
		115.18	0.59	8.2212E+000		-3.8682E+000
		238.63*	43.30	8.2460E-002		8.4847E-001
		300.09*	3.28	1.1559E+000		1.1682E+000
+	Bi-214	76.86*	0.43	1.4959E+001	9.35E-002	5.8019E+001
		89.81*	0.24	2.0427E+001		1.2255E+001
		386.77	0.30	1.5746E+001		3.5895E+000
		454.77	0.29	1.5632E+001		4.3256E+000
		609.31*	45.49	9.3516E-002		1.3181E+000
		665.45*	1.53	1.9440E+000		7.9202E-001
		703.11	0.48	1.0594E+001		6.3668E+000
		719.86	0.39	1.2477E+001		-6.0960E+000
		768.36*	4.89	6.0087E-001		1.4187E+000
		786.10*	0.31	1.0482E+001		2.0126E+000
		806.17	1.26	4.2302E+000		8.2444E-001
		934.06*	3.10	1.3721E+000		1.5601E+000
		964.08*	0.36	9.2538E+000		8.5434E+000
		1051.96	0.31	1.8117E+001		-5.5952E+000
		1120.29*	14.91	4.5167E-001		1.4462E+000

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GWET)	Nuclide MDA (pCi/GWET)	Activity (pCi/GWET)
+	Bi-214	1133.66	0.25	2.6543E+001	9.35E-002	4.9755E+000
		1155.19	1.63	4.1993E+000		6.2841E-001
		1207.68	0.45	1.6080E+001		6.0588E+000
		1238.11*	5.79	1.3861E+000		1.7900E+000
		1280.96	1.43	4.9213E+000		2.6295E+000
		1377.67*	4.00	9.7709E-001		1.4309E+000
		1385.31	0.76	7.8445E+000		1.6775E+000
		1401.50*	1.27	2.2407E+000		8.3065E-001
		1407.98*	2.15	1.5094E+000		1.0870E+000
		1509.23*	2.11	1.4568E+000		2.0882E+000
		1538.50	0.38	1.3457E+001		6.7002E+000
		1543.32	0.20	2.4209E+001		-8.0132E+000
		1583.22	0.69	8.0092E+000		1.3788E+000
		1594.73	0.25	2.1674E+001		3.0325E+000
		1599.31	0.23	2.0200E+001		1.4429E+001
		1661.28	1.15	4.0010E+000		1.6608E+000
		1683.99	0.22	1.9246E+001		2.9430E+000
		1729.59	2.92	2.0395E+000		2.0827E+000
		1764.49	15.40	6.1282E-001		1.5220E+000
		1847.42	2.11	2.5228E+000		2.6803E-001
		1873.16	0.22	1.6374E+001		-7.9224E+000
>		2118.55	1.14	0.0000E+000		0.0000E+000
>		2204.21	5.08	0.0000E+000		0.0000E+000
+	Pb-214	53.28	1.20	3.5282E+001	1.19E-001	6.2610E+000
		74.81*	6.44	1.0637E+000		2.5575E+000
		77.11*	10.80	5.9004E-001		2.2885E+000
		87.30*	4.84	1.0434E+000		1.4267E+000
		242.00*	7.43	4.3143E-001		1.7881E+000
		258.87	0.52	9.2233E+000		1.5074E-001
		274.80	0.47	1.0165E+001		-1.4483E+001
		295.22*	19.30	1.9925E-001		1.6016E+000
		351.93*	37.60	1.1917E-001		1.5605E+000
		462.00*	0.22	1.5464E+001		9.0967E+000
		533.66	0.19	2.3718E+001		-9.2706E+000
		785.96*	1.07	3.0367E+000		5.8310E-001
		839.04	0.59	9.0315E+000		5.3537E+000
+	Ra-224	81.07	0.13	6.4790E+001	8.16E-001	-2.9727E+001
		83.78	0.22	3.6816E+001		5.0778E-001
		240.99*	4.10	8.1613E-001		3.3825E+000
+	Ra-226	81.07	0.20	4.1273E+001	1.60E+000	-1.8937E+001
		83.78	0.33	2.3334E+001		3.2183E-001
		94.90	0.15	4.3236E+001		-9.7606E-001
		186.21*	3.59	1.5999E+000		2.9389E+000
+	Ac-228	99.50	1.26	4.3147E+000	2.12E-001	1.2921E-001
		129.07	2.50	2.1483E+000		1.4535E+000
		209.25*	3.97	1.0951E+000		8.5877E-001
		270.24	3.55	1.5063E+000		1.9002E+000
		328.00*	3.04	9.7646E-001		7.0085E-001
		338.32*	11.40	3.7058E-001		8.5212E-001
		409.46	2.02	2.4267E+000		3.5377E-001

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GWET)	Nuclide MDA (pCi/GWET)	Activity (pCi/GWET)
+	Ac-228	463.00*	4.45	8.0164E-001	2.12E-001	4.7157E-001
		755.31	1.03	4.9177E+000		-2.5008E-001
		772.29*	1.52	1.7735E+000		9.5770E-001
		794.94*	4.31	9.8877E-001		8.0231E-001
		835.70	1.70	3.4242E+000		1.7654E+000
		911.20*	26.20	2.1151E-001		8.8214E-001
		964.79*	4.99	7.0269E-001		6.4874E-001
		968.96*	15.90	2.3649E-001		7.5118E-001
		1588.20	3.06	1.9775E+000		6.8297E-001
		1630.62*	1.52	1.4799E+000		1.4293E+000
	Th-228	84.37	1.26	6.5218E+000	6.52E+000	1.6118E+000
		131.61	0.13	4.0891E+001		2.9250E+001
		166.41	0.10	4.8625E+001		-1.9498E+001
		215.98	0.25	1.9636E+001		-2.6535E+000
	Pa-234m	258.23	0.07	6.6139E+001	6.65E+000	4.6663E+001
		742.81	0.09	5.3075E+001		3.9221E+000
		766.36	0.32	1.9068E+001		-1.0282E+000
		786.27	0.05	9.8355E+001		3.2639E+001
		1001.03	0.85	6.6535E+000		2.3556E+000
		1737.77	0.02	2.4249E+002		-6.8053E+001
	Th-234	63.30	3.75	4.7083E+000	1.62E+000	3.1768E+000
		92.59	4.33	1.6187E+000		3.5780E+000
		112.81	0.22	2.2287E+001		9.3192E+000

+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
> = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or has not been calculated
@ = Half-life too short to be able to perform the decay correction

****
***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****
****

Sample Title: HTC-A02-S002-0612-01
Nuclide Library Used: C:\GENIE2K\CAMFILES\ERT_LIBRARY_LMDA.NLB

..... IDENTIFIED NUCLIDES .....

Nuclide Name	Id Confidence	Energy (keV)		Yield (%)	Activity (pCi/GWET)	Activity Uncertainty
K-40	0.932	1460.82*		10.55	1.64479E+001	5.61218E-001
Eu-152m	0.993	89.85*		69.90	4.30364E-002	9.07242E-003
Tl-208	0.841	72.80	@	2.02		
		74.97*	@	3.41	5.04179E+000	3.76412E-001
		84.90	@	1.51		
		277.36		6.31		
		510.77*	@	22.60	4.01649E-001	7.01620E-002
		583.19*		84.50	2.58946E-001	1.72378E-002
		763.13	@	1.81		
		860.56*		12.42	3.71564E-001	7.81647E-002
Bi-211	0.889	351.03*		13.00	4.53017E+000	2.03183E-001
Bi-212	0.761	39.86	@	1.06		
		727.33*		6.74	6.62957E-001	1.35037E-001
		785.37*		1.11	5.86745E-001	6.52292E-001
		1620.74		1.51		
		1806.00	@	0.09		
Pb-212	0.986	74.81*		10.40	1.65313E+000	1.32312E-001
		77.11*		17.50	1.47431E+000	9.49250E-002
		87.30*		7.81	9.22913E-001	1.10038E-001
		115.18	@	0.59		
		238.63*		43.30	8.48474E-001	3.68749E-002
		300.09*		3.28	1.16824E+000	2.64811E-001
Bi-214	0.648	76.86*	@	0.43	5.80194E+001	3.78706E+000
		89.81*	@	0.24	1.22549E+001	2.62057E+000
		386.77	@	0.30		
		454.77	@	0.29		
		609.31*		45.49	1.31814E+000	5.41286E-002
		665.45*	@	1.53	7.92020E-001	4.27744E-001
		703.11	@	0.48		
		719.86	@	0.39		
		768.36*		4.89	1.41871E+000	1.42699E-001
		786.10*	@	0.31	2.01264E+000	2.26083E+000
		806.17	@	1.26		
		934.06*		3.10	1.56008E+000	3.27614E-001
		964.08*	@	0.36	8.54340E+000	1.59558E+000
		1051.96	@	0.31		
		1120.29*		14.91	1.44625E+000	1.25138E-001
		1133.66	@	0.25		
		1155.19	@	1.63		
		1207.68	@	0.45		
		1238.11*		5.79	1.78998E+000	3.26438E-001

Nuclide Name	Id Confidence	Energy (keV)		Yield (%)	Activity (pCi/GWET)	Activity Uncertainty
Bi-214	0.648	1280.96	@	1.43		
		1377.67*		4.00	1.43094E+000	2.55744E-001
		1385.31	@	0.76		
		1401.50*	@	1.27	8.30649E-001	3.46691E-001
		1407.98*	@	2.15	1.08699E+000	2.76882E-001
		1509.23*	@	2.11	2.08822E+000	3.99508E-001
		1538.50	@	0.38		
		1543.32	@	0.20		
		1583.22	@	0.69		
		1594.73	@	0.25		
		1599.31	@	0.23		
		1661.28	@	1.15		
		1683.99	@	0.22		
		1729.59	@	2.92		
		1764.49		15.40		
		1847.42	@	2.11		
		1873.16	@	0.22		
		2118.55	@	1.14		
		2204.21	@	5.08		
Pb-214	0.961	53.28	@	1.20		
		74.81*		6.44	2.55746E+000	2.08354E-001
		77.11*		10.80	2.28854E+000	1.56911E-001
		87.30*		4.84	1.42666E+000	1.72230E-001
		242.00*		7.43	1.78807E+000	1.08695E-001
		258.87	@	0.52		
		274.80	@	0.47		
		295.22*		19.30	1.60157E+000	8.20846E-002
		351.93*		37.60	1.56046E+000	6.82189E-002
		462.00*	@	0.22	9.09670E+000	3.46536E+000
		533.66	@	0.19		
		785.96*	@	1.07	5.83102E-001	6.49684E-001
		839.04	@	0.59		
Ra-224	0.768	81.07	@	0.13		
		83.78	@	0.22		
		240.99*		4.10	3.38247E+000	2.03647E-001
Ra-226	0.773	81.07	@	0.20		
		83.78	@	0.33		
		94.90	@	0.15		
		186.21*		3.59	2.93892E+000	3.76409E-001
Ac-228	0.702	99.50	@	1.26		
		129.07	@	2.50		
		209.25*		3.97	8.58770E-001	2.45004E-001
		270.24		3.55		
		328.00*		3.04	7.00845E-001	2.21951E-001
		338.32*		11.40	8.52118E-001	9.91124E-002
		409.46	@	2.02		
		463.00*		4.45	4.71574E-001	1.80417E-001
		755.31	@	1.03		
		772.29*	@	1.52	9.57699E-001	2.86360E-001
		794.94*		4.31	8.02307E-001	2.28069E-001

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/GWET)	Activity Uncertainty
Ac-228	0.702	835.70 @	1.70		
		911.20*	26.20	8.82145E-001	6.89890E-002
		964.79*	4.99	6.48740E-001	1.21278E-001
		968.96*	15.90	7.51181E-001	6.60313E-002
		1588.20	3.06		
		1630.62* @	1.52	1.42926E+000	3.99241E-001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.45
Errors quoted at 1.000 sigma

****
***** I N T E R F E R E N C E C O R R E C T E D R E P O R T *****
****

	Nuclide Name		Nuclide Id Confidence	Wt mean Activity (pCi/GWET)	Wt mean Activity Uncertainty
	K-40		0.932	1.644792E+001	5.612180E-001
X	Cd-109		0.914		
	Eu-152m		0.993	3.827355E-002	9.066277E-003
	Tl-208	@	0.841	2.640764E-001	1.669349E-002
	Bi-211		0.889	8.820260E-001	2.667776E-001
	Bi-212	@	0.761	5.921287E-001	1.317747E-001
	Pb-212	@	0.986	7.579789E-001	3.245648E-002
	Bi-214	@	0.648	1.356243E+000	4.505135E-002
	Pb-214	@	0.961	1.256641E+000	6.376767E-002
	Ra-224	@	0.768	1.005300E+000	2.330703E-001
	Ra-226	@	0.773	2.938923E+000	3.764089E-001
	Ac-228	@	0.702	7.771488E-001	3.577305E-002

? = 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 1.000 sigma

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

Peak Locate Performed on: 6/27/2017 8:59:00 PM
Peak Locate From Channel: 100
Peak Locate To Channel: 8192

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
	1	26.17	2.1540E-003	343.71	Tol.	Am-241
m	6	92.85	5.8504E-002	8.53	Tol.	Yb-169 Th-234
	7	143.81	7.5242E-003	82.64	Tol.	Ra-223
	17	404.85	1.0526E-003	256.88	Sum	
	19	487.09	6.4501E-003	56.58	D-Esc.	
	34	1000.99	4.0927E-003	48.85	Sum	
	42	1589.22	5.5208E-003	21.38	Sum	
	44	1730.76	7.8889E-003	21.03	Sum	
	45	1765.75	4.0777E-002	7.05		
	46	1848.94	4.4854E-003	31.92	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.000 sigma