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***** G A M M A S P E C T R U M A N A L Y S I S *****
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-0310\W3H-ERRU-03

Report Generated On : 7/6/2017 9:59:22 AM

Sample Title : W3H-EERU-0310-S-P-1
Sample Description :
Sample Identification : 0310-S-P-1
Sample Type :
Sample Geometry : cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 40 - 8192
Peak Area Range (in channels) : 40 - 8192
Identification Energy Tolerance : 1.000 keV

Sample Size : 3.768E+002 grams

Sample Taken On : 6/1/2017 2:00:00 PM
Acquisition Started : 6/6/2017 1:43:54 PM

Live Time : 1800.0 seconds
Real Time : 1800.5 seconds

Dead Time : 0.03 %

Energy Calibration Used Done On : 4/13/2017
Efficiency Calibration Used Done On : 7/6/2017
Efficiency ID : H-IMC-2002-S-P-5

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***** P E A K A N A L Y S I S R E P O R T *****
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Detector Name: 8566
Sample Title: W3H-EERU-0310-S-P-1
Peak Analysis Performed on: 7/6/2017 9:59:19 AM
Peak Analysis From Channel: 40
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
M	1	295-	320	299.85	75.15	0.71	1.73E+002	27.40	1.38E+002
m	2	295-	320	308.17	77.23	0.71	1.50E+002	25.29	1.57E+002
F	3	736-	749	741.99	185.79	0.96	1.89E+002	89.70	8.23E+001
F	4	947-	958	952.88	238.56	0.79	1.90E+002	29.48	7.80E+001
F	5	1173-	1185	1179.19	295.20	1.08	4.90E+001	17.12	4.81E+001
F	6	1346-	1357	1352.03	338.45	0.54	3.26E+001	47.06	2.88E+001
F	7	1397-	1411	1404.91	351.68	1.34	1.13E+002	22.00	3.45E+001
F	8	2425-	2441	2433.12	608.99	1.29	7.25E+001	56.06	2.13E+001
F	9	5824-	5850	5836.24	1460.60	2.46	2.40E+002	31.52	1.50E+001

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

Errors quoted at 1.960 sigma

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***** 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 *****
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Sample Title: W3H-EERU-0310-S-P-1
Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 NLB 0328201

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.992	1460.82*	10.66	1.04995E+001	1.58008E+000
Pb-212	0.997	74.82*	10.28	1.00306E+000	2.08557E-001
		77.11*	17.10	5.12791E-001	1.10103E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	3.55917E-001	6.58108E-002
		300.09	3.30		
BI-214	0.216	76.86*	0.55	1.60894E+001	3.48474E+000
		79.29	0.91		
		609.32*	45.49	3.39481E-001	2.63640E-001
		665.45	1.53		
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.11	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1583.20	0.70		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
		2204.06	4.92		
		2447.70	1.55		
PB-214	0.847	74.82*	5.80	1.77784E+000	4.02424E-001
		77.11*	9.70	9.03992E-001	2.10471E-001
		86.83	1.70		
		87.35	2.24		
		89.78	0.82		
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	2.67284E-001	9.64426E-002
		351.93*	35.60	3.83792E-001	8.11526E-002

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
PB-214	0.847	785.96	1.06		
		839.07	0.58		
Ra-226	0.976	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	3.42172E+000	1.66448E+000
AC-228	0.150	89.96	1.90		
		93.35	3.10		
		99.51	1.26		
		105.60	0.74		
		129.07	2.42		
		153.98	0.72		
		209.25	3.89		
		214.85	0.76		
		270.24	3.46		
		328.00	2.95		
		338.32*	11.27	2.50207E+005	3.62058E+005
		409.46	1.92		
		463.00	4.40		
		562.50	0.87		
		674.75	2.10		
		726.86	0.62		
		755.32	1.00		
		772.29	1.49		
		794.95	4.25		
		830.49	0.54		
		835.71	1.61		
		840.38	0.91		
		904.20	0.77		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1247.08	0.50		
		1459.14	0.83		
		1495.91	0.86		
		1588.20	3.22		
		1630.63	1.51		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 keV
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

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***** 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 *****
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Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.992	1.049947E+001	1.580077E+000
Pb-212	0.997	3.753470E-001	5.493938E-002
BI-214	0.216	3.263000E-001	2.630653E-001
PB-214	0.847	3.453336E-001	5.939357E-002
Ra-226	0.976	3.421721E+000	1.664484E+000
AC-228	0.150	2.502069E+005	3.620577E+005

? = 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 1.960 sigma

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

Peak Locate Performed on: 7/6/2017 9:59:18 AM
Peak Locate From Channel: 40
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide

All peaks were identified.

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***** N U C L I D E M D A R E P O R T *****
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Detector Name: 8566
Sample Geometry: cylinder
Sample Title: W3H-EERU-0310-S-P-1
Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 NLB 0328201

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram
+	K-40	1460.82*	10.66	1.002E+000	1.00E+000	1.050E+001	4.416E-00
	Pb-210	46.54	4.25	1.596E+000	1.60E+000	6.068E-001	7.600E-00
	BI-212	727.33	6.67	1.670E+000	1.67E+000	7.392E-001	7.838E-00
		785.37	1.10	9.842E+000		5.106E-001	4.587E+00
		1078.62	0.56	2.188E+001		-4.750E+000	1.008E+00
		1620.50	1.47	8.718E+000		4.303E+000	3.888E+00
+	Pb-212	74.82*	10.28	3.331E-001	9.10E-002	1.003E+000	1.587E-00
		77.11*	17.10	2.084E-001		5.128E-001	9.958E-00
		86.83	2.07	2.245E+000		6.557E-001	1.087E+00
		87.35	3.97	1.097E+000		-1.703E+000	5.298E-00
		89.78	1.46	2.741E+000		-2.980E+000	1.320E+00
		115.18	0.60	5.094E+000		-2.528E+000	2.428E+00
		238.63*	43.60	9.098E-002		3.559E-001	4.296E-00
		300.09	3.30	1.807E+000		-9.910E-001	8.615E-00
+	BI-214	76.86*	0.55	6.539E+000	1.23E-001	1.609E+001	3.124E+00
		79.29	0.91	5.679E+000		8.542E-001	2.754E+00
		609.32*	45.49	1.230E-001		3.395E-001	5.517E-00
		665.45	1.53	6.993E+000		-4.334E-002	3.291E+00
		768.36	4.89	2.187E+000		-6.255E-001	1.020E+00
		806.18	1.26	8.661E+000		4.025E+000	4.033E+00
		934.06	3.11	4.053E+000		-2.365E-001	1.888E+00
		1120.29	14.92	1.125E+000		1.119E+000	5.286E-00
		1155.21	1.63	8.852E+000		-1.828E+000	4.109E+00
		1238.11	5.83	3.116E+000		2.141E+000	1.464E+00
		1280.98	1.43	9.871E+000		2.910E+000	4.542E+00
		1377.67	3.99	3.187E+000		1.380E+000	1.443E+00
		1385.31	0.79	1.657E+001		-4.472E+000	7.522E+00
		1401.52	1.33	9.113E+000		-5.989E+000	4.098E+00
		1407.99	2.39	5.488E+000		-2.395E+000	2.488E+00
		1509.21	2.13	5.424E+000		-3.913E+000	2.407E+00
		1583.20	0.70	1.673E+001		-5.416E+000	7.403E+00
		1661.27	1.05	1.150E+001		5.854E+000	5.074E+00
		1729.59	2.88	3.680E+000		1.077E+000	1.584E+00
		1764.49	15.30	1.036E+000		4.615E-001	4.688E-00
		1847.43	2.03	6.566E+000		3.228E+000	2.896E+00
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+00
>		2204.06	4.92	0.000E+000		0.000E+000	0.000E+00
>		2447.70	1.55	0.000E+000		0.000E+000	0.000E+00
+	PB-214	74.82*	5.80	5.905E-001	1.13E-001	1.778E+000	2.813E-00
		77.11*	9.70	3.674E-001		9.040E-001	1.755E-00
		86.83	1.70	2.734E+000		7.985E-001	1.323E+00
		87.35	2.24	1.944E+000		-3.018E+000	9.390E-00

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram
+	PB-214	89.78	0.82	4.880E+000	1.13E-001	-5.307E+000	2.351E+00
		241.99	7.25	1.033E+000		-3.006E-001	5.010E-00
		258.76	0.53	8.285E+000		4.231E+000	3.918E+00
		295.22*	18.42	2.036E-001		2.673E-001	9.440E-00
		351.93*	35.60	1.126E-001		3.838E-001	5.172E-00
		785.96	1.06	1.031E+001		-3.883E+000	4.810E+00
		839.07	0.58	1.811E+001		-4.420E+000	8.384E+00
+	Ra-226	81.07	0.20	1.835E+001	9.45E-001	-1.935E+001	8.786E+00
		83.79	0.32	1.365E+001		1.176E+001	6.591E+00
		186.21*	3.64	9.451E-001		3.422E+000	4.480E-00
+	AC-228	89.96	1.90	1.658E+006	2.21E+005	-3.080E+006	8.002E+00
		93.35	3.10	1.049E+006		4.296E+005	5.072E+00
		99.51	1.26	1.817E+006		-1.557E+004	8.663E+00
		105.60	0.74	3.381E+006		1.697E+006	1.619E+00
		129.07	2.42	1.059E+006		3.740E+005	5.072E+00
		153.98	0.72	3.429E+006		-2.724E+006	1.633E+00
		209.25	3.89	8.589E+005		-4.330E+005	4.106E+00
		214.85	0.76	4.389E+006		1.903E+006	2.096E+00
		270.24	3.46	1.106E+006		3.034E+005	5.259E+00
		328.00	2.95	1.441E+006		3.542E+005	6.819E+00
		338.32*	11.27	2.215E+005		2.502E+005	1.004E+00
		409.46	1.92	2.707E+006		1.639E+006	1.279E+00
		463.00	4.40	1.442E+006		7.416E+005	6.840E+00
		562.50	0.87	7.475E+006		-4.216E+005	3.509E+00
		674.75	2.10	3.528E+006		1.529E+006	1.651E+00
		726.86	0.62	1.356E+007		9.730E+006	6.367E+00
		755.32	1.00	8.083E+006		-9.298E+006	3.777E+00
		772.29	1.49	5.189E+006		1.693E+006	2.413E+00
		794.95	4.25	2.061E+006		1.109E+006	9.651E+00
		830.49	0.54	1.531E+007		-2.201E+006	7.119E+00
		835.71	1.61	5.083E+006		2.389E+006	2.361E+00
		840.38	0.91	8.743E+006		2.437E+006	4.051E+00
		904.20	0.77	1.333E+007		-7.499E+006	6.263E+00
		911.20	25.80	4.233E+005		4.109E+004	1.995E+00
		964.77	4.99	2.496E+006		2.145E+006	1.182E+00
		968.97	15.80	7.808E+005		5.782E+005	3.694E+00
		1247.08	0.50	2.500E+007		6.467E+005	1.168E+00
		1459.14	0.83	3.393E+007		1.027E+008	1.640E+00
		1495.91	0.86	1.036E+007		1.817E+006	4.619E+00
		1588.20	3.22	3.134E+006		2.228E+006	1.409E+00
		1630.63	1.51	6.491E+006		-2.164E+005	2.901E+00
	TH-230	67.67	0.38	1.225E+001	1.22E+001	4.316E+000	5.889E+00
	PA-234	742.81	0.11	9.799E+001	1.58E+001	-5.184E+001	4.572E+00
		766.42	0.32	3.511E+001		7.599E+000	1.642E+00
		1001.03	0.84	1.578E+001		-2.281E+000	7.345E+00
	TH-234	63.29	3.70	1.276E+000	1.28E+000	4.148E-002	6.123E-00
		92.38	2.13	2.117E+000		2.459E+000	1.024E+00
		92.80	2.10	2.154E+000		2.923E+000	1.043E+00
		112.81	0.21	1.505E+001		-9.655E+000	7.186E+00
	U-234	53.20	0.12	4.544E+001	4.54E+001	8.592E+000	2.171E+00
		120.90	0.04	9.096E+001		4.732E+001	4.343E+00

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram
U-235	89.96	3.43	1.231E+000	3.45E-001	-2.287E+000	5.941E-00
	93.35	5.54	7.868E-001		3.222E-001	3.804E-00
	104.82	0.69	4.909E+000		3.998E+000	2.351E+00
	105.60	1.31	2.559E+000		1.285E+000	1.226E+00
	108.58	0.50	6.833E+000		4.500E+000	3.275E+00
	109.19	1.66	2.014E+000		-2.259E-001	9.646E-00
	143.76	10.96	3.447E-001		2.797E-001	1.654E-00
	163.36	5.08	7.265E-001		2.805E-001	3.472E-00
	194.94	0.63	6.251E+000		3.285E+000	2.979E+00
	202.12	1.08	3.931E+000		5.219E-001	1.877E+00
	205.32	5.02	8.567E-001		-6.078E-001	4.091E-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

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**** L I N E A C T I V I T Y C O N S I S T E N C Y E V A L U A T O R ***
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Analysis using Key Line Activities
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-0310\W3H-ERRU-03

Equation used to calculate plot: ln(Ratio) = A + B*ln(Energy)
where: Ratio = Activity/KL Activity

Notes:
'^' Denotes Key Line energy
* All uncertainties quoted at 1.96 sigma

Nuclide	Energy (keV)		Activity (pCi/gram)	Activity %Uncert*	Ratio[%Uncert]	A	B [uncert]
K-40	1460.8	^	1.05E+001	15.049			
Pb-212	74.8		1.00E+000	20.792	2.818[27.825]	3.43	-0.627
	77.1		5.13E-001	21.471	1.441[28.336]		[0.287]
	238.6	^	3.56E-001	18.491	1.000[26.150]		
BI-214	76.9		1.61E+001	21.659	47.394[80.623]	11.95	-1.864
	609.3	^	3.39E-001	77.660	1.000[109.82]		[0.658]
PB-214	74.8		1.78E+000	22.636	4.632[30.975]	5.02	-0.885
	77.1		9.04E-001	23.282	2.355[31.451]		[0.222]
	295.2		2.67E-001	36.082	0.696[41.822]		
	351.9	^	3.84E-001	21.145	1.000[29.903]		
Ra-226	186.2	^	3.42E+000	48.645			

Nuclide	Energy (keV)	Activity (pCi/gram)	Activity %Uncert*	Ratio[%Uncert]	A	B [uncert]
AC-228	338.3	2.50E+005	******			