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

Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-2002\UNC-IMC-200

Report Generated On : 5/15/2017 10:41:41 AM

Sample Title : W3H-IMC-2002-S-P-2

Sample Description :

Sample Identification : IMC-2002-S-P-2

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 : 2.503E+002 grams

Sample Taken On : 5/3/2017 12:00:00 AM

Acquisition Started : 5/9/2017 10:19:31 AM

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 : 5/15/2017

Efficiency ID : H-IMC-2002-S-P-2

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

Detector Name: 8566

Sample Title: W3H-IMC-2002-S-P-2

Peak Analysis Performed on: 5/15/2017 10:41:33 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
F	1	207-	218	213.23	53.47	0.51	6.47E+001	61.71	8.20E+001
M	2	284-	315	291.54	73.07	0.84	7.89E+001	47.84	1.50E+002
m	3	284-	315	299.69	75.11	0.85	1.60E+002	86.77	1.36E+002
m	4	284-	315	307.94	77.17	0.85	1.01E+002	56.56	1.30E+002
M	5	332-	365	337.11	84.47	0.83	2.47E+002	29.52	1.10E+002
m	6	332-	365	348.72	87.38	0.83	5.20E+001	18.45	1.58E+002
m	7	332-	365	359.32	90.03	0.84	1.07E+002	22.95	1.67E+002
F	8	365-	385	372.61	93.36	0.92	1.65E+002	26.42	1.96E+002
F	9	481-	488	483.97	121.22	0.57	2.82E+001	13.44	6.10E+001
F	10	568-	579	574.26	143.82	0.91	2.56E+002	87.35	9.00E+001
F	11	646-	659	652.49	163.39	0.97	1.41E+002	23.92	7.88E+001
F	12	736-	749	741.90	185.77	0.91	1.19E+003	64.46	6.83E+001
F	13	815-	826	820.28	205.38	0.92	6.64E+001	18.34	4.95E+001
F	14	947-	960	952.88	238.56	0.91	1.01E+002	21.99	6.65E+001
F	15	1172-	1186	1179.55	295.29	0.33	3.17E+001	11.78	4.35E+001
F	16	1398-	1411	1404.85	351.67	1.12	3.70E+001	24.91	3.50E+001
F	17	5823-	5848	5835.61	1460.44	2.67	1.87E+002	27.47	7.22E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

 ***** 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: W3H-IMC-2002-S-P-2
 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	0.977	1460.82*	10.66	1.22906E+001	2.08720E+000
Pb-212	0.998	74.82*	10.28	1.37334E+000	7.94092E-001
		77.11*	17.10	5.11318E-001	3.03892E-001
		86.83	2.07		
		87.35*	3.97	1.05771E+000	4.31586E-001
		89.78*	1.46	5.87584E+000	1.72074E+000
		115.18	0.60		
		238.63*	43.60	2.82352E-001	7.60140E-002
		300.09	3.30		
PB-214	0.847	74.82*	5.80	2.43412E+000	1.42421E+000
		77.11*	9.70	9.01395E-001	5.41839E-001
		86.83	1.70		
		87.35*	2.24	1.87460E+000	7.81474E-001
		89.78*	0.82	1.04619E+001	3.19525E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	2.58961E-001	1.04352E-001
		351.93*	35.60	1.87575E-001	1.29106E-001
		785.96	1.06		
		839.07	0.58		
Ra-226	0.886	81.07	0.20		
		83.79*	0.32	6.26392E+001	1.46287E+001
		186.21*	3.64	3.20622E+001	5.70202E+000
U-234	0.987	53.20*	0.12	7.01805E+001	6.90225E+001
		120.90*	0.04	6.36140E+001	3.73004E+001
U-235	1.000	89.96*	3.43	2.50107E+000	7.36793E-001
		93.35*	5.54	2.34913E+000	6.06394E-001
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	1.95834E+000	7.72233E-001
		163.36*	5.08	2.49785E+000	6.30624E-001
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	1.40991E+000	4.49029E-001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.10

Errors quoted at 1.960 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/gram)	Wt mean Activity Uncertainty
K-40	0.977	1.229060E+001	2.087204E+000
Pb-212	0.998	3.143804E-001	7.220135E-002
PB-214	0.847	2.515040E-001	7.977754E-002
Ra-226	0.886	3.609503E+001	5.312707E+000
U-234	0.987	6.509820E+001	3.281522E+001
U-235	1.000	1.987009E+000	2.679785E-001

? = 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: 5/15/2017 10:41:33 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
M 2	73.07	4.3842E-002	60.63		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

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

Detector Name: 8566
Sample Geometry: cylinder
Sample Title: W3H-IMC-2002-S-P-2
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	1.087E+000	1.09E+000	1.229E+001	4.545E-00
	Pb-210	46.54	4.25	2.415E+000	2.42E+000	2.159E+000	1.152E+00
	BI-212	727.33	6.67	2.316E+000	2.32E+000	8.233E-001	1.081E+00
		785.37	1.10	1.475E+001		-5.803E-001	6.873E+00
		1078.62	0.56	3.248E+001		8.977E+000	1.494E+00
		1620.50	1.47	8.713E+000		-4.575E+000	3.649E+00
+	Pb-212	74.82*	10.28	4.882E-001	1.32E-001	1.373E+000	2.325E-00
		77.11*	17.10	2.823E-001		5.113E-001	1.343E-00
		86.83	2.07	3.707E+000		-9.361E+000	1.800E+00
		87.35*	3.97	1.245E+000		1.058E+000	5.950E-00
		89.78*	1.46	3.443E+000		5.876E+000	1.647E+00
		115.18	0.60	9.053E+000		2.493E+000	4.349E+00
		238.63*	43.60	1.319E-001		2.824E-001	6.217E-00
		300.09	3.30	2.280E+000		1.653E+000	1.077E+00
	BI-214	76.86	0.55	1.622E+001	3.47E-001	3.762E+001	7.894E+00
		79.29	0.91	7.774E+000		-2.185E-001	3.760E+00
		609.32	45.49	3.469E-001		2.349E-001	1.639E-00
		665.45	1.53	8.802E+000		6.653E-001	4.094E+00
		768.36	4.89	2.980E+000		1.630E-001	1.380E+00
		806.18	1.26	1.153E+001		-2.191E+000	5.316E+00
		934.06	3.11	5.799E+000		1.887E+000	2.692E+00
		1120.29	14.92	1.557E+000		7.643E-001	7.279E-00
		1155.21	1.63	1.018E+001		-3.486E+000	4.617E+00
		1238.11	5.83	3.910E+000		9.118E-001	1.814E+00
		1280.98	1.43	1.249E+001		-4.801E+000	5.654E+00
		1377.67	3.99	4.918E+000		3.026E+000	2.233E+00
		1385.31	0.79	2.232E+001		-3.190E+000	1.002E+00
		1401.52	1.33	1.412E+001		9.068E+000	6.370E+00
		1407.99	2.39	8.115E+000		2.458E+000	3.674E+00
		1509.21	2.13	7.602E+000		2.201E+000	3.343E+00
		1583.20	0.70	2.619E+001		-1.862E+001	1.165E+00
		1661.27	1.05	1.510E+001		-8.671E+000	6.535E+00
		1729.59	2.88	4.937E+000		7.652E-001	2.085E+00
		1764.49	15.30	1.277E+000		4.915E-001	5.651E-00
		1847.43	2.03	8.351E+000		-4.329E+000	3.595E+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	8.654E-001	1.66E-001	2.434E+000	4.121E-00
		77.11*	9.70	4.976E-001		9.014E-001	2.368E-00
		86.83	1.70	4.514E+000		-1.140E+001	2.192E+00
		87.35*	2.24	2.207E+000		1.875E+000	1.054E+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	6.129E+000	1.66E-001	1.046E+001	2.933E+00
		241.99	7.25	1.274E+000		1.256E-001	6.138E-00
		258.76	0.53	1.053E+001		-1.116E+000	4.930E+00
		295.22*	18.42	3.020E-001		2.590E-001	1.400E-00
		351.93*	35.60	1.664E-001		1.876E-001	7.634E-00
		785.96	1.06	1.545E+001		1.180E+000	7.206E+00
		839.07	0.58	2.592E+001		-1.303E+001	1.196E+00
+	Ra-226	81.07	0.20	3.165E+001	1.29E+000	1.069E+001	1.525E+00
		83.79*	0.32	1.308E+001		6.264E+001	6.199E+00
		186.21*	3.64	1.292E+000		3.206E+001	6.092E-00
	AC-228	89.96	1.90	1.406E+008	2.70E+007	-2.913E+008	6.820E+00
		93.35	3.10	8.840E+007		-4.179E+007	4.293E+00
		99.51	1.26	1.332E+008		-9.130E+006	6.350E+00
		105.60	0.74	2.695E+008		-2.670E+008	1.295E+00
		129.07	2.42	7.894E+007		-3.314E+007	3.782E+00
		153.98	0.72	2.585E+008		1.052E+007	1.233E+00
		209.25	3.89	6.022E+007		5.896E+006	2.872E+00
		214.85	0.76	2.462E+008		-1.221E+008	1.158E+00
		270.24	3.46	6.816E+007		3.042E+007	3.210E+00
		328.00	2.95	9.431E+007		5.647E+007	4.432E+00
		338.32	11.27	2.704E+007		2.940E+007	1.275E+00
		409.46	1.92	1.902E+008		8.039E+007	8.960E+00
		463.00	4.40	8.109E+007		4.150E+007	3.782E+00
		562.50	0.87	4.828E+008		-2.804E+008	2.245E+00
		674.75	2.10	2.486E+008		-7.549E+007	1.159E+00
		726.86	0.62	9.233E+008		5.845E+008	4.312E+00
		755.32	1.00	4.951E+008		-1.775E+008	2.280E+00
		772.29	1.49	3.836E+008		8.911E+007	1.784E+00
		794.95	4.25	1.413E+008		-3.515E+007	6.584E+00
		830.49	0.54	1.050E+009		-2.128E+008	4.854E+00
		835.71	1.61	3.605E+008		5.561E+007	1.669E+00
		840.38	0.91	6.182E+008		-2.904E+008	2.854E+00
		904.20	0.77	9.087E+008		-2.339E+008	4.244E+00
		911.20	25.80	2.823E+007		2.503E+007	1.321E+00
		964.77	4.99	1.603E+008		1.476E+008	7.524E+00
		968.97	15.80	4.867E+007		3.059E+007	2.279E+00
		1247.08	0.50	1.362E+009		-1.084E+009	6.200E+00
		1459.14	0.83	2.164E+009		5.622E+009	1.040E+00
		1495.91	0.86	6.352E+008		-1.107E+008	2.761E+00
		1588.20	3.22	2.320E+008		1.309E+008	1.043E+00
		1630.63	1.51	3.906E+008		1.489E+008	1.698E+00
	TH-230	67.67	0.38	1.842E+001	1.84E+001	5.941E-001	8.865E+00
	PA-234	742.81	0.11	1.489E+002	1.98E+001	8.802E+000	6.953E+00
		766.42	0.32	4.550E+001		5.827E+000	2.105E+00
	TH-234	1001.03	0.84	1.975E+001	1.87E+000	1.691E+000	9.063E+00
		63.29	3.70	1.869E+000		-1.156E+000	8.966E-00
		92.38	2.13	3.880E+000		7.818E+000	1.890E+00
		92.80	2.10	3.749E+000		1.508E+000	1.823E+00
	U-234	112.81	0.21	2.581E+001	5.89E+001	-4.024E+001	1.240E+00
		53.20*	0.12	5.890E+001		7.018E+001	2.798E+00
		120.90*	0.04	8.806E+001		6.361E+001	4.098E+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	1.465E+000	3.98E-001	2.501E+000	7.011E-00
		93.35*	5.54	1.433E+000		2.349E+000	6.973E-00
		104.82	0.69	7.798E+000		2.366E+000	3.745E+00
		105.60	1.31	4.135E+000		-4.096E+000	1.987E+00
		108.58	0.50	1.212E+001		1.245E+000	5.848E+00
		109.19	1.66	3.568E+000		-5.469E-001	1.721E+00
		143.76*	10.96	3.983E-001		1.958E+000	1.888E-00
		163.36*	5.08	9.057E-001		2.498E+000	4.289E-00
		194.94	0.63	9.041E+000		2.858E+000	4.301E+00
		202.12	1.08	6.721E+000		-1.827E+000	3.229E+00
		205.32*	5.02	8.348E-001		1.410E+000	3.887E-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

 *** LINE ACTIVITY CONSISTENCY EVALUATOR ***

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 Analysis using Key Line Activities
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-2002\UNC-IMC-200

Equation used to calculate plot: $\ln(\text{Ratio}) = A + B \cdot \ln(\text{Energy})$

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 ^	1.23E+001	16.982			
Pb-212	74.8	1.37E+000	57.822	4.864[63.782]	9.52	-1.717
	77.1	5.11E-001	59.433	1.811[65.246]		[0.438]
	87.3	1.06E+000	40.804	3.746[48.885]		
	89.8	5.88E+000	29.285	20.810[39.779]		
	238.6 ^	2.82E-001	26.922	1.000[38.073]		
PB-214	74.8	2.43E+000	58.510	12.977[90.338]	10.62	-1.795
	77.1	9.01E-001	60.111	4.806[91.383]		[0.552]
	87.3	1.87E+000	41.688	9.994[80.469]		
	89.8	1.05E+001	30.542	55.774[75.301]		
	295.2	2.59E-001	40.296	1.381[79.758]		
	351.9 ^	1.88E-001	68.829	1.000[97.339]		
Ra-226	83.8	6.26E+001	23.354	1.954[29.355]	4.38	-0.839
	186.2 ^	3.21E+001	17.784	1.000[25.151]		[0.484]
U-234	53.2 ^	7.02E+001	98.350	1.000[139.08]	0.48	-0.120
	120.9	6.36E+001	58.636	0.906[114.50]		[2.195]
U-235	90.0	2.50E+000	29.459	1.277[49.222]	2.33	-0.461
	93.3	2.35E+000	25.814	1.200[47.131]		[0.684]
	143.8 ^	1.96E+000	39.433	1.000[55.767]		
	163.4	2.50E+000	25.247	1.275[46.823]		
	205.3	1.41E+000	31.848	0.720[50.688]		