
***** 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 10:47:28 AM

Sample Title : W3H-IMC-2002-S-P-8

Sample Description :

Sample Identification : IMC-2002-S-P-8

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 : 2.671E+002 grams

Sample Taken On : 5/1/2017 12:00:00 AM

Acquisition Started : 5/10/2017 2:58:38 PM

Live Time : 1800.0 seconds

Real Time : 1800.4 seconds

Dead Time : 0.02 %

Energy Calibration Used Done On : 4/13/2017

Efficiency Calibration Used Done On : 5/15/2017

Efficiency ID : H-IMC-2002-S-P-8

***** 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-8

Peak Analysis Performed on: 5/15/2017 10:47:19 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
F	1	58-	71	65.15	16.41	0.93	2.94E+002	106.88	1.05E+002
F	2	72-	81	77.16	19.42	0.29	6.10E+001	99.22	9.00E+001
F	3	99-	107	103.43	25.99	0.51	6.11E+001	59.54	6.98E+001
F	4	207-	223	213.02	53.42	0.82	8.04E+001	69.17	1.25E+002
M	5	287-	317	291.22	72.99	0.74	8.78E+001	21.94	1.24E+002
m	6	287-	317	299.47	75.05	0.75	2.13E+002	29.11	1.65E+002
m	7	287-	317	308.59	77.33	0.76	8.72E+001	20.65	1.55E+002
F	8	330-	344	337.18	84.49	0.69	2.31E+002	31.42	2.05E+002
F	9	356-	364	359.75	90.14	0.56	7.36E+001	22.36	1.16E+002
F	10	364-	379	372.98	93.45	0.81	1.40E+002	86.89	2.24E+002
F	11	569-	583	574.43	143.86	0.78	2.92E+002	35.11	1.43E+002
F	12	647-	659	652.56	163.41	0.80	1.88E+002	4640.20	7.64E+001
F	13	734-	751	741.64	185.70	0.98	1.42E+003	137.15	8.33E+001
F	14	814-	826	819.77	205.25	0.99	1.36E+002	23.34	4.88E+001
F	15	948-	959	952.55	238.48	0.90	1.09E+002	22.21	4.65E+001
F	16	5825-	5848	5836.10	1460.56	2.72	1.27E+002	23.20	6.67E+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-8
 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	0.989	1460.82*	10.66	8.39307E+000	1.68855E+000
Pb-212	0.907	74.82*	10.28	1.83412E+000	4.47124E-001
		77.11*	17.10	4.42534E-001	1.37506E-001
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	4.04564E+000	1.47174E+000
		115.18	0.60		
		238.63*	43.60	3.04401E-001	7.86974E-002
		300.09	3.30		
Ra-226	0.878	81.07	0.20		
		83.79*	0.32	5.90080E+001	1.42929E+001
		186.21*	3.64	3.84781E+001	7.50229E+000
U-234	0.994	53.20*	0.12	8.79538E+001	7.85457E+001
		120.90	0.04		
U-235	0.999	89.96*	3.43	1.72203E+000	6.28865E-001
		93.35*	5.54	2.01339E+000	1.30997E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	2.24367E+000	5.18805E-001
		163.36*	5.08	3.34304E+000	8.24320E+001
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	2.89184E+000	6.75862E-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	0.989	8.393069E+000	1.688550E+000
Pb-212	0.907	3.707755E-001	6.707082E-002
Ra-226	0.878	4.291265E+001	6.642800E+000
U-234	0.994	8.795380E+001	7.854566E+001
U-235	0.999	2.193947E+000	3.309260E-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 10:47:19 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
F	1	16.41	1.6328E-001	36.37		
F	2	19.42	3.3865E-002	162.78		
F	3	25.99	3.3942E-002	97.45		
M	5	72.99	4.8780E-002	24.99		

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-8
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	1.034E+000	1.03E+000	8.393E+000	4.279E-00
	Pb-210	46.54	4.25	2.617E+000	2.62E+000	2.547E+000	1.252E+00
	BI-212	727.33	6.67	2.241E+000	2.24E+000	7.405E-001	1.043E+00
		785.37	1.10	1.447E+001		2.355E+000	6.732E+00
		1078.62	0.56	3.291E+001		6.544E+000	1.516E+00
		1620.50	1.47	9.511E+000		-5.401E+000	4.046E+00
+	Pb-212	74.82*	10.28	5.394E-001	1.07E-001	1.834E+000	2.580E-00
		77.11*	17.10	3.072E-001		4.425E-001	1.467E-00
		86.83	2.07	3.829E+000		5.243E-002	1.861E+00
		87.35	3.97	1.625E+000		2.727E-002	7.847E-00
		89.78*	1.46	3.222E+000		4.046E+000	1.536E+00
		115.18	0.60	9.566E+000		5.026E+000	4.605E+00
		238.63*	43.60	1.069E-001		3.044E-001	4.966E-00
		300.09	3.30	2.242E+000		-1.068E+000	1.058E+00
	BI-214	76.86	0.55	1.730E+001	3.41E-001	4.978E+001	8.433E+00
		79.29	0.91	8.062E+000		8.469E-001	3.904E+00
		609.32	45.49	3.414E-001		3.130E-001	1.612E-00
		665.45	1.53	9.676E+000		2.865E+000	4.530E+00
		768.36	4.89	3.381E+000		3.258E+000	1.580E+00
		806.18	1.26	1.156E+001		-7.020E+000	5.334E+00
		934.06	3.11	5.817E+000		2.950E+000	2.701E+00
		1120.29	14.92	1.476E+000		4.666E-001	6.873E-00
		1155.21	1.63	1.321E+001		9.238E-001	6.127E+00
		1238.11	5.83	4.143E+000		0.000E+000	1.930E+00
		1280.98	1.43	1.324E+001		6.130E+000	6.026E+00
		1377.67	3.99	4.352E+000		1.695E+000	1.949E+00
		1385.31	0.79	1.901E+001		-5.175E-001	8.359E+00
		1401.52	1.33	1.416E+001		1.289E+001	6.390E+00
		1407.99	2.39	7.388E+000		-1.359E+000	3.309E+00
		1509.21	2.13	7.809E+000		5.152E+000	3.445E+00
		1583.20	0.70	2.878E+001		-4.878E+000	1.294E+00
		1661.27	1.05	1.605E+001		1.054E+000	7.007E+00
		1729.59	2.88	5.718E+000		3.979E+000	2.474E+00
		1764.49	15.30	1.363E+000		2.587E-001	6.078E-00
		1847.43	2.03	8.092E+000		1.935E-001	3.464E+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	1.724E+000	2.67E-001	2.179E+000	8.414E-00
		77.11	9.70	9.502E-001		1.949E+000	4.630E-00
		86.83	1.70	4.662E+000		6.384E-002	2.266E+00
		87.35	2.24	2.879E+000		4.833E-002	1.391E+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	8.202E+000	2.67E-001	6.027E+000	3.968E+00
		241.99	7.25	1.230E+000		-3.670E-001	5.917E-00
		258.76	0.53	1.127E+001		-1.226E+001	5.300E+00
		295.22	18.42	4.193E-001		8.177E-002	1.986E-00
		351.93	35.60	2.672E-001		8.637E-002	1.267E-00
		785.96	1.06	1.493E+001		6.277E+000	6.946E+00
		839.07	0.58	2.550E+001		4.412E+000	1.174E+00
+	Ra-226	81.07	0.20	3.226E+001	1.54E+000	2.449E+001	1.555E+00
		83.79*	0.32	2.317E+001		5.901E+001	1.124E+00
		186.21*	3.64	1.539E+000		3.848E+001	7.331E-00
	AC-228	89.96	1.90	7.780E+011	1.61E+011	5.406E+011	3.771E+01
		93.35	3.10	5.133E+011		-2.851E+011	2.495E+01
		99.51	1.26	7.993E+011		-3.625E+011	3.821E+01
		105.60	0.74	1.611E+012		-2.417E+012	7.759E+01
		129.07	2.42	4.581E+011		1.134E+011	2.197E+01
		153.98	0.72	1.559E+012		2.478E+011	7.454E+01
		209.25	3.89	3.498E+011		3.701E+010	1.671E+01
		214.85	0.76	1.475E+012		-2.470E+011	6.966E+01
		270.24	3.46	4.154E+011		9.110E+010	1.965E+01
		328.00	2.95	6.020E+011		6.454E+011	2.850E+01
		338.32	11.27	1.613E+011		1.233E+011	7.634E+01
		409.46	1.92	9.950E+011		3.128E+011	4.664E+01
		463.00	4.40	5.570E+011		3.388E+011	2.630E+01
		562.50	0.87	2.920E+012		1.165E+012	1.364E+01
		674.75	2.10	1.292E+012		-1.401E+012	5.987E+01
		726.86	0.62	5.012E+012		1.210E+012	2.333E+01
		755.32	1.00	3.148E+012		-2.030E+012	1.463E+01
		772.29	1.49	2.224E+012		4.689E+011	1.036E+01
		794.95	4.25	7.829E+011		-1.862E+011	3.641E+01
		830.49	0.54	6.365E+012		1.928E+012	2.958E+01
		835.71	1.61	2.078E+012		2.234E+011	9.635E+01
		840.38	0.91	3.470E+012		7.874E+011	1.601E+01
		904.20	0.77	5.289E+012		-1.809E+012	2.475E+01
		911.20	25.80	1.709E+011		1.389E+011	8.033E+01
		964.77	4.99	8.358E+011		4.239E+011	3.902E+01
		968.97	15.80	2.536E+011		2.343E+011	1.180E+01
		1247.08	0.50	9.004E+012		-5.584E+012	4.157E+01
		1459.14	0.83	1.100E+013		2.577E+013	5.261E+01
		1495.91	0.86	3.383E+012		3.183E+011	1.457E+01
		1588.20	3.22	1.379E+012		6.955E+011	6.231E+01
		1630.63	1.51	1.860E+012		-6.940E+010	7.855E+01
	TH-230	67.67	0.38	1.832E+001	1.83E+001	-6.827E-001	8.814E+00
	PA-234	742.81	0.11	1.318E+002	2.11E+001	-1.023E+002	6.099E+00
		766.42	0.32	5.027E+001		-1.574E+001	2.343E+00
		1001.03	0.84	2.107E+001		-7.576E+000	9.720E+00
	TH-234	63.29	3.70	1.947E+000	1.95E+000	1.389E+000	9.350E-00
		92.38	2.13	3.936E+000		1.071E+001	1.918E+00
		92.80	2.10	3.849E+000		3.731E+000	1.873E+00
		112.81	0.21	2.708E+001		-4.293E+001	1.304E+00
+	U-234	53.20*	0.12	8.159E+001	8.16E+001	8.795E+001	3.932E+00
		120.90	0.04	1.671E+002		5.456E+001	8.048E+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	1.371E+000	5.32E-001	1.722E+000	6.540E-00
		93.35*	5.54	1.390E+000		2.013E+000	6.756E-00
		104.82	0.69	8.404E+000		1.039E+001	4.048E+00
		105.60	1.31	4.376E+000		-6.565E+000	2.107E+00
		108.58	0.50	1.252E+001		1.562E-001	6.047E+00
		109.19	1.66	3.718E+000		-1.051E+000	1.795E+00
		143.76*	10.96	5.318E-001		2.244E+000	2.555E-00
		163.36*	5.08	8.756E-001		3.343E+000	4.138E-00
		194.94	0.63	9.063E+000		-1.849E+000	4.312E+00
		202.12	1.08	7.744E+000		-3.540E-001	3.740E+00
		205.32*	5.02	8.495E-001		2.892E+000	3.960E-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	^	8.39E+000	20.118			
Pb-212	74.8		1.83E+000	24.378	6.025[35.534]	7.06	-1.270 [0.388]
	77.1		4.43E-001	31.072	1.454[40.421]		
	89.8		4.05E+000	36.378	13.291[44.629]		
	238.6	^	3.04E-001	25.853	1.000[36.562]		
Ra-226	83.8		5.90E+001	24.222	1.534[31.094]	2.80	-0.535 [0.520]
	186.2	^	3.85E+001	19.498	1.000[27.574]		
U-234	53.2	^	8.80E+001	89.303			
U-235	90.0		1.72E+000	36.519	0.768[43.224]	-2.87	0.584 [0.604]
	93.3		2.01E+000	65.063	0.897[69.050]		
	143.8	^	2.24E+000	23.123	1.000[32.701]		
	163.4		3.34E+000	2465.7	1.490[2465.8]		
	205.3		2.89E+000	23.371	1.289[32.877]		