
***** 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-0312\W3H-IMC-000

Report Generated On : 7/6/2017 9:30:39 AM

Sample Title : UNC-IMC-000312-S-P-4

Sample Description :

Sample Identification : IMC-000312-S-P-4

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 : 3.072E+002 grams

Sample Taken On : 4/28/2017 12:00:00 AM

Acquisition Started : 5/3/2017 1:03:27 PM

Live Time : 1800.0 seconds

Real Time : 1800.7 seconds

Dead Time : 0.04 %

Energy Calibration Used Done On : 4/13/2017

Efficiency Calibration Used Done On : 7/6/2017

Efficiency ID : H-IMC-2002-S-P-5

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

Detector Name: 8566

Sample Title: UNC-IMC-000312-S-P-4

Peak Analysis Performed on: 7/6/2017 9:30:31 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	48-	58	52.57	13.27	0.58	3.38E+002	38.43	2.67E+002
F	2	59-	72	65.15	16.41	0.91	1.71E+003	206.67	4.41E+002
F	3	93-	111	102.92	25.87	0.84	3.85E+002	103.73	1.95E+002
F	4	209-	218	213.34	53.50	0.69	3.42E+002	35.11	1.15E+002
M	5	286-	306	291.06	72.95	0.81	1.52E+002	63.91	2.78E+002
m	6	286-	306	299.66	75.10	0.81	3.09E+002	114.47	3.19E+002
M	7	322-	343	325.58	81.58	0.78	6.97E+001	24.32	2.00E+002
m	8	322-	343	337.17	84.49	0.79	7.78E+002	52.70	2.68E+002
F	9	354-	366	359.52	90.08	0.68	3.26E+002	39.81	3.16E+002
M	10	366-	387	373.34	93.54	0.95	4.99E+002	140.95	2.37E+002
m	11	366-	387	383.68	96.12	0.95	6.77E+001	27.65	2.54E+002
F	12	428-	442	436.42	109.32	1.01	2.02E+002	126.33	3.13E+002
F	13	473-	488	482.77	120.92	0.65	1.01E+002	84.56	2.46E+002
F	14	569-	585	574.56	143.89	0.84	1.04E+003	60.88	1.96E+002
F	15	646-	659	652.66	163.44	0.88	4.69E+002	112.21	1.38E+002
F	16	736-	751	741.94	185.78	0.90	4.78E+003	127.92	1.12E+002
F	17	773-	785	778.46	194.92	0.75	4.73E+001	50.97	5.53E+001
M	18	802-	830	807.27	202.13	0.90	5.44E+001	22.26	4.73E+001
m	19	802-	830	820.17	205.35	0.91	3.65E+002	94.97	4.42E+001
F	20	1400-	1411	1404.37	351.55	0.71	2.01E+001	12.23	2.88E+001
F	21	5826-	5846	5835.62	1460.44	2.70	1.11E+002	21.84	1.05E+001

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: UNC-IMC-000312-S-P-4
 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	5.97900E+000	1.25254E+000
PB-214	0.215	74.82*	5.80	3.89522E+000	1.57531E+000
		77.11	9.70		
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	2.63122E+001	5.10093E+000
		241.99	7.25		
		258.76	0.53		
		295.22	18.42		
		351.93*	35.60	8.36129E-002	5.12652E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.966	81.07*	0.20	2.45884E+001	9.17949E+000
		83.79*	0.32	1.63471E+002	2.36355E+001
		186.21*	3.64	1.06142E+002	1.16015E+001
U-234	0.989	53.20*	0.12	3.10369E+002	5.80721E+001
		120.90*	0.04	1.87577E+002	1.66721E+002
U-235	0.936	89.96*	3.43	6.29035E+000	1.10906E+000
		93.35*	5.54	5.87998E+000	1.81576E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19*	1.66	7.79796E+000	5.09621E+000
		143.76*	10.96	6.56089E+000	7.89902E-001
		163.36*	5.08	6.83878E+000	1.78833E+000
		194.94*	0.63	6.30436E+000	6.82404E+000
		202.12*	1.08	4.35446E+000	1.84514E+000
		205.32*	5.02	6.36474E+000	1.78677E+000

* = 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	5.978996E+000	1.252542E+000
PB-214	0.215	8.790487E-002	5.123262E-002
Ra-226	0.966	6.511170E+001	6.886349E+000
U-234	0.989	2.970835E+002	5.484055E+001
U-235	0.936	6.287923E+000	5.086982E-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: 7/6/2017 9:30:31 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	13.27	1.8780E-001	11.37		
F	2	16.41	9.4747E-001	12.12		
F	3	25.87	2.1411E-001	26.92		
M	5	72.95	8.4270E-002	42.13		
m	11	96.12	3.7609E-002	40.84		

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: UNC-IMC-000312-S-P-4
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	9.891E-001	9.89E-001	5.979E+000	4.218E-00
	Pb-210	46.54	4.25	2.836E+000	2.84E+000	2.423E+000	1.371E+00
	BI-212	727.33	6.67	1.745E+000	1.74E+000	-3.255E-001	8.094E-00
		785.37	1.10	1.096E+001		-7.990E-001	5.072E+00
		1078.62	0.56	2.141E+001		-1.155E+001	9.643E+00
		1620.50	1.47	8.045E+000		5.770E-001	3.444E+00
	Pb-212	74.82	10.28	1.044E+000	1.40E-001	2.614E+000	5.124E-00
		77.11	17.10	5.505E-001		4.755E-002	2.696E-00
		86.83	2.07	4.568E+000		5.722E-001	2.240E+00
		87.35	3.97	1.857E+000		2.976E-001	9.056E-00
		89.78	1.46	5.851E+000		1.670E+001	2.864E+00
		115.18	0.60	1.117E+001		4.904E+000	5.438E+00
		238.63	43.60	1.404E-001		1.847E-001	6.710E-00
		300.09	3.30	1.664E+000		-1.956E+000	7.804E-00
	BI-214	76.86	0.55	1.756E+001	2.33E-001	2.045E+000	8.599E+00
		79.29	0.91	8.047E+000		-1.281E+000	3.918E+00
		609.32	45.49	2.327E-001		-3.015E-002	1.086E-00
		665.45	1.53	7.039E+000		-1.329E-002	3.268E+00
		768.36	4.89	2.664E+000		3.812E-001	1.242E+00
		806.18	1.26	9.158E+000		-6.365E-001	4.214E+00
		934.06	3.11	3.692E+000		-1.466E+000	1.676E+00
		1120.29	14.92	1.099E+000		5.105E-001	5.083E-00
		1155.21	1.63	9.221E+000		-2.744E+000	4.222E+00
		1238.11	5.83	2.509E+000		-2.557E+000	1.139E+00
		1280.98	1.43	9.755E+000		-6.247E+000	4.394E+00
		1377.67	3.99	3.351E+000		-1.063E+000	1.491E+00
		1385.31	0.79	1.793E+001		9.551E+000	8.031E+00
		1401.52	1.33	1.118E+001		1.940E+000	5.026E+00
		1407.99	2.39	5.689E+000		-7.731E-002	2.531E+00
		1509.21	2.13	7.061E+000		3.461E+000	3.156E+00
		1583.20	0.70	2.006E+001		-4.073E+000	8.851E+00
		1661.27	1.05	1.155E+001		6.444E-001	4.946E+00
		1729.59	2.88	4.802E+000		9.383E-001	2.087E+00
		1764.49	15.30	1.021E+000		3.574E-001	4.502E-00
		1847.43	2.03	6.825E+000		5.080E-001	2.939E+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	1.083E+000	1.20E-001	3.895E+000	5.245E-00
		77.11	9.70	9.705E-001		8.382E-002	4.752E-00
		86.83	1.70	5.562E+000		6.967E-001	2.728E+00
		87.35	2.24	3.291E+000		5.274E-001	1.605E+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	8.610E+000	1.20E-001	2.631E+001	4.196E+00
		241.99	7.25	8.156E-001		3.198E-001	3.889E-00
		258.76	0.53	1.021E+001		6.656E+000	4.829E+00
		295.22	18.42	3.184E-001		-4.015E-002	1.501E-00
		351.93*	35.60	1.199E-001		8.361E-002	5.435E-00
		785.96	1.06	1.161E+001		9.436E-001	5.377E+00
		839.07	0.58	2.297E+001		8.067E+000	1.066E+00
+	Ra-226	81.07*	0.20	2.416E+001	1.40E+000	2.459E+001	1.160E+00
		83.79*	0.32	1.657E+001		1.635E+002	7.999E+00
		186.21*	3.64	1.400E+000		1.061E+002	6.697E-00
	AC-228	89.96	1.90	1.561E+007	1.73E+006	4.296E+007	7.648E+00
		93.35	3.10	1.009E+007		-3.581E+007	4.949E+00
		99.51	1.26	1.456E+007		-1.241E+007	7.047E+00
		105.60	0.74	3.141E+007		1.453E+007	1.531E+00
		129.07	2.42	7.784E+006		-2.666E+006	3.768E+00
		153.98	0.72	2.694E+007		1.471E+007	1.302E+00
		209.25	3.89	5.832E+006		-2.959E+006	2.813E+00
		214.85	0.76	1.966E+007		-1.003E+006	9.286E+00
		270.24	3.46	4.754E+006		1.638E+006	2.229E+00
		328.00	2.95	7.078E+006		5.462E+005	3.328E+00
		338.32	11.27	1.733E+006		-8.439E+004	8.095E+00
		409.46	1.92	1.244E+007		-7.753E+006	5.810E+00
		463.00	4.40	5.915E+006		-1.980E+006	2.754E+00
		562.50	0.87	3.543E+007		1.208E+007	1.646E+00
		674.75	2.10	1.609E+007		-5.724E+006	7.423E+00
		726.86	0.62	6.336E+007		1.675E+006	2.941E+00
		755.32	1.00	3.833E+007		6.766E+006	1.771E+00
		772.29	1.49	2.721E+007		-1.660E+007	1.261E+00
		794.95	4.25	9.544E+006		0.000E+000	4.413E+00
		830.49	0.54	8.365E+007		-6.372E+006	3.888E+00
		835.71	1.61	2.866E+007		1.001E+007	1.334E+00
		840.38	0.91	4.774E+007		-2.144E+006	2.210E+00
		904.20	0.77	5.530E+007		-5.048E+007	2.542E+00
		911.20	25.80	1.779E+006		7.744E+005	8.225E+00
		964.77	4.99	9.848E+006		7.555E+006	4.560E+00
		968.97	15.80	2.982E+006		7.521E+005	1.376E+00
		1247.08	0.50	9.161E+007		-3.813E+007	4.127E+00
		1459.14	0.83	1.362E+008		3.117E+008	6.498E+00
		1495.91	0.86	4.991E+007		4.813E+006	2.187E+00
		1588.20	3.22	1.637E+007		1.034E+007	7.317E+00
		1630.63	1.51	2.731E+007		-1.164E+007	1.176E+00
	TH-230	67.67	0.38	1.934E+001	1.93E+001	-2.908E+001	9.386E+00
	PA-234	742.81	0.11	1.085E+002	1.63E+001	3.836E+001	5.026E+00
		766.42	0.32	4.073E+001		-2.642E+000	1.897E+00
	TH-234	1001.03	0.84	1.634E+001	2.17E+000	5.380E+000	7.503E+00
		63.29	3.70	2.174E+000		2.587E+000	1.055E+00
		92.38	2.13	5.070E+000		2.171E+001	2.494E+00
		92.80	2.10	4.800E+000		-8.729E-001	2.358E+00
+	U-234	112.81	0.21	3.260E+001	5.47E+001	-1.031E+001	1.588E+00
		53.20*	0.12	5.474E+001		3.104E+002	2.614E+00
		120.90*	0.04	1.710E+002		1.876E+002	8.300E+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	2.058E+000	5.29E-001	6.290E+000	1.003E+00
		93.35*	5.54	8.761E-001		5.880E+000	4.221E-00
		104.82	0.69	9.925E+000		1.050E+001	4.836E+00
		105.60	1.31	5.295E+000		2.449E+000	2.581E+00
		108.58	0.50	1.619E+001		7.701E+000	7.923E+00
		109.19*	1.66	4.312E+000		7.798E+000	2.104E+00
		143.76*	10.96	5.291E-001		6.561E+000	2.560E-00
		163.36*	5.08	9.739E-001		6.839E+000	4.673E-00
		194.94*	0.63	5.638E+000		6.304E+000	2.639E+00
		202.12*	1.08	2.777E+000		4.354E+000	1.280E+00
		205.32*	5.02	5.867E-001		6.365E+000	2.698E-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
 =====

Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-0312\W3H-IMC-000

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	^	5.98E+000	20.949			
PB-214	74.8		3.90E+000	40.442	46.586[73.449]	18.90	-3.181
	89.8		2.63E+001	19.386	314.69[64.304]		[0.681]
	351.9	^	8.36E-002	61.313	1.000[86.709]		
Ra-226	81.1		2.46E+001	37.333	0.232[38.900]	0.48	-0.090
	83.8		1.63E+002	14.459	1.540[18.125]		[0.280]
	186.2	^	1.06E+002	10.930	1.000[15.458]		
U-234	53.2	^	3.10E+002	18.711	1.000[26.461]	2.44	-0.613
	120.9		1.88E+002	88.881	0.604[90.829]		[1.152]
U-235	90.0		6.29E+000	17.631	0.959[21.350]	0.14	-0.036
	93.3		5.88E+000	30.880	0.896[33.144]		[0.346]
	109.2		7.80E+000	65.353	1.189[66.453]		
	143.8	^	6.56E+000	12.040	1.000[17.026]		
	163.4		6.84E+000	26.150	1.042[28.788]		
	194.9		6.30E+000	108.24	0.961[108.91]		
	202.1		4.35E+000	42.373	0.664[44.051]		
	205.3		6.36E+000	28.073	0.970[30.546]		