
***** 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 9:30:05 AM

Sample Title : UNC-IMC-000312-S-P-3

Sample Description :

Sample Identification : IMC-000312-S-P-3

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 : 3.162E+002 grams

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

Acquisition Started : 5/3/2017 11:29:28 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 : 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-3

Peak Analysis Performed on: 7/6/2017 9:30:00 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	65.05	16.39	0.79	2.63E+002	101.29	1.47E+002
F	2	96-	108	103.24	25.95	0.62	1.02E+002	66.76	5.85E+001
F	3	205-	218	212.79	53.36	0.81	9.65E+001	65.43	8.87E+001
M	4	286-	305	291.38	73.03	0.78	1.06E+002	51.32	1.19E+002
m	5	286-	305	299.53	75.07	0.79	2.00E+002	86.90	1.64E+002
F	6	331-	343	337.32	84.52	0.82	2.38E+002	30.32	1.50E+002
F	7	354-	366	359.90	90.18	0.62	9.23E+001	56.12	1.13E+002
F	8	366-	378	373.06	93.47	0.83	1.54E+002	78.38	1.04E+002
F	9	568-	581	574.53	143.88	0.87	2.99E+002	101.92	1.07E+002
F	10	644-	657	652.59	163.42	0.77	1.12E+002	16.65	8.75E+001
F	11	734-	750	741.87	185.76	0.91	1.33E+003	68.51	9.35E+001
F	12	774-	782	778.18	194.85	0.49	1.98E+001	11.48	2.48E+001
F	13	812-	828	819.65	205.22	0.84	1.10E+002	92.96	5.31E+001
F	14	948-	957	953.10	238.62	0.37	2.54E+001	62.22	3.00E+001
F	15	2032-	2046	2039.72	510.54	1.52	4.13E+001	14.85	1.88E+001
F	16	5826-	5846	5835.22	1460.34	2.27	1.20E+002	22.29	8.17E+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: UNC-IMC-000312-S-P-3
 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	0.964	1460.82*	10.66	6.26190E+000	1.25059E+000
Pb-212	0.546	74.82*	10.28	1.38528E+000	6.29389E-001
		77.11	17.10		
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	4.05600E+000	2.51719E+000
		115.18	0.60		
		238.63*	43.60	5.66501E-002	1.38819E-001
		300.09	3.30		
Ra-226	0.885	81.07	0.20		
		83.79*	0.32	4.85680E+001	8.76276E+000
		186.21*	3.64	2.87034E+001	3.38198E+000
U-234	0.997	53.20*	0.12	8.54966E+001	5.94878E+001
		120.90	0.04		
U-235	0.998	89.96*	3.43	1.72645E+000	1.07287E+000
		93.35*	5.54	1.76246E+000	9.24411E-001
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	1.83116E+000	6.52638E-001
		163.36*	5.08	1.58994E+000	2.89723E-001
		194.94*	0.63	2.56761E+000	1.51180E+000
		202.12	1.08		
		205.32*	5.02	1.86356E+000	1.58661E+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	0.964	6.261898E+000	1.250595E+000
Pb-212	0.546	1.189764E-001	1.353339E-001
Ra-226	0.885	3.127872E+001	3.155147E+000
U-234	0.997	8.549661E+001	5.948782E+001
U-235	0.998	1.669787E+000	2.400214E-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 9:30:00 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	16.39	1.4626E-001	38.47		
F	2	25.95	5.6646E-002	65.47		
M	4	73.03	5.8805E-002	48.49		
F	15	510.54	2.2927E-002	35.99		

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: UNC-IMC-000312-S-P-3
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	8.641E-001	8.64E-001	6.262E+000	3.614E-00
	Pb-210	46.54	4.25	2.020E+000	2.02E+000	2.001E+000	9.646E-00
	BI-212	727.33	6.67	1.638E+000	1.64E+000	4.517E-001	7.578E-00
		785.37	1.10	1.065E+001		5.644E+000	4.928E+00
		1078.62	0.56	2.331E+001		2.997E+000	1.062E+00
		1620.50	1.47	8.353E+000		-3.031E+000	3.614E+00
+	Pb-212	74.82*	10.28	4.312E-001	6.63E-002	1.385E+000	2.062E-00
		77.11	17.10	4.029E-001		7.065E-002	1.959E-00
		86.83	2.07	2.976E+000		3.356E-001	1.446E+00
		87.35	3.97	1.305E+000		1.746E-001	6.302E-00
		89.78*	1.46	2.851E+000		4.056E+000	1.366E+00
		115.18	0.60	6.771E+000		3.188E+000	3.243E+00
		238.63*	43.60	6.628E-002		5.665E-002	3.013E-00
		300.09	3.30	1.683E+000		-1.126E+000	7.915E-00
	BI-214	76.86	0.55	1.278E+001	2.23E-001	2.179E+000	6.219E+00
		79.29	0.91	5.513E+000		7.540E-002	2.654E+00
		609.32	45.49	2.228E-001		4.325E-002	1.039E-00
		665.45	1.53	6.553E+000		-3.344E+000	3.032E+00
		768.36	4.89	2.607E+000		6.713E-001	1.216E+00
		806.18	1.26	9.078E+000		2.773E+000	4.184E+00
		934.06	3.11	3.276E+000		-1.736E+000	1.473E+00
		1120.29	14.92	1.018E+000		7.431E-003	4.690E-00
		1155.21	1.63	8.856E+000		3.433E+000	4.051E+00
		1238.11	5.83	2.536E+000		4.658E-002	1.156E+00
		1280.98	1.43	1.075E+001		7.977E+000	4.908E+00
		1377.67	3.99	3.853E+000		1.777E+000	1.747E+00
		1385.31	0.79	1.974E+001		9.651E+000	8.964E+00
		1401.52	1.33	8.843E+000		-3.658E+000	3.875E+00
		1407.99	2.39	5.298E+000		1.152E+000	2.344E+00
		1509.21	2.13	5.576E+000		-4.215E+000	2.424E+00
		1583.20	0.70	2.080E+001		1.197E+001	9.253E+00
		1661.27	1.05	1.162E+001		5.575E+000	5.001E+00
		1729.59	2.88	5.292E+000		3.680E+000	2.342E+00
		1764.49	15.30	1.036E+000		2.760E-001	4.598E-00
		1847.43	2.03	5.400E+000		-1.208E+000	2.240E+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	1.352E+000	1.83E-001	-5.326E-002	6.596E-00
		77.11	9.70	7.103E-001		1.245E-001	3.454E-00
		86.83	1.70	3.624E+000		4.087E-001	1.760E+00
		87.35	2.24	2.312E+000		3.094E-001	1.117E+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	6.014E+000	1.83E-001	3.711E+000	2.901E+00
		241.99	7.25	7.600E-001		9.507E-002	3.616E-00
		258.76	0.53	8.556E+000		-2.966E-001	4.010E+00
		295.22	18.42	2.965E-001		-9.103E-002	1.395E-00
		351.93	35.60	1.831E-001		2.826E-002	8.608E-00
		785.96	1.06	1.108E+001		3.645E+000	5.126E+00
		839.07	0.58	2.139E+001		1.133E+001	9.896E+00
+	Ra-226	81.07	0.20	2.452E+001	1.27E+000	1.004E+001	1.179E+00
		83.79*	0.32	1.517E+001		4.857E+001	7.308E+00
		186.21*	3.64	1.272E+000		2.870E+001	6.067E-00
	AC-228	89.96	1.90	7.515E+006	1.51E+006	4.494E+006	3.629E+00
		93.35	3.10	5.054E+006		-6.500E+006	2.449E+00
		99.51	1.26	8.283E+006		-1.257E+007	3.952E+00
		105.60	0.74	1.744E+007		-2.469E+007	8.402E+00
		129.07	2.42	4.603E+006		-2.143E+006	2.201E+00
		153.98	0.72	1.538E+007		-6.311E+006	7.325E+00
		209.25	3.89	3.466E+006		1.092E+005	1.648E+00
		214.85	0.76	1.405E+007		-3.675E+005	6.581E+00
		270.24	3.46	3.727E+006		2.179E+006	1.743E+00
		328.00	2.95	5.256E+006		1.207E+006	2.456E+00
		338.32	11.27	1.593E+006		2.577E+005	7.499E+00
		409.46	1.92	9.406E+006		-1.359E+007	4.369E+00
		463.00	4.40	4.359E+006		-1.408E+006	2.014E+00
		562.50	0.87	2.718E+007		-9.644E+006	1.257E+00
		674.75	2.10	1.323E+007		2.009E+006	6.107E+00
		726.86	0.62	4.945E+007		8.864E+006	2.288E+00
		755.32	1.00	3.289E+007		1.716E+007	1.526E+00
		772.29	1.49	2.345E+007		1.630E+006	1.091E+00
		794.95	4.25	6.950E+006		-3.167E+006	3.182E+00
		830.49	0.54	5.758E+007		-1.126E+007	2.639E+00
		835.71	1.61	2.088E+007		-1.793E+006	9.633E+00
		840.38	0.91	3.784E+007		-1.063E+006	1.748E+00
		904.20	0.77	4.687E+007		-1.466E+007	2.162E+00
		911.20	25.80	1.513E+006		8.322E+005	7.018E+00
		964.77	4.99	9.544E+006		7.508E+006	4.475E+00
		968.97	15.80	3.007E+006		2.806E+006	1.410E+00
		1247.08	0.50	9.164E+007		1.877E+006	4.213E+00
		1459.14	0.83	1.098E+008		2.341E+008	5.237E+00
		1495.91	0.86	3.734E+007		-2.238E+007	1.616E+00
		1588.20	3.22	1.308E+007		9.962E+006	5.833E+00
		1630.63	1.51	2.296E+007		-1.644E+007	9.937E+00
	TH-230	67.67	0.38	1.409E+001	1.41E+001	-2.503E+000	6.769E+00
	PA-234	742.81	0.11	1.100E+002	1.65E+001	6.219E+001	5.108E+00
		766.42	0.32	4.043E+001		1.861E+001	1.887E+00
		1001.03	0.84	1.654E+001		1.224E+001	7.621E+00
	TH-234	63.29	3.70	1.474E+000	1.47E+000	6.426E-001	7.061E-00
		92.38	2.13	2.877E+000		5.591E+000	1.398E+00
		92.80	2.10	2.818E+000		8.178E-001	1.368E+00
		112.81	0.21	1.891E+001		-3.695E+001	9.052E+00
+	U-234	53.20*	0.12	5.249E+001	5.25E+001	8.550E+001	2.505E+00
		120.90	0.04	1.230E+002		1.489E+001	5.907E+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	1.213E+000	3.61E-001	1.726E+000	5.814E-00
		93.35*	5.54	7.151E-001		1.762E+000	3.420E-00
		104.82	0.69	6.795E+000		3.611E+000	3.274E+00
		105.60	1.31	3.509E+000		-4.966E+000	1.690E+00
		108.58	0.50	9.818E+000		4.136E+000	4.740E+00
		109.19	1.66	2.826E+000		-1.096E+000	1.362E+00
		143.76*	10.96	3.614E-001		1.831E+000	1.724E-00
		163.36*	5.08	7.605E-001		1.590E+000	3.611E-00
		194.94*	0.63	3.437E+000		2.568E+000	1.543E+00
		202.12	1.08	5.401E+000		-7.773E-002	2.596E+00
		205.32*	5.02	7.638E-001		1.864E+000	3.590E-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	^	6.26E+000	19.971			
Pb-212	74.8		1.39E+000	45.434	24.453[249.22]	17.60	-3.166
	89.8		4.06E+000	62.061	71.597[252.78]		[3.577]
	238.6	^	5.67E-002	245.04	1.000[346.54]		
Ra-226	83.8		4.86E+001	18.042	1.692[21.549]	3.44	-0.659
	186.2	^	2.87E+001	11.783	1.000[16.663]		[0.341]
U-234	53.2	^	8.55E+001	69.579			
U-235	90.0		1.73E+000	62.143	0.943[71.638]	-0.78	0.153
	93.3		1.76E+000	52.450	0.962[63.413]		[0.865]
	143.8	^	1.83E+000	35.641	1.000[50.404]		
	163.4		1.59E+000	18.222	0.868[40.029]		
	194.9		2.57E+000	58.880	1.402[68.826]		
	205.3		1.86E+000	85.139	1.018[92.298]		