
***** 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 9:31:16 AM

Sample Title : UNC-IMC-000312-S-P-5
Sample Description :
Sample Identification : IMC-000312-S-P-5
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 : 2.485E+002 grams

Sample Taken On : 4/28/2017 12:00:00 AM
Acquisition Started : 5/3/2017 1:47:42 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

***** 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-5

Peak Analysis Performed on: 7/6/2017 9:31:07 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	65.16	16.42	0.94	3.26E+002	97.60	9.80E+001
F	2	95-	108	103.18	25.93	0.56	6.70E+001	42.06	9.10E+001
F	3	207-	218	213.27	53.48	0.84	1.04E+002	64.70	6.60E+001
M	4	288-	314	291.29	73.00	0.71	7.82E+001	20.46	9.39E+001
m	5	288-	314	299.58	75.08	0.72	1.89E+002	27.81	1.36E+002
m	6	288-	314	308.80	77.39	0.72	4.60E+001	17.67	1.41E+002
F	7	329-	343	337.16	84.48	0.73	2.48E+002	31.71	1.90E+002
F	8	353-	364	359.48	90.07	0.70	9.55E+001	22.65	1.30E+002
F	9	365-	378	372.71	93.38	0.89	1.44E+002	88.41	1.31E+002
F	10	568-	580	574.47	143.87	0.92	3.11E+002	33.30	9.43E+001
F	11	646-	658	652.26	163.34	0.79	1.20E+002	23.04	7.64E+001
F	12	733-	751	741.98	185.79	0.93	1.42E+003	70.26	1.19E+002
F	13	813-	828	819.79	205.26	1.05	1.38E+002	63.28	3.80E+001
F	14	947-	958	953.93	238.83	0.40	4.14E+001	44.27	4.35E+001
F	15	5824-	5849	5837.09	1460.81	2.97	1.39E+002	24.42	1.30E+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-5
 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	1.000	1460.82*	10.66	9.24913E+000	1.75806E+000
Pb-212	0.905	74.82*	10.28	1.66201E+000	3.31648E-001
		77.11*	17.10	2.38187E-001	9.67256E-002
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	5.34347E+000	1.42856E+000
		115.18	0.60		
		238.63*	43.60	1.17527E-001	1.26223E-001
		300.09	3.30		
Ra-226	0.889	81.07	0.20		
		83.79*	0.32	6.44179E+001	1.16447E+001
		186.21*	3.64	3.90530E+001	4.56619E+000
U-234	0.990	53.20*	0.12	1.16567E+002	7.48786E+001
		120.90	0.04		
U-235	0.999	89.96*	3.43	2.27446E+000	6.12409E-001
		93.35*	5.54	2.10473E+000	1.31559E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	2.41906E+000	3.63327E-001
		163.36*	5.08	2.15910E+000	4.73735E-001
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	2.98467E+000	1.39969E+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	1.000	9.249126E+000	1.758063E+000
Pb-212	0.905	2.712546E-001	7.430560E-002
Ra-226	0.889	4.243340E+001	4.251049E+000
U-234	0.990	1.165673E+002	7.487857E+001
U-235	0.999	2.308627E+000	2.488312E-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 9:31:07 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	16.42	1.8118E-001	29.93		
F 2	25.93	3.7215E-002	62.79		
M 4	73.00	4.3427E-002	26.18		

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-5
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	1.413E+000	1.41E+000	9.249E+000	6.164E-00
	Pb-210	46.54	4.25	2.642E+000	2.64E+000	3.573E+000	1.263E+00
	BI-212	727.33	6.67	2.261E+000	2.26E+000	3.449E-001	1.053E+00
		785.37	1.10	1.355E+001		3.097E+000	6.270E+00
		1078.62	0.56	3.251E+001		-1.604E+001	1.494E+00
		1620.50	1.47	9.946E+000		2.589E+000	4.258E+00
+	Pb-212	74.82*	10.28	5.022E-001	1.05E-001	1.662E+000	2.392E-00
		77.11*	17.10	2.993E-001		2.382E-001	1.427E-00
		86.83	2.07	3.721E+000		1.401E+000	1.806E+00
		87.35	3.97	1.597E+000		7.288E-001	7.706E-00
		89.78*	1.46	3.787E+000		5.343E+000	1.818E+00
		115.18	0.60	9.227E+000		4.591E+000	4.432E+00
		238.63*	43.60	1.051E-001		1.175E-001	4.870E-00
		300.09	3.30	2.129E+000		3.287E-001	1.001E+00
	BI-214	76.86	0.55	1.612E+001	3.07E-001	3.400E+001	7.840E+00
		79.29	0.91	7.247E+000		-5.916E-001	3.494E+00
		609.32	45.49	3.072E-001		8.698E-002	1.440E-00
		665.45	1.53	8.772E+000		2.530E+000	4.075E+00
		768.36	4.89	2.768E+000		-5.773E-001	1.273E+00
		806.18	1.26	1.323E+001		8.870E+000	6.164E+00
		934.06	3.11	5.470E+000		6.687E-001	2.525E+00
		1120.29	14.92	1.347E+000		1.655E-002	6.222E-00
		1155.21	1.63	1.000E+001		-8.293E+000	4.520E+00
		1238.11	5.83	3.574E+000		1.422E+000	1.644E+00
		1280.98	1.43	1.497E+001		5.958E+000	6.887E+00
		1377.67	3.99	4.689E+000		1.755E+000	2.116E+00
		1385.31	0.79	1.962E+001		-1.555E+001	8.655E+00
		1401.52	1.33	1.359E+001		-2.856E-002	6.097E+00
		1407.99	2.39	7.446E+000		-1.370E+000	3.335E+00
		1509.21	2.13	7.493E+000		-7.417E-001	3.283E+00
		1583.20	0.70	2.422E+001		-1.858E+000	1.065E+00
		1661.27	1.05	1.617E+001		6.601E+000	7.060E+00
		1729.59	2.88	4.773E+000		-5.585E-001	1.999E+00
		1764.49	15.30	1.373E+000		8.617E-001	6.123E-00
		1847.43	2.03	7.217E+000		5.630E-001	3.023E+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	1.632E+000	2.26E-001	2.359E+000	7.947E-00
		77.11	9.70	8.882E-001		2.133E-002	4.317E-00
		86.83	1.70	4.530E+000		1.706E+000	2.199E+00
		87.35	2.24	2.831E+000		1.292E+000	1.366E+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	8.228E+000	2.26E-001	1.217E+001	3.979E+00
		241.99	7.25	9.635E-001		-5.400E-002	4.584E-00
		258.76	0.53	9.519E+000		-8.278E+000	4.419E+00
		295.22	18.42	3.916E-001		1.332E-001	1.846E-00
		351.93	35.60	2.264E-001		4.624E-002	1.062E-00
		785.96	1.06	1.410E+001		4.638E+000	6.523E+00
		839.07	0.58	2.299E+001		-3.217E-001	1.048E+00
+	Ra-226	81.07	0.20	3.189E+001	1.88E+000	7.591E+000	1.535E+00
		83.79*	0.32	2.275E+001		6.442E+001	1.102E+00
		186.21*	3.64	1.883E+000		3.905E+001	9.043E-00
	AC-228	89.96	1.90	1.342E+007	2.63E+006	1.911E+007	6.498E+00
		93.35	3.10	8.398E+006		-1.257E+007	4.070E+00
		99.51	1.26	1.349E+007		-1.762E+007	6.432E+00
		105.60	0.74	2.818E+007		-3.266E+007	1.356E+00
		129.07	2.42	7.661E+006		-6.918E+005	3.664E+00
		153.98	0.72	2.501E+007		-3.841E+006	1.190E+00
		209.25	3.89	5.546E+006		1.544E+005	2.634E+00
		214.85	0.76	2.430E+007		7.612E+006	1.142E+00
		270.24	3.46	6.425E+006		-2.201E+006	3.014E+00
		328.00	2.95	8.787E+006		-1.258E+006	4.110E+00
		338.32	11.27	2.628E+006		1.020E+006	1.237E+00
		409.46	1.92	1.738E+007		9.479E+006	8.142E+00
		463.00	4.40	7.826E+006		-3.063E+006	3.640E+00
		562.50	0.87	5.018E+007		-1.716E+007	2.340E+00
		674.75	2.10	2.283E+007		1.472E+007	1.058E+00
		726.86	0.62	8.784E+007		1.912E+007	4.088E+00
		755.32	1.00	5.426E+007		3.884E+007	2.518E+00
		772.29	1.49	3.291E+007		-7.927E+006	1.512E+00
		794.95	4.25	1.270E+007		-9.455E+006	5.869E+00
		830.49	0.54	9.812E+007		8.351E+005	4.510E+00
		835.71	1.61	2.821E+007		-4.127E+007	1.277E+00
		840.38	0.91	5.503E+007		9.142E+006	2.514E+00
		904.20	0.77	8.964E+007		-2.782E+007	4.183E+00
		911.20	25.80	2.769E+006		-3.088E+005	1.294E+00
		964.77	4.99	1.368E+007		6.442E+006	6.352E+00
		968.97	15.80	4.230E+006		1.698E+006	1.960E+00
		1247.08	0.50	1.211E+008		-9.119E+007	5.444E+00
		1459.14	0.83	2.022E+008		5.474E+008	9.692E+00
		1495.91	0.86	5.765E+007		-8.848E+006	2.468E+00
		1588.20	3.22	2.158E+007		6.229E+006	9.622E+00
		1630.63	1.51	3.545E+007		-1.083E+007	1.518E+00
	TH-230	67.67	0.38	1.772E+001	1.77E+001	-1.178E+000	8.504E+00
	PA-234	742.81	0.11	1.294E+002	2.28E+001	-4.743E+001	5.974E+00
		766.42	0.32	4.395E+001		1.805E+001	2.026E+00
		1001.03	0.84	2.282E+001		1.672E+001	1.059E+00
	TH-234	63.29	3.70	1.860E+000	1.86E+000	-5.564E-001	8.908E-00
		92.38	2.13	3.765E+000		8.294E+000	1.831E+00
		92.80	2.10	3.590E+000		-1.619E+000	1.743E+00
		112.81	0.21	2.556E+001		-4.266E+001	1.227E+00
+	U-234	53.20*	0.12	5.500E+001	5.50E+001	1.166E+002	2.598E+00
		120.90	0.04	1.584E+002		3.042E+001	7.610E+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	1.612E+000	4.24E-001	2.274E+000	7.738E-00
		93.35*	5.54	1.041E+000		2.105E+000	5.007E-00
		104.82	0.69	8.363E+000		5.850E+000	4.025E+00
		105.60	1.31	4.372E+000		-5.067E+000	2.104E+00
		108.58	0.50	1.201E+001		-1.719E+000	5.789E+00
		109.19	1.66	3.568E+000		9.799E-001	1.719E+00
		143.76*	10.96	4.239E-001		2.419E+000	2.014E-00
		163.36*	5.08	8.873E-001		2.159E+000	4.193E-00
		194.94	0.63	8.481E+000		3.190E+000	4.018E+00
		202.12	1.08	7.000E+000		-3.956E-001	3.366E+00
		205.32*	5.02	8.155E-001		2.985E+000	3.786E-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-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	^	9.25E+000	19.008			
Pb-212	74.8		1.66E+000	19.955	14.141[109.23]	10.21	-1.789
	77.1		2.38E-001	40.609	2.027[114.82]		[1.489]
	89.8		5.34E+000	26.735	45.466[110.67]		
	238.6	^	1.18E-001	107.39	1.000[151.88]		
Ra-226	83.8		6.44E+001	18.077	1.649[21.529]	3.28	-0.627
	186.2	^	3.91E+001	11.692	1.000[16.535]		[0.340]
U-234	53.2	^	1.17E+002	64.236			
U-235	90.0		2.27E+000	26.925	0.940[30.831]	-0.71	0.138
	93.3		2.10E+000	62.506	0.870[64.285]		[0.544]
	143.8	^	2.42E+000	15.019	1.000[21.241]		
	163.4		2.16E+000	21.941	0.893[26.590]		
	205.3		2.98E+000	46.896	1.234[49.242]		