
***** 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-2165\W3H-IMC-216

Report Generated On : 7/6/2017 9:39:46 AM

Sample Title : W3H-IMC-2165-S-P-8
Sample Description :
Sample Identification : IMC-2165-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 : 3.032E+002 grams

Sample Taken On : 5/1/2017 12:00:00 AM
Acquisition Started : 5/15/2017 10:36:36 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: W3H-IMC-2165-S-P-8

Peak Analysis Performed on: 7/6/2017 9:39:42 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	181-	192	186.03	46.66	0.56	4.30E+001	49.11	8.60E+001
F	2	209-	217	213.88	53.63	0.45	7.27E+001	84.61	6.45E+001
M	3	281-	313	291.10	72.96	0.80	9.41E+001	47.20	1.54E+002
m	4	281-	313	299.48	75.05	0.81	1.85E+002	83.71	1.51E+002
m	5	281-	313	308.32	77.27	0.82	9.77E+001	47.03	1.49E+002
F	6	331-	342	337.27	84.51	0.78	2.12E+002	28.90	1.26E+002
F	7	356-	365	359.47	90.07	0.70	6.36E+001	19.93	1.13E+002
F	8	429-	441	437.03	109.47	0.25	5.69E+001	4.19	1.02E+002
F	9	569-	581	574.45	143.86	0.85	2.75E+002	32.04	9.91E+001
F	10	641-	657	652.87	163.49	0.82	1.10E+002	67.72	1.04E+002
F	11	735-	749	741.75	185.73	0.91	1.14E+003	63.60	8.81E+001
F	12	813-	828	819.78	205.26	0.85	8.28E+001	19.97	7.00E+001
F	13	948-	957	952.74	238.53	0.68	9.89E+001	51.41	4.88E+001
F	14	1174-	1184	1179.22	295.20	0.74	4.69E+001	15.55	2.42E+001
F	15	1397-	1412	1404.79	351.65	1.27	6.02E+001	55.03	2.88E+001
F	16	5822-	5847	5834.81	1460.24	2.70	1.48E+002	24.37	4.33E+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-2165-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	0.947	1460.82*	10.66	8.03372E+000	1.45087E+000
Pb-210	0.998	46.54*	4.25	1.49967E+000	1.74973E+000
Pb-212	0.997	74.82*	10.28	1.33486E+000	6.30086E-001
		77.11*	17.10	4.14500E-001	2.07074E-001
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	2.91531E+000	9.82352E-001
		115.18	0.60		
		238.63*	43.60	2.29813E-001	1.21701E-001
		300.09	3.30		
PB-214	0.847	74.82*	5.80	2.36593E+000	1.13666E+000
		77.11*	9.70	7.30716E-001	3.70928E-001
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	5.19067E+000	1.80605E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	3.18159E-001	1.09234E-001
		351.93*	35.60	2.53113E-001	2.32471E-001
		785.96	1.06		
		839.07	0.58		
Ra-226	0.881	81.07	0.20		
		83.79*	0.32	4.50470E+001	8.42430E+000
		186.21*	3.64	2.57531E+001	3.08155E+000
U-234	0.977	53.20*	0.12	6.65721E+001	7.81435E+001
		120.90	0.04		
U-235	0.741	89.96*	3.43	1.24090E+000	4.20016E-001
		93.35	5.54		
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19*	1.66	2.23062E+000	4.46733E-001
		143.76*	10.96	1.75323E+000	2.75375E-001
		163.36*	5.08	1.63035E+000	1.01466E+000
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	1.46352E+000	3.84927E-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	0.947	8.033725E+000	1.450870E+000
Pb-210	0.998	1.499674E+000	1.749732E+000
Pb-212	0.997	2.393438E-001	1.039781E-001
PB-214	0.847	3.099925E-001	9.599547E-002
Ra-226	0.881	2.803003E+001	2.894011E+000
U-234	0.977	6.657212E+001	7.814350E+001
U-235	0.741	1.745929E+000	1.597593E-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 9:39:42 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 3	72.96	5.2295E-002	50.15		

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-2165-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	7.306E-001	7.31E-001	8.034E+000	2.916E-00
+	Pb-210	46.54*	4.25	1.938E+000	1.94E+000	1.500E+000	9.220E-00
	BI-212	727.33	6.67	1.768E+000	1.77E+000	4.946E-001	8.201E-00
		785.37	1.10	1.168E+001		-8.752E-002	5.427E+00
		1078.62	0.56	2.521E+001		-1.146E+001	1.153E+00
		1620.50	1.47	7.854E+000		-5.998E+000	3.341E+00
+	Pb-212	74.82*	10.28	4.326E-001	8.64E-002	1.335E+000	2.065E-00
		77.11*	17.10	2.526E-001		4.145E-001	1.206E-00
		86.83	2.07	3.069E+000		-2.024E-001	1.490E+00
		87.35	3.97	1.375E+000		-1.052E-001	6.644E-00
		89.78*	1.46	2.747E+000		2.915E+000	1.312E+00
		115.18	0.60	7.580E+000		-2.009E+000	3.642E+00
		238.63*	43.60	8.636E-002		2.298E-001	4.004E-00
		300.09	3.30	1.886E+000		-2.255E+000	8.908E-00
	BI-214	76.86	0.55	1.420E+001	3.12E-001	-1.782E-001	6.919E+00
		79.29	0.91	6.550E+000		4.718E-001	3.169E+00
		609.32	45.49	3.124E-001		3.928E-001	1.483E-00
		665.45	1.53	7.689E+000		-1.925E+000	3.589E+00
		768.36	4.89	2.757E+000		1.820E+000	1.287E+00
		806.18	1.26	1.139E+001		2.208E+000	5.325E+00
		934.06	3.11	4.847E+000		2.129E+000	2.252E+00
		1120.29	14.92	1.256E+000		5.095E-001	5.858E-00
		1155.21	1.63	9.658E+000		3.089E-001	4.436E+00
		1238.11	5.83	3.075E+000		2.278E+000	1.421E+00
		1280.98	1.43	1.065E+001		-3.255E+000	4.834E+00
		1377.67	3.99	4.130E+000		5.845E-001	1.878E+00
		1385.31	0.79	2.030E+001		4.158E+000	9.206E+00
		1401.52	1.33	1.113E+001		3.113E+000	4.997E+00
		1407.99	2.39	6.624E+000		1.802E+000	2.994E+00
		1509.21	2.13	6.449E+000		4.255E+000	2.845E+00
		1583.20	0.70	2.255E+001		2.948E-001	1.008E+00
		1661.27	1.05	1.083E+001		3.949E+000	4.575E+00
		1729.59	2.88	3.077E+000		-2.253E+000	1.221E+00
		1764.49	15.30	1.147E+000		4.228E-001	5.127E-00
		1847.43	2.03	6.682E+000		2.893E+000	2.861E+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	7.667E-001	1.31E-001	2.366E+000	3.660E-00
		77.11*	9.70	4.454E-001		7.307E-001	2.126E-00
		86.83	1.70	3.737E+000		-2.464E-001	1.814E+00
		87.35	2.24	2.437E+000		-1.865E-001	1.178E+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	4.892E+000	1.31E-001	5.191E+000	2.335E+00
		241.99	7.25	1.074E+000		-6.657E-001	5.179E-00
		258.76	0.53	1.039E+001		-8.249E-002	4.916E+00
		295.22*	18.42	1.774E-001		3.182E-001	7.951E-00
		351.93*	35.60	1.312E-001		2.531E-001	5.989E-00
		785.96	1.06	1.206E+001		7.512E-001	5.597E+00
		839.07	0.58	2.250E+001		1.230E+000	1.042E+00
+	Ra-226	81.07	0.20	2.529E+001	1.24E+000	1.759E+001	1.216E+00
		83.79*	0.32	1.420E+001		4.505E+001	6.811E+00
		186.21*	3.64	1.239E+000		2.575E+001	5.891E-00
	AC-228	89.96	1.90	2.902E+017	5.93E+016	-5.883E+017	1.406E+01
		93.35	3.10	1.872E+017		2.437E+017	9.088E+01
		99.51	1.26	3.237E+017		-1.849E+017	1.552E+01
		105.60	0.74	6.108E+017		9.050E+016	2.941E+01
		129.07	2.42	1.741E+017		-9.871E+015	8.351E+01
		153.98	0.72	6.274E+017		2.621E+016	3.008E+01
		209.25	3.89	1.259E+017		2.588E+016	5.998E+01
		214.85	0.76	5.705E+017		-4.758E+016	2.696E+01
		270.24	3.46	1.432E+017		-2.512E+016	6.734E+01
		328.00	2.95	1.941E+017		-9.872E+016	9.100E+01
		338.32	11.27	6.302E+016		5.095E+016	2.987E+01
		409.46	1.92	4.036E+017		-3.204E+017	1.900E+01
		463.00	4.40	1.993E+017		1.545E+017	9.380E+01
		562.50	0.87	1.074E+018		1.335E+017	5.009E+01
		674.75	2.10	5.248E+017		-2.771E+017	2.445E+01
		726.86	0.62	1.836E+018		1.107E+018	8.531E+01
		755.32	1.00	1.152E+018		-1.017E+017	5.340E+01
		772.29	1.49	8.589E+017		4.726E+017	4.008E+01
		794.95	4.25	2.936E+017		5.454E+015	1.365E+01
		830.49	0.54	2.347E+018		2.592E+018	1.089E+01
		835.71	1.61	7.513E+017		-2.517E+017	3.471E+01
		840.38	0.91	1.336E+018		-7.210E+017	6.173E+01
		904.20	0.77	1.905E+018		-6.428E+017	8.883E+01
		911.20	25.80	5.926E+016		-1.779E+016	2.770E+01
		964.77	4.99	3.328E+017		1.117E+017	1.559E+01
		968.97	15.80	1.028E+017		5.184E+016	4.810E+01
		1247.08	0.50	3.167E+018		-1.265E+017	1.453E+01
		1459.14	0.83	4.200E+018		9.747E+018	2.010E+01
		1495.91	0.86	1.142E+018		-8.084E+017	4.822E+01
		1588.20	3.22	4.707E+017		-6.666E+016	2.104E+01
		1630.63	1.51	8.823E+017		6.852E+017	3.866E+01
	TH-230	67.67	0.38	1.498E+001	1.50E+001	3.862E+000	7.199E+00
	PA-234	742.81	0.11	1.100E+002	1.81E+001	6.013E+000	5.092E+00
		766.42	0.32	4.217E+001		2.320E+001	1.968E+00
	TH-234	1001.03	0.84	1.807E+001	1.50E+000	-6.042E+000	8.360E+00
		63.29	3.70	1.499E+000		-1.051E+000	7.174E-00
		92.38	2.13	3.114E+000		4.932E+000	1.515E+00
		92.80	2.10	3.014E+000		4.248E+000	1.464E+00
	U-234	112.81	0.21	2.151E+001	4.07E+001	1.334E+001	1.034E+00
		53.20*	0.12	4.072E+001		6.657E+001	1.912E+00
		120.90	0.04	1.367E+002		3.034E+001	6.581E+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	1.169E+000	3.56E-001	1.241E+000	5.583E-00
		93.35	5.54	1.102E+000		1.434E+000	5.349E-00
		104.82	0.69	6.765E+000		-3.481E-001	3.254E+00
		105.60	1.31	3.629E+000		5.377E-001	1.747E+00
		108.58	0.50	1.011E+001		5.397E+000	4.878E+00
		109.19*	1.66	2.421E+000		2.231E+000	1.157E+00
		143.76*	10.96	3.558E-001		1.753E+000	1.693E-00
		163.36*	5.08	9.161E-001		1.630E+000	4.381E-00
		194.94	0.63	7.414E+000		2.817E+000	3.524E+00
		202.12	1.08	5.473E+000		1.500E+000	2.627E+00
		205.32*	5.02	8.900E-001		1.464E+000	4.211E-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-2165\W3H-IMC-216

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	^	8.03E+000	18.060			
Pb-210	46.5	^	1.50E+000	116.67			
Pb-212	74.8		1.33E+000	47.202	5.808[70.940]	7.69	-1.368
	77.1		4.14E-001	49.958	1.804[72.802]		[0.774]
	89.8		2.92E+000	33.696	12.686[62.768]		
	238.6	^	2.30E-001	52.957	1.000[74.892]		
PB-214	74.8		2.37E+000	48.043	9.347[103.65]	8.19	-1.386
	77.1		7.31E-001	50.762	2.887[104.94]		[0.714]
	89.8		5.19E+000	34.794	20.507[98.215]		
	295.2		3.18E-001	34.333	1.257[98.052]		
	351.9	^	2.53E-001	91.845	1.000[129.88]		
Ra-226	83.8		4.50E+001	18.701	1.749[22.202]	3.66	-0.700
	186.2	^	2.58E+001	11.966	1.000[16.922]		[0.350]
U-234	53.2	^	6.66E+001	117.38			
U-235	90.0		1.24E+000	33.848	0.708[37.315]	0.76	-0.159
	109.2		2.23E+000	20.027	1.272[25.452]		[0.505]
	143.8	^	1.75E+000	15.707	1.000[22.213]		
	163.4		1.63E+000	62.235	0.930[64.187]		
	205.3		1.46E+000	26.301	0.835[30.634]		