
***** 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 9:36:40 AM

Sample Title : W3H-IMC-2165-S-P-3

Sample Description :

Sample Identification : IMC-2165-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 : 3.235E+002 grams

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

Acquisition Started : 5/12/2017 10:13:28 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: W3H-IMC-2165-S-P-3

Peak Analysis Performed on: 7/6/2017 9:36:36 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	98-	110	103.11	25.91	0.54	4.58E+001	56.60	9.75E+001
F	2	177-	194	186.71	46.83	0.57	8.04E+001	52.18	1.23E+002
F	3	209-	219	212.74	53.35	0.51	4.89E+001	17.97	8.25E+001
M	4	295-	315	299.44	75.04	0.60	1.52E+002	30.74	2.27E+002
m	5	295-	315	308.16	77.23	0.61	9.82E+001	24.68	1.95E+002
F	6	331-	343	337.70	84.62	0.84	2.09E+002	29.19	1.60E+002
F	7	355-	363	359.02	89.95	0.58	7.84E+001	22.48	1.13E+002
F	8	365-	382	373.59	93.60	0.62	1.60E+002	134.56	1.92E+002
F	9	431-	441	436.59	109.36	0.22	4.77E+001	72.82	8.98E+001
F	10	568-	579	574.42	143.86	0.73	2.06E+002	29.51	1.11E+002
F	11	645-	659	652.40	163.37	0.76	1.13E+002	73.66	1.09E+002
F	12	734-	749	741.68	185.71	0.93	9.62E+002	58.43	9.40E+001
F	13	813-	826	819.66	205.23	0.95	8.85E+001	20.41	6.30E+001
F	14	948-	960	952.72	238.52	0.85	1.76E+002	28.44	8.13E+001
F	15	1175-	1186	1179.18	295.20	1.08	4.56E+001	16.47	3.60E+001
F	16	1399-	1412	1404.75	351.64	1.13	7.11E+001	18.65	3.08E+001
F	17	2322-	2337	2328.61	582.83	1.39	4.58E+001	55.35	2.67E+001
F	18	2425-	2441	2432.48	608.83	1.57	5.11E+001	17.51	3.12E+001
F	19	3630-	3647	3639.21	910.80	1.85	4.95E+001	47.77	1.29E+001
F	20	5822-	5848	5834.99	1460.29	2.74	2.05E+002	28.78	4.50E+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-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	0.955	1460.82*	10.66	1.04640E+001	1.65567E+000
Pb-210	0.986	46.54*	4.25	2.60708E+000	1.79746E+000
Pb-212	0.997	74.82*	10.28	1.02894E+000	2.49822E-001
		77.11*	17.10	3.90801E-001	1.11124E-001
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	3.37372E+000	1.05252E+000
		115.18	0.60		
		238.63*	43.60	3.84380E-001	7.30849E-002
		300.09	3.30		
BI-214	0.208	76.86*	0.55	1.22618E+001	3.50403E+000
		79.29	0.91		
		609.32*	45.49	2.78380E-001	9.77161E-002
		665.45	1.53		
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.11	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1583.20	0.70		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
		2204.06	4.92		
		2447.70	1.55		
PB-214	0.847	74.82*	5.80	1.82371E+000	4.71898E-001
		77.11*	9.70	6.88938E-001	2.05484E-001
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	6.00687E+000	1.94503E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	2.89808E-001	1.07855E-001

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
PB-214	0.847	351.93*	35.60	2.80415E-001	7.72292E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.877	81.07	0.20		
		83.79*	0.32	4.16780E+001	7.88701E+000
		186.21*	3.64	2.02752E+001	2.47686E+000
U-234	0.997	53.20*	0.12	4.23152E+001	1.69270E+001
		120.90	0.04		
U-235	0.998	89.96*	3.43	1.43603E+000	4.50352E-001
		93.35*	5.54	1.79374E+000	1.52281E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19*	1.66	1.75116E+000	2.69391E+000
		143.76*	10.96	1.23278E+000	2.19033E-001
		163.36*	5.08	1.56166E+000	1.03211E+000
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	1.46460E+000	3.71362E-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	0.955	1.046396E+001	1.655672E+000
Pb-210	0.986	2.607084E+000	1.797462E+000
Pb-212	0.997	3.663189E-001	5.986343E-002
BI-214	0.208	2.748203E-001	9.767081E-002
PB-214	0.847	2.758325E-001	6.032641E-002
Ra-226	0.877	2.219656E+001	2.363071E+000
U-234	0.997	4.231519E+001	1.692701E+001
U-235	0.998	1.296065E+000	1.686934E-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 9:36:36 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	25.91	2.5420E-002	123.69		
F	17	582.83	2.5418E-002	120.98		
F	19	910.80	2.7519E-002	96.43		

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-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	7.015E-001	7.01E-001	1.046E+001	2.817E-00
+	Pb-210	46.54*	4.25	2.455E+000	2.45E+000	2.607E+000	1.183E+00
	BI-212	727.33	6.67	1.750E+000	1.75E+000	-6.181E-001	8.152E-00
		785.37	1.10	1.187E+001		3.076E+000	5.548E+00
		1078.62	0.56	2.497E+001		3.580E+000	1.148E+00
		1620.50	1.47	9.110E+000		1.542E+000	4.006E+00
+	Pb-212	74.82*	10.28	4.923E-001	1.11E-001	1.029E+000	2.370E-00
		77.11*	17.10	2.695E-001		3.908E-001	1.294E-00
		86.83	2.07	3.002E+000		1.159E+000	1.459E+00
		87.35	3.97	1.364E+000		6.025E-001	6.605E-00
		89.78*	1.46	2.489E+000		3.374E+000	1.186E+00
		115.18	0.60	7.003E+000		6.506E-001	3.363E+00
		238.63*	43.60	1.105E-001		3.844E-001	5.232E-00
		300.09	3.30	1.974E+000		2.561E-001	9.382E-00
+	BI-214	76.86*	0.55	8.457E+000	1.70E-001	1.226E+001	4.059E+00
		79.29	0.91	6.840E+000		-1.081E+000	3.320E+00
		609.32*	45.49	1.704E-001		2.784E-001	7.781E-00
		665.45	1.53	7.549E+000		-1.754E+000	3.536E+00
		768.36	4.89	2.741E+000		8.914E-001	1.285E+00
		806.18	1.26	8.517E+000		2.619E+000	3.912E+00
		934.06	3.11	4.395E+000		1.109E+000	2.036E+00
		1120.29	14.92	1.143E+000		3.613E-001	5.322E-00
		1155.21	1.63	1.080E+001		5.740E+000	5.032E+00
		1238.11	5.83	2.659E+000		2.125E-001	1.220E+00
		1280.98	1.43	1.161E+001		4.915E+000	5.349E+00
		1377.67	3.99	3.369E+000		1.795E+000	1.509E+00
		1385.31	0.79	1.733E+001		-9.798E+000	7.777E+00
		1401.52	1.33	1.025E+001		2.523E+000	4.593E+00
		1407.99	2.39	5.616E+000		3.646E+000	2.510E+00
		1509.21	2.13	4.950E+000		1.139E+000	2.119E+00
		1583.20	0.70	1.991E+001		-5.479E+000	8.836E+00
		1661.27	1.05	1.208E+001		2.360E+000	5.251E+00
		1729.59	2.88	5.173E+000		3.850E-001	2.289E+00
		1764.49	15.30	1.055E+000		6.619E-001	4.704E-00
		1847.43	2.03	6.896E+000		-1.331E-001	2.998E+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	8.725E-001	1.22E-001	1.824E+000	4.200E-00
		77.11*	9.70	4.751E-001		6.889E-001	2.281E-00
		86.83	1.70	3.655E+000		1.411E+000	1.777E+00
		87.35	2.24	2.418E+000		1.068E+000	1.171E+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	4.432E+000	1.22E-001	6.007E+000	2.112E+00
		241.99	7.25	1.166E+000		1.908E-001	5.652E-00
		258.76	0.53	9.782E+000		4.909E+000	4.629E+00
		295.22*	18.42	2.033E-001		2.898E-001	9.303E-00
		351.93*	35.60	1.222E-001		2.804E-001	5.577E-00
		785.96	1.06	1.235E+001		4.288E+000	5.772E+00
		839.07	0.58	2.053E+001		-1.108E+001	9.485E+00
+	Ra-226	81.07	0.20	2.556E+001	1.22E+000	5.719E+000	1.232E+00
		83.79*	0.32	1.533E+001		4.168E+001	7.394E+00
		186.21*	3.64	1.222E+000		2.028E+001	5.825E-00
	AC-228	89.96	1.90	8.381E+013	1.85E+013	1.559E+013	4.069E+01
		93.35	3.10	5.194E+013		-2.643E+013	2.523E+01
		99.51	1.26	8.978E+013		-1.853E+013	4.310E+01
		105.60	0.74	1.677E+014		-2.242E+013	8.080E+01
		129.07	2.42	4.965E+013		1.298E+013	2.387E+01
		153.98	0.72	1.790E+014		1.349E+014	8.604E+01
		209.25	3.89	3.746E+013		2.882E+012	1.793E+01
		214.85	0.76	1.628E+014		-3.676E+013	7.722E+01
		270.24	3.46	4.469E+013		1.500E+013	2.120E+01
		328.00	2.95	5.929E+013		1.505E+013	2.801E+01
		338.32	11.27	1.956E+013		2.898E+013	9.338E+01
		409.46	1.92	9.663E+013		-5.748E+013	4.515E+01
		463.00	4.40	5.261E+013		-6.506E+013	2.474E+01
		562.50	0.87	2.903E+014		-6.450E+013	1.355E+01
		674.75	2.10	1.333E+014		-3.807E+012	6.186E+01
		726.86	0.62	5.234E+014		-9.691E+013	2.442E+01
		755.32	1.00	3.268E+014		5.933E+011	1.521E+01
		772.29	1.49	2.478E+014		1.687E+014	1.162E+01
		794.95	4.25	7.496E+013		1.903E+013	3.471E+01
		830.49	0.54	6.033E+014		6.116E+013	2.789E+01
		835.71	1.61	2.125E+014		6.958E+013	9.859E+01
		840.38	0.91	3.586E+014		-8.344E+013	1.657E+01
		904.20	0.77	5.634E+014		-6.383E+014	2.645E+01
		911.20	25.80	1.854E+013		2.054E+013	8.752E+01
		964.77	4.99	9.525E+013		6.024E+013	4.481E+01
		968.97	15.80	3.069E+013		3.750E+013	1.445E+01
		1247.08	0.50	7.613E+014		-6.305E+013	3.457E+01
		1459.14	0.83	1.310E+015		3.655E+015	6.306E+01
		1495.91	0.86	3.191E+014		-1.339E+014	1.357E+01
		1588.20	3.22	1.309E+014		7.018E+013	5.876E+01
		1630.63	1.51	2.036E+014		-2.380E+013	8.717E+01
	TH-230	67.67	0.38	1.557E+001	1.56E+001	7.943E+000	7.514E+00
	PA-234	742.81	0.11	1.092E+002	1.72E+001	-1.570E+001	5.078E+00
		766.42	0.32	4.116E+001		-1.150E+001	1.926E+00
	TH-234	1001.03	0.84	1.723E+001	1.77E+000	2.627E-001	7.985E+00
		63.29	3.70	1.765E+000		1.007E+000	8.524E-00
		92.38	2.13	3.089E+000		7.876E+000	1.505E+00
		92.80	2.10	2.943E+000		3.552E-001	1.431E+00
+	U-234	112.81	0.21	1.944E+001	4.59E+001	5.914E+000	9.327E+00
		53.20*	0.12	4.590E+001		4.232E+001	2.178E+00
		120.90	0.04	1.284E+002		5.556E+001	6.182E+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	1.060E+000	3.44E-001	1.436E+000	5.050E-00
		93.35*	5.54	1.051E+000		1.794E+000	5.104E-00
		104.82	0.69	6.892E+000		8.973E+000	3.325E+00
		105.60	1.31	3.479E+000		-4.652E-001	1.677E+00
		108.58	0.50	9.421E+000		4.875E-001	4.546E+00
		109.19*	1.66	2.027E+000		1.751E+000	9.637E-00
		143.76*	10.96	3.439E-001		1.233E+000	1.638E-00
		163.36*	5.08	8.420E-001		1.562E+000	4.023E-00
		194.94	0.63	7.550E+000		-1.660E+000	3.604E+00
		202.12	1.08	5.413E+000		1.292E+000	2.604E+00
		205.32*	5.02	7.617E-001		1.465E+000	3.584E-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 ***

=====
 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	^	1.05E+001	15.823			
Pb-210	46.5	^	2.61E+000	68.945			
Pb-212	74.8		1.03E+000	24.280	2.677[30.839]	4.39	-0.785
	77.1		3.91E-001	28.435	1.017[34.206]		[0.300]
	89.8		3.37E+000	31.197	8.777[36.535]		
	238.6	^	3.84E-001	19.014	1.000[26.889]		
BI-214	76.9		1.23E+001	28.577	44.047[45.263]	11.72	-1.828
	609.3	^	2.78E-001	35.102	1.000[49.641]		[0.324]
PB-214	74.8		1.82E+000	25.876	6.504[37.790]	7.36	-1.256
	77.1		6.89E-001	29.826	2.457[40.597]		[0.266]
	89.8		6.01E+000	32.380	21.421[42.509]		
	295.2		2.90E-001	37.216	1.033[46.298]		
	351.9	^	2.80E-001	27.541	1.000[38.949]		
Ra-226	83.8		4.17E+001	18.924	2.056[22.524]	4.72	-0.902
	186.2	^	2.03E+001	12.216	1.000[17.276]		[0.355]
U-234	53.2	^	4.23E+001	40.002			
U-235	90.0		1.44E+000	31.361	1.165[36.044]	0.21	-0.020
	93.3		1.79E+000	84.896	1.455[86.735]		[0.548]
	109.2		1.75E+000	153.83	1.420[154.85]		
	143.8	^	1.23E+000	17.767	1.000[25.127]		
	163.4		1.56E+000	66.091	1.267[68.437]		
	205.3		1.46E+000	25.356	1.188[30.961]		