
 ***** 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 9:36:08 AM

Sample Title : W3H-IMC-2165-S-P-2

Sample Description :

Sample Identification : IMC-2165-S-P-2

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 : 2.737E+002 grams

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

Acquisition Started : 5/12/2017 9:25:02 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-2

Peak Analysis Performed on: 7/6/2017 9:36:04 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-	108	103.02	25.89	0.76	7.32E+001	72.09	6.33E+001
F	2	207-	218	213.10	53.44	0.63	7.17E+001	19.85	1.00E+002
M	3	284-	312	290.88	72.90	0.77	1.07E+002	45.74	1.50E+002
m	4	284-	312	299.78	75.13	0.78	2.44E+002	89.39	1.85E+002
m	5	284-	312	308.06	77.20	0.78	8.74E+001	35.84	1.83E+002
F	6	331-	344	337.13	84.47	0.78	2.54E+002	32.09	1.96E+002
F	7	356-	365	359.73	90.13	0.74	9.64E+001	22.20	1.17E+002
F	8	365-	378	372.83	93.41	0.79	1.29E+002	82.68	1.91E+002
F	9	568-	583	574.38	143.85	0.85	3.00E+002	33.86	1.46E+002
F	10	646-	659	652.09	163.29	0.84	1.22E+002	22.98	8.05E+001
F	11	736-	749	741.84	185.75	0.89	1.45E+003	71.72	8.40E+001
F	12	812-	827	820.13	205.34	0.89	1.14E+002	27.19	6.40E+001
M	13	946-	970	952.77	238.54	0.90	1.01E+002	21.66	5.00E+001
m	14	946-	970	966.70	242.02	0.90	2.02E+001	12.34	3.41E+001
F	15	1401-	1412	1405.43	351.81	0.87	4.71E+001	16.18	2.88E+001
F	16	5823-	5849	5835.95	1460.53	2.64	1.68E+002	26.12	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-2
 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	0.986	1460.82*	10.66	1.01209E+001	1.74051E+000
Pb-212	0.909	74.82*	10.28	1.94543E+000	7.60413E-001
		77.11*	17.10	4.11083E-001	1.77284E-001
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	4.89859E+000	1.27918E+000
		115.18	0.60		
		238.63*	43.60	2.59213E-001	6.15902E-002
		300.09	3.30		
PB-214	0.604	74.82*	5.80	3.44811E+000	1.38263E+000
		77.11*	9.70	7.24694E-001	3.19270E-001
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	8.72188E+000	2.39986E+000
		241.99*	7.25	3.16916E-001	1.96040E-001
		258.76	0.53		
		295.22	18.42		
		351.93*	35.60	2.19584E-001	7.76692E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.885	81.07	0.20		
		83.79*	0.32	5.99003E+001	1.07647E+001
		186.21*	3.64	3.60777E+001	4.22066E+000
U-234	0.993	53.20*	0.12	7.31663E+001	2.32759E+001
		120.90	0.04		
U-235	0.999	89.96*	3.43	2.08509E+000	5.48554E-001
		93.35*	5.54	1.71195E+000	1.11519E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	2.11831E+000	3.27067E-001
		163.36*	5.08	1.98883E+000	4.30737E-001
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	2.22386E+000	5.81474E-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	0.986	1.012088E+001	1.740511E+000
Pb-212	0.909	2.692442E-001	5.787192E-002
PB-214	0.604	2.406419E-001	7.042612E-002
Ra-226	0.885	3.925194E+001	3.929423E+000
U-234	0.993	7.316632E+001	2.327590E+001
U-235	0.999	2.054203E+000	2.118166E-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 9:36:04 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	25.89	4.0647E-002	98.53		
M	3	72.90	5.9559E-002	42.67		

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-2
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	8.292E-001	8.29E-001	1.012E+001	3.330E-00
	Pb-210	46.54	4.25	2.470E+000	2.47E+000	3.732E+000	1.183E+00
	BI-212	727.33	6.67	2.129E+000	2.13E+000	3.914E-001	9.937E-00
		785.37	1.10	1.355E+001		-1.769E+000	6.316E+00
		1078.62	0.56	2.588E+001		-1.171E+001	1.175E+00
		1620.50	1.47	9.030E+000		-7.867E+000	3.866E+00
+	Pb-212	74.82*	10.28	5.274E-001	9.17E-002	1.945E+000	2.529E-00
		77.11*	17.10	3.086E-001		4.111E-001	1.479E-00
		86.83	2.07	3.552E+000		-1.515E-001	1.727E+00
		87.35	3.97	1.557E+000		-7.878E-002	7.529E-00
		89.78*	1.46	3.085E+000		4.899E+000	1.474E+00
		115.18	0.60	8.197E+000		7.487E-001	3.934E+00
		238.63*	43.60	9.167E-002		2.592E-001	4.235E-00
		300.09	3.30	2.119E+000		-3.858E+000	1.002E+00
	BI-214	76.86	0.55	1.646E+001	2.92E-001	-7.404E-002	8.027E+00
		79.29	0.91	7.621E+000		-1.699E+000	3.692E+00
		609.32	45.49	2.924E-001		3.385E-002	1.375E-00
		665.45	1.53	8.809E+000		6.622E+000	4.122E+00
		768.36	4.89	3.033E+000		1.123E+000	1.415E+00
		806.18	1.26	1.128E+001		-9.958E-001	5.229E+00
		934.06	3.11	5.150E+000		-7.655E-001	2.384E+00
		1120.29	14.92	1.299E+000		2.554E-001	6.031E-00
		1155.21	1.63	1.136E+001		3.503E+000	5.245E+00
		1238.11	5.83	3.343E+000		1.202E+000	1.542E+00
		1280.98	1.43	1.130E+001		7.813E+000	5.105E+00
		1377.67	3.99	4.451E+000		-2.300E-001	2.018E+00
		1385.31	0.79	2.048E+001		5.726E+000	9.192E+00
		1401.52	1.33	1.121E+001		6.326E+000	4.975E+00
		1407.99	2.39	6.385E+000		2.820E+000	2.840E+00
		1509.21	2.13	7.468E+000		-1.813E+000	3.313E+00
		1583.20	0.70	2.252E+001		-4.572E+000	9.934E+00
		1661.27	1.05	1.620E+001		-1.309E+000	7.167E+00
		1729.59	2.88	4.895E+000		-6.761E-001	2.096E+00
		1764.49	15.30	1.340E+000		9.817E-001	6.024E-00
		1847.43	2.03	8.150E+000		2.871E+000	3.543E+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	9.348E-001	1.35E-001	3.448E+000	4.483E-00
		77.11*	9.70	5.440E-001		7.247E-001	2.608E-00
		86.83	1.70	4.325E+000		-1.844E-001	2.103E+00
		87.35	2.24	2.759E+000		-1.396E-001	1.334E+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	5.493E+000	1.35E-001	8.722E+000	2.624E+00
		241.99*	7.25	4.685E-001		3.169E-001	2.130E-00
		258.76	0.53	1.156E+001		-3.404E+000	5.472E+00
		295.22	18.42	4.048E-001		-1.818E-001	1.922E-00
		351.93*	35.60	1.347E-001		2.196E-001	6.105E-00
		785.96	1.06	1.450E+001		4.716E+000	6.773E+00
		839.07	0.58	2.449E+001		2.483E+000	1.132E+00
+	Ra-226	81.07	0.20	3.301E+001	1.31E+000	3.731E+001	1.597E+00
		83.79*	0.32	2.048E+001		5.990E+001	9.921E+00
		186.21*	3.64	1.314E+000		3.608E+001	6.232E-00
	AC-228	89.96	1.90	8.845E+013	1.81E+013	9.352E+013	4.291E+01
		93.35	3.10	5.660E+013		-5.058E+013	2.750E+01
		99.51	1.26	9.923E+013		-7.569E+013	4.768E+01
		105.60	0.74	1.813E+014		-2.423E+014	8.738E+01
		129.07	2.42	5.272E+013		8.671E+012	2.533E+01
		153.98	0.72	1.808E+014		-1.273E+014	8.664E+01
		209.25	3.89	3.962E+013		1.659E+013	1.895E+01
		214.85	0.76	1.489E+014		-6.848E+013	6.994E+01
		270.24	3.46	4.030E+013		-3.365E+012	1.892E+01
		328.00	2.95	6.398E+013		2.599E+012	3.023E+01
		338.32	11.27	1.833E+013		1.511E+013	8.689E+01
		409.46	1.92	1.200E+014		8.321E+012	5.657E+01
		463.00	4.40	4.888E+013		-3.912E+013	2.275E+01
		562.50	0.87	3.448E+014		1.334E+014	1.619E+01
		674.75	2.10	1.314E+014		-8.108E+013	6.051E+01
		726.86	0.62	5.648E+014		1.883E+014	2.635E+01
		755.32	1.00	3.335E+014		-6.210E+013	1.546E+01
		772.29	1.49	2.434E+014		5.133E+013	1.134E+01
		794.95	4.25	8.830E+013		2.069E+013	4.116E+01
		830.49	0.54	6.742E+014		-5.953E+013	3.126E+01
		835.71	1.61	2.331E+014		4.278E+013	1.083E+01
		840.38	0.91	3.975E+014		1.009E+014	1.841E+01
		904.20	0.77	5.437E+014		-4.830E+014	2.533E+01
		911.20	25.80	1.805E+013		2.082E+013	8.469E+01
		964.77	4.99	8.686E+013		-4.119E+013	4.040E+01
		968.97	15.80	2.919E+013		2.301E+013	1.363E+01
		1247.08	0.50	9.172E+014		4.030E+014	4.208E+01
		1459.14	0.83	1.280E+015		3.189E+015	6.140E+01
		1495.91	0.86	4.464E+014		9.703E+013	1.975E+01
		1588.20	3.22	1.338E+014		1.019E+014	5.964E+01
		1630.63	1.51	2.033E+014		-7.587E+012	8.587E+01
	TH-230	67.67	0.38	1.693E+001	1.69E+001	-1.165E+001	8.145E+00
	PA-234	742.81	0.11	1.208E+002	2.00E+001	1.546E+001	5.587E+00
		766.42	0.32	4.605E+001		1.499E+001	2.146E+00
		1001.03	0.84	2.002E+001		3.140E+000	9.261E+00
	TH-234	63.29	3.70	1.814E+000	1.81E+000	3.163E-001	8.714E-00
		92.38	2.13	3.644E+000		8.636E+000	1.775E+00
		92.80	2.10	3.564E+000		3.027E+000	1.734E+00
		112.81	0.21	2.427E+001		-1.902E+001	1.167E+00
	U-234	53.20*	0.12	6.091E+001	6.09E+001	7.317E+001	2.908E+00
		120.90	0.04	1.482E+002		-3.518E+001	7.127E+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	1.313E+000	5.06E-001	2.085E+000	6.274E-00
		93.35*	5.54	1.136E+000		1.712E+000	5.500E-00
		104.82	0.69	7.960E+000		6.118E+000	3.838E+00
		105.60	1.31	4.120E+000		-5.508E+000	1.986E+00
		108.58	0.50	1.178E+001		-3.097E+000	5.697E+00
		109.19	1.66	3.478E+000		-1.230E-001	1.680E+00
		143.76*	10.96	5.057E-001		2.118E+000	2.433E-00
		163.36*	5.08	8.442E-001		1.989E+000	4.000E-00
		194.94	0.63	8.427E+000		5.251E+000	4.011E+00
		202.12	1.08	6.538E+000		1.527E+000	3.148E+00
		205.32*	5.02	9.454E-001		2.224E+000	4.462E-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 ^	1.01E+001	17.197			
Pb-212	74.8	1.95E+000	39.087	7.505[45.742]	9.73	-1.753
	77.1	4.11E-001	43.126	1.586[49.238]		[0.385]
	89.8	4.90E+000	26.113	18.898[35.305]		
	238.6 ^	2.59E-001	23.760	1.000[33.602]		
PB-214	74.8	3.45E+000	40.098	15.703[53.469]	10.61	-1.806
	77.1	7.25E-001	44.056	3.300[56.498]		[0.369]
	89.8	8.72E+000	27.515	39.720[44.813]		
	242.0	3.17E-001	61.859	1.443[71.257]		
	351.9 ^	2.20E-001	35.371	1.000[50.022]		
Ra-226	83.8	5.99E+001	17.971	1.660[21.443]	3.32	-0.635
	186.2 ^	3.61E+001	11.699	1.000[16.545]		[0.339]
U-234	53.2 ^	7.32E+001	31.812			
U-235	90.0	2.09E+000	26.308	0.984[30.505]	-0.42	0.081
	93.3	1.71E+000	65.141	0.808[66.946]		[0.478]
	143.8 ^	2.12E+000	15.440	1.000[21.835]		
	163.4	1.99E+000	21.658	0.939[26.598]		
	205.3	2.22E+000	26.147	1.050[30.365]		