
***** 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 9:35:37 AM

Sample Title : W3H-IMC-2165-S-P-1

Sample Description :

Sample Identification : IMC-2165-S-P-1

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 : 3.095E+002 grams

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

Acquisition Started : 5/11/2017 9:15:31 AM

Live Time : 1800.0 seconds

Real Time : 1800.4 seconds

Dead Time : 0.02 %

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-1

Peak Analysis Performed on: 7/6/2017 9:35:33 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	208-	218	212.79	53.36	0.59	4.92E+001	17.23	7.70E+001
M	2	296-	314	299.48	75.05	0.69	1.61E+002	27.78	1.34E+002
m	3	296-	314	308.22	77.24	0.70	5.90E+001	20.25	1.79E+002
F	4	332-	345	336.92	84.42	0.78	2.05E+002	27.74	1.45E+002
F	5	355-	364	359.55	90.09	0.63	9.06E+001	22.15	1.02E+002
F	6	366-	378	373.07	93.47	0.80	1.61E+002	99.72	1.17E+002
F	7	570-	582	574.49	143.87	0.83	2.55E+002	31.70	1.22E+002
F	8	647-	659	652.21	163.32	0.89	1.25E+002	23.32	7.96E+001
F	9	735-	749	741.87	185.76	0.92	1.26E+003	66.51	8.06E+001
F	10	813-	827	820.63	205.47	0.69	7.52E+001	56.15	8.06E+001
F	11	948-	959	952.74	238.53	0.93	8.40E+001	20.81	5.85E+001
F	12	1173-	1185	1179.36	295.24	1.04	3.60E+001	34.25	2.86E+001
F	13	1400-	1411	1405.28	351.77	1.11	3.84E+001	15.11	2.76E+001
F	14	2427-	2440	2433.53	609.09	1.14	3.65E+001	14.49	1.98E+001
F	15	5824-	5848	5835.62	1460.44	2.71	1.53E+002	25.06	8.33E+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-1

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	0.977	1460.82*	10.66	8.16574E+000	1.46418E+000
Pb-212	0.997	74.82*	10.28	1.13768E+000	2.49070E-001
		77.11*	17.10	2.45229E-001	9.03361E-002
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	4.07091E+000	1.11473E+000
		115.18	0.60		
		238.63*	43.60	1.91337E-001	5.11663E-002
		300.09	3.30		
BI-214	0.321	76.86*	0.55	7.69434E+000	2.84282E+000
		79.29	0.91		
		609.32*	45.49	2.07926E-001	8.40646E-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	0.850	74.82*	5.80	2.01643E+000	4.76900E-001
		77.11*	9.70	4.32311E-001	1.63939E-001
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	7.24820E+000	2.08190E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	2.39437E-001	2.28537E-001
		351.93*	35.60	1.58479E-001	6.36825E-002

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
PB-214	0.850	785.96	1.06		
		839.07	0.58		
Ra-226	0.886	81.07	0.20		
		83.79*	0.32	4.27543E+001	7.95968E+000
		186.21*	3.64	2.77657E+001	3.28752E+000
U-234	0.997	53.20*	0.12	4.45601E+001	1.70921E+001
		120.90	0.04		
U-235	0.998	89.96*	3.43	1.73278E+000	4.77710E-001
		93.35*	5.54	1.88972E+000	1.19075E+000
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	1.59316E+000	2.59553E-001
		163.36*	5.08	1.80912E+000	3.87793E-001
		194.94	0.63		
		202.12	1.08		
		205.32*	5.02	1.30244E+000	9.82192E-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	0.977	8.165741E+000	1.464178E+000
Pb-212	0.997	2.059848E-001	4.446162E-002
BI-214	0.321	2.060406E-001	8.402638E-002
PB-214	0.850	1.761792E-001	5.782447E-002
Ra-226	0.886	2.994999E+001	3.038548E+000
U-234	0.997	4.456006E+001	1.709207E+001
U-235	0.998	1.642998E+000	1.882803E-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 9:35:33 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
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

***** 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-1
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	9.277E-001	9.28E-001	8.166E+000	3.917E-00
	Pb-210	46.54	4.25	2.172E+000	2.17E+000	1.770E+000	1.040E+00
	BI-212	727.33	6.67	1.643E+000	1.64E+000	4.615E-002	7.591E-00
		785.37	1.10	1.126E+001		-3.966E+000	5.224E+00
		1078.62	0.56	2.381E+001		2.916E-001	1.085E+00
		1620.50	1.47	9.975E+000		5.473E+000	4.414E+00
+	Pb-212	74.82*	10.28	4.003E-001	9.67E-002	1.138E+000	1.906E-00
		77.11*	17.10	2.703E-001		2.452E-001	1.295E-00
		86.83	2.07	3.014E+000		1.189E+000	1.464E+00
		87.35	3.97	1.363E+000		6.186E-001	6.590E-00
		89.78*	1.46	2.555E+000		4.071E+000	1.217E+00
		115.18	0.60	7.067E+000		-1.235E+000	3.388E+00
		238.63*	43.60	9.674E-002		1.913E-001	4.529E-00
		300.09	3.30	1.847E+000		-7.540E-002	8.727E-00
+	BI-214	76.86*	0.55	8.481E+000	1.38E-001	7.694E+000	4.064E+00
		79.29	0.91	6.333E+000		1.284E-001	3.062E+00
		609.32*	45.49	1.383E-001		2.079E-001	6.145E-00
		665.45	1.53	8.088E+000		5.105E+000	3.794E+00
		768.36	4.89	2.775E+000		6.007E-001	1.298E+00
		806.18	1.26	9.365E+000		-1.780E+000	4.320E+00
		934.06	3.11	4.308E+000		2.428E+000	1.986E+00
		1120.29	14.92	1.298E+000		9.736E-001	6.077E-00
		1155.21	1.63	1.014E+001		3.383E+000	4.686E+00
		1238.11	5.83	2.956E+000		1.063E+000	1.363E+00
		1280.98	1.43	1.189E+001		-5.315E-001	5.468E+00
		1377.67	3.99	3.522E+000		1.371E+000	1.577E+00
		1385.31	0.79	1.575E+001		-4.835E+000	6.949E+00
		1401.52	1.33	1.091E+001		3.049E+000	4.896E+00
		1407.99	2.39	6.188E+000		1.931E+000	2.783E+00
		1509.21	2.13	6.604E+000		-5.497E-001	2.930E+00
		1583.20	0.70	1.847E+001		-1.006E+001	8.062E+00
		1661.27	1.05	1.494E+001		6.731E+000	6.647E+00
		1729.59	2.88	5.161E+000		7.818E-001	2.270E+00
		1764.49	15.30	1.144E+000		6.191E-001	5.126E-00
		1847.43	2.03	5.795E+000		-7.581E+000	2.427E+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	7.096E-001	1.17E-001	2.016E+000	3.378E-00
		77.11*	9.70	4.765E-001		4.323E-001	2.283E-00
		86.83	1.70	3.670E+000		1.448E+000	1.782E+00
		87.35	2.24	2.416E+000		1.096E+000	1.168E+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	4.550E+000	1.17E-001	7.248E+000	2.167E+00
		241.99	7.25	9.709E-001		1.734E-002	4.667E-00
		258.76	0.53	9.756E+000		4.364E+000	4.605E+00
		295.22*	18.42	1.952E-001		2.394E-001	8.863E-00
		351.93*	35.60	1.169E-001		1.585E-001	5.285E-00
		785.96	1.06	1.122E+001		-1.478E+001	5.187E+00
		839.07	0.58	2.166E+001		6.587E+000	1.001E+00
+	Ra-226	81.07	0.20	2.426E+001	1.16E+000	1.993E+000	1.166E+00
		83.79*	0.32	1.564E+001		4.275E+001	7.540E+00
		186.21*	3.64	1.164E+000		2.777E+001	5.521E-00
	AC-228	89.96	1.90	4.998E+012	1.02E+012	3.656E+012	2.423E+01
		93.35	3.10	3.088E+012		4.749E+012	1.498E+01
		99.51	1.26	5.045E+012		-9.954E+011	2.410E+01
		105.60	0.74	1.068E+013		-3.396E+012	5.149E+01
		129.07	2.42	2.774E+012		1.113E+012	1.327E+01
		153.98	0.72	9.783E+012		-3.889E+012	4.675E+01
		209.25	3.89	2.133E+012		1.668E+011	1.016E+01
		214.85	0.76	9.184E+012		9.702E+011	4.330E+01
		270.24	3.46	2.588E+012		-1.812E+012	1.223E+01
		328.00	2.95	2.992E+012		-2.642E+012	1.394E+01
		338.32	11.27	1.019E+012		5.307E+011	4.819E+01
		409.46	1.92	6.606E+012		4.160E+012	3.105E+01
		463.00	4.40	3.353E+012		3.345E+012	1.578E+01
		562.50	0.87	1.968E+013		2.157E+013	9.231E+01
		674.75	2.10	8.894E+012		7.956E+011	4.146E+01
		726.86	0.62	2.911E+013		-1.215E+012	1.346E+01
		755.32	1.00	1.888E+013		-1.086E+013	8.735E+01
		772.29	1.49	1.455E+013		-4.689E+012	6.793E+01
		794.95	4.25	4.616E+012		-1.404E+012	2.134E+01
		830.49	0.54	3.712E+013		-2.105E+012	1.714E+01
		835.71	1.61	1.240E+013		-6.238E+012	5.722E+01
		840.38	0.91	2.289E+013		2.931E+012	1.059E+01
		904.20	0.77	3.015E+013		-2.658E+013	1.400E+01
		911.20	25.80	1.023E+012		1.208E+012	4.792E+01
		964.77	4.99	5.199E+012		3.695E+012	2.423E+01
		968.97	15.80	1.600E+012		-7.586E+011	7.439E+01
		1247.08	0.50	4.965E+013		-3.740E+013	2.263E+01
		1459.14	0.83	7.243E+013		1.782E+014	3.470E+01
		1495.91	0.86	2.535E+013		-1.189E+013	1.118E+01
		1588.20	3.22	8.065E+012		1.639E+012	3.612E+01
		1630.63	1.51	1.364E+013		-4.950E+012	5.902E+01
	TH-230	67.67	0.38	1.521E+001	1.52E+001	1.247E+001	7.318E+00
	PA-234	742.81	0.11	1.234E+002	1.74E+001	8.037E+001	5.774E+00
		766.42	0.32	4.246E+001		1.938E+001	1.985E+00
	TH-234	1001.03	0.84	1.738E+001	1.54E+000	6.102E-002	8.031E+00
		63.29	3.70	1.542E+000		-1.942E-002	7.395E-00
		92.38	2.13	3.084E+000		7.958E+000	1.501E+00
		92.80	2.10	2.949E+000		4.064E+000	1.432E+00
		112.81	0.21	2.017E+001		-3.755E+001	9.671E+00
+	U-234	53.20*	0.12	4.642E+001	4.64E+001	4.456E+001	2.198E+00
		120.90	0.04	1.226E+002		1.267E+001	5.880E+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	1.088E+000	3.85E-001	1.733E+000	5.180E-00
		93.35*	5.54	7.730E-001		1.890E+000	3.706E-00
		104.82	0.69	6.914E+000		3.504E+000	3.331E+00
		105.60	1.31	3.694E+000		-1.175E+000	1.781E+00
		108.58	0.50	1.040E+001		1.081E+001	5.030E+00
		109.19	1.66	3.033E+000		-4.158E-001	1.464E+00
		143.76*	10.96	3.847E-001		1.593E+000	1.839E-00
		163.36*	5.08	7.266E-001		1.809E+000	3.437E-00
		194.94	0.63	7.152E+000		3.190E+000	3.397E+00
		202.12	1.08	5.454E+000		1.588E+000	2.619E+00
		205.32*	5.02	9.144E-001		1.302E+000	4.338E-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	^	8.17E+000	17.931			
Pb-212	74.8		1.14E+000	21.893	5.946[34.560]	8.16	-1.456
	77.1		2.45E-001	36.837	1.282[45.520]		[0.398]
	89.8		4.07E+000	27.383	21.276[38.274]		
	238.6	^	1.91E-001	26.741	1.000[37.818]		
BI-214	76.9		7.69E+000	36.947	37.005[54.769]	11.18	-1.744
	609.3	^	2.08E-001	40.430	1.000[57.177]		[0.382]
PB-214	74.8		2.02E+000	23.651	12.724[46.627]	9.40	-1.571
	77.1		4.32E-001	37.922	2.728[55.252]		[0.398]
	89.8		7.25E+000	28.723	45.736[49.394]		
	295.2		2.39E-001	95.448	1.511[103.56]		
	351.9	^	1.58E-001	40.184	1.000[56.828]		
Ra-226	83.8		4.28E+001	18.617	1.540[22.063]	2.83	-0.541
	186.2	^	2.78E+001	11.840	1.000[16.745]		[0.347]
U-234	53.2	^	4.46E+001	38.357			
U-235	90.0		1.73E+000	27.569	1.088[32.023]	0.53	-0.097
	93.3		1.89E+000	63.012	1.186[65.084]		[0.598]
	143.8	^	1.59E+000	16.292	1.000[23.040]		
	163.4		1.81E+000	21.436	1.136[26.924]		
	205.3		1.30E+000	75.412	0.818[77.151]		