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\*\*\*\*\* G A M M A S P E C T R U M A N A L Y S I S \*\*\*\*\*  
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-2008\W6H-IMC-200

Report Generated On : 3/27/2017 11:37:59 AM

Sample Title : W6H-IMC-2008-S-P-3

Sample Description :

Sample Identification : 2008-S-P-4

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 : 2.566E+002 grams

Sample Taken On : 3/17/2017 12:00:00 AM

Acquisition Started : 3/27/2017 11:02:00 AM

Live Time : 1800.0 seconds

Real Time : 1800.3 seconds

Dead Time : 0.02 %

Energy Calibration Used Done On : 3/24/2017

Efficiency Calibration Used Done On : 3/27/2017

Efficiency ID : H-IMC-2008-S-P-4

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\*\*\*\*\* P E A K A N A L Y S I S R E P O R T \*\*\*\*\*  
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Detector Name: 8566

Sample Title: W6H-IMC-2008-S-P-3

Peak Analysis Performed on: 3/27/2017 11:37:52 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
M	1	296-	314	299.59	75.11	0.66	7.14E+001	21.81	7.04E+001
m	2	296-	314	308.68	77.39	0.67	7.96E+001	21.37	5.88E+001
F	3	733-	748	741.45	185.64	0.93	5.58E+001	18.45	5.20E+001
F	4	946-	958	952.54	238.45	1.00	7.88E+001	21.19	4.39E+001
F	5	5823-	5850	5836.53	1460.16	2.59	1.86E+002	25.36	6.22E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

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 \*\*\*\*\* 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 \*\*\*\*\*  
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Sample Title: W6H-IMC-2008-S-P-3  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 Full NLB.NL

..... IDENTIFIED NUCLIDES .....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.932	1460.82*	10.66	1.32398E+001	2.12980E+000
Pb-212	0.993	74.82*	10.28	7.75720E-001	2.83986E-001
		77.11*	17.10	5.05958E-001	1.69806E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	2.48839E-001	7.77051E-002
Ra-226	0.956	300.09	3.30		
		81.07	0.20		
		83.79	0.32		
		186.21*	3.64	1.72387E+000	6.40518E-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

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 \*\*\*\*\* 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 \*\*\*\*\*  
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Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.932	1.323983E+001	2.129800E+000
Pb-212	0.993	3.214789E-001	6.856777E-002
Ra-226	0.956	1.723867E+000	6.405183E-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: 3/27/2017 11:37:52 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
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All peaks were identified.

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\*\*\*\*\* N U C L I D E M D A R E P O R T \*\*\*\*\*  
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Detector Name: 8566  
Sample Geometry: cylinder  
Sample Title: W6H-IMC-2008-S-P-3  
Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 Full NLB.NL

	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	1.128E+000	1.13E+000	1.324E+001	4.676E-00
	CO-60	1173.23	99.85	2.135E-001	1.99E-001	-8.387E-002	9.814E-00
		1332.49	99.98	1.991E-001		8.435E-002	8.998E-00
	CS-137	661.66	85.10	1.728E-001	1.73E-001	8.667E-003	8.031E-00
	Pb-210	46.54	4.25	3.334E+000	3.33E+000	2.387E+000	1.587E+00
	BI-212	288.20	0.34	2.316E+001	2.43E+000	1.111E+001	1.092E+00
		328.03	0.13	6.853E+001		-2.480E+001	3.223E+00
		452.98	0.36	3.202E+001		8.428E+000	1.503E+00
		727.33	6.67	2.426E+000		4.696E-001	1.128E+00
		785.37	1.10	1.407E+001		-4.588E+000	6.483E+00
		893.41	0.38	4.597E+001		-2.629E+001	2.119E+00
		952.12	0.17	1.037E+002		2.692E+001	4.761E+00
		1078.62	0.56	3.510E+001		-3.222E+001	1.614E+00
		1512.70	0.29	6.351E+001		1.380E+001	2.810E+00
		1620.50	1.47	1.173E+001		4.023E+000	5.098E+00
+	Pb-212	74.82*	10.28	4.537E-001	1.20E-001	7.757E-001	2.121E-00
		77.11*	17.10	2.441E-001		5.060E-001	1.134E-00
		86.83	2.07	2.940E+000		2.296E+000	1.404E+00
		87.35	3.97	1.518E+000		2.637E-001	7.251E-00
		89.78	1.46	3.753E+000		-5.384E+000	1.785E+00
		115.18	0.60	7.070E+000		-1.247E+000	3.324E+00
		238.63*	43.60	1.201E-001		2.488E-001	5.578E-00
		300.09	3.30	2.424E+000		-1.379E+000	1.142E+00
	BI-214	76.86	0.55	1.622E+001	3.64E-001	3.689E+001	7.841E+00
		79.29	0.91	7.422E+000		2.564E+000	3.552E+00
		89.26	0.11	5.175E+001		9.408E+000	2.466E+00
		89.81	0.21	2.609E+001		-3.743E+001	1.241E+00
		273.80	0.13	6.256E+001		3.357E+001	2.962E+00
		348.92	0.10	9.294E+001		2.983E+001	4.387E+00
		386.78	0.29	3.079E+001		1.985E+001	1.437E+00
		388.89	0.40	2.175E+001		5.125E+000	1.012E+00
		405.72	0.17	6.136E+001		3.517E+001	2.881E+00
		454.79	0.29	3.853E+001		2.029E+000	1.805E+00
		469.77	0.13	8.756E+001		2.371E+001	4.099E+00
		609.32	45.49	3.636E-001		2.911E-002	1.713E-00
		665.45	1.53	9.340E+000		-1.363E+000	4.330E+00
		703.11	0.47	3.497E+001		1.427E+001	1.633E+00
		719.87	0.39	4.089E+001		-2.163E+001	1.902E+00
		752.85	0.13	1.253E+002		-8.467E+001	5.810E+00
		768.36	4.89	3.504E+000		-4.102E-001	1.630E+00
		786.35	0.32	4.944E+001		1.251E+001	2.282E+00
		806.18	1.26	1.339E+001		-2.877E+000	6.203E+00

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram)
BI-214	821.18	0.16	1.041E+002	3.64E-001	-4.220E+001	4.811E+00
	826.45	0.12	1.491E+002		-7.157E+001	6.914E+00
	934.06	3.11	5.926E+000		2.292E+000	2.736E+00
	964.08	0.37	5.183E+001		6.336E+000	2.393E+00
	1051.96	0.31	6.630E+001		4.151E+001	3.065E+00
	1069.96	0.27	6.999E+001		-4.980E+001	3.208E+00
	1120.29	14.92	1.531E+000		-1.448E+000	7.103E-00
	1133.66	0.25	9.030E+001		4.818E+001	4.184E+00
	1155.21	1.63	1.435E+001		1.004E+000	6.658E+00
	1207.68	0.45	5.256E+001		3.781E+001	2.434E+00
	1238.11	5.83	3.924E+000		1.758E+000	1.809E+00
	1280.98	1.43	1.378E+001		3.560E+000	6.246E+00
	1303.75	0.11	1.977E+002		-1.614E+001	9.010E+00
	1377.67	3.99	4.170E+000		-4.837E-001	1.839E+00
	1385.31	0.79	2.155E+001		-5.550E+000	9.535E+00
	1401.52	1.33	1.208E+001		-4.997E+000	5.293E+00
	1407.99	2.39	6.908E+000		-2.479E+000	3.038E+00
	1509.21	2.13	8.033E+000		-5.912E-001	3.520E+00
	1538.53	0.40	4.482E+001		1.298E+001	1.971E+00
	1543.34	0.30	6.451E+001		7.452E+000	2.870E+00
	1583.20	0.70	2.252E+001		1.734E+000	9.695E+00
	1594.75	0.27	7.534E+001		3.122E+001	3.351E+00
	1599.37	0.32	6.097E+001		1.325E+001	2.705E+00
	1661.27	1.05	1.582E+001		7.675E+000	6.812E+00
	1684.01	0.21	8.336E+001		3.177E+001	3.624E+00
	1729.59	2.88	6.163E+000		2.053E+000	2.667E+00
	1764.49	15.30	1.349E+000		9.011E-001	5.953E-00
	1838.36	0.35	3.761E+001		-2.293E+001	1.520E+00
	1847.43	2.03	9.021E+000		-7.409E-001	3.884E+00
	1873.16	0.21	7.399E+001		5.772E+000	3.099E+00
	1896.05	0.15	1.170E+002		2.129E+001	4.979E+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
	2293.38	0.31	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	1.486E+000	2.82E-001	1.611E-001	7.169E-00
	77.11	9.70	8.965E-001		3.748E-002	4.330E-00
	86.83	1.70	3.579E+000		2.795E+000	1.710E+00
	87.35	2.24	2.691E+000		4.674E-001	1.285E+00
	89.78	0.82	6.681E+000		-9.587E+000	3.179E+00
	241.99	7.25	1.244E+000		-5.464E-001	5.960E-00
	258.76	0.53	1.125E+001		2.574E+000	5.248E+00
	274.80	0.35	2.152E+001		-7.847E+000	1.016E+00
	295.22	18.42	4.556E-001		1.788E-001	2.154E-00
	351.93	35.60	2.819E-001		1.617E-001	1.333E-00
	462.02	0.21	5.255E+001		1.073E+001	2.457E+00
	480.43	0.34	3.464E+001		5.028E+000	1.620E+00
	487.14	0.43	2.630E+001		8.991E+000	1.226E+00
	533.66	0.18	6.369E+001		-4.621E+001	2.953E+00
	580.14	0.37	3.632E+001		-3.184E+000	1.693E+00
	785.96	1.06	1.520E+001		4.621E+000	7.026E+00

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram)
+	PB-214	839.07	0.58	2.929E+001	2.82E-001	0.000E+000	1.354E+00
	Ra-226	81.07	0.20	2.436E+001	1.35E+000	7.479E+000	1.146E+00
		83.79	0.32	1.652E+001		-2.322E+000	7.832E+00
		186.21*	3.64	1.353E+000		1.724E+000	6.349E-00
	U-234	53.20	0.12	6.391E+001	6.39E+001	2.032E+001	2.992E+00
		120.90	0.04	1.124E+002		-5.328E+001	5.259E+00
	U-235	72.70	0.12	5.974E+001	4.10E-001	6.412E-001	2.857E+00
		89.96	3.43	1.596E+000		-2.290E+000	7.592E-00
		93.35	5.54	9.962E-001		6.187E-001	4.745E-00
		104.82	0.69	5.940E+000		1.615E+000	2.785E+00
		105.60	1.31	3.045E+000		-4.632E-001	1.426E+00
		108.58	0.50	8.298E+000		-2.761E+000	3.897E+00
		109.19	1.66	2.484E+000		-6.725E-001	1.166E+00
		140.76	0.20	2.157E+001		-1.633E+000	1.013E+00
		143.76	10.96	4.103E-001		5.117E-002	1.931E-00
		163.36	5.08	9.810E-001		3.445E-001	4.629E-00
		182.62	0.39	1.686E+001		1.996E+000	8.043E+00
		194.94	0.63	9.022E+000		-6.475E-001	4.261E+00
		202.12	1.08	5.170E+000		-1.387E+000	2.435E+00
		205.32	5.02	1.120E+000		-6.766E-001	5.274E-00
		221.39	0.12	5.512E+001		-1.367E-001	2.608E+00
	U-238	63.29	3.70	1.876E+000	1.38E+000	9.945E-001	8.877E-00
		92.60	4.23	1.376E+000		1.477E+000	6.568E-00
		766.42	0.32	5.700E+001		4.098E+001	2.665E+00
		1001.03	0.84	2.064E+001		-1.015E+001	9.431E+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-2008\W6H-IMC-200

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]
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K-40	1460.8	^	1.32E+001	16.086			
Pb-212	74.8		7.76E-001	36.609	3.117[48.118]	4.40	-0.804
	77.1		5.06E-001	33.561	2.033[45.842]		[ 0.483]
	238.6	^	2.49E-001	31.227	1.000[44.162]		
Ra-226	186.2	^	1.72E+000	37.156			