
***** 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-2008\W6H-IMC-200

Report Generated On : 3/27/2017 12:14:11 PM

Sample Title : W6H-IMC-2008-S-P-5

Sample Description :

Sample Identification : 2008-S-P-5

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 : 3.296E+002 grams

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

Acquisition Started : 3/27/2017 11:37:12 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-5

***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 8566

Sample Title: W6H-IMC-2008-S-P-5

Peak Analysis Performed on: 3/27/2017 12:14:06 PM

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	178-	190	186.64	46.86	0.62	6.51E+001	19.41	5.42E+001
M	2	296-	314	299.69	75.14	0.80	1.03E+002	25.76	8.40E+001
m	3	296-	314	308.55	77.35	0.81	1.06E+002	25.17	8.51E+001
F	4	346-	353	348.65	87.38	0.67	4.79E+001	17.87	4.27E+001
F	5	739-	748	742.42	185.88	0.93	4.18E+001	18.20	5.00E+001
F	6	946-	959	953.16	238.60	0.94	1.17E+002	25.25	6.48E+001
F	7	1174-	1182	1178.90	295.07	0.96	3.56E+001	16.15	3.06E+001
F	8	1396-	1413	1405.34	351.71	1.15	7.97E+001	20.18	3.60E+001
F	9	2426-	2443	2434.19	609.07	1.54	4.66E+001	17.03	3.00E+001
F	10	5824-	5849	5836.06	1460.04	2.43	1.86E+002	25.78	5.78E+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: W6H-IMC-2008-S-P-5
 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	0.907	1460.82*	10.66	9.55762E+000	1.55213E+000
Pb-210	0.984	46.54*	4.25	2.52776E+000	1.03844E+000
Pb-212	0.996	74.82*	10.28	7.70380E-001	2.47597E-001
		77.11*	17.10	4.66744E-001	1.44992E-001
		86.83	2.07		
		87.35*	3.97	8.33515E-001	3.53439E-001
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	2.63570E-001	7.04671E-002
		300.09	3.30		
BI-214	0.267	76.86*	0.55	1.46446E+001	4.56829E+000
		79.29	0.91		
		89.26	0.11		
		89.81	0.21		
		273.80	0.13		
		348.92	0.10		
		386.78	0.29		
		388.89	0.40		
		405.72	0.17		
		454.79	0.29		
		469.77	0.13		
		609.32*	45.49	2.58829E-001	9.93150E-002
		665.45	1.53		
		703.11	0.47		
		719.87	0.39		
		752.85	0.13		
		768.36	4.89		
		786.35	0.32		
		806.18	1.26		
		821.18	0.16		
		826.45	0.12		
		934.06	3.11		
		964.08	0.37		
		1051.96	0.31		
		1069.96	0.27		
		1120.29	14.92		
		1133.66	0.25		
		1155.21	1.63		
		1207.68	0.45		
		1238.11	5.83		
		1280.98	1.43		
		1303.75	0.11		

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
BI-214	0.267	1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1538.53	0.40		
		1543.34	0.30		
		1583.20	0.70		
		1594.75	0.27		
		1599.37	0.32		
		1661.27	1.05		
		1684.01	0.21		
		1729.59	2.88		
		1764.49	15.30		
		1838.36	0.35		
		1847.43	2.03		
		1873.16	0.21		
		1896.05	0.15		
		2118.51	1.16		
		2204.06	4.92		
		2293.38	0.31		
		2447.70	1.55		
PB-214	0.848	74.82*	5.80	1.36543E+000	4.55533E-001
		77.11*	9.70	8.22817E-001	2.66122E-001
		86.83	1.70		
		87.35*	2.24	1.47726E+000	6.38980E-001
		89.78	0.82		
		241.99	7.25		
		258.76	0.53		
		274.80	0.35		
		295.22*	18.42	2.32734E-001	1.11602E-001
		351.93*	35.60	3.22303E-001	9.42935E-002
		462.02	0.21		
		480.43	0.34		
		487.14	0.43		
		533.66	0.18		
		580.14	0.37		
		785.96	1.06		
		839.07	0.58		
Ra-226	0.985	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	9.15749E-001	4.27961E-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	0.907	9.557622E+000	1.552134E+000
Pb-210	0.984	2.527764E+000	1.038441E+000
Pb-212	0.996	2.991340E-001	6.106024E-002
BI-214	0.267	2.586106E-001	9.928006E-002
PB-214	0.848	3.060966E-001	6.899667E-002
Ra-226	0.985	9.157487E-001	4.279607E-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 12:14:06 PM
 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.

***** N U C L I D E M D A R E P O R T *****

Detector Name: 8566
Sample Geometry: cylinder
Sample Title: W6H-IMC-2008-S-P-5
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	7.728E-001	7.73E-001	9.558E+000	3.170E-00
	CO-60	1173.23	99.85	1.742E-001	1.47E-001	-1.371E-002	8.094E-00
		1332.49	99.98	1.474E-001		-2.539E-003	6.682E-00
	CS-137	661.66	85.10	1.265E-001	1.26E-001	-3.812E-002	5.890E-00
+	Pb-210	46.54*	4.25	1.779E+000	1.78E+000	2.528E+000	8.368E-00
	BI-212	288.20	0.34	1.795E+001	2.01E+000	9.585E+000	8.505E+00
		328.03	0.13	4.749E+001		-1.179E+001	2.229E+00
		452.98	0.36	2.204E+001		1.702E+001	1.032E+00
		727.33	6.67	2.010E+000		1.950E+000	9.442E-00
		785.37	1.10	1.110E+001		-1.144E+000	5.158E+00
		893.41	0.38	3.573E+001		4.694E+000	1.658E+00
		952.12	0.17	9.002E+001		6.995E+000	4.198E+00
		1078.62	0.56	2.746E+001		2.641E+001	1.271E+00
		1512.70	0.29	3.658E+001		-1.285E+001	1.566E+00
		1620.50	1.47	7.095E+000		-3.960E+000	2.996E+00
+	Pb-212	74.82*	10.28	3.394E-001	1.05E-001	7.704E-001	1.596E-00
		77.11*	17.10	2.002E-001		4.667E-001	9.414E-00
		86.83	2.07	2.345E+000		1.374E+000	1.127E+00
		87.35*	3.97	6.188E-001		8.335E-001	2.859E-00
		89.78	1.46	3.092E+000		-1.496E+000	1.483E+00
		115.18	0.60	5.430E+000		6.738E-001	2.567E+00
		238.63*	43.60	1.048E-001		2.636E-001	4.936E-00
		300.09	3.30	1.893E+000		-3.940E+000	8.961E-00
+	BI-214	76.86*	0.55	6.280E+000	1.73E-001	1.464E+001	2.954E+00
		79.29	0.91	5.843E+000		-1.338E+000	2.812E+00
		89.26	0.11	4.158E+001		-6.946E+000	1.995E+00
		89.81	0.21	2.150E+001		-1.040E+001	1.031E+00
		273.80	0.13	4.415E+001		1.945E+001	2.090E+00
		348.92	0.10	8.219E+001		-2.100E+001	3.924E+00
		386.78	0.29	2.345E+001		-3.770E-001	1.099E+00
		388.89	0.40	1.803E+001		3.975E+000	8.475E+00
		405.72	0.17	4.481E+001		1.749E+001	2.107E+00
		454.79	0.29	2.571E+001		-4.990E+000	1.198E+00
		469.77	0.13	6.642E+001		1.473E+000	3.122E+00
		609.32*	45.49	1.731E-001		2.588E-001	7.905E-00
		665.45	1.53	7.274E+000		2.809E+000	3.394E+00
		703.11	0.47	2.396E+001		1.271E+001	1.115E+00
		719.87	0.39	3.166E+001		-1.775E+001	1.481E+00
		752.85	0.13	9.343E+001		2.170E+001	4.345E+00
		768.36	4.89	2.528E+000		1.409E+000	1.177E+00
		786.35	0.32	3.828E+001		-2.588E+001	1.778E+00
		806.18	1.26	1.007E+001		2.339E+000	4.683E+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	7.785E+001	1.73E-001	2.816E+000	3.612E+00			
		826.45	0.12	1.179E+002		-2.441E+001	5.508E+00			
		934.06	3.11	4.289E+000		-2.495E+000	1.981E+00			
		964.08	0.37	4.859E+001		2.285E+001	2.287E+00			
		1051.96	0.31	4.537E+001		-1.457E+001	2.089E+00			
		1069.96	0.27	5.401E+001		-2.898E+000	2.492E+00			
		1120.29	14.92	1.135E+000		4.175E-001	5.279E-00			
		1133.66	0.25	6.429E+001		1.944E+001	2.977E+00			
		1155.21	1.63	9.598E+000		-9.854E+000	4.427E+00			
		1207.68	0.45	3.906E+001		1.555E+001	1.813E+00			
		1238.11	5.83	3.438E+000		2.338E+000	1.609E+00			
		1280.98	1.43	1.169E+001		4.947E+000	5.383E+00			
		1303.75	0.11	1.067E+002		-1.230E+002	4.706E+00			
		1377.67	3.99	3.787E+000		-6.523E-002	1.717E+00			
		1385.31	0.79	1.772E+001		-6.738E+000	7.968E+00			
		1401.52	1.33	1.119E+001		-4.344E+000	5.057E+00			
		1407.99	2.39	7.194E+000		4.132E+000	3.298E+00			
		1509.21	2.13	5.630E+000		-6.896E-001	2.457E+00			
		1538.53	0.40	3.064E+001		1.198E+001	1.337E+00			
		1543.34	0.30	3.923E+001		1.388E+001	1.706E+00			
		1583.20	0.70	2.345E+001		1.220E+001	1.060E+00			
		1594.75	0.27	5.943E+001		7.370E+000	2.673E+00			
		1599.37	0.32	4.199E+001		-1.319E+000	1.852E+00			
		1661.27	1.05	1.280E+001		5.789E+000	5.609E+00			
		1684.01	0.21	6.002E+001		1.260E+001	2.609E+00			
		1729.59	2.88	4.299E+000		2.868E+000	1.851E+00			
		1764.49	15.30	1.155E+000		7.208E-001	5.204E-00			
		1838.36	0.35	4.711E+001		1.421E+001	2.096E+00			
		1847.43	2.03	7.667E+000		1.468E+000	3.382E+00			
		1873.16	0.21	5.571E+001		-5.421E+001	2.353E+00			
		1896.05	0.15	8.430E+001		3.323E+001	3.586E+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	6.015E-001	1.44E-001	1.365E+000	2.828E-00			
		77.11*	9.70	3.528E-001		8.228E-001	1.660E-00			
		86.83	1.70	2.855E+000		1.673E+000	1.372E+00			
		87.35*	2.24	1.097E+000		1.477E+000	5.066E-00			
		89.78	0.82	5.505E+000		-2.663E+000	2.640E+00			
		241.99	7.25	1.037E+000		-3.219E-001	4.997E-00			
		258.76	0.53	9.664E+000		3.266E+000	4.563E+00			
		274.80	0.35	1.612E+001		-1.578E-001	7.632E+00			
		295.22*	18.42	1.814E-001		2.327E-001	8.189E-00			
		351.93*	35.60	1.445E-001		3.223E-001	6.677E-00			
		462.02	0.21	4.111E+001		1.502E+001	1.933E+00			
		480.43	0.34	2.474E+001		-4.477E+000	1.157E+00			
		487.14	0.43	1.958E+001		-6.734E+000	9.157E+00			
		533.66	0.18	4.702E+001		-1.977E+001	2.186E+00			
		580.14	0.37	3.202E+001		1.626E+001	1.513E+00			
		785.96	1.06	1.164E+001		-7.507E+000	5.412E+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	2.496E+001	1.44E-001	-5.716E+000	1.169E+00
+	Ra-226	81.07	0.20	2.052E+001	8.24E-001	6.648E+000	9.758E+00
		83.79	0.32	1.374E+001		1.001E+001	6.572E+00
		186.21*	3.64	8.244E-001		9.157E-001	3.825E-00
	U-234	53.20	0.12	4.664E+001	4.66E+001	-1.051E+001	2.194E+00
		120.90	0.04	9.589E+001		-2.735E+001	4.541E+00
	U-235	72.70	0.12	4.649E+001	3.10E-001	-6.614E+000	2.235E+00
		89.96	3.43	1.315E+000		-6.360E-001	6.306E-00
		93.35	5.54	7.189E-001		-2.000E-001	3.430E-00
		104.82	0.69	4.846E+000		2.526E+000	2.294E+00
		105.60	1.31	2.532E+000		1.129E+000	1.198E+00
		108.58	0.50	6.257E+000		-4.600E+000	2.952E+00
		109.19	1.66	1.948E+000		9.148E-002	9.211E-00
		140.76	0.20	1.597E+001		-8.737E+000	7.525E+00
		143.76	10.96	3.104E-001		-2.486E-001	1.467E-00
		163.36	5.08	7.306E-001		2.220E-001	3.458E-00
		182.62	0.39	1.270E+001		-1.435E+001	6.074E+00
		194.94	0.63	6.552E+000		-7.414E+000	3.098E+00
		202.12	1.08	4.390E+000		2.815E+000	2.089E+00
		205.32	5.02	9.600E-001		-4.267E-001	4.568E-00
		221.39	0.12	4.021E+001		-6.704E+000	1.905E+00
	U-238	63.29	3.70	1.505E+000	9.98E-001	8.855E-001	7.184E-00
		92.60	4.23	9.976E-001		2.468E-001	4.773E-00
		766.42	0.32	3.857E+001		7.213E+000	1.796E+00
		1001.03	0.84	1.550E+001		-3.539E-001	7.114E+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-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]
-----	-----		-----	-----	-----	-----	-----
K-40	1460.8	^	9.56E+000	16.240			
Pb-210	46.5	^	2.53E+000	41.081			
Pb-212	74.8		7.70E-001	32.140	2.923[41.806]	4.34	-0.789
	77.1		4.67E-001	31.064	1.771[40.985]		[0.408]
	87.3		8.34E-001	42.403	3.162[50.128]		
	238.6	^	2.64E-001	26.736	1.000[37.810]		

Nuclide	Energy (keV)	Activity (pCi/gram)	Activity %Uncert*	Ratio[%Uncert]	A	B [uncert]
-----	-----	-----	-----	-----	-----	-----
BI-214	76.9	1.46E+001	31.194	56.580[49.451]	12.50	-1.949
	609.3 ^	2.59E-001	38.371	1.000[54.265]		[0.355]
PB-214	74.8	1.37E+000	33.362	4.236[44.373]	5.36	-0.940
	77.1	8.23E-001	32.343	2.553[43.612]		[0.296]
	87.3	1.48E+000	43.254	4.583[52.219]		
	295.2	2.33E-001	47.953	0.722[56.173]		
	351.9 ^	3.22E-001	29.256	1.000[41.374]		
Ra-226	186.2 ^	9.16E-001	46.733			