
***** 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-2120\W6H-IMC-212

Report Generated On : 4/19/2017 10:38:25 AM

Sample Title : W6H-IMC-2120-S-P-3

Sample Description :

Sample Identification : 2120-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 : 1.500 keV

Sample Size : 2.315E+002 GRAMS

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

Acquisition Started : 3/28/2017 10:12:49 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 : 4/19/2017

Efficiency ID : H-IMC-2120-S-P-3

***** 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-2120-S-P-3

Peak Analysis Performed on: 4/19/2017 10:38:21 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	293-	313	299.58	75.11	0.77	1.08E+002	25.14	7.85E+001
m	2	293-	313	308.29	77.29	0.77	5.27E+001	19.06	6.49E+001
F	3	346-	354	348.89	87.44	0.60	3.57E+001	15.96	4.20E+001
F	4	736-	747	741.87	185.75	0.93	4.32E+001	17.03	3.75E+001
F	5	948-	959	952.97	238.55	0.89	6.78E+001	20.91	5.70E+001
F	6	1175-	1183	1179.32	295.17	0.71	2.07E+001	13.30	2.88E+001
F	7	5825-	5851	5837.46	1460.39	2.59	1.67E+002	24.01	3.00E+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-2120-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	0.987	1460.82*	10.66	1.10321E+001	1.84379E+000
Pb-212	0.998	74.82*	10.28	9.30846E-001	2.86050E-001
		77.11*	17.10	2.66238E-001	1.10286E-001
		86.83	2.07		
		87.35*	3.97	7.28084E-001	3.56886E-001
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	1.90613E-001	6.60666E-002
		300.09	3.30		
PB-214	0.270	74.82*	5.80	1.64984E+000	5.28053E-001
		77.11*	9.70	4.69348E-001	1.98960E-001
		86.83	1.70		
		87.35*	2.24	1.29040E+000	6.42041E-001
		89.78	0.82		
		241.99	7.25		
		258.76	0.53		
		274.80	0.35		
		295.22*	18.42	1.69584E-001	1.12319E-001
		351.93	35.60		
		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	0.987	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	1.17407E+000	5.03832E-001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.500 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	0.987	1.103212E+001	1.843794E+000
Pb-212	0.998	2.135658E-001	5.744026E-002
PB-214	0.270	2.069636E-001	9.890872E-002
Ra-226	0.987	1.174072E+000	5.038318E-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: 4/19/2017 10:38:21 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.

***** 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-2120-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	7.745E-001	7.74E-001	1.103E+001	2.978E-00
	CO-60	1173.23	99.85	1.949E-001	1.60E-001	-1.614E-002	8.952E-00
		1332.49	99.98	1.603E-001		-2.143E-002	7.133E-00
	CS-137	661.66	85.10	1.571E-001	1.57E-001	-4.701E-002	7.304E-00
	Pb-210	46.54	4.25	2.332E+000	2.33E+000	2.320E+000	1.111E+00
	BI-212	288.20	0.34	1.916E+001	2.21E+000	9.188E-001	8.989E+00
		328.03	0.13	5.974E+001		4.650E+001	2.805E+00
		452.98	0.36	2.839E+001		1.011E+001	1.331E+00
		727.33	6.67	2.211E+000		1.027E+000	1.028E+00
		785.37	1.10	1.404E+001		2.227E+000	6.519E+00
		893.41	0.38	4.127E+001		6.954E+000	1.899E+00
		952.12	0.17	1.057E+002		5.620E+001	4.895E+00
		1078.62	0.56	3.264E+001		-1.841E+001	1.502E+00
		1512.70	0.29	6.390E+001		1.350E+001	2.856E+00
		1620.50	1.47	1.089E+001		-4.088E-001	4.736E+00
+	Pb-212	74.82*	10.28	3.771E-001	1.18E-001	9.308E-001	1.769E-00
		77.11*	17.10	2.032E-001		2.662E-001	9.478E-00
		86.83	2.07	2.429E+000		-5.099E-001	1.161E+00
		87.35*	3.97	7.427E-001		7.281E-001	3.438E-00
		89.78	1.46	3.268E+000		-2.600E+000	1.560E+00
		115.18	0.60	6.299E+000		2.283E+000	2.971E+00
		238.63*	43.60	1.180E-001		1.906E-001	5.519E-00
		300.09	3.30	2.314E+000		-1.918E+000	1.094E+00
	BI-214	76.86	0.55	1.287E+001	3.30E-001	1.592E-001	6.221E+00
		79.29	0.91	5.507E+000		-2.813E-001	2.627E+00
		89.26	0.11	4.219E+001		-1.680E+001	2.011E+00
		89.81	0.21	2.272E+001		-1.807E+001	1.084E+00
		273.80	0.13	4.905E+001		1.532E+000	2.305E+00
		348.92	0.10	9.350E+001		5.963E+001	4.441E+00
		386.78	0.29	2.612E+001		9.918E+000	1.214E+00
		388.89	0.40	1.818E+001		-1.289E+001	8.411E+00
		405.72	0.17	5.396E+001		2.669E+001	2.529E+00
		454.79	0.29	3.274E+001		6.784E-002	1.527E+00
		469.77	0.13	6.754E+001		-6.861E+001	3.125E+00
		609.32	45.49	3.301E-001		1.586E-001	1.555E-00
		665.45	1.53	8.914E+000		1.663E+000	4.148E+00
		703.11	0.47	2.978E+001		8.589E+000	1.383E+00
		719.87	0.39	3.608E+001		-2.019E+001	1.674E+00
		752.85	0.13	1.133E+002		-9.150E+001	5.251E+00
		768.36	4.89	3.073E+000		-1.380E+000	1.426E+00
		786.35	0.32	4.841E+001		3.016E+000	2.248E+00
		806.18	1.26	1.101E+001		-9.897E+000	5.057E+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	9.337E+001	3.30E-001	-5.294E+000	4.310E+00
	826.45	0.12	1.292E+002		-7.327E+000	5.966E+00
	934.06	3.11	6.106E+000		3.048E+000	2.844E+00
	964.08	0.37	5.689E+001		5.074E+001	2.662E+00
	1051.96	0.31	5.872E+001		2.535E+001	2.707E+00
	1069.96	0.27	7.185E+001		-2.849E+000	3.325E+00
	1120.29	14.92	1.411E+000		1.102E+000	6.544E-00
	1133.66	0.25	7.412E+001		8.741E+000	3.401E+00
	1155.21	1.63	1.301E+001		6.943E+000	6.028E+00
	1207.68	0.45	4.679E+001		-1.086E+001	2.160E+00
	1238.11	5.83	3.366E+000		1.715E+000	1.541E+00
	1280.98	1.43	1.344E+001		-7.240E+000	6.125E+00
	1303.75	0.11	1.805E+002		6.269E+001	8.217E+00
	1377.67	3.99	4.876E+000		2.342E+000	2.211E+00
	1385.31	0.79	2.204E+001		-7.215E+000	9.873E+00
	1401.52	1.33	1.565E+001		1.460E+001	7.136E+00
	1407.99	2.39	7.916E+000		1.901E+000	3.572E+00
	1509.21	2.13	8.519E+000		2.762E+000	3.799E+00
	1538.53	0.40	3.728E+001		1.174E+001	1.613E+00
	1543.34	0.30	4.756E+001		1.302E+001	2.048E+00
	1583.20	0.70	2.467E+001		2.039E+001	1.088E+00
	1594.75	0.27	6.708E+001		3.455E+001	2.968E+00
	1599.37	0.32	5.159E+001		-6.416E+000	2.261E+00
	1661.27	1.05	1.315E+001		-3.170E+000	5.553E+00
	1684.01	0.21	8.393E+001		5.403E+001	3.690E+00
	1729.59	2.88	5.168E+000		2.094E+000	2.199E+00
	1764.49	15.30	1.468E+000		8.764E-001	6.601E-00
	1838.36	0.35	4.323E+001		1.576E+001	1.826E+00
	1847.43	2.03	7.507E+000		-3.555E+000	3.170E+00
	1873.16	0.21	5.828E+001		-3.885E+001	2.355E+00
	1896.05	0.15	9.019E+001		-5.045E+001	3.697E+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	6.684E-001	2.22E-001	1.650E+000	3.136E-00
	77.11*	9.70	3.583E-001		4.693E-001	1.671E-00
	86.83	1.70	2.958E+000		-6.209E-001	1.414E+00
	87.35*	2.24	1.316E+000		1.290E+000	6.093E-00
	89.78	0.82	5.819E+000		-4.629E+000	2.777E+00
	241.99	7.25	1.153E+000		2.526E-001	5.535E-00
	258.76	0.53	1.059E+001		1.197E+000	4.958E+00
	274.80	0.35	1.795E+001		2.573E+000	8.441E+00
	295.22*	18.42	2.218E-001		1.696E-001	9.981E-00
	351.93	35.60	2.778E-001		1.681E-001	1.320E-00
	462.02	0.21	4.347E+001		-1.567E+001	2.020E+00
	480.43	0.34	2.916E+001		-1.568E+001	1.357E+00
	487.14	0.43	2.290E+001		-1.300E+001	1.065E+00
	533.66	0.18	5.911E+001		-3.719E+001	2.746E+00
	580.14	0.37	3.548E+001		4.022E+001	1.662E+00
	785.96	1.06	1.484E+001		4.496E+000	6.900E+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	2.727E+001	2.22E-001	6.923E+000	1.263E+00
+	Ra-226	81.07	0.20	1.909E+001	9.39E-001	-2.498E+001	8.967E+00
		83.79	0.32	1.398E+001		1.252E+001	6.643E+00
		186.21*	3.64	9.393E-001		1.174E+000	4.329E-00
	AC-228	89.96	1.90	6.824E+013	1.65E+013	-5.428E+013	3.257E+01
		93.35	3.10	3.933E+013		1.530E+013	1.873E+01
		99.51	1.26	7.580E+013		-3.945E+012	3.561E+01
		104.82	0.39	2.615E+014		2.249E+014	1.234E+01
		105.60	0.74	1.378E+014		6.356E+013	6.502E+01
		108.58	0.28	3.570E+014		-6.571E+013	1.683E+01
		129.07	2.42	4.398E+013		1.144E+013	2.076E+01
		145.85	0.16	7.085E+014		1.387E+014	3.345E+01
		153.98	0.72	1.657E+014		8.837E+013	7.838E+01
		191.35	0.12	1.081E+015		4.447E+014	5.100E+01
		199.41	0.31	4.026E+014		-1.197E+014	1.891E+01
		204.03	0.11	1.268E+015		1.229E+014	5.991E+01
		209.25	3.89	3.801E+013		9.422E+012	1.798E+01
		214.85	0.76	1.788E+014		-1.066E+014	8.399E+01
		270.24	3.46	4.273E+013		-2.020E+013	1.990E+01
		278.95	0.16	1.188E+015		5.600E+014	5.612E+01
		321.65	0.23	8.432E+014		8.241E+014	3.947E+01
		327.44	0.12	1.709E+015		1.391E+015	8.027E+01
		328.00	2.95	6.882E+013		5.357E+013	3.231E+01
		332.37	0.40	4.769E+014		-2.322E+013	2.227E+01
		338.32	11.27	1.652E+013		9.866E+012	7.690E+01
		340.96	0.37	5.310E+014		-2.973E+014	2.480E+01
		409.46	1.92	1.246E+014		-3.617E+012	5.824E+01
		440.44	0.12	2.150E+015		7.617E+014	1.005E+01
		463.00	4.40	5.662E+013		-2.207E+013	2.628E+01
		478.33	0.21	1.233E+015		-2.580E+014	5.725E+01
		503.82	0.18	1.554E+015		-2.274E+015	7.235E+01
		508.96	0.45	8.314E+014		7.278E+014	3.939E+01
		523.13	0.10	2.630E+015		5.441E+013	1.217E+01
		546.47	0.20	1.574E+015		5.248E+014	7.346E+01
		562.50	0.87	3.692E+014		-6.704E+013	1.721E+01
		570.91	0.18	1.698E+015		7.067E+014	7.881E+01
		572.14	0.15	1.978E+015		-1.255E+015	9.153E+01
		583.41	0.11	3.273E+015		1.842E+015	1.535E+01
		674.75	2.10	1.749E+014		8.125E+013	8.126E+01
		701.75	0.17	2.169E+015		7.144E+014	1.006E+01
		707.41	0.16	2.460E+015		-3.901E+014	1.142E+01
		726.86	0.62	6.362E+014		3.837E+014	2.955E+01
		755.32	1.00	4.313E+014		4.236E+014	2.011E+01
		772.29	1.49	2.976E+014		2.991E+013	1.389E+01
		782.14	0.49	9.186E+014		2.366E+014	4.284E+01
		794.95	4.25	9.334E+013		4.347E+012	4.309E+01
		830.49	0.54	7.502E+014		-5.605E+014	3.457E+01
		835.71	1.61	2.833E+014		1.990E+014	1.318E+01
		840.38	0.91	4.544E+014		-3.901E+013	2.096E+01
		904.20	0.77	5.681E+014		-7.763E+014	2.618E+01
		911.20	25.80	1.867E+013		6.801E+012	8.665E+01

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GRAM)	Nuclide MDA (pCi/GRAM)	Activity (pCi/GRAM)	Dec. Leve (pCi/GRAM)
AC-228	947.98	0.11	4.087E+015	1.65E+013	9.328E+013	1.875E+01
	958.61	0.28	1.677E+015		-1.266E+015	7.744E+01
	964.77	4.99	1.110E+014		7.446E+013	5.185E+01
	968.97	15.80	3.322E+013		1.388E+013	1.546E+01
	1033.25	0.20	2.632E+015		1.119E+015	1.220E+01
	1065.18	0.13	4.081E+015		8.502E+014	1.891E+01
	1095.68	0.13	3.219E+015		-4.073E+015	1.453E+01
	1110.61	0.28	1.976E+015		2.888E+014	9.162E+01
	1153.52	0.14	3.893E+015		-1.146E+015	1.794E+01
	1247.08	0.50	9.976E+014		2.152E+014	4.536E+01
	1459.14	0.83	1.526E+015		3.775E+015	7.318E+01
	1495.91	0.86	4.576E+014		-1.049E+014	1.980E+01
	1501.57	0.46	1.003E+015		2.181E+014	4.440E+01
	1557.11	0.18	1.984E+015		-6.074E+014	8.378E+01
	1580.53	0.60	6.887E+014		-3.081E+014	2.980E+01
	1588.20	3.22	1.664E+014		8.436E+013	7.453E+01
	1625.06	0.25	1.808E+015		1.078E+015	7.922E+01
	1630.63	1.51	3.216E+014		2.106E+014	1.419E+01
	1638.28	0.47	8.794E+014		5.266E+013	3.786E+01
	1666.52	0.18	2.109E+015		-9.382E+014	8.906E+01
TH-230	67.67	0.38	1.247E+001	1.25E+001	-4.625E+000	5.892E+00
PA-234	742.81	0.11	1.400E+002		2.914E+001	6.508E+00
	766.42	0.32	4.733E+001	1.43E+000	-2.586E+001	2.196E+00
	1001.03	0.84	1.826E+001		1.775E+000	8.315E+00
TH-234	63.29	3.70	1.432E+000		-9.105E-001	6.777E-00
	92.38	2.13	2.221E+000		3.079E+000	1.060E+00
	92.80	2.10	2.162E+000		5.483E-001	1.030E+00
	112.81	0.21	1.738E+001	5.03E+001	-6.836E+000	8.184E+00
U-234	53.20	0.12	5.029E+001		2.073E+001	2.367E+00
	120.90	0.04	9.794E+001		-5.574E+001	4.591E+00
U-235	72.70	0.12	4.575E+001	3.64E-001	0.000E+000	2.185E+00
	89.96	3.43	1.390E+000		-1.106E+000	6.635E-00
	93.35	5.54	8.095E-001		3.149E-001	3.854E-00
	104.82	0.69	5.476E+000		4.710E+000	2.584E+00
	105.60	1.31	2.863E+000		1.321E+000	1.351E+00
	108.58	0.50	7.354E+000		-1.353E+000	3.466E+00
	109.19	1.66	2.192E+000		-8.626E-001	1.033E+00
	140.76	0.20	1.816E+001		-1.090E+001	8.516E+00
	143.76	10.96	3.639E-001		-3.748E-002	1.715E-00
	163.36	5.08	8.642E-001		3.361E-001	4.080E-00
	182.62	0.39	1.355E+001		9.079E-001	6.436E+00
	194.94	0.63	7.639E+000		4.627E+000	3.599E+00
	202.12	1.08	4.637E+000		1.555E+000	2.186E+00
	205.32	5.02	1.051E+000		-1.868E-001	4.968E-00
	221.39	0.12	4.774E+001		-8.485E+000	2.256E+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-2120\W6H-IMC-212

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 ^	1.10E+001	16.713			
Pb-212	74.8	9.31E-001	30.730	4.883[46.321]	5.49	-1.001 [0.516]
	77.1	2.66E-001	41.424	1.397[54.011]		
	87.3	7.28E-001	49.017	3.820[60.033]		
	238.6 ^	1.91E-001	34.660	1.000[49.017]		
PB-214	74.8	1.65E+000	*****			
	77.1	4.69E-001	*****			
	87.3	1.29E+000	*****			
	295.2	1.70E-001	*****			
Ra-226	186.2 ^	1.17E+000	42.913			