
***** 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 10:44:22 AM

Sample Title : W6H-IMC-2120-S-P-8

Sample Description :

Sample Identification : 2120-S-P-8

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 : 2.579E+002 grams

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

Acquisition Started : 3/30/2017 8:02:26 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-8

***** 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-8

Peak Analysis Performed on: 4/19/2017 10:44:17 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	294-	315	299.69	75.14	0.71	7.06E+001	23.54	1.03E+002
m	2	294-	315	308.67	77.38	0.71	6.17E+001	21.17	7.70E+001
F	3	737-	746	742.37	185.87	0.83	5.47E+001	18.53	3.50E+001
F	4	946-	960	953.72	238.74	1.05	7.64E+001	21.53	5.81E+001
F	5	1175-	1184	1178.57	294.99	0.75	2.25E+001	13.52	3.30E+001
F	6	1398-	1411	1405.36	351.72	0.93	4.76E+001	17.06	4.06E+001
F	7	5825-	5850	5837.10	1460.30	2.36	1.52E+002	23.52	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-2120-S-P-8
 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	0.981	1460.82*	10.66	9.11939E+000	1.60867E+000
Pb-212	0.998	74.82*	10.28	5.71934E-001	2.22878E-001
		77.11*	17.10	2.93774E-001	1.16872E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	1.96799E-001	6.36230E-002
		300.09	3.30		
PB-214	0.997	74.82*	5.80	1.01370E+000	4.05311E-001
		77.11*	9.70	5.17890E-001	2.11241E-001
		86.83	1.70		
		87.35	2.24		
		89.78	0.82		
		241.99	7.25		
		258.76	0.53		
		274.80	0.35		
		295.22*	18.42	1.68407E-001	1.04737E-001
		351.93*	35.60	2.21423E-001	8.57799E-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	0.993	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	1.36595E+000	5.17469E-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	0.981	9.119393E+000	1.608669E+000
Pb-212	0.998	2.077902E-001	5.490612E-002
PB-214	0.997	2.068877E-001	6.336285E-002
Ra-226	0.993	1.365945E+000	5.174691E-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 10:44:17 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-8
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	9.027E-001	9.03E-001	9.119E+000	3.703E-00
	CO-60	1173.23	99.85	1.825E-001	1.59E-001	-1.205E-001	8.406E-00
		1332.49	99.98	1.594E-001		5.304E-002	7.169E-00
	CS-137	661.66	85.10	1.419E-001	1.42E-001	4.094E-002	6.594E-00
	Pb-210	46.54	4.25	2.568E+000	2.57E+000	3.536E+000	1.230E+00
	BI-212	288.20	0.34	1.815E+001	2.15E+000	-3.362E+000	8.535E+00
		328.03	0.13	5.832E+001		2.711E+001	2.749E+00
		452.98	0.36	2.393E+001		-4.016E+000	1.116E+00
		727.33	6.67	2.147E+000		1.765E+000	1.003E+00
		785.37	1.10	1.224E+001		-2.122E+000	5.663E+00
		893.41	0.38	3.429E+001		-1.990E+001	1.565E+00
		952.12	0.17	9.597E+001		-1.154E+001	4.447E+00
		1078.62	0.56	3.223E+001		6.716E+000	1.493E+00
		1512.70	0.29	5.897E+001		6.055E+000	2.641E+00
		1620.50	1.47	9.868E+000		3.386E+000	4.290E+00
+	Pb-212	74.82*	10.28	4.041E-001	1.17E-001	5.719E-001	1.911E-00
		77.11*	17.10	2.072E-001		2.938E-001	9.717E-00
		86.83	2.07	2.469E+000		2.040E+000	1.185E+00
		87.35	3.97	1.201E+000		-8.219E-001	5.746E-00
		89.78	1.46	2.948E+000		-5.139E+000	1.405E+00
		115.18	0.60	5.383E+000		1.222E+000	2.526E+00
		238.63*	43.60	1.166E-001		1.968E-001	5.479E-00
		300.09	3.30	1.974E+000		-6.388E-001	9.294E-00
	BI-214	76.86	0.55	1.251E+001	2.93E-001	2.127E+001	6.050E+00
		79.29	0.91	5.899E+000		5.001E-001	2.830E+00
		89.26	0.11	4.133E+001		1.914E+001	1.974E+00
		89.81	0.21	2.049E+001		-3.573E+001	9.764E+00
		273.80	0.13	4.811E+001		5.106E+000	2.270E+00
		348.92	0.10	9.457E+001		1.153E+001	4.515E+00
		386.78	0.29	2.459E+001		-1.141E+001	1.146E+00
		388.89	0.40	1.881E+001		-7.829E+000	8.783E+00
		405.72	0.17	4.547E+001		6.263E+000	2.119E+00
		454.79	0.29	3.133E+001		-4.889E+000	1.466E+00
		469.77	0.13	6.883E+001		-9.771E+000	3.212E+00
		609.32	45.49	2.927E-001		6.419E-002	1.377E-00
		665.45	1.53	8.115E+000		2.910E+000	3.776E+00
		703.11	0.47	2.459E+001		-2.147E+001	1.133E+00
		719.87	0.39	3.468E+001		-3.368E+001	1.616E+00
		752.85	0.13	1.132E+002		4.192E+001	5.281E+00
		768.36	4.89	2.772E+000		8.406E-001	1.285E+00
		786.35	0.32	4.331E+001		8.894E+000	2.008E+00
		806.18	1.26	1.131E+001		8.096E+000	5.248E+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	7.994E+001	2.93E-001	4.212E+001	3.671E+00
	826.45	0.12	1.106E+002		-1.237E+002	5.081E+00
	934.06	3.11	4.937E+000		4.108E+000	2.279E+00
	964.08	0.37	4.890E+001		3.207E+001	2.279E+00
	1051.96	0.31	5.279E+001		-4.815E-001	2.431E+00
	1069.96	0.27	5.780E+001		-2.417E+001	2.647E+00
	1120.29	14.92	1.121E+000		3.923E-001	5.143E-00
	1133.66	0.25	6.268E+001		-1.215E+001	2.857E+00
	1155.21	1.63	1.051E+001		-1.200E+000	4.824E+00
	1207.68	0.45	4.122E+001		-1.346E+001	1.898E+00
	1238.11	5.83	3.475E+000		2.417E+000	1.609E+00
	1280.98	1.43	1.218E+001		8.754E+000	5.554E+00
	1303.75	0.11	1.615E+002		3.248E+001	7.343E+00
	1377.67	3.99	3.883E+000		2.005E+000	1.735E+00
	1385.31	0.79	1.962E+001		4.146E+000	8.768E+00
	1401.52	1.33	1.246E+001		3.887E+000	5.601E+00
	1407.99	2.39	6.830E+000		1.910E+000	3.066E+00
	1509.21	2.13	8.012E+000		-3.257E-001	3.589E+00
	1538.53	0.40	3.161E+001		8.396E-001	1.353E+00
	1543.34	0.30	4.163E+001		1.106E+000	1.782E+00
	1583.20	0.70	2.286E+001		-6.644E+000	1.012E+00
	1594.75	0.27	6.076E+001		1.091E+001	2.688E+00
	1599.37	0.32	4.294E+001		4.626E+000	1.858E+00
	1661.27	1.05	1.085E+001		6.153E-001	4.498E+00
	1684.01	0.21	6.597E+001		7.958E+000	2.840E+00
	1729.59	2.88	5.027E+000		3.354E+000	2.164E+00
	1764.49	15.30	1.284E+000		8.752E-001	5.752E-00
	1838.36	0.35	4.075E+001		-8.089E+000	1.734E+00
	1847.43	2.03	8.317E+000		1.970E+000	3.631E+00
	1873.16	0.21	6.786E+001		-1.646E+001	2.887E+00
	1896.05	0.15	8.627E+001		1.631E+000	3.578E+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	7.162E-001	1.64E-001	1.014E+000	3.387E-00
	77.11*	9.70	3.653E-001		5.179E-001	1.713E-00
	86.83	1.70	3.007E+000		2.484E+000	1.443E+00
	87.35	2.24	2.129E+000		-1.457E+000	1.018E+00
	89.78	0.82	5.249E+000		-9.151E+000	2.501E+00
	241.99	7.25	1.051E+000		2.000E-001	5.044E-00
	258.76	0.53	1.075E+001		1.667E+000	5.068E+00
	274.80	0.35	1.732E+001		-9.746E+000	8.172E+00
	295.22*	18.42	2.207E-001		1.684E-001	1.002E-00
	351.93*	35.60	1.637E-001		2.214E-001	7.555E-00
	462.02	0.21	4.582E+001		4.333E-001	2.150E+00
	480.43	0.34	3.055E+001		1.862E+001	1.435E+00
	487.14	0.43	2.105E+001		-2.606E+001	9.795E+00
	533.66	0.18	5.212E+001		-2.025E+001	2.415E+00
	580.14	0.37	3.192E+001		2.105E+001	1.494E+00
	785.96	1.06	1.307E+001		2.684E+000	6.059E+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	2.479E+001	1.64E-001	1.123E+001	1.148E+00
+	Ra-226	81.07	0.20	2.153E+001	7.97E-001	6.979E+000	1.022E+00
		83.79	0.32	1.440E+001		-7.592E-001	6.876E+00
		186.21*	3.64	7.969E-001		1.366E+000	3.646E-00
	AC-228	89.96	1.90	1.077E+016	3.03E+015	-1.878E+016	5.133E+01
		93.35	3.10	6.522E+015		3.752E+015	3.107E+01
		99.51	1.26	1.358E+016		5.377E+015	6.415E+01
		104.82	0.39	4.341E+016		-3.455E+016	2.051E+01
		105.60	0.74	2.341E+016		-3.345E+015	1.107E+01
		108.58	0.28	6.041E+016		-8.219E+014	2.854E+01
		129.07	2.42	7.389E+015		-1.833E+014	3.496E+01
		145.85	0.16	1.275E+017		8.130E+016	6.055E+01
		153.98	0.72	2.719E+016		8.086E+015	1.288E+01
		191.35	0.12	1.787E+017		1.798E+015	8.450E+01
		199.41	0.31	7.177E+016		-1.650E+016	3.392E+01
		204.03	0.11	2.056E+017		2.806E+016	9.720E+01
		209.25	3.89	5.757E+015		4.890E+014	2.713E+01
		214.85	0.76	2.820E+016		-5.120E+015	1.323E+01
		270.24	3.46	7.935E+015		-1.932E+015	3.732E+01
		278.95	0.16	1.948E+017		5.786E+016	9.213E+01
		321.65	0.23	1.349E+017		-5.720E+016	6.317E+01
		327.44	0.12	2.856E+017		1.433E+017	1.346E+01
		328.00	2.95	1.176E+016		5.466E+015	5.544E+01
		332.37	0.40	8.657E+016		2.786E+015	4.077E+01
		338.32	11.27	3.029E+015		1.813E+015	1.423E+01
		340.96	0.37	8.837E+016		-6.411E+016	4.138E+01
		409.46	1.92	1.992E+016		-4.334E+015	9.307E+01
		440.44	0.12	3.388E+017		5.156E+016	1.582E+01
		463.00	4.40	1.065E+016		5.775E+014	5.003E+01
		478.33	0.21	2.399E+017		1.505E+017	1.129E+01
		503.82	0.18	2.660E+017		-5.154E+017	1.245E+01
		508.96	0.45	1.447E+017		2.081E+017	6.887E+01
		523.13	0.10	4.308E+017		4.341E+016	1.997E+01
		546.47	0.20	2.530E+017		1.597E+017	1.181E+01
		562.50	0.87	6.422E+016		2.508E+016	3.011E+01
		570.91	0.18	2.940E+017		2.183E+017	1.373E+01
		572.14	0.15	3.449E+017		5.874E+016	1.607E+01
		583.41	0.11	5.220E+017		4.287E+017	2.448E+01
		674.75	2.10	2.650E+016		-1.107E+016	1.226E+01
		701.75	0.17	3.427E+017		2.283E+017	1.589E+01
		707.41	0.16	3.789E+017		-3.107E+016	1.754E+01
		726.86	0.62	1.106E+017		1.023E+017	5.171E+01
		755.32	1.00	6.717E+016		6.342E+015	3.128E+01
		772.29	1.49	4.497E+016		4.345E+016	2.090E+01
		782.14	0.49	1.330E+017		-1.922E+016	6.158E+01
		794.95	4.25	1.619E+016		-2.768E+015	7.526E+01
		830.49	0.54	1.337E+017		8.132E+016	6.217E+01
		835.71	1.61	4.330E+016		2.161E+016	2.008E+01
		840.38	0.91	7.368E+016		1.301E+016	3.404E+01
		904.20	0.77	1.130E+017		-6.826E+016	5.296E+01
		911.20	25.80	3.578E+015		3.279E+015	1.683E+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	7.234E+017	3.03E+015	1.644E+017	3.349E+01
	958.61	0.28	2.884E+017		-2.930E+016	1.340E+01
	964.77	4.99	1.666E+016		6.959E+015	7.752E+01
	968.97	15.80	5.158E+015		2.730E+015	2.396E+01
	1033.25	0.20	3.217E+017		6.815E+016	1.456E+01
	1065.18	0.13	5.101E+017		-6.370E+016	2.313E+01
	1095.68	0.13	5.194E+017		-5.631E+017	2.347E+01
	1110.61	0.28	3.031E+017		-5.220E+016	1.402E+01
	1153.52	0.14	5.741E+017		-2.390E+017	2.629E+01
	1247.08	0.50	1.666E+017		-1.745E+017	7.612E+01
	1459.14	0.83	2.427E+017		5.752E+017	1.164E+01
	1495.91	0.86	8.099E+016		1.123E+016	3.561E+01
	1501.57	0.46	1.660E+017		-5.264E+016	7.385E+01
	1557.11	0.18	3.633E+017		-2.408E+016	1.572E+01
	1580.53	0.60	1.188E+017		-1.176E+016	5.207E+01
	1588.20	3.22	2.591E+016		1.236E+016	1.158E+01
	1625.06	0.25	2.866E+017		1.193E+017	1.256E+01
	1630.63	1.51	4.979E+016		2.243E+016	2.189E+01
	1638.28	0.47	1.394E+017		-7.634E+016	6.003E+01
	1666.52	0.18	3.045E+017		1.727E+016	1.263E+01
TH-230	67.67	0.38	1.267E+001	1.27E+001	-9.191E+000	6.008E+00
PA-234	742.81	0.11	1.284E+002	1.88E+001	6.604E+001	5.971E+00
	766.42	0.32	4.196E+001		2.294E+000	1.943E+00
TH-234	1001.03	0.84	1.880E+001	1.59E+000	7.647E+000	8.656E+00
	63.29	3.70	1.594E+000		1.935E+000	7.607E-00
	92.38	2.13	2.102E+000		2.163E+000	1.004E+00
	92.80	2.10	2.048E+000		1.025E+000	9.760E-00
	112.81	0.21	1.534E+001		-6.805E+000	7.200E+00
U-234	53.20	0.12	5.224E+001	5.22E+001	4.084E+001	2.469E+00
	120.90	0.04	9.181E+001		-1.729E+001	4.307E+00
U-235	72.70	0.12	4.993E+001	3.62E-001	1.879E+001	2.400E+00
	89.96	3.43	1.254E+000		-2.186E+000	5.974E-00
	93.35	5.54	7.669E-001		4.412E-001	3.654E-00
	104.82	0.69	5.193E+000		-4.133E+000	2.453E+00
	105.60	1.31	2.778E+000		-3.970E-001	1.314E+00
	108.58	0.50	7.109E+000		-9.672E-002	3.358E+00
	109.19	1.66	2.162E+000		8.959E-001	1.022E+00
	140.76	0.20	1.948E+001		-4.908E+000	9.220E+00
	143.76	10.96	3.620E-001		-3.191E-002	1.714E-00
	163.36	5.08	7.596E-001		-2.479E-001	3.576E-00
	182.62	0.39	1.387E+001		-8.112E+000	6.622E+00
	194.94	0.63	7.194E+000		-4.229E+000	3.394E+00
	202.12	1.08	4.570E+000		-1.573E-001	2.163E+00
	205.32	5.02	9.600E-001		-5.461E-001	4.535E-00
	221.39	0.12	4.230E+001		2.145E+001	1.995E+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	^	9.12E+000	17.640			
Pb-212	74.8		5.72E-001	38.969	2.906[50.634]	3.57	-0.654
	77.1		2.94E-001	39.783	1.493[51.262]		[0.508]
	238.6	^	1.97E-001	32.329	1.000[45.720]		
PB-214	74.8		1.01E+000	39.983	4.578[55.673]	4.93	-0.866
	77.1		5.18E-001	40.789	2.339[56.254]		[0.401]
	295.2		1.68E-001	62.193	0.761[73.272]		
	351.9	^	2.21E-001	38.740	1.000[54.787]		
Ra-226	186.2	^	1.37E+000	37.884			