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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-2079\W6H-IMC-207

Report Generated On : 5/1/2017 9:59:21 AM

Sample Title : W6H-IMC-2079-S-P-6

Sample Description :

Sample Identification : 2079-S-P-6

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 : 2.524E+002 grams

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

Acquisition Started : 3/31/2017 11:52:21 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 : 5/1/2017

Efficiency ID : H-IMC-2079-S-P-6

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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-2079-S-P-6

Peak Analysis Performed on: 5/1/2017 9:59:17 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
F	1	182-	191	186.00	46.70	0.55	3.50E+001	15.83	5.00E+001
M	2	295-	313	299.74	75.15	0.68	8.97E+001	22.53	5.70E+001
m	3	295-	313	308.45	77.33	0.69	5.36E+001	17.91	4.62E+001
F	4	947-	957	953.67	238.73	0.65	3.38E+001	15.99	4.95E+001
F	5	5825-	5848	5836.77	1460.22	2.73	1.32E+002	21.72	9.33E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

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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-2079-S-P-6  
 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	0.944	1460.82*	10.66	8.63076E+000	1.59620E+000
Pb-210	0.996	46.54*	4.25	1.42680E+000	7.62465E-001
Pb-212	0.995	74.82*	10.28	7.66177E-001	2.46784E-001
		77.11*	17.10	2.69347E-001	1.05092E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	9.39221E-002	4.68443E-002
		300.09	3.30		

\* = 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	0.944	8.630755E+000	1.596204E+000
Pb-210	0.996	1.426797E+000	7.624645E-001
Pb-212	0.995	1.417686E-001	4.215727E-002

? = 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: 5/1/2017 9:59:17 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.

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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-2079-S-P-6  
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	1.178E+000	1.18E+000	8.631E+000	5.009E-00
	CO-60	1173.23	99.85	1.821E-001	1.58E-001	-1.113E-001	8.320E-00
		1332.49	99.98	1.585E-001		-4.451E-002	7.050E-00
	CS-137	661.66	85.10	1.553E-001	1.55E-001	4.847E-002	7.217E-00
+	Pb-210	46.54*	4.25	1.661E+000	1.66E+000	1.427E+000	7.754E-00
	BI-212	288.20	0.34	1.960E+001	1.85E+000	6.353E+000	9.215E+00
		328.03	0.13	6.205E+001		-2.130E+001	2.922E+00
		452.98	0.36	2.821E+001		6.227E+000	1.324E+00
		727.33	6.67	1.852E+000		-1.579E+000	8.500E-00
		785.37	1.10	1.218E+001		3.745E+000	5.593E+00
		893.41	0.38	4.240E+001		2.232E+000	1.957E+00
		952.12	0.17	1.070E+002		-4.066E+000	4.968E+00
		1078.62	0.56	2.911E+001		-9.802E+000	1.327E+00
		1512.70	0.29	5.553E+001		3.532E+001	2.442E+00
		1620.50	1.47	1.193E+001		3.719E+000	5.262E+00
+	Pb-212	74.82*	10.28	3.230E-001	1.07E-001	7.662E-001	1.500E-00
		77.11*	17.10	1.726E-001		2.693E-001	7.950E-00
		86.83	2.07	2.281E+000		7.012E-001	1.088E+00
		87.35	3.97	1.154E+000		-3.647E-001	5.497E-00
		89.78	1.46	2.962E+000		-1.500E+000	1.407E+00
		115.18	0.60	6.081E+000		-1.392E+000	2.864E+00
		238.63*	43.60	1.066E-001		9.392E-002	4.955E-00
		300.09	3.30	2.177E+000		-2.208E+000	1.026E+00
	BI-214	76.86	0.55	1.211E+001	3.18E-001	5.280E-002	5.839E+00
		79.29	0.91	5.255E+000		-5.594E-001	2.501E+00
		89.26	0.11	3.862E+001		1.813E+000	1.833E+00
		89.81	0.21	2.059E+001		-1.043E+001	9.781E+00
		273.80	0.13	5.141E+001		3.015E+001	2.424E+00
		348.92	0.10	8.246E+001		6.232E+001	3.892E+00
		386.78	0.29	2.886E+001		3.154E+000	1.352E+00
		388.89	0.40	2.089E+001		-9.906E-001	9.777E+00
		405.72	0.17	5.231E+001		3.450E+000	2.449E+00
		454.79	0.29	3.415E+001		1.749E+001	1.598E+00
		469.77	0.13	7.559E+001		-6.134E-001	3.530E+00
		609.32	45.49	3.175E-001		1.218E-001	1.493E-00
		665.45	1.53	8.464E+000		5.059E+000	3.927E+00
		703.11	0.47	2.895E+001		9.533E+000	1.343E+00
		719.87	0.39	3.052E+001		-4.180E+001	1.398E+00
		752.85	0.13	1.100E+002		3.035E+000	5.091E+00
		768.36	4.89	3.085E+000		1.156E+000	1.433E+00
		786.35	0.32	3.920E+001		-2.230E+001	1.789E+00
		806.18	1.26	1.088E+001		9.310E+000	4.996E+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	9.481E+001	3.18E-001	3.119E+001	4.387E+00
	826.45	0.12	1.265E+002		4.188E+001	5.833E+00
	934.06	3.11	5.467E+000		4.173E+000	2.528E+00
	964.08	0.37	5.318E+001		2.830E+000	2.479E+00
	1051.96	0.31	5.507E+001		-1.320E+001	2.527E+00
	1069.96	0.27	7.096E+001		6.691E+001	3.283E+00
	1120.29	14.92	1.322E+000		-4.084E-001	6.107E-00
	1133.66	0.25	7.858E+001		1.573E+001	3.627E+00
	1155.21	1.63	1.217E+001		-8.510E+000	5.613E+00
	1207.68	0.45	4.209E+001		-7.531E+000	1.927E+00
	1238.11	5.83	3.247E+000		-9.568E-001	1.483E+00
	1280.98	1.43	1.165E+001		-4.333E-001	5.237E+00
	1303.75	0.11	1.558E+002		-7.369E+001	6.993E+00
	1377.67	3.99	4.068E+000		6.542E-001	1.810E+00
	1385.31	0.79	2.137E+001		4.516E+000	9.551E+00
	1401.52	1.33	1.238E+001		-2.047E+000	5.507E+00
	1407.99	2.39	6.764E+000		-3.754E-001	3.001E+00
	1509.21	2.13	6.967E+000		1.289E+000	3.029E+00
	1538.53	0.40	3.792E+001		-6.099E-001	1.649E+00
	1543.34	0.30	4.848E+001		-1.245E+001	2.098E+00
	1583.20	0.70	2.599E+001		1.925E+001	1.156E+00
	1594.75	0.27	6.766E+001		3.598E+000	3.002E+00
	1599.37	0.32	4.680E+001		-1.331E+001	2.025E+00
	1661.27	1.05	1.051E+001		-1.669E+001	4.246E+00
	1684.01	0.21	7.424E+001		1.236E+001	3.213E+00
	1729.59	2.88	5.295E+000		2.953E-001	2.267E+00
	1764.49	15.30	1.400E+000		7.574E-001	6.270E-00
	1838.36	0.35	4.082E+001		-4.777E+000	1.710E+00
	1847.43	2.03	5.577E+000		-2.531E+000	2.213E+00
	1873.16	0.21	6.798E+001		-1.040E+001	2.847E+00
	1896.05	0.15	8.903E+001		-4.150E+000	3.649E+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	1.136E+000	2.55E-001	4.556E-001	5.473E-00
	77.11	9.70	6.747E-001		4.440E-003	3.254E-00
	86.83	1.70	2.777E+000		8.539E-001	1.324E+00
	87.35	2.24	2.046E+000		-6.464E-001	9.743E-00
	89.78	0.82	5.273E+000		-2.670E+000	2.505E+00
	241.99	7.25	1.042E+000		-7.275E-001	4.979E-00
	258.76	0.53	1.224E+001		3.745E+000	5.789E+00
	274.80	0.35	1.851E+001		-1.603E+000	8.726E+00
	295.22	18.42	3.989E-001		3.484E-002	1.885E-00
	351.93	35.60	2.547E-001		3.221E-001	1.206E-00
	462.02	0.21	4.190E+001		-4.579E+001	1.943E+00
	480.43	0.34	2.903E+001		2.890E+000	1.352E+00
	487.14	0.43	2.227E+001		-8.030E+000	1.035E+00
	533.66	0.18	6.202E+001		-3.573E+000	2.894E+00
	580.14	0.37	3.858E+001		3.220E+001	1.819E+00
	785.96	1.06	1.183E+001		-6.730E+000	5.398E+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	3.025E+001	2.55E-001	2.057E+001	1.413E+00
Ra-226	81.07	0.20	1.887E+001	1.53E+000	-6.386E+000	8.858E+00
	83.79	0.32	1.389E+001		5.203E+000	6.601E+00
	186.21	3.64	1.528E+000		9.015E-001	7.274E-00
AC-228	89.96	1.90	2.493E+017	7.05E+016	-1.262E+017	1.184E+01
	93.35	3.10	1.487E+017		-1.947E+016	7.060E+01
	99.51	1.26	2.996E+017		-2.929E+016	1.406E+01
	104.82	0.39	8.490E+017		-9.241E+017	3.951E+01
	105.60	0.74	4.802E+017		1.547E+017	2.246E+01
	108.58	0.28	1.319E+018		-8.026E+017	6.183E+01
	129.07	2.42	1.703E+017		5.785E+016	8.025E+01
	145.85	0.16	2.684E+018		3.347E+017	1.263E+01
	153.98	0.72	6.330E+017		2.753E+017	2.988E+01
	191.35	0.12	4.305E+018		-1.136E+018	2.032E+01
	199.41	0.31	1.788E+018		-2.428E+017	8.452E+01
	204.03	0.11	4.955E+018		8.248E+017	2.338E+01
	209.25	3.89	1.413E+017		2.805E+016	6.655E+01
	214.85	0.76	7.669E+017		2.005E+017	3.619E+01
	270.24	3.46	1.906E+017		-6.055E+016	8.943E+01
	278.95	0.16	4.842E+018		2.076E+018	2.290E+01
	321.65	0.23	3.526E+018		1.423E+018	1.656E+01
	327.44	0.12	6.996E+018		-2.731E+018	3.293E+01
	328.00	2.95	2.881E+017		-9.893E+016	1.357E+01
	332.37	0.40	2.073E+018		-1.225E+018	9.740E+01
	338.32	11.27	7.053E+016		-2.508E+015	3.300E+01
	340.96	0.37	2.200E+018		1.467E+018	1.030E+01
	409.46	1.92	4.997E+017		-3.301E+017	2.336E+01
	440.44	0.12	8.091E+018		1.388E+018	3.767E+01
	463.00	4.40	2.236E+017		-1.142E+017	1.038E+01
	478.33	0.21	5.107E+018		-3.786E+017	2.378E+01
	503.82	0.18	6.807E+018		-1.277E+019	3.191E+01
	508.96	0.45	3.585E+018		3.306E+018	1.705E+01
	523.13	0.10	1.154E+019		4.671E+018	5.378E+01
	546.47	0.20	5.142E+018		-4.954E+018	2.362E+01
	562.50	0.87	1.427E+018		5.525E+017	6.637E+01
	570.91	0.18	6.925E+018		4.021E+018	3.221E+01
	572.14	0.15	8.289E+018		-1.250E+018	3.850E+01
	583.41	0.11	1.381E+019		1.146E+019	6.499E+01
	674.75	2.10	5.870E+017		-3.118E+017	2.688E+01
	701.75	0.17	8.349E+018		-1.168E+018	3.863E+01
	707.41	0.16	9.877E+018		-8.546E+018	4.588E+01
	726.86	0.62	2.230E+018		-1.495E+018	1.025E+01
	755.32	1.00	1.589E+018		-1.403E+017	7.368E+01
	772.29	1.49	1.051E+018		-1.066E+017	4.862E+01
	782.14	0.49	2.956E+018		-2.469E+017	1.355E+01
	794.95	4.25	3.537E+017		4.140E+016	1.626E+01
	830.49	0.54	3.185E+018		1.517E+018	1.476E+01
	835.71	1.61	1.065E+018		-7.905E+017	4.932E+01
	840.38	0.91	2.170E+018		2.356E+018	1.015E+01
	904.20	0.77	2.533E+018		3.269E+017	1.178E+01
	911.20	25.80	7.958E+016		6.792E+016	3.713E+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	1.747E+019	7.05E+016	5.541E+018	8.065E+01
	958.61	0.28	7.222E+018		-1.385E+018	3.355E+01
	964.77	4.99	4.266E+017		9.616E+016	1.988E+01
	968.97	15.80	1.343E+017		7.367E+016	6.255E+01
	1033.25	0.20	9.455E+018		2.359E+018	4.346E+01
	1065.18	0.13	1.524E+019		5.009E+018	7.023E+01
	1095.68	0.13	1.484E+019		6.954E+018	6.793E+01
	1110.61	0.28	7.023E+018		-3.000E+018	3.225E+01
	1153.52	0.14	1.565E+019		4.422E+018	7.218E+01
	1247.08	0.50	4.606E+018		1.015E+018	2.123E+01
	1459.14	0.83	5.718E+018		1.403E+019	2.735E+01
	1495.91	0.86	1.577E+018		-1.056E+017	6.661E+01
	1501.57	0.46	3.309E+018		3.114E+017	1.425E+01
	1557.11	0.18	9.117E+018		-6.043E+017	3.945E+01
	1580.53	0.60	2.824E+018		-1.612E+018	1.228E+01
	1588.20	3.22	6.622E+017		6.375E+017	2.966E+01
	1625.06	0.25	6.404E+018		-3.506E+018	2.757E+01
	1630.63	1.51	1.085E+018		-1.033E+018	4.670E+01
	1638.28	0.47	3.829E+018		2.166E+018	1.672E+01
	1666.52	0.18	8.392E+018		4.817E+018	3.544E+01
TH-230	67.67	0.38	1.189E+001	1.19E+001	3.383E-001	5.600E+00
PA-234	742.81	0.11	1.478E+002		6.117E+001	6.903E+00
	766.42	0.32	4.865E+001	1.23E+000	-1.023E+001	2.264E+00
	1001.03	0.84	2.024E+001		9.846E+000	9.312E+00
TH-234	63.29	3.70	1.231E+000		2.342E-001	5.773E-00
	92.38	2.13	2.081E+000		2.426E+000	9.901E-00
	92.80	2.10	2.061E+000		6.567E-001	9.800E-00
	112.81	0.21	1.685E+001		4.494E+000	7.923E+00
U-234	53.20	0.12	4.897E+001	4.90E+001	-1.256E+001	2.301E+00
	120.90	0.04	9.577E+001		-5.967E+001	4.485E+00
U-235	72.70	0.12	4.173E+001	3.69E-001	9.390E+000	1.985E+00
	89.96	3.43	1.260E+000		-6.379E-001	5.985E-00
	93.35	5.54	7.593E-001		-9.942E-002	3.604E-00
	104.82	0.69	4.410E+000		-4.800E+000	2.052E+00
	105.60	1.31	2.475E+000		7.972E-001	1.158E+00
	108.58	0.50	6.737E+000		-4.101E+000	3.159E+00
	109.19	1.66	2.078E+000		-6.915E-001	9.761E-00
	140.76	0.20	1.892E+001		-1.609E+001	8.903E+00
	143.76	10.96	3.690E-001		3.099E-001	1.742E-00
	163.36	5.08	7.938E-001		4.709E-001	3.731E-00
	182.62	0.39	1.380E+001		2.568E+000	6.565E+00
	194.94	0.63	8.154E+000		4.814E+000	3.859E+00
	202.12	1.08	4.697E+000		1.670E+000	2.218E+00
	205.32	5.02	9.986E-001		-1.239E-001	4.708E-00
	221.39	0.12	4.246E+001		-3.233E+000	1.993E+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-2079\W6H-IMC-207

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	^	8.63E+000	18.494			
Pb-210	46.5	^	1.43E+000	53.439			
Pb-212	74.8		7.66E-001	32.210	8.158[59.372]	7.79	-1.426
	77.1		2.69E-001	39.017	2.868[63.324]		[ 0.722]
	238.6	^	9.39E-002	49.876	1.000[70.535]		