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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 9:48:01 AM

Sample Title : W6H-IMC-2079-S-P-2

Sample Description :

Sample Identification : 2079-S-P-2

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 : 2.712E+002 grams

Sample Taken On : 3/23/2017 12:00:00 AM

Acquisition Started : 3/30/2017 2:12:14 PM

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-2

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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-2

Peak Analysis Performed on: 5/1/2017 9:47:57 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	180-	192	186.86	46.91	0.59	4.96E+001	16.67	4.33E+001
M	2	286-	303	290.96	72.95	0.73	4.49E+001	16.76	4.39E+001
m	3	286-	303	299.56	75.11	0.74	7.81E+001	21.89	5.43E+001
F	4	365-	377	369.73	92.66	0.89	4.81E+001	18.25	4.77E+001
F	5	943-	959	953.02	238.56	1.25	6.50E+001	19.77	4.68E+001
F	6	1176-	1186	1179.80	295.29	0.75	2.11E+001	12.79	2.86E+001
F	7	5826-	5851	5838.48	1460.65	2.75	1.40E+002	21.87	4.33E+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-2  
 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	0.995	1460.82*	10.66	8.54948E+000	1.52229E+000
Pb-210	0.978	46.54*	4.25	1.97648E+000	8.67174E-001
Pb-212	0.635	74.82*	10.28	6.42805E-001	2.21905E-001
		77.11	17.10		
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	1.70380E-001	5.84015E-002
		300.09	3.30		
TH-234	0.329	63.29	3.70		
		92.38	2.13		
		92.80*	2.10	1.72793E+000	8.05129E-001
		112.81	0.21		

\* = 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	0.995	8.549482E+000	1.522293E+000
Pb-210	0.978	1.976482E+000	8.671737E-001
Pb-212	0.635	2.009830E-001	5.647825E-002
TH-234	0.329	1.727934E+000	8.051294E-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: 5/1/2017 9:47:57 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
M 2	72.95	2.4970E-002	37.29	Tol.	U-235
F 6	295.29	1.1742E-002	60.53	Tol.	PB-214

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 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-2  
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	8.200E-001	8.20E-001	8.549E+000	3.273E-00
	CO-60	1173.23	99.85	1.840E-001	1.57E-001	-2.475E-002	8.466E-00
		1332.49	99.98	1.568E-001		-8.891E-002	7.024E-00
	CS-137	661.66	85.10	1.424E-001	1.42E-001	-9.322E-002	6.604E-00
+	Pb-210	46.54*	4.25	1.643E+000	1.64E+000	1.976E+000	7.677E-00
	BI-212	288.20	0.34	1.696E+001	2.18E+000	-1.450E+001	7.930E+00
		328.03	0.13	5.625E+001		2.823E+001	2.643E+00
		452.98	0.36	2.275E+001		-1.162E+001	1.055E+00
		727.33	6.67	2.175E+000		1.747E+000	1.016E+00
		785.37	1.10	1.248E+001		-9.099E-001	5.776E+00
		893.41	0.38	3.865E+001		2.973E+001	1.780E+00
		952.12	0.17	9.361E+001		-3.417E+001	4.321E+00
		1078.62	0.56	2.831E+001		-6.518E+000	1.295E+00
		1512.70	0.29	4.939E+001		-6.050E+000	2.156E+00
		1620.50	1.47	1.064E+001		6.343E+000	4.660E+00
+	Pb-212	74.82*	10.28	3.043E-001	1.11E-001	6.428E-001	1.410E-00
		77.11	17.10	3.513E-001		-8.077E-003	1.691E-00
		86.83	2.07	2.312E+000		1.344E+000	1.105E+00
		87.35	3.97	1.159E+000		-4.853E-001	5.531E-00
		89.78	1.46	2.879E+000		1.296E+000	1.369E+00
		115.18	0.60	5.786E+000		1.531E+000	2.725E+00
		238.63*	43.60	1.113E-001		1.704E-001	5.209E-00
		300.09	3.30	1.932E+000		-4.985E-001	9.076E-00
	BI-214	76.86	0.55	1.103E+001	2.90E-001	-3.048E-001	5.307E+00
		79.29	0.91	5.032E+000		2.464E+000	2.395E+00
		89.26	0.11	3.815E+001		3.194E+001	1.813E+00
		89.81	0.21	2.001E+001		9.012E+000	9.514E+00
		273.80	0.13	4.409E+001		7.948E+000	2.066E+00
		348.92	0.10	7.044E+001		1.849E+001	3.304E+00
		386.78	0.29	2.631E+001		1.150E+001	1.230E+00
		388.89	0.40	1.889E+001		-7.181E+000	8.813E+00
		405.72	0.17	5.049E+001		-4.639E+001	2.368E+00
		454.79	0.29	2.932E+001		6.621E+000	1.364E+00
		469.77	0.13	6.964E+001		2.972E+001	3.248E+00
		609.32	45.49	2.901E-001		8.181E-002	1.362E-00
		665.45	1.53	8.275E+000		3.679E+000	3.851E+00
		703.11	0.47	2.381E+001		-3.624E+000	1.093E+00
		719.87	0.39	3.457E+001		-8.923E+000	1.608E+00
		752.85	0.13	1.069E+002		1.425E+001	4.962E+00
		768.36	4.89	2.989E+000		-2.713E-001	1.392E+00
		786.35	0.32	4.107E+001		-4.748E+000	1.893E+00
		806.18	1.26	1.032E+001		-5.512E+000	4.745E+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	9.585E+001	2.90E-001	6.926E+001	4.460E+00
	826.45	0.12	1.296E+002		6.092E+001	6.020E+00
	934.06	3.11	5.036E+000		-2.957E-001	2.325E+00
	964.08	0.37	4.531E+001		-1.234E+001	2.096E+00
	1051.96	0.31	5.051E+001		-9.922E+000	2.313E+00
	1069.96	0.27	6.097E+001		4.589E-001	2.800E+00
	1120.29	14.92	1.144E+000		-6.613E-001	5.248E-00
	1133.66	0.25	6.314E+001		-3.041E+001	2.874E+00
	1155.21	1.63	1.084E+001		-8.978E-001	4.980E+00
	1207.68	0.45	4.569E+001		3.008E+001	2.118E+00
	1238.11	5.83	3.515E+000		1.987E+000	1.626E+00
	1280.98	1.43	1.305E+001		6.293E+000	5.974E+00
	1303.75	0.11	1.509E+002		3.866E+001	6.799E+00
	1377.67	3.99	4.573E+000		1.761E+000	2.076E+00
	1385.31	0.79	2.039E+001		-6.673E+000	9.132E+00
	1401.52	1.33	1.136E+001		-6.304E-001	5.040E+00
	1407.99	2.39	6.336E+000		6.300E-001	2.811E+00
	1509.21	2.13	6.891E+000		4.180E+000	3.020E+00
	1538.53	0.40	3.447E+001		1.085E+001	1.492E+00
	1543.34	0.30	4.540E+001		-1.166E+001	1.965E+00
	1583.20	0.70	2.172E+001		5.457E+000	9.517E+00
	1594.75	0.27	5.919E+001		2.666E+001	2.603E+00
	1599.37	0.32	4.644E+001		-8.109E+000	2.027E+00
	1661.27	1.05	1.215E+001		4.500E+000	5.132E+00
	1684.01	0.21	7.756E+001		1.313E+001	3.411E+00
	1729.59	2.88	5.458E+000		1.053E-001	2.373E+00
	1764.49	15.30	1.133E+000		5.399E-001	4.981E-00
	1838.36	0.35	3.234E+001		-2.981E+000	1.307E+00
	1847.43	2.03	6.318E+000		1.732E+000	2.620E+00
	1873.16	0.21	5.006E+001		-5.441E+001	1.986E+00
	1896.05	0.15	8.805E+001		-1.970E+001	3.652E+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	1.105E+000	2.19E-001	-1.414E-001	5.325E-00
	77.11	9.70	6.194E-001		-1.424E-002	2.981E-00
	86.83	1.70	2.815E+000		1.636E+000	1.346E+00
	87.35	2.24	2.054E+000		-8.602E-001	9.803E-00
	89.78	0.82	5.125E+000		2.308E+000	2.437E+00
	241.99	7.25	9.589E-001		-1.796E-001	4.579E-00
	258.76	0.53	1.012E+001		2.045E+000	4.744E+00
	274.80	0.35	1.535E+001		-6.195E+000	7.177E+00
	295.22	18.42	3.778E-001		2.421E-001	1.786E-00
	351.93	35.60	2.186E-001		2.133E-001	1.029E-00
	462.02	0.21	4.382E+001		7.947E+000	2.048E+00
	480.43	0.34	2.812E+001		-8.735E+000	1.312E+00
	487.14	0.43	2.241E+001		4.898E+000	1.046E+00
	533.66	0.18	5.358E+001		-3.888E+001	2.484E+00
	580.14	0.37	3.590E+001		2.299E+001	1.691E+00
	785.96	1.06	1.252E+001		2.303E-001	5.773E+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	2.529E+001	2.19E-001	6.419E+000	1.171E+00
Ra-226	81.07	0.20	1.833E+001	1.49E+000	-1.697E+001	8.613E+00
	83.79	0.32	1.312E+001		1.704E+000	6.230E+00
	186.21	3.64	1.494E+000		1.199E+000	7.126E-00
AC-228	89.96	1.90	1.884E+009	5.23E+008	8.486E+008	8.959E+00
	93.35	3.10	1.115E+009		-3.104E+007	5.295E+00
	99.51	1.26	2.400E+009		-2.844E+008	1.132E+00
	104.82	0.39	7.147E+009		4.865E+009	3.356E+00
	105.60	0.74	3.721E+009		1.133E+008	1.746E+00
	108.58	0.28	9.651E+009		-2.955E+009	4.522E+00
	129.07	2.42	1.245E+009		-2.938E+008	5.862E+00
	145.85	0.16	2.032E+010		9.979E+009	9.577E+00
	153.98	0.72	4.799E+009		4.949E+008	2.269E+00
	191.35	0.12	3.149E+010		-2.089E+010	1.486E+01
	199.41	0.31	1.232E+010		-2.346E+009	5.801E+00
	204.03	0.11	3.747E+010		-3.787E+008	1.771E+01
	209.25	3.89	1.065E+009		-5.708E+008	5.024E+00
	214.85	0.76	5.377E+009		1.268E+009	2.531E+00
	270.24	3.46	1.389E+009		6.059E+008	6.518E+00
	278.95	0.16	3.119E+010		-2.478E+009	1.464E+01
	321.65	0.23	2.445E+010		3.188E+009	1.144E+01
	327.44	0.12	5.014E+010		6.671E+009	2.357E+01
	328.00	2.95	2.032E+009		1.019E+009	9.545E+00
	332.37	0.40	1.392E+010		1.694E+009	6.499E+00
	338.32	11.27	5.234E+008		3.920E+008	2.451E+00
	340.96	0.37	1.581E+010		1.094E+010	7.394E+00
	409.46	1.92	3.802E+009		3.251E+009	1.782E+00
	440.44	0.12	5.555E+010		3.011E+009	2.574E+01
	463.00	4.40	1.828E+009		1.160E+009	8.550E+00
	478.33	0.21	3.875E+010		1.821E+010	1.809E+01
	503.82	0.18	4.022E+010		-9.025E+010	1.855E+01
	508.96	0.45	2.381E+010		2.897E+010	1.127E+01
	523.13	0.10	8.062E+010		2.149E+010	3.745E+01
	546.47	0.20	4.178E+010		-4.501E+010	1.936E+01
	562.50	0.87	1.019E+010		8.283E+009	4.731E+00
	570.91	0.18	5.256E+010		-3.267E+009	2.451E+01
	572.14	0.15	6.616E+010		9.933E+009	3.093E+01
	583.41	0.11	9.875E+010		3.394E+010	4.641E+01
	674.75	2.10	4.665E+009		-6.141E+009	2.152E+00
	701.75	0.17	5.281E+010		-3.209E+010	2.413E+01
	707.41	0.16	6.922E+010		7.569E+009	3.205E+01
	726.86	0.62	2.021E+010		2.038E+010	9.447E+00
	755.32	1.00	1.151E+010		-3.610E+009	5.333E+00
	772.29	1.49	8.596E+009		-2.458E+009	4.009E+00
	782.14	0.49	2.574E+010		1.139E+009	1.197E+01
	794.95	4.25	2.888E+009		1.787E+009	1.340E+00
	830.49	0.54	2.138E+010		-2.445E+010	9.838E+00
	835.71	1.61	7.641E+009		3.098E+009	3.533E+00
	840.38	0.91	1.395E+010		2.512E+009	6.464E+00
	904.20	0.77	1.730E+010		-1.455E+010	8.005E+00
	911.20	25.80	6.010E+008		5.674E+008	2.811E+00

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	1.275E+011	5.23E+008	-8.380E+010	5.886E+01
	958.61	0.28	5.228E+010		3.126E+010	2.427E+01
	964.77	4.99	2.852E+009		1.121E+008	1.320E+00
	968.97	15.80	8.882E+008		-9.887E+007	4.107E+00
	1033.25	0.20	6.897E+010		-2.671E+010	3.171E+01
	1065.18	0.13	9.835E+010		-7.889E+010	4.483E+01
	1095.68	0.13	9.774E+010		-6.019E+010	4.431E+01
	1110.61	0.28	4.661E+010		-5.185E+010	2.122E+01
	1153.52	0.14	1.096E+011		6.735E+009	5.039E+01
	1247.08	0.50	3.153E+010		-9.884E+009	1.445E+01
	1459.14	0.83	4.117E+010		9.953E+010	1.968E+01
	1495.91	0.86	1.242E+010		-1.905E+009	5.315E+00
	1501.57	0.46	2.708E+010		1.182E+010	1.187E+01
	1557.11	0.18	6.842E+010		1.155E+010	2.974E+01
	1580.53	0.60	1.933E+010		-1.753E+010	8.324E+00
	1588.20	3.22	4.462E+009		3.167E+009	1.980E+00
	1625.06	0.25	5.373E+010		4.309E+010	2.363E+01
	1630.63	1.51	7.900E+009		4.731E+008	3.401E+00
	1638.28	0.47	1.715E+010		-3.779E+009	6.805E+00
	1666.52	0.18	5.846E+010		-1.824E+010	2.448E+01
TH-230	67.67	0.38	1.100E+001	1.10E+001	-1.635E+000	5.168E+00
PA-234	742.81	0.11	1.258E+002	1.90E+001	6.276E+001	5.831E+00
	766.42	0.32	4.569E+001		3.176E+000	2.126E+00
+ TH-234	1001.03	0.84	1.898E+001	1.43E+000	-7.346E-001	8.735E+00
	63.29	3.70	1.427E+000		1.122E+000	6.768E-00
	92.38	2.13	1.997E+000		1.984E+000	9.507E-00
	92.80*	2.10	1.549E+000		1.728E+000	7.257E-00
	112.81	0.21	1.559E+001		-2.872E+000	7.317E+00
U-234	53.20	0.12	4.538E+001	4.54E+001	1.140E+001	2.124E+00
	120.90	0.04	9.770E+001		-4.954E+001	4.597E+00
U-235	72.70	0.12	4.253E+001	3.41E-001	5.794E+000	2.029E+00
	89.96	3.43	1.224E+000		5.514E-001	5.822E-00
	93.35	5.54	7.318E-001		-2.037E-002	3.475E-00
	104.82	0.69	4.773E+000		3.249E+000	2.241E+00
	105.60	1.31	2.466E+000		7.506E-002	1.157E+00
	108.58	0.50	6.340E+000		-1.941E+000	2.970E+00
	109.19	1.66	1.910E+000		-7.550E-001	8.948E-00
	140.76	0.20	1.755E+001		-1.561E+001	8.245E+00
	143.76	10.96	3.412E-001		5.497E-002	1.609E-00
	163.36	5.08	7.765E-001		1.812E-001	3.657E-00
	182.62	0.39	1.276E+001		-4.066E+000	6.063E+00
	194.94	0.63	7.244E+000		4.225E+000	3.416E+00
	202.12	1.08	4.438E+000		-4.115E-001	2.095E+00
	205.32	5.02	9.904E-001		2.267E-001	4.682E-00
	221.39	0.12	3.664E+001		-2.555E+001	1.709E+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  
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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	^	8.55E+000	17.806			
Pb-210	46.5	^	1.98E+000	43.875			
Pb-212	74.8		6.43E-001	34.521	3.773[48.648]	6.27	-1.145
	238.6	^	1.70E-001	34.277	1.000[48.475]		[ 0.592]
TH-234	92.8		1.73E+000	*****			