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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-0011\W6H-IMC-001

Report Generated On : 3/10/2017 2:56:04 PM

Sample Title : W6H-IMC-0011-S-P-7

Sample Description : UNC 2017

Sample Identification : IMC-0011-S-P-7

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 : 3.830E+002 GRAMS

Sample Taken On : 2/28/2017 12:00:00 PM

Acquisition Started : 3/10/2017 12:21:01 PM

Live Time : 1800.0 seconds

Real Time : 1800.7 seconds

Dead Time : 0.04 %

Energy Calibration Used Done On : 3/9/2017

Efficiency Calibration Used Done On : 3/10/2017

Efficiency ID : H-IMC-0011-S-P-7

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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: 8381

Sample Title: W6H-IMC-0011-S-P-7

Peak Analysis Performed on: 3/10/2017 2:55:45 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	98-	106	102.76	25.65	0.43	6.33E+001	19.51	5.40E+001
F	2	296-	304	299.90	74.97	0.58	1.27E+002	28.76	1.15E+002
F	3	331-	343	337.77	84.44	0.91	1.80E+002	30.90	8.13E+001
F	4	366-	377	372.60	93.15	0.91	9.89E+001	26.30	8.40E+001
F	5	568-	581	575.22	143.84	0.69	9.20E+001	20.85	3.50E+001
F	6	648-	656	653.14	163.33	0.45	4.24E+001	15.10	3.15E+001
F	7	737-	750	742.62	185.71	0.79	6.45E+002	52.37	4.43E+001
F	8	816-	826	820.82	205.27	0.63	6.70E+001	18.43	3.30E+001
F	9	948-	959	953.98	238.58	0.77	7.85E+001	20.77	4.65E+001
F	10	1399-	1413	1406.20	351.71	0.98	6.53E+001	18.70	3.30E+001
F	11	5825-	5849	5837.40	1460.15	2.30	1.76E+002	62.86	1.53E+001
F	12	7044-	7061	7052.32	1764.06	1.53	1.69E+001	9.48	6.30E+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-0011-S-P-7  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\GE UNC\_b\_112211.NLB

..... IDENTIFIED NUCLIDES .....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/GRAM)	Activity Uncertainty
K-40	0.930	1460.82*	10.66	6.64723E+000	2.43685E+000
PB-212	1.000	238.63*	43.60	1.57797E-001	4.86810E-002
		300.09	3.30		
BI-214	0.218	609.32	45.49		
		665.45	1.53		
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1729.59	2.88		
		1764.49*	15.30	5.18007E-001	2.92705E-001
		1847.43	2.03		
PB-214	0.995	53.23	1.08		
		241.99	7.25		
		295.22	18.42		
		351.93*	35.60	2.23047E-001	7.17310E-002
		785.96	1.06		
U-235	1.000	105.60	1.31		
		109.19	1.66		
		143.76*	10.96	5.47359E-001	1.64614E-001
		163.36*	5.08	5.73574E-001	2.30851E-001
		185.71*	57.00	8.33749E-001	1.56543E-001
		202.12	1.08		
		205.32*	5.02	1.04884E+000	3.33168E-001
U-238	0.338	63.29	3.70		
		92.60*	4.23	1.50622E+000	6.50432E-001
		766.42	0.32		
		1001.03	0.84		

\* = 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	0.930	6.647225E+000	2.436850E+000
PB-212	1.000	1.577967E-001	4.868099E-002
BI-214	0.218	5.180065E-001	2.927048E-001
PB-214	0.995	2.230469E-001	7.173101E-002
U-235	1.000	7.056428E-001	9.736576E-002
U-238	0.338	1.506222E+000	6.504318E-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: 3/10/2017 2:55:45 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
F 1	25.65	3.5143E-002	30.84		
F 2	74.97	7.0496E-002	22.67		
F 3	84.44	1.0028E-001	17.12		

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: 8381  
 Sample Geometry: CYLINDER  
 Sample Title: W6H-IMC-0011-S-P-7  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\GE UNC\_b\_112211.NLB

	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	8.515E-001	8.52E-001	6.647E+000	3.747E-00
	CO-60	1173.23	99.85	1.289E-001	1.16E-001	6.006E-002	5.985E-00
		1332.49	99.98	1.165E-001		2.713E-002	5.316E-00
	CS-137	661.66	85.10	1.063E-001	1.06E-001	4.383E-003	4.978E-00
	BI-212	727.33	6.67	1.552E+000	1.55E+000	4.153E-001	7.290E-00
		785.37	1.10	9.044E+000		5.790E+000	4.220E+00
		1620.50	1.47	7.284E+000		-1.054E+000	3.240E+00
+	PB-212	238.63*	43.60	7.679E-002	7.68E-002	1.578E-001	3.567E-00
		300.09	3.30	1.470E+000		-2.124E+000	6.915E-00
+	BI-214	609.32	45.49	2.167E-001	2.17E-001	5.234E-002	1.025E-00
		665.45	1.53	6.087E+000		-1.864E-001	2.854E+00
		768.36	4.89	2.069E+000		-2.716E-001	9.679E-00
		806.18	1.26	7.884E+000		3.112E+000	3.673E+00
		934.06	3.11	3.450E+000		4.958E-001	1.602E+00
		1120.29	14.92	8.941E-001		-2.027E-001	4.174E-00
		1155.21	1.63	7.823E+000		3.013E+000	3.634E+00
		1238.12	5.83	2.384E+000		-1.057E+000	1.110E+00
		1280.98	1.43	8.317E+000		-2.559E+000	3.816E+00
		1377.67	3.99	3.095E+000		2.675E-001	1.417E+00
		1401.52	1.33	9.076E+000		2.976E+000	4.142E+00
		1407.99	2.39	5.122E+000		5.712E-001	2.340E+00
		1509.21	2.13	5.542E+000		2.566E+000	2.509E+00
		1729.59	2.88	3.408E+000		-1.135E+000	1.488E+00
		1764.49*	15.30	4.306E-001		5.180E-001	1.740E-00
		1847.43	2.03	5.516E+000		3.697E+000	2.433E+00
+	PB-214	53.23	1.08	5.536E+000	1.11E-001	6.027E+000	2.626E+00
		241.99	7.25	7.086E-001		6.114E-002	3.378E-00
		295.22	18.42	3.111E-001		1.387E-001	1.479E-00
		351.93*	35.60	1.113E-001		2.230E-001	5.101E-00
		785.96	1.06	9.409E+000		2.638E+000	4.390E+00
	U-234	53.20	0.12	4.843E+001	4.84E+001	5.273E+001	2.298E+00
		120.90	0.04	8.120E+001		3.372E+001	3.818E+00
+	U-235	105.60	1.31	2.464E+000	5.52E-002	1.435E+000	1.167E+00
		109.19	1.66	1.955E+000		5.458E-001	9.268E-00
		143.76*	10.96	2.276E-001		5.474E-001	1.057E-00
		163.36*	5.08	4.318E-001		5.736E-001	1.976E-00
		185.71*	57.00	5.524E-002		8.337E-001	2.587E-00
		202.12	1.08	3.462E+000		8.465E-001	1.634E+00
		205.32*	5.02	4.986E-001		1.049E+000	2.281E-00
+	U-238	63.29	3.70	1.204E+000	9.60E-001	4.989E-001	5.703E-00
		92.60*	4.23	9.601E-001		1.506E+000	4.594E-00
		766.42	0.32	3.137E+001		1.981E+001	1.467E+00

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GRAM)	Nuclide MDA (pCi/GRAM)	Activity (pCi/GRAM)	Dec. Leve (pCi/GRAM)
+	U-238	1001.03	0.84	1.334E+001	9.60E-001	-9.222E+000	6.189E+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

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 \*\*\* LINE ACTIVITY CONSISTENCY EVALUATOR \*\*\*  
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 Analysis using Key Line Activities  
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-0011\W6H-IMC-001

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	^	6.65E+000	36.660			
PB-212	238.6	^	1.58E-001	30.850			
BI-214	1764.5		5.18E-001	*****			
PB-214	351.9	^	2.23E-001	32.160			
U-235	143.8	^	5.47E-001	30.074	1.000[42.531]	-9.46	1.892
	163.4		5.74E-001	40.248	1.048[50.243]		[ 1.593]
	185.7		8.34E-001	18.776	1.523[35.454]		
	205.3		1.05E+000	31.765	1.916[43.743]		
U-238	92.6	^	1.51E+000	43.183			