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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-2120\W6H-IMC-212

Report Generated On : 4/19/2017 10:33:39 AM

Sample Title : W6H-IMC-2120-S-P-1

Sample Description :

Sample Identification : 2120-S-P-1

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 : 3.145E+002 grams

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

Acquisition Started : 3/27/2017 2:57:23 PM

Live Time : 1800.0 seconds

Real Time : 1800.4 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-1

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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-2120-S-P-1

Peak Analysis Performed on: 4/19/2017 10:33:30 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-	191	186.54	46.83	0.95	8.46E+001	11.94	6.60E+001
m	2	296-	313	308.63	77.37	0.55	9.30E+001	11.65	6.25E+001
F	3	345-	353	348.56	87.36	0.20	3.23E+001	7.52	5.85E+001
F	4	1343-	1357	1351.84	338.33	0.90	3.73E+001	7.57	2.85E+001
F	5	2426-	2439	2433.18	608.82	1.49	3.67E+001	7.53	1.87E+001

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.000 sigma

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\*\*\*\*\* P E A K L O C A T E R E P O R T \*\*\*\*\*  
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Detector Name: 8566

Sample Title: W6H-IMC-2120-S-P-1

Peak Locate Performed on: 4/19/2017 10:33:30 AM

Peak Locate From Channel: 40

Peak Locate To Channel: 8192

Peak Search Sensitivity: 3.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance
1	185.83	0.3961	46.83	3.37
2	308.71	0.2570	77.37	6.76
3	348.73	0.3686	87.36	3.41
4	1352.08	0.3027	338.33	3.54
5	2432.88	0.2596	608.82	3.11

? = Adjacent peak noted

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-2120-S-P-1  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 NLB 0328201

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
Pb-210	0.986	46.54*	4.25	3.31186E+000	1.30937E+000

\* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.60

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
Pb-210	0.986	3.311864E+000	1.309372E+000

? = 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 10:33:30 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	77.37	5.1650E-002	24.57	Tol.	Pb-212 BI-214 PB-214
F 3	87.36	1.7924E-002	45.69	Tol.	Pb-212 Pb-212 PB-214 PB-214
F 4	338.33	2.0737E-002	39.76	Tol.	AC-228
F 5	608.82	2.0368E-002	40.28	Tol.	BI-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-2120-S-P-1  
Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 NLB 0328201

	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	3.969E+000	3.97E+000	1.243E+001	1.912E+00
+	Pb-210	46.54*	4.25	1.918E+000	1.92E+000	3.312E+000	9.058E-00
	BI-212	727.33	6.67	1.778E+000	1.78E+000	4.197E-001	8.262E-00
		785.37	1.10	1.165E+001		2.164E-001	5.414E+00
		1078.62	0.56	2.597E+001		-2.590E+000	1.193E+00
		1620.50	1.47	9.056E+000		9.441E-002	3.953E+00
	Pb-212	74.82	10.28	6.423E-001	1.89E-001	6.012E-002	3.108E-00
		77.11	17.10	3.974E-001		2.249E-002	1.926E-00
		86.83	2.07	2.398E+000		2.096E+000	1.153E+00
		87.35	3.97	1.212E+000		-5.625E-001	5.816E-00
		89.78	1.46	3.147E+000		-1.414E+000	1.509E+00
		115.18	0.60	6.275E+000		2.551E+000	2.985E+00
		238.63	43.60	1.888E-001		3.616E-001	9.124E-00
		300.09	3.30	2.023E+000		-1.096E+000	9.596E-00
	BI-214	76.86	0.55	1.263E+001	2.92E-001	9.903E-001	6.122E+00
		79.29	0.91	6.054E+000		1.660E-001	2.915E+00
		609.32	45.49	2.921E-001		-1.587E-002	1.383E-00
		665.45	1.53	7.776E+000		2.415E+000	3.635E+00
		768.36	4.89	2.670E+000		2.087E+000	1.244E+00
		806.18	1.26	1.096E+001		-8.694E-001	5.112E+00
		934.06	3.11	4.784E+000		3.763E-001	2.222E+00
		1120.29	14.92	1.345E+000		1.830E+000	6.312E-00
		1155.21	1.63	1.065E+001		2.648E+000	4.938E+00
		1238.11	5.83	3.441E+000		1.927E+000	1.605E+00
		1280.98	1.43	1.266E+001		1.600E+000	5.850E+00
		1377.67	3.99	3.468E+000		1.300E+000	1.550E+00
		1385.31	0.79	1.543E+001		-8.094E+000	6.783E+00
		1401.52	1.33	1.112E+001		3.472E+000	5.002E+00
		1407.99	2.39	6.205E+000		1.077E+000	2.790E+00
		1509.21	2.13	6.182E+000		1.882E+000	2.718E+00
		1583.20	0.70	2.446E+001		1.605E+001	1.106E+00
		1661.27	1.05	1.188E+001		1.433E+000	5.116E+00
		1729.59	2.88	4.907E+000		2.002E+000	2.142E+00
		1764.49	15.30	1.262E+000		1.206E+000	5.713E-00
		1847.43	2.03	6.061E+000		-2.871E+000	2.560E+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
>		2447.70	1.55	0.000E+000		0.000E+000	0.000E+00
	PB-214	74.82	5.80	1.138E+000	2.35E-001	1.066E-001	5.508E-00
		77.11	9.70	7.006E-001		3.964E-002	3.396E-00
		86.83	1.70	2.920E+000		2.552E+000	1.403E+00
		87.35	2.24	2.147E+000		-9.970E-001	1.031E+00

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram)
PB-214	89.78	0.82	5.603E+000	2.35E-001	-2.518E+000	2.686E+00
	241.99	7.25	1.136E+000		1.773E+000	5.488E-00
	258.76	0.53	9.974E+000		-4.502E+000	4.707E+00
	295.22	18.42	3.737E-001		1.003E-001	1.777E-00
	351.93	35.60	2.350E-001		1.092E-001	1.118E-00
	785.96	1.06	1.183E+001		-7.204E-001	5.487E+00
	839.07	0.58	2.300E+001		5.863E+000	1.068E+00
AC-228	89.96	1.90	7.497E+012	1.98E+012	-3.369E+012	3.594E+01
	93.35	3.10	4.247E+012		-1.518E+012	2.030E+01
	99.51	1.26	8.986E+012		3.613E+011	4.267E+01
	105.60	0.74	1.405E+013		-3.377E+012	6.644E+01
	129.07	2.42	4.745E+012		-2.632E+011	2.254E+01
	153.98	0.72	1.645E+013		3.115E+012	7.800E+01
	209.25	3.89	3.864E+012		-2.141E+012	1.834E+01
	214.85	0.76	2.022E+013		-4.350E+012	9.599E+01
	270.24	3.46	5.760E+012		4.954E+012	2.741E+01
	328.00	2.95	6.777E+012		4.167E+012	3.191E+01
	338.32	11.27	2.203E+012		2.233E+012	1.048E+01
	409.46	1.92	1.155E+013		4.614E+012	5.390E+01
	463.00	4.40	6.257E+012		-6.199E+011	2.938E+01
	562.50	0.87	3.744E+013		1.384E+013	1.755E+01
	674.75	2.10	1.697E+013		1.101E+012	7.906E+01
	726.86	0.62	5.933E+013		8.556E+012	2.756E+01
	755.32	1.00	3.991E+013		2.392E+013	1.860E+01
	772.29	1.49	2.754E+013		4.597E+012	1.284E+01
	794.95	4.25	9.094E+012		-1.954E+012	4.213E+01
	830.49	0.54	7.819E+013		1.081E+013	3.636E+01
	835.71	1.61	2.468E+013		-9.238E+012	1.142E+01
	840.38	0.91	4.579E+013		-1.556E+012	2.126E+01
	904.20	0.77	6.563E+013		-5.942E+013	3.075E+01
	911.20	25.80	1.984E+012		1.684E+012	9.301E+01
	964.77	4.99	1.130E+013		6.371E+012	5.314E+01
	968.97	15.80	3.603E+012		1.284E+012	1.695E+01
	1247.08	0.50	1.171E+014		-7.948E+013	5.434E+01
	1459.14	0.83	1.577E+014		4.847E+014	7.596E+01
	1495.91	0.86	4.353E+013		8.051E+012	1.892E+01
	1588.20	3.22	1.716E+013		1.425E+013	7.779E+01
	1630.63	1.51	2.248E+013		-1.764E+013	9.494E+01
TH-230	67.67	0.38	1.352E+001	1.35E+001	-5.255E+000	6.447E+00
PA-234	742.81	0.11	1.098E+002	1.77E+001	8.926E+000	5.087E+00
	766.42	0.32	4.142E+001		3.693E+001	1.932E+00
TH-234	1001.03	0.84	1.766E+001	1.62E+000	7.556E+000	8.164E+00
	63.29	3.70	1.621E+000		4.288E-003	7.757E-00
	92.38	2.13	2.160E+000		2.696E+000	1.036E+00
	92.80	2.10	2.148E+000		2.270E+000	1.029E+00
U-234	112.81	0.21	1.861E+001	5.09E+001	5.264E+000	8.876E+00
	53.20	0.12	5.086E+001		1.937E+001	2.404E+00
U-235	120.90	0.04	1.001E+002	9.46E-002	2.192E+001	4.745E+00
	89.96	3.43	1.338E+000		-6.014E-001	6.416E-00
	93.35	5.54	7.659E-001		-2.737E-001	3.661E-00
	104.82	0.69	4.895E+000		-4.249E-001	2.315E+00



Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram)
U-235	105.60	1.31	2.558E+000	9.46E-002	-6.148E-001	1.210E+00
	108.58	0.50	7.135E+000		-1.653E+000	3.386E+00
	109.19	1.66	2.183E+000		-9.550E-001	1.037E+00
	143.76	10.96	3.666E-001		3.808E-002	1.745E-00
	163.36	5.08	7.419E-001		-2.967E-001	3.508E-00
	185.71	57.00	9.458E-002		1.414E-001	4.533E-00
	194.94	0.63	7.177E+000		3.941E+000	3.405E+00
	202.12	1.08	4.237E+000		-2.987E+000	2.008E+00
	205.32	5.02	9.538E-001		-3.154E-001	4.529E-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  
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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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Pb-210	46.5	^ 3.31E+000	39.536			