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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-1742\GFLU-1742-S

Report Generated On : 7/6/2017 10:08:44 AM

Sample Title : W3H-GFLU-1742-S-P-6

Sample Description :

Sample Identification : GFLU-1742-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 : 3.033E+002 grams

Sample Taken On : 6/7/2017 2:00:00 PM

Acquisition Started : 6/20/2017 10:49:13 AM

Live Time : 1800.0 seconds

Real Time : 1800.3 seconds

Dead Time : 0.02 %

Energy Calibration Used Done On : 4/13/2017

Efficiency Calibration Used Done On : 7/6/2017

Efficiency ID : H-IMC-2002-S-P-5

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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: W3H-GFLU-1742-S-P-6

Peak Analysis Performed on: 7/6/2017 10:08:39 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	295-	316	299.69	75.11	0.71	8.45E+001	20.20	8.62E+001
m	2	295-	316	308.57	77.33	0.72	1.09E+002	21.57	9.54E+001
F	3	734-	748	742.38	185.89	1.12	8.06E+001	66.17	6.75E+001
F	4	948-	957	952.83	238.55	0.73	8.20E+001	21.15	5.38E+001
F	5	1398-	1413	1405.76	351.89	1.20	6.41E+001	18.53	4.80E+001
F	6	4469-	4482	4475.20	1120.00	1.02	2.32E+001	10.61	7.88E+000
F	7	5823-	5848	5835.84	1460.50	2.62	1.63E+002	25.69	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

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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: W3H-GFLU-1742-S-P-6  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\UNC 2017 NLB 0328201

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.983	1460.82*	10.66	8.85840E+000	1.54123E+000
Pb-212	0.996	74.82*	10.28	6.08810E-001	1.67086E-001
		77.11*	17.10	4.63699E-001	1.10340E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	1.90612E-001	5.27786E-002
		300.09	3.30		
PB-214	0.513	74.82*	5.80	1.07906E+000	3.11486E-001
		77.11*	9.70	8.17448E-001	2.07973E-001
		86.83	1.70		
		87.35	2.24		
		89.78	0.82		
		241.99	7.25		
		258.76	0.53		
		295.22	18.42		
		351.93*	35.60	2.69913E-001	8.12016E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.986	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	1.81476E+000	1.50175E+000

\* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.10

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	0.983	8.858398E+000	1.541226E+000
Pb-212	0.996	2.253785E-001	4.670121E-002
PB-214	0.513	3.167458E-001	7.433339E-002
Ra-226	0.986	1.814760E+000	1.501749E+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: 7/6/2017 10:08:39 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
F 6	1120.00	1.2874E-002	45.79		

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: W3H-GFLU-1742-S-P-6  
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	8.206E-001	8.21E-001	8.858E+000	3.366E-00
	Pb-210	46.54	4.25	1.799E+000	1.80E+000	1.807E+000	8.521E-00
	BI-212	727.33	6.67	1.934E+000	1.93E+000	1.389E+000	9.034E-00
		785.37	1.10	1.258E+001		6.321E+000	5.875E+00
		1078.62	0.56	2.367E+001		-1.825E+001	1.076E+00
		1620.50	1.47	9.476E+000		4.286E+000	4.152E+00
+	Pb-212	74.82*	10.28	3.309E-001	9.03E-002	6.088E-001	1.557E-00
		77.11*	17.10	2.042E-001		4.637E-001	9.635E-00
		86.83	2.07	2.237E+000		8.857E-001	1.074E+00
		87.35	3.97	1.117E+000		-6.768E-001	5.355E-00
		89.78	1.46	2.687E+000		-6.763E+000	1.281E+00
		115.18	0.60	5.445E+000		5.715E+000	2.574E+00
		238.63*	43.60	9.035E-002		1.906E-001	4.203E-00
		300.09	3.30	1.830E+000		-3.289E+000	8.631E-00
	BI-214	76.86	0.55	1.196E+001	3.03E-001	2.915E+001	5.799E+00
		79.29	0.91	5.588E+000		-1.061E+000	2.688E+00
		609.32	45.49	3.035E-001		2.865E-001	1.439E-00
		665.45	1.53	7.686E+000		-2.692E-002	3.588E+00
		768.36	4.89	2.698E+000		1.400E-001	1.258E+00
		806.18	1.26	1.100E+001		5.821E+000	5.130E+00
		934.06	3.11	4.767E+000		1.437E+000	2.212E+00
		1120.29	14.92	1.281E+000		1.075E+000	5.988E-00
		1155.21	1.63	9.232E+000		-4.178E+000	4.223E+00
		1238.11	5.83	3.102E+000		-6.960E-001	1.434E+00
		1280.98	1.43	9.880E+000		2.531E+000	4.451E+00
		1377.67	3.99	4.017E+000		-2.268E+000	1.821E+00
		1385.31	0.79	2.030E+001		4.157E+000	9.203E+00
		1401.52	1.33	1.094E+001		7.393E+000	4.899E+00
		1407.99	2.39	5.762E+000		7.961E-001	2.563E+00
		1509.21	2.13	4.212E+000		-2.337E+000	1.726E+00
		1583.20	0.70	2.296E+001		1.179E+000	1.028E+00
		1661.27	1.05	1.211E+001		-3.263E+000	5.214E+00
		1729.59	2.88	4.088E+000		-1.079E+000	1.726E+00
		1764.49	15.30	1.057E+000		2.428E-001	4.678E-00
		1847.43	2.03	6.913E+000		1.881E+000	2.977E+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	5.865E-001	1.66E-001	1.079E+000	2.760E-00
		77.11*	9.70	3.599E-001		8.174E-001	1.699E-00
		86.83	1.70	2.723E+000		1.079E+000	1.308E+00
		87.35	2.24	1.980E+000		-1.199E+000	9.490E-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	4.784E+000	1.66E-001	-1.204E+001	2.282E+00
		241.99	7.25	1.037E+000		-8.212E-001	4.995E-00
		258.76	0.53	9.708E+000		-1.051E+000	4.575E+00
		295.22	18.42	3.624E-001		9.083E-002	1.720E-00
		351.93*	35.60	1.661E-001		2.699E-001	7.734E-00
		785.96	1.06	1.317E+001		1.092E+000	6.156E+00
		839.07	0.58	2.420E+001		-1.116E+001	1.127E+00
+	Ra-226	81.07	0.20	1.698E+001	1.09E+000	-7.774E+000	8.007E+00
		83.79	0.32	1.264E+001		7.056E+000	6.031E+00
		186.21*	3.64	1.092E+000		1.815E+000	5.158E-00
	AC-228	89.96	1.90	2.993E+015	8.16E+014	-7.910E+015	1.432E+01
		93.35	3.10	1.777E+015		1.535E+015	8.496E+01
		99.51	1.26	3.088E+015		2.090E+014	1.450E+01
		105.60	0.74	6.053E+015		6.492E+014	2.867E+01
		129.07	2.42	1.814E+015		-3.115E+014	8.565E+01
		153.98	0.72	6.847E+015		1.785E+015	3.241E+01
		209.25	3.89	1.561E+015		9.804E+014	7.384E+01
		214.85	0.76	7.594E+015		3.259E+014	3.576E+01
		270.24	3.46	2.078E+015		-2.706E+014	9.791E+01
		328.00	2.95	3.001E+015		2.060E+015	1.415E+01
		338.32	11.27	8.155E+014		6.942E+014	3.846E+01
		409.46	1.92	5.018E+015		8.612E+013	2.343E+01
		463.00	4.40	2.456E+015		4.225E+014	1.146E+01
		562.50	0.87	1.602E+016		2.075E+015	7.500E+01
		674.75	2.10	7.305E+015		-1.149E+015	3.399E+01
		726.86	0.62	2.813E+016		1.837E+016	1.315E+01
		755.32	1.00	1.796E+016		2.655E+015	8.389E+01
		772.29	1.49	1.106E+016		-5.650E+015	5.122E+01
		794.95	4.25	4.277E+015		1.156E+014	1.992E+01
		830.49	0.54	3.118E+016		-8.207E+015	1.439E+01
		835.71	1.61	1.173E+016		5.452E+015	5.462E+01
		840.38	0.91	2.132E+016		5.491E+015	9.944E+01
		904.20	0.77	2.653E+016		-1.042E+016	1.236E+01
		911.20	25.80	8.701E+014		9.754E+014	4.079E+01
		964.77	4.99	4.138E+015		2.338E+015	1.921E+01
		968.97	15.80	1.279E+015		6.371E+014	5.927E+01
		1247.08	0.50	4.804E+016		1.847E+016	2.218E+01
		1459.14	0.83	6.083E+016		1.532E+017	2.915E+01
		1495.91	0.86	1.974E+016		4.477E+015	8.619E+01
		1588.20	3.22	7.462E+015		1.913E+015	3.378E+01
		1630.63	1.51	1.072E+016		-5.296E+015	4.589E+01
	TH-230	67.67	0.38	1.105E+001	1.10E+001	1.180E+000	5.233E+00
	PA-234	742.81	0.11	1.165E+002	1.85E+001	5.152E+000	5.416E+00
		766.42	0.32	4.245E+001		2.044E+001	1.982E+00
		1001.03	0.84	1.854E+001		4.328E+000	8.595E+00
	TH-234	63.29	3.70	1.336E+000	1.34E+000	5.034E-001	6.357E-00
		92.38	2.13	2.036E+000		2.805E+000	9.756E-00
		92.80	2.10	1.995E+000		1.247E+000	9.549E-00
		112.81	0.21	1.483E+001		6.566E+000	6.997E+00
	U-234	53.20	0.12	4.114E+001	4.11E+001	1.114E+001	1.931E+00
		120.90	0.04	9.173E+001		-4.280E+001	4.332E+00

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Leve (pCi/gram)
U-235	89.96	3.43	1.234E+000	3.49E-001	-3.261E+000	5.905E-00
	93.35	5.54	7.400E-001		6.393E-001	3.538E-00
	104.82	0.69	4.695E+000		-9.650E-001	2.219E+00
	105.60	1.31	2.545E+000		2.729E-001	1.205E+00
	108.58	0.50	6.810E+000		1.863E+000	3.229E+00
	109.19	1.66	2.000E+000		-1.240E-001	9.468E-00
	143.76	10.96	3.489E-001		-1.992E-002	1.658E-00
	163.36	5.08	7.465E-001		5.956E-001	3.533E-00
	194.94	0.63	6.516E+000		-7.589E+000	3.075E+00
	202.12	1.08	3.894E+000		-2.583E+000	1.838E+00
	205.32	5.02	8.819E-001		-2.937E-001	4.170E-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-1742\GFLU-1742-S

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	^	8.86E+000	17.398			
Pb-212	74.8		6.09E-001	27.445	3.194[38.986]	4.88	-0.893
	77.1		4.64E-001	23.796	2.433[36.509]		[ 0.414]
	238.6	^	1.91E-001	27.689	1.000[39.158]		
PB-214	74.8		1.08E+000	28.866	3.998[41.693]	4.75	-0.811
	77.1		8.17E-001	25.442	3.029[39.400]		[ 0.335]
	351.9	^	2.70E-001	30.084	1.000[42.546]		
Ra-226	186.2	^	1.81E+000	82.752			