
 ***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-2123\UNC-GFLU-21

Report Generated On : 7/6/2017 10:13:14 AM

Sample Title : UNC-GFLU-2123-S-P-6
 Sample Description :
 Sample Identification : UNC-GFLU-2123-S-
 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 : 3.576E+002 grams

Sample Taken On : 6/1/2017 2:00:00 PM
 Acquisition Started : 6/5/2017 12:22:52 PM

Live Time : 1800.0 seconds
 Real Time : 1800.4 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

***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: 8566

Sample Title: UNC-GFLU-2123-S-P-6

Peak Analysis Performed on: 7/6/2017 10:13:10 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	47-	58	52.51	13.25	0.45	6.09E+001	19.67	9.60E+001
F	2	181-	193	186.28	46.73	0.61	6.55E+001	56.57	5.42E+001
	3	295-	304	299.58	75.08	0.96	4.90E+001	45.08	1.80E+002
F	4	330-	343	337.29	84.51	0.69	5.07E+001	18.96	1.40E+002
F	5	354-	364	359.96	90.19	0.63	4.75E+001	52.61	7.70E+001
F	6	569-	579	574.33	143.83	0.73	8.31E+001	19.80	6.05E+001
F	7	648-	657	652.76	163.46	0.77	2.94E+001	13.69	4.00E+001
F	8	736-	750	741.97	185.78	0.88	3.36E+002	35.11	7.31E+001
F	9	946-	958	952.67	238.51	0.87	1.17E+002	69.30	6.01E+001
F	10	1174-	1183	1178.80	295.10	0.53	2.06E+001	11.99	3.20E+001
F	11	1397-	1412	1404.45	351.57	1.20	4.62E+001	15.96	3.68E+001
F	12	5823-	5849	5834.72	1460.22	2.75	1.32E+002	23.78	9.00E+000

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

 ***** 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 *****

Sample Title: UNC-GFLU-2123-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	0.943	1460.82*	10.66	6.10906E+000	1.18509E+000
Pb-210	0.994	46.54*	4.25	1.93067E+000	1.72725E+000
Pb-212	0.997	74.82*	10.28	2.99644E-001	2.78610E-001
		77.11	17.10		
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	1.84443E+000	2.05747E+000
		115.18	0.60		
		238.63*	43.60	2.30089E-001	1.38493E-001
		300.09	3.30		
PB-214	0.989	74.82*	5.80	5.31093E-001	4.96094E-001
		77.11	9.70		
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	3.28399E+000	3.67435E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	1.18545E-001	6.97008E-002
		351.93*	35.60	1.64881E-001	5.85710E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.968	81.07	0.20		
		83.79*	0.32	9.15374E+000	3.61811E+000
		186.21*	3.64	6.40451E+000	9.53598E-001
U-235	0.741	89.96*	3.43	7.85089E-001	8.76129E-001
		93.35	5.54		
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	4.49682E-001	1.17075E-001
		163.36*	5.08	3.68262E-001	1.75743E-001
		194.94	0.63		
		202.12	1.08		
		205.32	5.02		

* = 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

 ***** 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 *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.943	6.109063E+000	1.185088E+000
Pb-210	0.994	1.930666E+000	1.727251E+000
Pb-212	0.997	2.295040E-001	1.237965E-001
PB-214	0.989	1.456692E-001	4.468906E-002
Ra-226	0.968	6.583082E+000	9.221081E-001
U-235	0.741	4.275444E-001	9.649634E-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: 7/6/2017 10:13:10 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 1	13.25	3.3812E-002	32.32		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

***** N U C L I D E M D A R E P O R T *****

Detector Name: 8566
Sample Geometry: cylinder
Sample Title: UNC-GFLU-2123-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	8.456E-001	8.46E-001	6.109E+000	3.603E-00
+	Pb-210	46.54*	4.25	1.350E+000	1.35E+000	1.931E+000	6.349E-00
	BI-212	727.33	6.67	1.523E+000	1.52E+000	3.595E-001	7.076E-00
		785.37	1.10	9.248E+000		2.579E+000	4.272E+00
		1078.62	0.56	2.087E+001		-1.472E+000	9.523E+00
		1620.50	1.47	6.659E+000		-7.692E+000	2.833E+00
+	Pb-212	74.82*	10.28	4.573E-001	8.68E-002	2.996E-001	2.204E-00
		77.11	17.10	3.301E-001		2.703E-001	1.602E-00
		86.83	2.07	2.004E+000		3.524E-001	9.644E-00
		87.35	3.97	9.745E-001		1.833E-001	4.677E-00
		89.78*	1.46	1.994E+000		1.844E+000	9.444E-00
		115.18	0.60	5.275E+000		1.858E+000	2.512E+00
		238.63*	43.60	8.676E-002		2.301E-001	4.072E-00
	BI-214	300.09	3.30	1.614E+000		-9.398E-001	7.629E-00
		76.86	0.55	1.060E+001	2.45E-001	8.311E+000	5.146E+00
		79.29	0.91	4.718E+000		-1.567E+000	2.269E+00
		609.32	45.49	2.452E-001		9.622E-002	1.159E-00
		665.45	1.53	6.335E+000		1.484E+000	2.951E+00
		768.36	4.89	2.186E+000		2.906E+000	1.015E+00
		806.18	1.26	8.847E+000		3.314E+000	4.110E+00
		934.06	3.11	4.142E+000		2.283E+000	1.925E+00
		1120.29	14.92	1.049E+000		6.800E-001	4.891E-00
		1155.21	1.63	8.859E+000		4.114E+000	4.096E+00
		1238.11	5.83	2.815E+000		1.725E+000	1.308E+00
		1280.98	1.43	8.244E+000		-6.747E+000	3.707E+00
		1377.67	3.99	3.502E+000		2.680E+000	1.592E+00
		1385.31	0.79	1.512E+001		3.196E+000	6.759E+00
		1401.52	1.33	9.916E+000		2.381E+000	4.475E+00
		1407.99	2.39	5.531E+000		5.866E-001	2.496E+00
		1509.21	2.13	4.785E+000		2.418E+000	2.071E+00
		1583.20	0.70	1.947E+001		-4.915E+000	8.721E+00
		1661.27	1.05	1.093E+001		5.984E+000	4.750E+00
		1729.59	2.88	3.746E+000		9.354E-001	1.604E+00
		1764.49	15.30	9.164E-001		6.617E-001	4.066E-00
		1847.43	2.03	5.459E+000		2.152E+000	2.322E+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	8.106E-001	1.24E-001	5.311E-001	3.906E-00
		77.11	9.70	5.819E-001		4.765E-001	2.824E-00
		86.83	1.70	2.440E+000		4.291E-001	1.174E+00
		87.35	2.24	1.727E+000		3.249E-001	8.289E-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	3.550E+000	1.24E-001	3.284E+000	1.682E+00
		241.99	7.25	9.282E-001		-3.828E-001	4.479E-00
		258.76	0.53	8.444E+000		-1.644E+000	3.985E+00
		295.22*	18.42	1.668E-001		1.185E-001	7.563E-00
		351.93*	35.60	1.244E-001		1.649E-001	5.738E-00
		785.96	1.06	9.441E+000		1.737E-001	4.355E+00
		839.07	0.58	1.989E+001		-7.750E+000	9.242E+00
+	Ra-226	81.07	0.20	1.782E+001	9.62E-001	2.435E+000	8.496E+00
		83.79*	0.32	1.332E+001		9.154E+000	6.416E+00
		186.21*	3.64	9.619E-001		6.405E+000	4.551E-00
	AC-228	89.96	1.90	9.167E+004	2.23E+004	-1.588E+005	4.410E+00
		93.35	3.10	5.769E+004		8.692E+004	2.780E+00
		99.51	1.26	1.015E+005		3.674E+004	4.822E+00
		105.60	0.74	1.953E+005		7.609E+004	9.335E+00
		129.07	2.42	5.484E+004		-2.515E+003	2.606E+00
		153.98	0.72	2.053E+005		1.316E+005	9.773E+00
		209.25	3.89	4.779E+004		-1.147E+004	2.275E+00
		214.85	0.76	2.299E+005		1.785E+005	1.090E+00
		270.24	3.46	6.285E+004		2.520E+004	2.980E+00
		328.00	2.95	7.820E+004		2.572E+004	3.678E+00
		338.32	11.27	2.261E+004		1.298E+004	1.068E+00
		409.46	1.92	1.404E+005		5.989E+003	6.568E+00
		463.00	4.40	7.859E+004		3.510E+004	3.706E+00
		562.50	0.87	4.576E+005		3.776E+005	2.150E+00
		674.75	2.10	1.961E+005		6.578E+004	9.118E+00
		726.86	0.62	7.074E+005		3.128E+005	3.288E+00
		755.32	1.00	3.757E+005		-5.576E+004	1.718E+00
		772.29	1.49	3.116E+005		9.435E+004	1.448E+00
		794.95	4.25	1.086E+005		-9.463E+004	5.035E+00
		830.49	0.54	8.896E+005		3.569E+005	4.125E+00
		835.71	1.61	3.026E+005		-7.719E+004	1.404E+00
		840.38	0.91	5.513E+005		-1.465E+005	2.562E+00
		904.20	0.77	7.013E+005		-6.206E+005	3.262E+00
		911.20	25.80	2.234E+004		9.208E+003	1.043E+00
		964.77	4.99	1.264E+005		7.136E+004	5.920E+00
		968.97	15.80	4.107E+004		1.301E+004	1.927E+00
		1247.08	0.50	1.128E+006		-7.044E+005	5.141E+00
		1459.14	0.83	1.605E+006		4.009E+006	7.681E+00
		1495.91	0.86	5.192E+005		9.603E+004	2.257E+00
		1588.20	3.22	1.896E+005		-4.311E+003	8.527E+00
		1630.63	1.51	3.372E+005		-1.155E+004	1.477E+00
	TH-230	67.67	0.38	1.153E+001	1.15E+001	1.546E+000	5.518E+00
	PA-234	742.81	0.11	9.644E+001	1.45E+001	-1.256E+001	4.477E+00
		766.42	0.32	3.200E+001		2.018E+001	1.481E+00
		1001.03	0.84	1.448E+001		-1.637E+000	6.667E+00
	TH-234	63.29	3.70	1.331E+000	1.33E+000	4.741E-001	6.383E-00
		92.38	2.13	2.108E+000		2.441E+000	1.018E+00
		92.80	2.10	2.074E+000		2.508E+000	1.001E+00
		112.81	0.21	1.429E+001		-1.930E+000	6.789E+00
	U-234	53.20	0.12	4.308E+001	4.31E+001	2.257E+001	2.048E+00
		120.90	0.04	8.731E+001		2.194E+000	4.150E+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	8.488E-001	2.28E-001	7.851E-001	4.020E-00
		93.35	5.54	7.534E-001		1.135E+000	3.630E-00
		104.82	0.69	4.821E+000		-1.878E-001	2.301E+00
		105.60	1.31	2.575E+000		1.003E+000	1.231E+00
		108.58	0.50	6.726E+000		8.270E-001	3.214E+00
		109.19	1.66	1.932E+000		-1.522E+000	9.208E-00
		143.76*	10.96	2.279E-001		4.497E-001	1.066E-00
		163.36*	5.08	4.245E-001		3.683E-001	1.953E-00
		194.94	0.63	6.166E+000		-1.917E+000	2.928E+00
		202.12	1.08	3.860E+000		-1.392E+000	1.837E+00
		205.32	5.02	8.885E-001		3.708E-001	4.240E-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-2123\UNC-GFLU-21

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	^	6.11E+000	19.399			
Pb-210	46.5	^	1.93E+000	89.464			
Pb-212	74.8		3.00E-001	92.980	1.302[110.76]	4.57	-0.818 [1.095]
	89.8		1.84E+000	111.55	8.016[126.75]		
	238.6	^	2.30E-001	60.191	1.000[85.123]		
PB-214	74.8		5.31E-001	93.410	3.221[99.937]	7.71	-1.343 [0.605]
	89.8		3.28E+000	111.88	19.917[117.39]		
	295.2		1.19E-001	58.797	0.719[68.695]		
	351.9	^	1.65E-001	35.523	1.000[50.237]		
Ra-226	83.8		9.15E+000	39.526	1.429[42.237]	2.34	-0.447 [0.591]
	186.2	^	6.40E+000	14.889	1.000[21.057]		
U-235	90.0		7.85E-001	111.59	1.746[114.59]	6.33	-1.277 [2.122]
	143.8	^	4.50E-001	26.035	1.000[36.819]		
	163.4		3.68E-001	47.722	0.819[54.362]		