
***** 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-0226\UNC-IMC-022

Report Generated On : 5/9/2017 10:31:27 AM

Sample Title : UNC-IMC-0226-S-P-4

Sample Description :

Sample Identification : IMC-0226-S-P-4

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 : 3.611E+002 grams

Sample Taken On : 4/18/2017 12:00:00 AM

Acquisition Started : 5/1/2017 10:39:16 AM

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 : 5/9/2017

Efficiency ID : H-IMC-0074-S-P-4

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

Detector Name: 8566
Sample Title: UNC-IMC-0226-S-P-4
Peak Analysis Performed on: 5/9/2017 10:31:20 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	296-	312	299.64	75.09	0.67	1.14E+002	23.12	9.40E+001
m	2	296-	312	308.23	77.24	0.68	1.11E+002	21.85	1.05E+002
F	3	735-	749	741.70	185.72	0.85	2.12E+002	48.55	6.94E+001
F	4	946-	959	952.92	238.58	0.67	1.25E+002	55.68	7.88E+001
F	5	1173-	1183	1178.59	295.05	0.93	3.88E+001	15.00	2.75E+001
F	6	1400-	1414	1405.53	351.84	1.22	7.73E+001	18.66	2.25E+001
F	7	2322-	2334	2329.28	583.00	0.76	3.77E+001	14.17	2.17E+001
F	8	5822-	5848	5834.35	1460.13	2.58	1.67E+002	26.00	4.50E+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-IMC-0226-S-P-4
 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	0.925	1460.82*	10.66	8.67241E+000	1.53931E+000
Pb-212	0.998	74.82*	10.28	9.91979E-001	2.83458E-001
		77.11*	17.10	5.64281E-001	1.58711E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	2.96498E-001	1.40039E-001
PB-214	0.848	300.09	3.30		
		74.82*	5.80	1.75820E+000	5.26459E-001
		77.11*	9.70	9.94764E-001	2.93773E-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	2.65545E-001	1.10693E-001
		351.93*	35.60	3.26326E-001	9.21502E-002
Ra-226	0.966	785.96	1.06		
		839.07	0.58		
		81.07	0.20		
		83.79	0.32		
		186.21*	3.64	4.95762E+000	1.41002E+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

 ***** 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	0.925	8.672411E+000	1.539306E+000
Pb-212	0.998	3.943469E-001	9.978141E-002
PB-214	0.848	3.155907E-001	6.937053E-002
Ra-226	0.966	4.957618E+000	1.410018E+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: 5/9/2017 10:31:20 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 7	583.00	2.0967E-002	37.53		

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-IMC-0226-S-P-4
 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	7.138E-001	7.14E-001	8.672E+000	2.866E-00
	Pb-210	46.54	4.25	2.999E+000	3.00E+000	3.260E+000	1.432E+00
	BI-212	727.33	6.67	1.788E+000	1.79E+000	3.461E-001	8.315E-00
		785.37	1.10	1.229E+001		-9.084E+000	5.740E+00
		1078.62	0.56	2.701E+001		7.514E+000	1.247E+00
		1620.50	1.47	7.173E+000		-7.577E+000	3.030E+00
+	Pb-212	74.82*	10.28	4.152E-001	1.21E-001	9.920E-001	1.959E-00
		77.11*	17.10	2.559E-001		5.643E-001	1.211E-00
		86.83	2.07	2.709E+000		1.956E+000	1.303E+00
		87.35	3.97	1.319E+000		-2.339E+000	6.329E-00
		89.78	1.46	3.572E+000		-3.140E+000	1.715E+00
		115.18	0.60	7.047E+000		-2.046E+000	3.361E+00
		238.63*	43.60	1.211E-001		2.965E-001	5.736E-00
		300.09	3.30	1.982E+000		-2.647E+000	9.383E-00
	BI-214	76.86	0.55	1.541E+001	2.76E-001	-2.319E+000	7.489E+00
		79.29	0.91	7.215E+000		-2.489E-001	3.481E+00
		609.32	45.49	2.756E-001		1.362E-001	1.300E-00
		665.45	1.53	8.677E+000		7.964E+000	4.088E+00
		768.36	4.89	2.751E+000		2.459E+000	1.286E+00
		806.18	1.26	9.147E+000		-3.623E-001	4.212E+00
		934.06	3.11	4.267E+000		-9.865E-001	1.967E+00
		1120.29	14.92	1.209E+000		4.908E-001	5.643E-00
		1155.21	1.63	9.680E+000		-3.916E+000	4.462E+00
		1238.11	5.83	2.950E+000		-7.509E-001	1.363E+00
		1280.98	1.43	1.034E+001		2.080E+000	4.702E+00
		1377.67	3.99	3.179E+000		-1.654E+000	1.410E+00
		1385.31	0.79	1.797E+001		8.095E+000	8.080E+00
		1401.52	1.33	1.217E+001		3.599E+000	5.538E+00
		1407.99	2.39	7.211E+000		3.965E+000	3.302E+00
		1509.21	2.13	6.817E+000		2.317E+000	3.047E+00
		1583.20	0.70	2.185E+001		4.441E+000	9.788E+00
		1661.27	1.05	1.112E+001		-1.536E+000	4.762E+00
		1729.59	2.88	4.879E+000		1.348E+000	2.138E+00
		1764.49	15.30	1.089E+000		8.966E-002	4.866E-00
		1847.43	2.03	5.865E+000		2.071E+000	2.477E+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	7.359E-001	1.16E-001	1.758E+000	3.471E-00
		77.11*	9.70	4.511E-001		9.948E-001	2.134E-00
		86.83	1.70	3.298E+000		2.382E+000	1.586E+00
		87.35	2.24	2.338E+000		-4.145E+000	1.122E+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	6.360E+000	1.16E-001	-5.590E+000	3.053E+00
		241.99	7.25	1.117E+000		-9.378E-002	5.391E-00
		258.76	0.53	1.006E+001		-5.422E+000	4.746E+00
		295.22*	18.42	1.895E-001		2.655E-001	8.548E-00
		351.93*	35.60	1.155E-001		3.263E-001	5.206E-00
		785.96	1.06	1.287E+001		-9.139E+000	6.015E+00
		839.07	0.58	2.054E+001		-8.135E-001	9.458E+00
+	Ra-226	81.07	0.20	2.489E+001	1.15E+000	-5.649E+000	1.187E+00
		83.79	0.32	1.678E+001		1.135E+001	8.052E+00
	AC-228	186.21*	3.64	1.147E+000	4.17E+015	4.958E+000	5.421E-00
		89.96	1.90	1.881E+016		-1.336E+016	9.055E+01
		93.35	3.10	1.133E+016		7.408E+015	5.454E+01
		99.51	1.26	1.966E+016		1.420E+016	9.324E+01
		105.60	0.74	3.529E+016		4.069E+015	1.680E+01
		129.07	2.42	1.084E+016		5.466E+015	5.162E+01
		153.98	0.72	3.840E+016		-1.860E+016	1.828E+01
		209.25	3.89	8.698E+015		2.092E+015	4.143E+01
		214.85	0.76	4.166E+016		-1.024E+016	1.975E+01
		270.24	3.46	1.067E+016		-2.501E+015	5.047E+01
		328.00	2.95	1.520E+016		1.030E+016	7.190E+01
		338.32	11.27	4.197E+015		4.624E+015	1.988E+01
		409.46	1.92	2.915E+016		-1.045E+016	1.378E+01
		463.00	4.40	1.178E+016		-2.358E+015	5.499E+01
		562.50	0.87	7.334E+016		2.660E+015	3.427E+01
		674.75	2.10	3.464E+016		2.247E+015	1.614E+01
		726.86	0.62	1.209E+017		-3.804E+016	5.616E+01
		755.32	1.00	8.065E+016		3.183E+016	3.757E+01
		772.29	1.49	5.521E+016		-1.373E+016	2.572E+01
		794.95	4.25	2.030E+016		9.342E+015	9.470E+01
		830.49	0.54	1.347E+017		-2.195E+016	6.179E+01
		835.71	1.61	4.639E+016		-9.674E+015	2.133E+01
		840.38	0.91	8.667E+016		7.564E+016	4.001E+01
		904.20	0.77	1.305E+017		-6.892E+016	6.105E+01
		911.20	25.80	4.166E+015		1.049E+015	1.957E+01
		964.77	4.99	2.361E+016		2.202E+016	1.113E+01
		968.97	15.80	7.123E+015		4.404E+015	3.346E+01
1247.08	0.50	2.171E+017	-1.421E+017	1.001E+01			
1459.14	0.83	2.883E+017	7.039E+017	1.384E+01			
1495.91	0.86	1.009E+017	-2.123E+016	4.476E+01			
1588.20	3.22	3.010E+016	9.705E+015	1.345E+01			
1630.63	1.51	4.848E+016	-2.395E+016	2.076E+01			
	TH-230	67.67	0.38	1.573E+001	1.57E+001	8.782E+000	7.506E+00
	PA-234	742.81	0.11	1.038E+002	1.72E+001	-3.805E+001	4.792E+00
		766.42	0.32	4.237E+001		2.675E+001	1.981E+00
		1001.03	0.84	1.717E+001		8.649E+000	7.932E+00
	TH-234	63.29	3.70	1.866E+000	1.87E+000	4.921E-001	8.921E-00
		92.38	2.13	2.750E+000		4.481E+000	1.327E+00
		92.80	2.10	2.670E+000		1.879E+000	1.286E+00
		112.81	0.21	2.035E+001		1.425E+001	9.713E+00
	U-234	53.20	0.12	6.756E+001	6.76E+001	3.205E+001	3.209E+00
		120.90	0.04	1.135E+002		-1.031E+002	5.398E+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	1.631E+000	4.14E-001	-1.159E+000	7.851E-00
	93.35	5.54	9.923E-001		6.488E-001	4.777E-00
	104.82	0.69	5.911E+000		3.216E+000	2.812E+00
	105.60	1.31	3.120E+000		3.598E-001	1.485E+00
	108.58	0.50	8.277E+000		-2.765E+000	3.943E+00
	109.19	1.66	2.421E+000		-2.012E+000	1.152E+00
	143.76	10.96	4.141E-001		2.172E-001	1.978E-00
	163.36	5.08	8.727E-001		6.077E-001	4.154E-00
	194.94	0.63	7.630E+000		3.276E+000	3.626E+00
	202.12	1.08	4.691E+000		7.308E-001	2.232E+00
	205.32	5.02	1.057E+000		-1.205E-001	5.041E-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-0226\UNC-IMC-022

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 ^	8.67E+000	17.749			
Pb-212	74.8	9.92E-001	28.575	3.346[55.202]	4.48	-0.820 [0.675]
	77.1	5.64E-001	28.126	1.903[54.971]		
	238.6 ^	2.96E-001	47.231	1.000[66.795]		
PB-214	74.8	1.76E+000	29.943	5.388[41.158]	5.71	-0.998 [0.290]
	77.1	9.95E-001	29.532	3.048[40.860]		
	295.2	2.66E-001	41.685	0.814[50.350]		
	351.9 ^	3.26E-001	28.239	1.000[39.936]		
Ra-226	186.2 ^	4.96E+000	28.441			