
***** 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 10:29:57 AM

Sample Title : UNC-IMC-0226-S-P-3

Sample Description :

Sample Identification : IMC-0226-S-P-3

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 : 3.470E+002 grams

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

Acquisition Started : 5/1/2017 10:06:51 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-0226-S-P-3

***** 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-3

Peak Analysis Performed on: 5/9/2017 10:29:50 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-	315	299.59	75.08	0.57	8.99E+001	60.46	1.15E+002
m	2	295-	315	308.59	77.33	0.58	8.49E+001	55.39	9.07E+001
F	3	569-	584	574.12	143.78	0.94	6.98E+001	18.02	8.40E+001
F	4	734-	747	741.89	185.76	0.91	3.15E+002	33.72	5.78E+001
F	5	945-	958	952.83	238.55	0.79	1.12E+002	55.74	5.60E+001
F	6	1399-	1411	1405.21	351.76	1.24	4.36E+001	15.62	2.99E+001
F	7	2321-	2334	2327.75	582.62	1.23	3.56E+001	15.08	2.57E+001
F	8	2426-	2439	2432.35	608.79	0.98	2.99E+001	13.92	2.68E+001
F	9	5823-	5848	5835.46	1460.40	2.32	1.81E+002	27.29	1.01E+001
F	10	7041-	7056	7048.66	1764.00	1.72	1.61E+001	9.49	2.40E+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-3
 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	0.972	1460.82*	10.66	9.99862E+000	1.72953E+000
Pb-212	0.996	74.82*	10.28	7.05149E-001	4.94979E-001
		77.11*	17.10	3.90590E-001	2.66625E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	2.69131E-001	1.40182E-001
		300.09	3.30		
BI-214	0.362	76.86*	0.55	1.22552E+001	8.37293E+000
		79.29	0.91		
		609.32*	45.49	1.77920E-001	8.53357E-002
		665.45	1.53		
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.11	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1583.20	0.70		
		1661.27	1.05		
		1729.59	2.88		
		1764.49*	15.30	7.30743E-001	4.35379E-001
		1847.43	2.03		
		2118.51	1.16		
		2204.06	4.92		
		2447.70	1.55		
PB-214	0.508	74.82*	5.80	1.24982E+000	8.84406E-001
		77.11*	9.70	6.88567E-001	4.74101E-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	1.88124E-001	7.28796E-002

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
PB-214	0.508	785.96	1.06		
		839.07	0.58		
Ra-226	0.972	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	7.35023E+000	1.47212E+000
U-235	1.000	89.96	3.43		
		93.35	5.54		
		104.82	0.69		
		105.60	1.31		
		108.58	0.50		
		109.19	1.66		
		143.76*	10.96	4.65070E-001	1.51136E-001
		163.36	5.08		
		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	0.972	9.998624E+000	1.729533E+000
Pb-212	0.996	2.899208E-001	1.206811E-001
BI-214	0.362	1.983238E-001	8.373060E-002
PB-214	0.508	1.912971E-001	7.205585E-002
Ra-226	0.972	7.350227E+000	1.472118E+000
U-235	1.000	4.650697E-001	1.511359E-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: 5/9/2017 10:29:50 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	582.62	1.9786E-002	42.35		

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-3
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	1.052E+000	1.05E+000	9.999E+000	4.513E-00
	Pb-210	46.54	4.25	2.111E+000	2.11E+000	1.773E+000	1.001E+00
	BI-212	727.33	6.67	1.664E+000	1.66E+000	-1.779E+000	7.669E-00
		785.37	1.10	1.182E+001		1.875E+000	5.488E+00
		1078.62	0.56	3.077E+001		3.681E+000	1.429E+00
		1620.50	1.47	8.539E+000		2.586E+000	3.677E+00
+	Pb-212	74.82*	10.28	4.129E-001	1.04E-001	7.051E-001	1.958E-00
		77.11*	17.10	2.162E-001		3.906E-001	1.019E-00
		86.83	2.07	2.528E+000		-1.063E+000	1.216E+00
		87.35	3.97	1.219E+000		-3.344E+000	5.845E-00
		89.78	1.46	3.213E+000		-2.780E+000	1.540E+00
		115.18	0.60	6.812E+000		9.249E-001	3.250E+00
		238.63*	43.60	1.043E-001		2.691E-001	4.891E-00
		300.09	3.30	2.020E+000		-2.650E+000	9.564E-00
+	BI-214	76.86*	0.55	6.785E+000	1.65E-001	1.226E+001	3.197E+00
		79.29	0.91	6.049E+000		1.815E+000	2.909E+00
		609.32*	45.49	1.652E-001		1.779E-001	7.456E-00
		665.45	1.53	8.485E+000		-3.026E-001	3.982E+00
		768.36	4.89	2.753E+000		1.399E+000	1.283E+00
		806.18	1.26	9.167E+000		-1.495E+000	4.206E+00
		934.06	3.11	4.477E+000		-5.903E-001	2.064E+00
		1120.29	14.92	1.132E+000		-7.480E-002	5.233E-00
		1155.21	1.63	1.221E+001		5.740E+000	5.707E+00
		1238.11	5.83	3.369E+000		2.410E+000	1.566E+00
		1280.98	1.43	1.206E+001		0.000E+000	5.532E+00
		1377.67	3.99	3.709E+000		-7.796E-003	1.665E+00
		1385.31	0.79	1.808E+001		1.182E+000	8.081E+00
		1401.52	1.33	1.004E+001		-9.963E-001	4.442E+00
		1407.99	2.39	6.294E+000		-1.323E-002	2.825E+00
		1509.21	2.13	4.950E+000		-1.515E+000	2.090E+00
		1583.20	0.70	1.856E+001		6.366E+000	8.066E+00
		1661.27	1.05	1.304E+001		7.142E+000	5.670E+00
		1729.59	2.88	4.137E+000		-2.256E-001	1.747E+00
		1764.49*	15.30	4.342E-001		7.307E-001	1.555E-00
		1847.43	2.03	5.391E+000		-1.634E+000	2.210E+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	7.318E-001	1.30E-001	1.250E+000	3.471E-00
		77.11*	9.70	3.812E-001		6.886E-001	1.796E-00
		86.83	1.70	3.078E+000		-1.295E+000	1.481E+00
		87.35	2.24	2.160E+000		-5.927E+000	1.036E+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	5.721E+000	1.30E-001	-4.949E+000	2.742E+00
		241.99	7.25	1.098E+000		-2.317E-001	5.294E-00
		258.76	0.53	1.005E+001		-2.187E+000	4.738E+00
		295.22	18.42	3.858E-001		4.113E-002	1.835E-00
		351.93*	35.60	1.295E-001		1.881E-001	5.893E-00
		785.96	1.06	1.260E+001		5.573E-001	5.858E+00
		839.07	0.58	2.353E+001		-1.514E+001	1.092E+00
+	Ra-226	81.07	0.20	2.201E+001	1.03E+000	-7.172E+000	1.048E+00
		83.79	0.32	1.649E+001		1.544E+001	7.932E+00
		186.21*	3.64	1.030E+000		7.350E+000	4.833E-00
	AC-228	89.96	1.90	1.556E+016	3.92E+015	-2.373E+016	7.472E+01
		93.35	3.10	9.241E+015		-5.215E+015	4.435E+01
		99.51	1.26	1.671E+016		-2.322E+015	7.908E+01
		105.60	0.74	3.099E+016		2.016E+016	1.474E+01
		129.07	2.42	9.260E+015		-2.663E+015	4.394E+01
		153.98	0.72	3.552E+016		7.614E+015	1.691E+01
		209.25	3.89	7.876E+015		-9.661E+015	3.744E+01
		214.85	0.76	3.913E+016		7.909E+015	1.854E+01
		270.24	3.46	1.043E+016		3.698E+015	4.940E+01
		328.00	2.95	1.344E+016		-4.226E+015	6.324E+01
		338.32	11.27	3.933E+015		6.696E+014	1.860E+01
		409.46	1.92	2.350E+016		2.089E+015	1.099E+01
		463.00	4.40	1.204E+016		3.781E+015	5.642E+01
		562.50	0.87	7.193E+016		-1.512E+016	3.363E+01
		674.75	2.10	3.236E+016		-6.110E+013	1.502E+01
		726.86	0.62	1.117E+017		-5.906E+016	5.164E+01
		755.32	1.00	7.798E+016		-1.641E+016	3.629E+01
		772.29	1.49	5.382E+016		-9.870E+015	2.506E+01
		794.95	4.25	1.952E+016		9.499E+015	9.094E+01
		830.49	0.54	1.610E+017		5.243E+016	7.506E+01
		835.71	1.61	5.626E+016		4.431E+016	2.629E+01
		840.38	0.91	9.225E+016		-3.594E+016	4.285E+01
		904.20	0.77	1.209E+017		-3.552E+016	5.633E+01
		911.20	25.80	3.917E+015		3.542E+015	1.834E+01
		964.77	4.99	1.960E+016		-2.833E+015	9.126E+01
		968.97	15.80	6.487E+015		3.988E+015	3.030E+01
		1247.08	0.50	2.098E+017		-1.844E+017	9.653E+01
		1459.14	0.83	2.979E+017		8.106E+017	1.432E+01
		1495.91	0.86	9.873E+016		5.272E+016	4.368E+01
		1588.20	3.22	2.652E+016		-2.035E+015	1.166E+01
		1630.63	1.51	5.189E+016		-9.674E+015	2.246E+01
	TH-230	67.67	0.38	1.347E+001	1.35E+001	6.164E+000	6.415E+00
	PA-234	742.81	0.11	1.207E+002	1.84E+001	1.008E+002	5.621E+00
		766.42	0.32	4.392E+001		2.686E+001	2.053E+00
		1001.03	0.84	1.838E+001		-2.535E+000	8.505E+00
	TH-234	63.29	3.70	1.525E+000	1.52E+000	3.770E-001	7.267E-00
		92.38	2.13	2.479E+000		4.051E+000	1.194E+00
		92.80	2.10	2.389E+000		1.080E+000	1.149E+00
		112.81	0.21	1.759E+001		-9.668E+000	8.351E+00
	U-234	53.20	0.12	5.230E+001	5.23E+001	2.479E+001	2.473E+00
		120.90	0.04	1.159E+002		-3.935E+001	5.528E+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	1.433E+000	3.66E-001	-2.187E+000	6.884E-00
		93.35	5.54	8.601E-001		-4.853E-001	4.128E-00
		104.82	0.69	5.552E+000		4.682E+000	2.640E+00
		105.60	1.31	2.912E+000		1.894E+000	1.385E+00
		108.58	0.50	7.416E+000		-1.284E+000	3.522E+00
		109.19	1.66	2.125E+000		-2.791E+000	1.007E+00
		143.76*	10.96	3.659E-001		4.651E-001	1.739E-00
		163.36	5.08	8.708E-001		1.016E+000	4.147E-00
		194.94	0.63	7.787E+000		4.364E-001	3.704E+00
		202.12	1.08	4.939E+000		-2.200E-001	2.356E+00
		205.32	5.02	1.087E+000		1.393E-001	5.186E-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 ***

=====
 Analysis using Key Line Activities
 =====

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 ^	1.00E+001	17.298			
Pb-212	74.8	7.05E-001	70.195	2.620[87.409]	3.21	-0.587
	77.1	3.91E-001	68.262	1.451[85.865]		[0.837]
	238.6 ^	2.69E-001	52.087	1.000[73.662]		
BI-214	76.9	1.23E+001	68.321	68.881[83.476]	8.05	-1.042
	609.3 ^	1.78E-001	47.963	1.000[67.830]		[0.357]
	1764.5	7.31E-001	59.580	4.107[76.487]		
PB-214	74.8	1.25E+000	70.763	6.644[80.673]	6.10	-1.040
	77.1	6.89E-001	68.853	3.660[79.004]		[0.513]
	351.9 ^	1.88E-001	38.740	1.000[54.787]		
Ra-226	186.2 ^	7.35E+000	20.028			
U-235	143.8 ^	4.65E-001	32.497			