
***** 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 10:34:26 AM

Sample Title : UNC-IMC-0226-S-P-6

Sample Description :

Sample Identification : IMC-0226-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 : 3.537E+002 grams

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

Acquisition Started : 5/1/2017 12:09:37 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 : 5/9/2017

Efficiency ID : H-IMC-0226-S-P-6

***** 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-6

Peak Analysis Performed on: 5/9/2017 10:34:13 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-	193	186.29	46.73	0.68	5.66E+001	10.63	5.83E+001
M	2	295-	315	299.80	75.13	0.57	7.85E+001	21.58	1.08E+002
m	3	295-	315	308.81	77.39	0.57	5.28E+001	17.23	8.68E+001
	4	356-	364	360.45	90.31	0.49	2.00E+001	23.80	5.10E+001
F	5	733-	748	741.99	185.79	0.87	1.91E+002	74.63	6.60E+001
F	6	949-	959	952.98	238.59	0.70	7.43E+001	20.11	5.36E+001
F	7	1175-	1183	1178.68	295.07	0.77	2.75E+001	13.81	2.70E+001
F	8	1397-	1412	1405.19	351.75	1.21	7.09E+001	17.64	2.24E+001
F	9	1901-	1912	1907.26	477.39	1.01	3.13E+001	15.32	3.40E+001
F	10	2031-	2046	2039.21	510.41	1.49	4.55E+001	16.36	3.07E+001
F	11	2425-	2438	2432.24	608.77	1.07	3.09E+001	41.96	1.75E+001
F	12	5823-	5849	5835.34	1460.37	2.64	1.59E+002	25.20	3.00E+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-IMC-0226-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	0.968	1460.82*	10.66	7.65554E+000	1.37770E+000
Pb-210	0.994	46.54*	4.25	2.19125E+000	7.44846E-001
Pb-212	0.994	74.82*	10.28	5.68820E-001	1.94020E-001
		77.11*	17.10	2.24159E-001	8.59384E-002
		86.83	2.07		
		87.35	3.97		
		89.78*	1.46	8.97803E-001	1.08357E+000
		115.18	0.60		
		238.63*	43.60	1.58361E-001	4.96433E-002
		300.09	3.30		
PB-214	0.846	74.82*	5.80	1.00819E+000	3.55519E-001
		77.11*	9.70	3.95167E-001	1.55621E-001
		86.83	1.70		
		87.35	2.24		
		89.78*	0.82	1.59853E+000	1.93425E+000
		241.99	7.25		
		258.76	0.53		
		295.22*	18.42	1.69817E-001	8.94174E-002
		351.93*	35.60	2.71237E-001	7.83087E-002
		785.96	1.06		
		839.07	0.58		
Ra-226	0.975	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	3.96635E+000	1.69254E+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	0.968	7.655542E+000	1.377697E+000
	Pb-210	0.994	2.191253E+000	7.448458E-001
	Pb-212	0.994	1.576068E-001	4.273897E-002
X	BI-214	0.304		
	PB-214	0.846	2.265212E-001	5.538814E-002
	Ra-226	0.975	3.966347E+000	1.692535E+000
X	U-235	0.500		

? = 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 10:34:13 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	9	477.39	1.7408E-002	48.90	Sum	
F	10	510.41	2.5279E-002	35.94		
F	11	608.77	1.7187E-002	135.63		

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-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	5.644E-001	5.64E-001	7.656E+000	2.170E-00
+	Pb-210	46.54*	4.25	1.881E+000	1.88E+000	2.191E+000	8.880E-00
	BI-212	727.33	6.67	1.598E+000	1.60E+000	4.225E-002	7.420E-00
		785.37	1.10	9.946E+000		-7.250E-001	4.602E+00
		1078.62	0.56	2.243E+001		-5.163E+000	1.026E+00
		1620.50	1.47	5.742E+000		1.319E+000	2.354E+00
+	Pb-212	74.82*	10.28	3.706E-001	8.49E-002	5.688E-001	1.755E-00
		77.11*	17.10	1.955E-001		2.242E-001	9.201E-00
		86.83	2.07	2.187E+000		1.696E+000	1.050E+00
		87.35	3.97	1.040E+000		-8.732E-001	4.972E-00
		89.78*	1.46	1.789E+000		8.978E-001	8.338E-00
		115.18	0.60	5.173E+000		4.148E+000	2.445E+00
		238.63*	43.60	8.488E-002		1.584E-001	3.956E-00
		300.09	3.30	1.727E+000		-1.115E+000	8.160E-00
	BI-214	76.86*	0.55	6.134E+000	1.20E-001	7.033E+000	2.887E+00
		79.29	0.91	5.040E+000		6.536E-001	2.414E+00
		609.32*	45.49	1.202E-001		1.619E-001	5.300E-00
		665.45	1.53	7.190E+000		3.266E+000	3.366E+00
		768.36	4.89	2.176E+000		-8.823E-001	1.006E+00
		806.18	1.26	8.305E+000		-4.145E+000	3.821E+00
		934.06	3.11	4.325E+000		1.120E+000	2.009E+00
		1120.29	14.92	1.084E+000		8.680E-001	5.047E-00
		1155.21	1.63	9.025E+000		-5.327E+000	4.163E+00
		1238.11	5.83	2.898E+000		1.049E+000	1.346E+00
		1280.98	1.43	1.042E+001		-3.207E-001	4.777E+00
		1377.67	3.99	3.239E+000		1.362E+000	1.454E+00
		1385.31	0.79	1.579E+001		-3.578E+000	7.058E+00
		1401.52	1.33	1.051E+001		5.634E+000	4.751E+00
		1407.99	2.39	5.683E+000		-1.144E+000	2.560E+00
		1509.21	2.13	5.140E+000		8.681E-001	2.235E+00
		1583.20	0.70	2.100E+001		-4.774E-001	9.443E+00
		1661.27	1.05	1.033E+001		5.764E-001	4.424E+00
		1729.59	2.88	4.977E+000		5.696E-001	2.208E+00
		1764.49	15.30	1.031E+000		8.473E-001	4.616E-00
		1847.43	2.03	6.297E+000		7.670E-001	2.725E+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	6.569E-001	1.06E-001	1.008E+000	3.111E-00
		77.11*	9.70	3.446E-001		3.952E-001	1.622E-00
		86.83	1.70	2.663E+000		2.066E+000	1.278E+00
		87.35	2.24	1.843E+000		-1.548E+000	8.813E-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	3.185E+000	1.06E-001	1.599E+000	1.485E+00
		241.99	7.25	8.869E-001		1.038E-001	4.259E-00
		258.76	0.53	8.310E+000		2.829E-001	3.900E+00
		295.22*	18.42	1.623E-001		1.698E-001	7.280E-00
		351.93*	35.60	1.063E-001		2.712E-001	4.800E-00
		785.96	1.06	1.044E+001		-4.688E-001	4.833E+00
		839.07	0.58	2.181E+001		5.895E-001	1.016E+00
+	Ra-226	81.07	0.20	1.885E+001	1.02E+000	-1.189E+000	8.941E+00
		83.79	0.32	1.418E+001		1.160E+001	6.804E+00
		186.21*	3.64	1.020E+000		3.966E+000	4.819E-00
	AC-228	89.96	1.90	1.686E+016	4.38E+015	-2.813E+016	8.075E+01
		93.35	3.10	1.057E+016		1.578E+016	5.073E+01
		99.51	1.26	1.950E+016		1.084E+016	9.236E+01
		105.60	0.74	3.076E+016		-1.280E+016	1.452E+01
		129.07	2.42	1.072E+016		5.374E+015	5.091E+01
		153.98	0.72	3.539E+016		2.127E+015	1.674E+01
		209.25	3.89	8.495E+015		1.009E+015	4.029E+01
		214.85	0.76	4.039E+016		-6.336E+015	1.905E+01
		270.24	3.46	1.053E+016		-1.371E+015	4.957E+01
		328.00	2.95	1.482E+016		-3.088E+015	6.973E+01
		338.32	11.27	4.524E+015		2.284E+015	2.143E+01
		409.46	1.92	2.768E+016		-9.173E+015	1.299E+01
		463.00	4.40	1.347E+016		1.323E+015	6.313E+01
		562.50	0.87	7.071E+016		-4.025E+016	3.276E+01
		674.75	2.10	3.641E+016		8.186E+015	1.692E+01
		726.86	0.62	1.301E+017		3.439E+015	6.040E+01
		755.32	1.00	8.492E+016		-4.670E+016	3.947E+01
		772.29	1.49	5.235E+016		-6.051E+015	2.413E+01
		794.95	4.25	2.060E+016		1.318E+016	9.562E+01
		830.49	0.54	1.686E+017		5.920E+016	7.827E+01
		835.71	1.61	5.732E+016		-2.233E+016	2.663E+01
		840.38	0.91	1.027E+017		-1.756E+016	4.775E+01
		904.20	0.77	1.355E+017		-3.248E+016	6.317E+01
		911.20	25.80	4.378E+015		4.113E+015	2.052E+01
		964.77	4.99	2.146E+016		8.073E+015	9.987E+01
		968.97	15.80	7.585E+015		5.968E+015	3.557E+01
		1247.08	0.50	2.237E+017		-1.698E+017	1.026E+01
		1459.14	0.83	3.041E+017		6.986E+017	1.457E+01
		1495.91	0.86	9.284E+016		1.308E+016	4.018E+01
		1588.20	3.22	3.822E+016		1.724E+016	1.735E+01
		1630.63	1.51	5.874E+016		-7.794E+015	2.554E+01
	TH-230	67.67	0.38	1.151E+001	1.15E+001	2.783E+000	5.457E+00
	PA-234	742.81	0.11	1.099E+002	1.51E+001	4.312E+001	5.132E+00
		766.42	0.32	3.471E+001		-3.064E+000	1.609E+00
		1001.03	0.84	1.506E+001		-8.492E+000	6.929E+00
	TH-234	63.29	3.70	1.386E+000	1.39E+000	-2.591E-001	6.595E-00
		92.38	2.13	2.175E+000		2.437E+000	1.046E+00
		92.80	2.10	2.187E+000		2.847E+000	1.052E+00
		112.81	0.21	1.501E+001		-1.533E+000	7.106E+00
	U-234	53.20	0.12	4.757E+001	4.76E+001	2.500E+001	2.243E+00
		120.90	0.04	9.088E+001		-4.023E+000	4.302E+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	7.615E-001	3.70E-001	3.821E-001	3.549E-00
	93.35	5.54	7.814E-001		1.166E+000	3.749E-00
	104.82	0.69	4.416E+000		7.162E-001	2.084E+00
	105.60	1.31	2.295E+000		-9.552E-001	1.083E+00
	108.58	0.50	6.590E+000		2.038E+000	3.126E+00
	109.19	1.66	1.960E+000		-2.192E-001	9.291E-00
	143.76	10.96	3.704E-001		3.147E-001	1.771E-00
	163.36	5.08	7.224E-001		3.348E-001	3.426E-00
	194.94	0.63	6.869E+000		-4.360E-001	3.266E+00
	202.12	1.08	4.418E+000		2.046E+000	2.108E+00
	205.32	5.02	8.597E-001		-1.003E+000	4.078E-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]
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K-40	1460.8	^	7.66E+000	17.996			
Pb-210	46.5	^	2.19E+000	33.992			
Pb-212	74.8		5.69E-001	34.109	3.592[46.327]	4.32	-0.788
	77.1		2.24E-001	38.338	1.415[49.523]		[0.484]
	89.8		8.98E-001	120.69	5.669[124.69]		
	238.6	^	1.58E-001	31.348	1.000[44.333]		
PB-214	74.8		1.01E+000	35.263	3.717[45.574]	4.02	-0.715
	77.1		3.95E-001	39.381	1.457[48.830]		[0.317]
	89.8		1.60E+000	121.00	5.893[124.39]		
	295.2		1.70E-001	52.655	0.626[60.051]		
	351.9	^	2.71E-001	28.871	1.000[40.830]		
Ra-226	186.2	^	3.97E+000	42.672			