
 ***** 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-0074\UNC-IMC-007

Report Generated On : 5/9/2017 10:08:40 AM

Sample Title : UNC-IMC-0074-S-P-4

Sample Description :

Sample Identification : IMC-0074-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 : 4.656E+002 grams

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

Acquisition Started : 5/2/2017 10:15:17 AM

Live Time : 1800.0 seconds

Real Time : 1800.6 seconds

Dead Time : 0.04 %

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-0074-S-P-4

Peak Analysis Performed on: 5/9/2017 10:08:32 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	287-	313	291.52	73.06	0.77	5.77E+001	35.05	1.20E+002
m	2	287-	313	299.28	75.00	0.78	1.38E+002	68.85	1.40E+002
m	3	287-	313	308.26	77.25	0.78	1.38E+002	67.58	1.33E+002
F	4	735-	749	742.10	185.82	1.03	1.58E+002	76.58	8.81E+001
F	5	947-	958	952.97	238.59	0.93	1.77E+002	28.27	7.50E+001
F	6	1173-	1186	1179.07	295.17	1.18	5.98E+001	17.68	4.20E+001
F	7	1395-	1411	1405.32	351.78	1.17	1.04E+002	63.42	4.42E+001
F	8	5823-	5849	5835.92	1460.52	2.55	2.50E+002	32.24	1.05E+001

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-0074-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	0.985	1460.82*	10.66	1.00723E+001	1.55632E+000
Pb-212	0.998	74.82*	10.28	9.28683E-001	5.00638E-001
		77.11*	17.10	5.44058E-001	2.87550E-001
		86.83	2.07		
		87.35	3.97		
		89.78	1.46		
		115.18	0.60		
		238.63*	43.60	3.24797E-001	7.31206E-002
		300.09	3.30		
PB-214	0.848	74.82*	5.80	1.64601E+000	8.99477E-001
		77.11*	9.70	9.59113E-001	5.14219E-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	3.17496E-001	1.06186E-001
		351.93*	35.60	3.39044E-001	2.13411E-001
		785.96	1.06		
		839.07	0.58		
Ra-226	0.979	81.07	0.20		
		83.79	0.32		
		186.21*	3.64	2.85406E+000	1.46816E+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	0.985	1.007226E+001	1.556322E+000
Pb-212	0.998	3.348266E-001	6.994607E-002
PB-214	0.848	3.314390E-001	9.306852E-002
Ra-226	0.979	2.854059E+000	1.468162E+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 10:08:32 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
M 1	73.06	3.2035E-002	60.79		

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-0074-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	7.883E-001	7.88E-001	1.007E+001	3.396E-00
	Pb-210	46.54	4.25	2.104E+000	2.10E+000	1.409E+000	1.000E+00
	BI-212	727.33	6.67	1.632E+000	1.63E+000	7.873E-001	7.676E-00
		785.37	1.10	9.198E+000		1.939E+000	4.285E+00
		1078.62	0.56	1.886E+001		-2.127E+001	8.628E+00
		1620.50	1.47	6.991E+000		-2.395E-001	3.063E+00
+	Pb-212	74.82*	10.28	3.892E-001	8.78E-002	9.287E-001	1.855E-00
		77.11*	17.10	2.220E-001		5.441E-001	1.057E-00
		86.83	2.07	2.352E+000		1.330E+000	1.136E+00
		87.35	3.97	1.182E+000		-8.493E-001	5.702E-00
		89.78	1.46	2.851E+000		-8.050E+000	1.370E+00
		115.18	0.60	6.032E+000		-6.380E+000	2.890E+00
		238.63*	43.60	8.776E-002		3.248E-001	4.139E-00
		300.09	3.30	1.596E+000		-3.251E-001	7.574E-00
	BI-214	76.86	0.55	1.305E+001	2.46E-001	8.270E-002	6.356E+00
		79.29	0.91	5.952E+000		-5.068E-001	2.878E+00
		609.32	45.49	2.462E-001		2.858E-001	1.171E-00
		665.45	1.53	5.981E+000		-2.001E+000	2.796E+00
		768.36	4.89	2.031E+000		9.883E-001	9.463E-00
		806.18	1.26	8.207E+000		2.218E-001	3.823E+00
		934.06	3.11	3.618E+000		-4.662E-001	1.680E+00
		1120.29	14.92	1.020E+000		7.700E-001	4.788E-00
		1155.21	1.63	8.406E+000		-4.353E+000	3.910E+00
		1238.11	5.83	2.798E+000		1.659E+000	1.312E+00
		1280.98	1.43	9.117E+000		-6.720E+000	4.195E+00
		1377.67	3.99	3.142E+000		2.565E-001	1.432E+00
		1385.31	0.79	1.776E+001		1.420E+001	8.179E+00
		1401.52	1.33	7.499E+000		-1.087E+001	3.327E+00
		1407.99	2.39	4.756E+000		1.634E+000	2.142E+00
		1509.21	2.13	4.171E+000		-2.764E-001	1.805E+00
		1583.20	0.70	1.695E+001		-4.278E+000	7.591E+00
		1661.27	1.05	9.499E+000		1.833E-001	4.129E+00
		1729.59	2.88	4.240E+000		2.541E+000	1.886E+00
		1764.49	15.30	8.599E-001		3.444E-001	3.852E-00
		1847.43	2.03	6.405E+000		2.729E+000	2.849E+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	6.898E-001	1.26E-001	1.646E+000	3.287E-00
		77.11*	9.70	3.914E-001		9.591E-001	1.863E-00
		86.83	1.70	2.864E+000		1.619E+000	1.383E+00
		87.35	2.24	2.095E+000		-1.505E+000	1.011E+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	5.077E+000	1.26E-001	-1.433E+001	2.440E+00
		241.99	7.25	1.017E+000		-5.553E-001	4.932E-00
		258.76	0.53	9.085E+000		1.299E-001	4.323E+00
		295.22*	18.42	1.896E-001		3.175E-001	8.762E-00
		351.93*	35.60	1.265E-001		3.390E-001	5.880E-00
		785.96	1.06	9.569E+000		-6.208E-001	4.458E+00
		839.07	0.58	1.829E+001		8.501E+000	8.516E+00
+	Ra-226	81.07	0.20	2.094E+001	9.97E-001	-7.996E+000	1.003E+00
		83.79	0.32	1.455E+001		4.985E+000	7.015E+00
		186.21*	3.64	9.970E-001		2.854E+000	4.740E-00
	AC-228	89.96	1.90	2.152E+017	4.93E+016	-6.387E+017	1.037E+01
		93.35	3.10	1.341E+017		-1.815E+016	6.473E+01
		99.51	1.26	2.566E+017		-1.036E+016	1.227E+01
		105.60	0.74	4.260E+017		-1.735E+017	2.036E+01
		129.07	2.42	1.345E+017		8.998E+015	6.441E+01
		153.98	0.72	4.561E+017		2.156E+016	2.179E+01
		209.25	3.89	1.084E+017		-4.112E+016	5.191E+01
		214.85	0.76	5.161E+017		-2.325E+017	2.461E+01
		270.24	3.46	1.373E+017		1.825E+016	6.547E+01
		328.00	2.95	1.760E+017		-9.912E+016	8.346E+01
		338.32	11.27	5.041E+016		3.448E+016	2.398E+01
		409.46	1.92	3.110E+017		8.479E+016	1.468E+01
		463.00	4.40	1.765E+017		4.562E+016	8.393E+01
		562.50	0.87	7.850E+017		-1.425E+017	3.659E+01
		674.75	2.10	4.007E+017		1.800E+016	1.873E+01
		726.86	0.62	1.629E+018		1.371E+018	7.670E+01
		755.32	1.00	9.202E+017		-3.787E+017	4.296E+01
		772.29	1.49	5.795E+017		7.722E+016	2.689E+01
		794.95	4.25	2.218E+017		1.151E+016	1.034E+01
		830.49	0.54	1.774E+018		-5.387E+017	8.255E+01
		835.71	1.61	5.891E+017		6.676E+016	2.738E+01
		840.38	0.91	1.072E+018		7.958E+017	4.990E+01
		904.20	0.77	1.437E+018		-2.415E+018	6.721E+01
		911.20	25.80	4.925E+016		4.017E+016	2.323E+01
		964.77	4.99	2.520E+017		2.050E+017	1.185E+01
		968.97	15.80	8.212E+016		5.492E+016	3.866E+01
		1247.08	0.50	2.606E+018		1.292E+017	1.210E+01
		1459.14	0.83	3.890E+018		1.314E+019	1.881E+01
		1495.91	0.86	9.364E+017		-2.147E+017	4.052E+01
		1588.20	3.22	3.744E+017		3.024E+017	1.695E+01
		1630.63	1.51	6.714E+017		-6.453E+017	2.971E+01
	TH-230	67.67	0.38	1.383E+001	1.38E+001	8.600E-001	6.636E+00
	PA-234	742.81	0.11	1.052E+002	1.31E+001	-9.781E-001	4.952E+00
		766.42	0.32	3.106E+001		-2.819E+000	1.446E+00
		1001.03	0.84	1.307E+001		-3.366E+000	6.028E+00
	TH-234	63.29	3.70	1.643E+000	1.64E+000	4.167E-001	7.896E-00
		92.38	2.13	2.269E+000		3.185E+000	1.097E+00
		92.80	2.10	2.258E+000		2.354E+000	1.091E+00
		112.81	0.21	1.764E+001		6.145E+000	8.461E+00
	U-234	53.20	0.12	5.498E+001	5.50E+001	-4.213E+001	2.618E+00
		120.90	0.04	9.850E+001		-2.585E+001	4.710E+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	1.305E+000	3.51E-001	-3.873E+000	6.288E-00
	93.35	5.54	8.218E-001		-1.112E-001	3.966E-00
	104.82	0.69	5.077E+000		-3.152E-001	2.427E+00
	105.60	1.31	2.635E+000		-1.073E+000	1.259E+00
	108.58	0.50	7.091E+000		-6.285E+000	3.394E+00
	109.19	1.66	2.152E+000		-1.274E+000	1.030E+00
	143.76	10.96	3.509E-001		1.395E-001	1.684E-00
	163.36	5.08	7.523E-001		-1.831E-001	3.599E-00
	194.94	0.63	6.637E+000		-2.014E+000	3.172E+00
	202.12	1.08	4.093E+000		1.085E+000	1.959E+00
	205.32	5.02	9.136E-001		-1.992E-001	4.377E-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-0074\UNC-IMC-007

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	^	1.01E+001	15.452			
Pb-212	74.8		9.29E-001	53.908	2.859[58.420]	3.75	-0.685
	77.1		5.44E-001	52.853	1.675[57.448]		[0.453]
	238.6	^	3.25E-001	22.513	1.000[31.838]		
PB-214	74.8		1.65E+000	54.646	4.855[83.356]	5.37	-0.939
	77.1		9.59E-001	53.614	2.829[82.683]		[0.565]
	295.2		3.17E-001	33.445	0.936[71.278]		
	351.9	^	3.39E-001	62.945	1.000[89.017]		
Ra-226	186.2	^	2.85E+000	51.441			