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\*\*\*\*\* G A M M A S P E C T R U M A N A L Y S I S \*\*\*\*\*  
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Filename: C:\GENIE2K\CAMFILES\UNC 2017\IMC Samples\IMC-2198\UNC-IMC-219

Report Generated On : 5/4/2017 8:06:01 AM

Sample Title : UNC-IMC-2198-S-P-4

Sample Description :

Sample Identification : IMC-2198-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 : 2.815E+002 grams

Sample Taken On : 4/10/2017 12:00:00 AM

Acquisition Started : 4/20/2017 3:05:20 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 : 5/4/2017

Efficiency ID : H-IMC-2189-S-P-4

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\*\*\*\*\* P E A K A N A L Y S I S R E P O R T \*\*\*\*\*  
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Detector Name: 8566

Sample Title: UNC-IMC-2198-S-P-4

Peak Analysis Performed on: 5/4/2017 8:05:57 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	183-	192	186.60	46.81	0.61	6.89E+001	18.22	7.17E+001
F	2	205-	220	213.58	53.56	0.65	7.31E+001	51.21	1.04E+002
F	3	296-	304	299.62	75.09	0.58	1.08E+002	25.57	1.41E+002
M	4	332-	365	337.58	84.59	0.73	1.53E+002	71.01	8.82E+001
m	5	332-	365	359.81	90.15	0.75	5.35E+001	29.04	1.23E+002
F	6	567-	583	574.68	143.92	0.86	2.00E+002	27.49	9.56E+001
F	7	649-	658	652.87	163.49	0.80	6.62E+001	18.21	5.00E+001
F	8	734-	751	741.83	185.75	0.89	7.91E+002	54.00	1.06E+002
F	9	815-	826	820.17	205.35	0.80	6.52E+001	17.56	3.75E+001
F	10	946-	957	953.21	238.65	0.68	4.46E+001	44.20	4.65E+001
F	11	5822-	5848	5835.25	1460.35	2.76	1.33E+002	23.13	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

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 \*\*\*\*\* 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 \*\*\*\*\*  
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Sample Title: UNC-IMC-2198-S-P-4  
 Nuclide Library Used: C:\GENIE2K\CAMFILES\GE\_UNC\_U-NLB.NLB

..... IDENTIFIED NUCLIDES .....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.965	1460.82*	10.66	8.36412E+000	1.61897E+000
U-234	0.984	53.20*	0.12	7.83744E+001	5.80589E+001
		120.90	0.04		
U-235	0.998	105.60	1.31		
		109.19	1.66		
		143.76*	10.96	1.47929E+000	3.55872E-001
		163.36*	5.08	1.12963E+000	3.75778E-001
		202.12	1.08		
		205.32*	5.02	1.33220E+000	4.16238E-001

\* = 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

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 \*\*\*\*\* 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 \*\*\*\*\*  
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Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.965	8.364123E+000	1.618972E+000
U-234	0.984	7.837440E+001	5.805885E+001
U-235	0.998	1.319041E+000	2.195302E-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: 5/4/2017 8:05:56 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	46.81	3.8298E-002	26.43		
F 3	75.09	6.0070E-002	23.65		
M 4	84.59	8.4840E-002	46.50		
m 5	90.15	2.9730E-002	54.27		
F 8	185.75	4.3932E-001	6.83		
F 10	238.65	2.4796E-002	99.03		

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 1.960 sigma

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\*\*\*\*\* N U C L I D E M D A R E P O R T \*\*\*\*\*  
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Detector Name: 8566  
Sample Geometry: cylinder  
Sample Title: UNC-IMC-2198-S-P-4  
Nuclide Library Used: C:\GENIE2K\CAMFILES\GE\_UNC\_U-NLB.NLB

	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	7.366E-001	7.37E-001	8.364E+000	2.832E-00
	PA-234	742.81	0.11	1.292E+002	2.01E+001	1.240E+000	5.992E+00
		766.42	0.32	4.475E+001		-8.332E+000	2.075E+00
		1001.03	0.84	2.011E+001		-9.280E+000	9.276E+00
	TH-234	63.29	3.70	1.743E+000	1.74E+000	-7.261E-001	8.342E-00
		92.38	2.13	3.093E+000		3.856E+000	1.497E+00
		92.80	2.10	2.960E+000		3.062E+000	1.430E+00
		112.81	0.21	2.099E+001		-1.199E+001	1.001E+00
+	U-234	53.20*	0.12	7.181E+001	7.18E+001	7.837E+001	3.445E+00
		120.90	0.04	1.393E+002		1.139E+002	6.671E+00
+	U-235	105.60	1.31	3.658E+000	4.40E-001	-1.631E+000	1.751E+00
		109.19	1.66	2.997E+000		1.438E+000	1.437E+00
		143.76*	10.96	4.399E-001		1.479E+000	2.100E-00
		163.36*	5.08	6.420E-001		1.130E+000	2.979E-00
		202.12	1.08	6.214E+000		-2.811E-001	2.980E+00
		205.32*	5.02	7.058E-001		1.332E+000	3.253E-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

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\*\*\* 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-2198\UNC-IMC-219

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	^	8.36E+000	19.356			
U-234	53.2	^	7.84E+001	74.079			
U-235	143.8	^	1.48E+000	24.057	1.000[34.022]	1.13	-0.243
	163.4		1.13E+000	33.266	0.764[41.053]		[ 1.457]
	205.3		1.33E+000	31.244	0.901[39.433]		