

Outline _____ Urgent _____

UNITED STATES NUCLEAR REGULATORY COMMISSION
 REGION I LABORATORY
SAMPLE RECORD SHEET

Serial No. 301228

on Outline X Date Needed ASAP

Sample From: RTI
 Collected By: M. Taylor
J. Miller Date Sent _____
 Organization ORSS

Samples Received: 6-15-87
 Analysis Completed: 6-16-87
 Notified: _____ Date: _____

Analyzed By: N.T.M.
 Approved By: [Signature]

Sample			Sample Description	Anal. for	Inst. used	Quant. used	Date cntd.	Count time	Gross count	Bkgd.	Net count	Eff.	Results $\pm 1\sigma$ uCi/g
No.	Date	Hour											
1	6/11	14:00	Soil (450ml. Marinelli)	gamma scan	9cm x 9cm	845.2 g		10 min					$(6.12 \pm 0.27)E-6$
2		11:28				1209.2 g							$(8.42 \pm 0.30)E-6$
3		11:00				863.8 g							$(3.23 \pm 0.09)E-5$
4	6/12	12:00				1224.3 g							$(2.42 \pm 0.06)E-4$
5	6/11	15:15				1176.5 g							$(5.28 \pm 0.22)E-6$
6	6/12	14:25				1124.5 g							$(6.76 \pm 0.26)E-6$
7		14:50				1137.5 g							$(2.63 \pm 0.08)E-5$
8													
9	6/11	15:00	liquid 50ml poly bottle			50 ml							$(1.17 \pm 0.4)E-6$
10	6/12	12:00											
11	6/11	10:35											$(7.29 \pm 0.36)E-5$
12	6/11	19:12						1000 seconds					

*Random uncertainties reported are 1 standard deviation, 10. small negative and other results $\leq 3\sigma$ are interpreted by NRC as including "zero" or as not detected. If appropriate, estimates of possible systematic errors are reported in parentheses.

3/5

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS ENMJ: 62
COLLECT STARTED ON MCA 1 16-JUN-87 09:11:46
COLLECT DONE, 0.17 % DEAD TIME

AHL: UN

AHL: QU

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (09:11:46):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 14:00
DECAY TIME = 6911.77 MINUTES
% DEAD TIME (0.17):
SAMPLE DESCRIPTION: 301226 #1
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G : 845.2
UNITS CONVERSION FACTOR (1.0):

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 09:23:45

ANALYSIS PARAMETERS

HCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM HCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #1
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 8.4520E+02 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 09:11:46

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 601. SECONDS
DEAD TIME: 0.17 %

DECAYED TO 4. DAYS, 19.1961 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
10	97 - 120	107.39	74.90	1.6	288.	221.	67.	24.4	8.50E-01	
20	97 - 120	110.77	77.19	1.6	330.	221.	109.	20.0	8.50E-01	
3	116 - 134	125.11	86.86	1.5	255.	240.	15.	130.3	*****	
4	341 - 359	350.35	238.88	1.5	324.	156.	168.	12.1	*****	PB-212
5	425 - 443	433.97	295.32	1.5	138.	93.	45.	30.6	*****	PB-214
6	489 - 507	497.90	338.47	1.4	124.	68.	56.	23.0	*****	AC-228
7	509 - 527	518.39	352.30	1.6	172.	78.	94.	15.6	*****	PB-214
8	559 - 578	568.50	386.13	1.4	76.	59.	17.	64.5	*****	
9	744 - 763	753.73	511.16	0.8	82.	55.	27.	39.8	*****	TL-208,NA-22,ANN-RD
10	851 - 870	861.02	583.59	1.5	97.	53.	44.	26.4	*****	TL-208
11	890 - 909	899.59	609.63	2.1	126.	49.	77.	16.3	*****	BI-214
12	1064 - 1084	1074.07	727.42	1.6	68.	55.	13.	78.8	*****	BI-212
13	1336 - 1357	1346.85	911.60	2.5	107.	79.	28.	47.3	*****	AC-228
14	1631 - 1652	1641.45	1110.53	1.2	77.	61.	16.	69.9	*****	
15	1724 - 1746	1735.50	1174.04	2.1	929.	48.	881.	3.5	*****	CO-60
16C	1960 - 1982	1971.45	1333.39	2.4	787.	9.	778.	3.6	5.61E-01	CO-60
17	2067 - 2090	2078.70	1405.82	0.7	10.	6.	4.	100.0	*****	
18	2150 - 2173	2161.78	1461.94	2.2	132.	11.	121.	9.9	*****	
19	2344 - 2367	2355.78	1592.98	2.2	8.	5.	3.	120.2	*****	
20	2599 - 2623	2611.69	1765.85	2.1	18.	4.	14.	34.9	*****	
21	3697 - 3725	3711.77	2509.16	2.3	8.	1.	7.	48.1	*****	

ERROR QUOTATION AT 1.00 SIGMA
 PEAK CONFIDENCE LEVEL AT 68.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY

SAMPLE: 30122B #1

DATA COLLECTED ON 16-JUN-87 AT 09:11:46

DECAYED TO 4. DAYS, 19.1961 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	$6.11\text{E-}06$	$\pm 2.68\text{E-}07$	$6.12\text{E-}06$	$\pm 2.68\text{E-}07$
TL-208	$5.12\text{E-}07$	$\pm 1.36\text{E-}07$	$5.12\text{E-}07$	$\pm 1.36\text{E-}07$
TOTAL	$6.62\text{E-}06$	$\pm 3.00\text{E-}07$	$6.63\text{E-}06$	$\pm 3.01\text{E-}07$

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
107.39	74.90	67.	24.4	3.72E+00
110.77	77.19	107.	20.0	5.79E+00
125.11	86.86	15.	130.3	7.10E-01
350.35	238.88	168.	12.1	8.73E+00
433.97	295.32	45.	30.6	2.78E+00
497.90	338.47	56.	23.0	3.84E+00
518.39	352.30	94.	15.6	6.74E+00
568.50	386.13	17.	64.5	1.29E+00
753.73	511.16	27.	39.8	2.74E+00
899.59	609.63	77.	16.3	9.17E+00
1074.07	727.42	13.	78.8	1.86E+00
1346.85	911.60	28.	47.3	4.84E+00
1641.45	1110.53	16.	69.9	3.38E+00
2078.70	1405.82	4.	100.0	1.03E+00
2161.78	1461.94	121.	9.9	3.22E+01
2355.78	1592.98	3.	120.2	8.56E-01
2611.69	1765.85	14.	34.9	4.23E+00
3711.77	2509.16	7.	48.1	2.61E+00

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS (NM): 62
COLLECT STARTED ON MCA 1 16-JUN-87 09:31:11
COLLECT DONE, 0.33 % DEAD TIME

ANL> UN

ANL> QU

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (09:31:11):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 11:28
DECAY TIME = 7083.18 MINUTES
% DEAD TIME (0.33):
SAMPLE DESCRIPTION: 301228 #2
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G : 1209.2
UNITS CONVERSION FACTOR (1.0):

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 09:42:35

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTK

SAMPLE DESCRIPTION: 301228 #2
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 1.2092E+03 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 09:31:11

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 602. SECONDS
DEAD TIME: 0.33 %

DECAYED TO 4. DAYS, 22.0531 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1C	99 - 120	106.96	74.61	1.1	321.	259.	63.	31.9	1.63E+00	
2C	99 - 120	111.17	77.46	1.1	355.	260.	95.	26.6	1.63E+00	
3	341 - 359	350.17	238.76	1.7	502.	268.	234.	11.0	*****	PB-212
4	354 - 372	362.63	247.17	1.9	274.	255.	19.	111.2	*****	
5	489 - 507	498.23	338.70	0.8	179.	147.	32.	50.8	*****	AC-228
6	509 - 527	518.20	352.18	1.4	240.	142.	98.	18.4	*****	PB-214
7	745 - 764	754.30	511.55	2.6	143.	105.	38.	38.1	*****	TL-208, NA-22, ANN-RD
8	852 - 871	861.25	583.75	1.0	165.	109.	56.	27.7	*****	TL-208
9	890 - 909	899.74	609.73	2.4	196.	95.	101.	16.0	*****	BI-214
10	1165 - 1185	1174.82	795.45	1.3	155.	118.	37.	41.9	*****	CS-134
11	1336 - 1357	1346.66	911.47	3.0	220.	169.	51.	37.4	*****	AC-228
12	1510 - 1530	1520.29	1028.71	2.6	124.	103.	21.	66.7	*****	
13	1724 - 1746	1735.40	1173.97	1.9	1835.	58.	1777.	2.4	*****	CO-60
14	1960 - 1982	1971.42	1333.37	2.0	1546.	17.	1531.	2.6	*****	CO-60
15	2150 - 2172	2161.48	1461.74	2.1	171.	6.	166.	8.0	*****	
16	2226 - 2249	2237.89	1513.35	1.7	12.	5.	7.	58.9	*****	
17	2337 - 2361	2349.35	1588.63	3.7	17.	9.	8.	61.6	*****	
18	2600 - 2624	2612.18	1766.18	2.3	23.	8.	15.	36.2	*****	
19	3695 - 3723	3710.20	2508.10	2.7	14.	0.	14.	26.7	*****	

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY

SAMPLE: 301228 #2

DATA COLLECTED ON 16-JUN-87 AT 09:31:11

DECAYED TO 4. DAYS, 22.0531 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	8.40E-06	+ 3.00E-07	8.42E-06	+ 3.01E-07
TL-208	4.56E-07	+ 1.27E-07	4.56E-07	+ 1.27E-07
TOTAL	8.86E-06	+ 3.26E-07	8.87E-06	+ 3.27E-07

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
106.96	74.61	63.	31.9	3.48E+00
111.17	77.46	95.	26.6	5.03E+00
350.17	238.76	234.	11.0	1.21E+01
362.63	247.17	19.	111.2	9.85E-01
498.23	338.70	32.	50.8	2.21E+00
518.20	352.18	98.	18.4	6.97E+00
754.30	511.55	38.	38.1	3.85E+00
899.74	609.73	101.	16.0	1.19E+01
1174.82	795.45	37.	41.9	5.70E+00
1346.66	911.47	51.	37.4	8.84E+00
1520.29	1028.71	21.	66.7	4.14E+00
2161.48	1461.74	166.	8.0	4.40E+01
2237.89	1513.35	7.	58.9	1.91E+00
2349.35	1588.63	8.	61.6	2.37E+00
2612.18	1766.18	15.	36.2	4.77E+00
3710.20	2508.10	14.	26.7	5.55E+00

CO

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS [NM]: 62
COLLECT STARTED ON MCA 1 16-JUN-87 09:45:21
COLLECT DONE, 0.50 % DEAD TIME

ANL> UN

ANL> QU

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (09:45:21):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 11:00
DECAY TIME = 7125.35 MINUTES
% DEAD TIME (0.50):
SAMPLE DESCRIPTION: **301228 #3**
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G : 863.8
UNITS CONVERSION FACTOR (1.0):

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 09:58:09

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #3
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 8.6380E+02 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 09:45:21

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 603. SECONDS
DEAD TIME: 0.50 %

DECAYED TO 4. DAYS, 22.7558 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	138 - 155	146.48	101.29	1.2	580.	528.	52.	55.9	*****	
2	257 - 274	265.46	181.58	0.7	468.	449.	20.	134.9	*****	
3	341 - 359	350.36	238.89	1.3	791.	535.	256.	13.0	*****	PB-212
4	509 - 527	518.33	352.26	1.3	401.	281.	120.	19.7	*****	PB-214
5	701 - 719	710.18	481.77	0.9	264.	220.	44.	44.9	*****	
6C	741 - 763	750.17	508.76	1.4	221.	202.	19.	59.7	6.76E-01	
7C	741 - 763	753.37	510.92	1.4	250.	207.	43.	46.5	6.76E-01	TL-208,NA-22,ANN-RD
8	851 - 871	861.19	583.71	1.2	327.	269.	59.	39.3	*****	TL-208
9	1112 - 1132	1122.04	759.81	1.1	273.	260.	14.	160.2	*****	
10	1724 - 1746	1735.34	1173.93	2.0	4989.	159.	4810.	1.5	*****	CO-60
11	1960 - 1982	1971.32	1333.30	2.1	4246.	45.	4201.	1.6	*****	CO-60
12	2150 - 2173	2161.53	1461.77	2.1	160.	18.	142.	9.4	*****	
13	2650 - 2674	2662.79	1800.37	1.3	16.	11.	5.	101.9	*****	
14N	2755 - 2777	2766.18	1870.22	4.5	15.	8.	7.	70.4	1.19E+00	
15	2920 - 2945	2933.36	1983.16	0.7	12.	9.	3.	179.4	*****	
16	3117 - 3143	3130.50	2116.36	5.2	11.	5.	6.	69.2	*****	
17	3306 - 3332	3319.59	2244.13	1.0	11.	2.	9.	44.2	*****	
18	3404 - 3430	3417.71	2310.44	0.7	11.	5.	6.	69.2	*****	

AN UNRESOLVABLE PARAMETER CONFLICT HAS OCCURED
 WITHIN THE GAUFIT SUBROUTINE - ERROR

19E	3439 - 3483	3470.24	2345.93	2.1	19.	3.	16.	31.7	*****	
20	3697 - 3725	3711.44	2508.94	1.7	55.	1.	54.	14.1	*****	

ERROR QUOTATION AT 1.00 SIGMA
 PEAK CONFIDENCE LEVEL AT 68.0%

C - MULTIPLY ANALYSIS CONVERGED NORMALLY
 N - MULTIPLY ANALYSIS DID NOT CONVERGE
 E - MULTIPLY ANALYSIS ERROR

SAMPLE: 301228 #3

DATA COLLECTED ON 16-JUN-87 AT 09:45:21

DECAYED TO: 4. DAYS, 22.7558 HOURS BEFORE THE START OF COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$			
	MEASURED		DECAY CORRECTED	
	MEASURED	ERROR	CORRECTED	ERROR
CO-60	3.23E-05	+ 9.43E-07	3.23E-05	+ 9.44E-07
TL-208	6.71E-07	+ 2.64E-07	6.71E-07	+ 2.64E-07
TOTAL	3.29E-05	+ 9.79E-07	3.30E-05	+ 9.81E-07

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
146.48	101.29	52.	55.9	2.14E+00
265.46	181.58	20.	134.9	8.36E-01
350.36	238.89	256.	13.0	1.33E+01
518.33	352.26	120.	19.7	8.59E+00
710.18	481.77	44.	44.9	4.18E+00
750.17	508.76	19.	59.7	1.94E+00
753.37	510.92	43.	46.5	4.34E+00
1122.04	759.81	14.	160.2	1.98E+00
2161.53	1461.77	142.	9.4	3.77E+01
2662.79	1800.37	5.	101.9	1.62E+00
2766.18	1870.22	7.	70.4	2.18E+00
2933.36	1983.16	3.	179.4	9.01E-01
3130.50	2116.36	6.	69.2	2.12E+00
3319.59	2244.13	9.	44.2	3.13E+00
3417.71	2310.44	6.	69.2	2.26E+00
3470.24	2345.93	16.	31.7	6.17E+00
3711.44	2508.94	54.	14.1	2.12E+01

00
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS [NM]: 62
COLLECT STARTED ON MCA 1 15-JUN-87 11:51:14
COLLECT DONE. 3.23 % DEAD TIME

ANL> UN

ANL> QU
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (15-JUN-87):
TIME COLLECT STARTED (11:51:14):
DECAY TIME: 12-JUN-87(6):
TIME SAMPLE TAKEN: 12:00
DECAY TIME = 4311.23 MINUTES
3 DEAD TIME (3.23):
SAMPLE DESCRIPTION: 301228 #4
USER IDENTIFICATION: NTM
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G ; 1224.3
UNITS CONVERSION FACTOR (1.0):

GAMMA SPECTRUM ANALYSIS #

CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

15-JUN-87 12:03:14

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLER ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301226 #4
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 1.2243E+03 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 15-JUN-87 AT 11:51:14

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 620. SECONDS
DEAD TIME: 3.23 %

DECAYED TO 2. DAYS, 23.8539 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87

EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	81 - 98	89.87	63.08	0.8	5132.	5046.	87.	101.1	*****	TH-234
2	448 - 466	456.98	310.86	2.0	4257.	4021.	236.	34.5	*****	
3	743 - 762	753.00	510.67	2.1	2980.	2907.	73.	95.6	*****	TL-208,NA-22,ANN-80
4	1153 - 1173	1163.05	787.50	2.3	3339.	3176.	164.	46.3	*****	
5?	1723 - 1750	1734.36	1173.27	2.0	51129.	1780.	49349.	0.5	6.31E+00	CO-60
6?	1723 - 1750	1739.26	1176.58	2.0	2766.	1692.	1074.	11.7	6.31E+00	
7?	1949 - 1987	1960.25	1325.83	2.2	504.	434.	70.	66.9	7.32E+00	
8?	1949 - 1987	1970.30	1332.61	2.2	45076.	394.	44684.	0.5	7.32E+00	CO-60
9?	1949 - 1987	1975.80	1336.33	2.2	1351.	372.	978.	10.9	7.32E+00	
10	2148 - 2171	2160.18	1460.86	3.0	375.	230.	145.	17.0	*****	K-40
11	2944 - 2970	2957.68	1999.59	1.1	109.	94.	15.	98.6	*****	
12	3125 - 3151	3138.40	2121.70	1.4	98.	80.	18.	78.2	*****	
13	3694 - 3722	3709.05	2507.33	2.7	409.	14.	395.	5.2	*****	
14	3813 - 3841	3827.69	2587.51	0.8	5.	1.	4.	73.9	*****	
15	3851 - 3879	3865.88	2613.32	2.4	38.	3.	35.	18.4	*****	

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

? - MULTIPLET ANALYSIS CONVERGED BUT GFIT > 4

U. S. NRC REGION I LABORATORY

15-JUN-87 12:03:14

SAMPLE: 301228 #4

DATA COLLECTED ON 15-JUN-87 AT 11:51:14

DECAYED TO 2. DAYS, 23.8539 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	2.42E-04	+/- 6.13E-06	2.42E-04	+/- 6.14E-06
K-40	7.87E-06	+/- 1.35E-06	7.87E-06	+/- 1.35E-06
TOTAL	2.50E-04	+/- 6.28E-06	2.50E-04	+/- 6.28E-06

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
89.87	63.06	67.	101.1	6.24E+00
456.98	310.86	236.	34.5	1.51E+01
753.00	510.67	73.	95.6	7.35E+00
1163.05	787.50	164.	46.3	2.48E+01
1739.26	1176.58	1074.	11.7	2.36E+02
1960.25	1325.83	70.	66.9	1.70E+01
1975.80	1336.33	978.	10.9	2.41E+02
2957.68	1999.59	15.	98.6	5.19E+00
3138.40	2121.70	18.	78.2	6.39E+00
3709.05	2507.33	395.	5.2	1.56E+02
3827.69	2587.51	4.	73.9	1.45E+00
3865.88	2613.32	35.	18.4	1.43E+01

00

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS (NMJ): 62
COLLECT STARTED ON MCA 1 15-JUN-87 12:07:11

COLLECT DONE. 0.33 % DEAD TIME

ANL>

Invalid Command

ANL> UN

ANL> QU

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (15-JUN-87):
TIME COLLECT STARTED (12:07:11):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 15:15
DECAY TIME = 5572.18 MINUTES
% DEAD TIME (0.33):
SAMPLE DESCRIPTION: 301228 #5
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G : 1176.45
UNITS CONVERSION FACTOR (1.0):

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

15-JUN-87 12:18:42

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLIET ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301229 #5
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 1.1764E+03 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 15-JUN-87 AT 12:07:11

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 602. SECONDS
DEAD TIME: 0.33 %

DECAYED TO 3. DAYS, 20.8697 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87

EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	OFIT	NUCLIDES
10	87 - 118	99.75	69.75	2.1	482.	409.	72.	28.5	2.88E-01	
20	87 - 118	107.05	74.67	2.1	552.	430.	123.	25.7	2.88E-01	
3	263 - 280	271.65	185.76	1.6	211.	168.	44.	39.5	*****	U-235
4	341 - 359	350.04	238.67	1.1	421.	195.	226.	10.3	*****	PB-212
5	424 - 442	433.41	294.95	1.5	169.	124.	45.	34.7	*****	PB-214
6	488 - 507	497.50	338.21	1.2	128.	109.	19.	73.2	*****	AC-228
7	509 - 527	517.96	352.02	1.6	159.	95.	65.	22.7	*****	PB-214
8	744 - 763	753.41	510.95	1.9	101.	75.	26.	46.6	*****	TL-208, NA-22, ANN-20
9	851 - 870	860.69	583.37	1.5	135.	73.	62.	22.0	*****	TL-208
10	889 - 908	899.02	609.25	1.7	141.	57.	84.	15.9	*****	BI-214
11E	1329 - 1356	1346.49	911.35	1.4	182.	168.	14.	143.9	*****	AC-228
12	1645 - 1666	1655.71	1120.16	1.6	79.	55.	24.	46.6	*****	BI-214, SO-46
13	1723 - 1745	1734.54	1173.39	2.0	1101.	55.	1046.	3.2	*****	CO-60
14	1820 - 1841	1830.85	1238.43	3.2	37.	22.	15.	48.4	*****	BI-214, CO-56
15	1959 - 1981	1970.40	1332.68	2.1	945.	11.	934.	3.3	*****	CO-60
16	2025 - 2047	2036.65	1377.42	2.4	22.	6.	17.	31.5	*****	BI-214
17	2149 - 2171	2160.48	1461.06	2.6	157.	9.	148.	8.7	*****	K-40
18	2261 - 2284	2272.97	1537.04	1.2	5.	3.	2.	141.4	*****	
19	3505 - 3533	3519.78	2379.41	0.7	4.	1.	3.	94.9	*****	
20	3694 - 3722	3708.69	2507.08	1.1	8.	3.	5.	67.1	*****	
21	3848 - 3876	3862.92	2611.32	0.9	23.	0.	23.	20.9	*****	

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

E - MULTIPLET ANALYSIS CONVERGED NORMALLY
E - MULTIPLET ANALYSIS ERROR

SAMPLE: 301228 #5

DATA COLLECTED ON 15-JUN-87 AT 12:07:11

DECAYED TO 3. DAYS, 20.6697 HOURS BEFORE THE START OF COLLECT.

RADIO NUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN UCI/G			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	5.27E-06	+ 2.18E-07	5.28E-06	+ 2.18E-07
K-40	8.35E-06	+ 7.57E-07	8.35E-06	+ 7.57E-07
TL-208	5.19E-07	+ 1.15E-07	5.19E-07	+ 1.15E-07
TOTAL	1.41E-05	+ 7.96E-07	1.41E-05	+ 7.96E-07

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
99.75	69.75	72.	28.5	4.44E+00
107.05	74.57	123.	25.7	6.81E+00
271.65	185.76	44.	39.5	1.89E+00
350.04	238.67	226.	10.3	1.17E+01
433.41	294.95	48.	34.7	2.74E+00
477.50	338.21	19.	73.2	1.33E+00
517.96	352.02	65.	22.7	4.60E+00
753.41	510.95	26.	46.6	2.64E+00
899.02	609.25	64.	15.9	1.00E+01
1346.49	911.35	14.	143.9	2.44E+00
1655.71	1120.16	24.	46.6	5.05E+00
1830.85	1238.43	15.	48.4	3.53E+00
2036.65	1377.42	17.	31.5	4.17E+00
2272.97	1537.04	2.	141.4	5.54E-01
3519.78	2379.41	3.	94.9	9.90E-01
3708.69	2507.08	5.	67.1	2.05E+00
3862.92	2611.32	23.	20.9	9.35E+00

00
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1):
ENTER PRESET TIME DIGITS ENMI: 42
COLLECT STARTED ON MCA 1 15-JUN-87 12:21:22
COLLECT DONE. 0.17 % DEAD TIME

ANL: UN

ANL: GU
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (15-JUN-87):
TIME COLLECT STARTED (12:21:22):
DECAY TIME: 12-JUN-87
TIME SAMPLE TAKEN: 14:25
DECAY TIME = 4196.37 MINUTES
% DEAD TIME (0.17):
SAMPLE DESCRIPTION: 301228 #6
USER IDENTIFICATION: NTM
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G : 1124.5
UNITS CONVERSION FACTOR (1.0):

*
* GAMMA SPECTRUM ANALYSIS *
*

CAMBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

15-JUN-87 12:32:57

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLER ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTH

SAMPLE DESCRIPTION: 301228 #6
GEOMETRY DESCRIPTION: 450 ML MARINELLI BEAKER
SAMPLE SIZE: 1.1245E+03 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 15-JUN-87 AT 12:21:22

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 601. SECONDS
DEAD TIME: 0.17 %

DECAYED TO 2. DAYS, 21.9394 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87

EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1C	99 - 119	107.52	74.99	1.1	328.	262.	66.	26.2	1.01E+00	
2C	99 - 119	110.71	77.14	1.1	399.	281.	117.	20.6	1.01E+00	
3	341 - 359	350.01	238.65	1.4	597.	226.	371.	7.3	*****	PB-212
4	363 - 381	372.48	253.82	1.4	219.	200.	20.	93.9	*****	
5	425 - 443	434.13	295.43	1.5	222.	180.	42.	42.7	*****	PB-214
6	488 - 506	497.45	338.17	1.7	201.	122.	79.	20.9	*****	AC-228
7	509 - 527	517.99	352.03	1.6	209.	112.	97.	17.1	*****	PB-214
8	673 - 692	682.52	463.09	0.8	127.	117.	10.	138.5	*****	CS-136
9	743 - 762	752.34	510.23	0.7	110.	88.	22.	59.0	*****	TL-208, NA-22, ANN-RD
10	850 - 870	860.11	582.97	1.8	178.	96.	82.	19.3	*****	TL-208
11	889 - 908	898.93	609.18	1.5	166.	73.	93.	15.8	*****	BI-214
12	1047 - 1067	1057.13	715.99	1.0	107.	93.	14.	95.0	*****	
13	1063 - 1083	1073.10	726.77	1.0	128.	104.	24.	60.5	*****	BI-212
14	1336 - 1356	1346.49	911.35	2.9	213.	128.	86.	20.5	*****	AC-228
15	1422 - 1443	1432.46	969.41	1.7	191.	134.	57.	30.6	*****	RU-105
16	1613 - 1634	1624.04	1098.77	2.1	139.	103.	36.	42.1	*****	FE-59
17	1723 - 1745	1734.40	1173.30	2.0	1374.	57.	1317.	2.9	*****	CO-60
18	1959 - 1981	1970.26	1332.58	2.0	1162.	18.	1144.	3.0	*****	CO-60
19	2069 - 2092	2080.86	1407.28	2.0	17.	13.	4.	136.9	*****	
20	2148 - 2171	2160.17	1460.85	2.2	162.	9.	153.	8.5	*****	K-40
21	2546 - 2570	2558.09	1729.63	0.9	10.	4.	6.	67.6	*****	
22	2597 - 2622	2609.96	1764.68	0.9	11.	4.	7.	51.8	*****	BI-214
23	2725 - 2750	2737.81	1851.05	1.2	9.	6.	3.	125.5	*****	
24	2822 - 2847	2834.93	1916.66	1.9	9.	7.	2.	207.2	*****	Y-93
25	3273 - 3299	3286.64	2221.87	2.1	11.	1.	10.	36.4	*****	
26	3694 - 3721	3708.30	2506.82	1.2	17.	1.	16.	27.7	*****	
27C	3851 - 3878	3865.35	2612.96	1.9	30.	0.	30.	18.3	7.59E-01	

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY

SAMPLE: 301228 #6

DATA COLLECTED ON 15-JUN-87 AT 12:21:22

DECAYED TO 2. DAYS, 21.9394 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$		DECAY	
	MEASURED	ERROR	CORRECTED	ERROR
CO-60	6.75E-06	+ 2.62E-07	6.76E-06	+ 2.63E-07
K-40	9.04E-06	+ 8.06E-07	9.04E-06	+ 8.06E-07
TL-208	7.23E-07	+ 1.41E-07	7.23E-07	+ 1.41E-07
TOTAL	1.65E-05	+ 8.59E-07	1.65E-05	+ 8.59E-07

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTRID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
107.52	74.99	66.	26.2	3.65E+00
110.71	77.14	117.	20.6	6.25E+00
350.01	238.65	371.	7.3	1.92E+01
372.48	253.82	20.	93.9	1.06E+00
434.13	295.43	42.	42.7	2.60E+00
497.45	338.17	79.	20.9	5.45E+00
517.99	352.03	97.	17.1	6.92E+00
682.52	463.09	10.	138.5	9.45E-01
752.34	510.23	22.	59.0	2.20E+00
898.93	609.18	93.	15.8	1.10E+01
1057.13	715.99	14.	95.0	1.94E+00
1073.10	726.77	24.	60.5	3.33E+00
1346.49	911.35	86.	20.5	1.49E+01
1432.46	969.41	57.	30.6	1.05E+01
1624.04	1098.77	36.	42.1	7.38E+00
2080.86	1407.28	4.	136.9	1.03E+00
2558.09	1729.63	6.	67.6	1.73E+00
2609.96	1764.68	7.	51.8	2.32E+00
2737.81	1851.05	3.	125.5	1.02E+00
2834.93	1916.66	2.	207.2	6.59E-01
3286.64	2221.87	10.	36.4	3.57E+00
3708.30	2506.82	16.	27.7	6.21E+00
3865.35	2612.96	30.	18.3	1.22E+01

00
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS (NM): 62
COLLECT STARTED ON MCA 1 15-JUN-87 12:35:16
COLLECT DONE. 0.33 % DEAD TIME

ANL> UB\BN

ANL> 00
MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 2
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (15-JUN-87):
TIME COLLECT STARTED (12:35:16):
DECAY TIME: 12-JUN-87
TIME SAMPLE TAKEN: 14:50
DECAY TIME = 4185.27 MINUTES
% DEAD TIME (0.33):
SAMPLE DESCRIPTION: 301229 #7
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: G
SIZE OF SAMPLE IN G ; 1137.8
UNITS CONVERSION FACTOR (1.0):

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

15-JUN-87 12:46:38

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 2
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #7
GEOMETRY DESCRIPTION: 450 ML. MARINELLI BEAKER
SAMPLE SIZE: 1.1378E+03 G / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 4.5000E+02 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 15-JUN-87 AT 12:35:16

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 602. SECONDS
DEAD TIME: 0.33 %

DECAYED TO 2. DAYS, 21.7544 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87

EFFICIENCY CALIBRATION PERFORMED 13-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	140 - 158	149.28	103.17	1.8	808.	779.	29.	124.0	*****	
2	341 - 359	350.25	238.81	1.7	888.	624.	264.	13.4	*****	PB-212
3	425 - 443	433.95	295.31	1.3	513.	446.	67.	41.3	*****	PB-214
4	508 - 527	517.58	351.76	2.5	425.	375.	50.	51.6	*****	PB-214
5	744 - 763	753.25	510.84	3.4	325.	262.	63.	35.5	*****	TL-208,NA-22,ANN-RD
6	1222 - 1242	1232.38	834.31	2.8	372.	330.	42.	59.3	*****	GA-72,KR-86,MN-54
7	1723 - 1745	1734.42	1173.31	2.0	5241.	199.	5042.	1.5	*****	CO-60
8	1959 - 1981	1970.36	1332.65	2.2	4557.	58.	4499.	1.5	*****	CO-60
9	2149 - 2171	2160.48	1461.06	2.3	171.	21.	150.	9.2	*****	K-40
10	3695 - 3723	3709.42	2507.58	3.9	46.	0.	46.	14.7	*****	

ERROR QUOTATION AT 1.00 SIGMA
 PEAK CONFIDENCE LEVEL AT 68.0%

SAMPLE: 301228 #7

DATA COLLECTED ON 15-JUN-87 AT 12:35:16

DECAYED TO 2. DAYS, 21.7544 HOURS BEFORE THE START OF COLLECT.

RADIO NUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci/g}$			
	MEASURED		DECAY CORRECTED	
	MEASURED	ERROR	CORRECTED	ERROR
CO-60	2.62E-05	+ 7.60E-07	2.63E-05	+ 7.61E-07
K-40	8.76E-06	+ 8.36E-07	8.76E-06	+ 8.36E-07
KN-54	1.60E-07	+ 9.48E-08	1.61E-07	+ 9.54E-08
TOTAL	3.52E-05	+ 1.13E-06	3.52E-05	+ 1.13E-06

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
149.28	103.17	29.	124.0	1.17E+00
350.25	238.81	264.	13.4	1.37E+01
433.95	295.31	67.	41.3	4.13E+00
517.58	351.76	50.	51.6	3.59E+00
753.25	510.84	63.	35.5	6.32E+00
3709.42	2507.58	46.	14.7	1.62E+01

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS ENH: 42
COLLECT STARTED ON MCA 1 15-JUN-87 16:25:24
COLLECT DONE, 0.17 % DEAD TIME

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MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 5
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (15-JUN-87):
TIME COLLECT STARTED (16:25:24):
DECAY TIME: 12-JUN\NUJ-21\11-JUN-87
TIME SAMPLE TAKEN: 15:00
DECAY TIME = 5845.40 MINUTES
% DEAD TIME (0.17):
SAMPLE DESCRIPTION: 301228 49
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: ML
SIZE OF SAMPLE IN ML : 50
UNITS CONVERSION FACTOR (1.0):

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

15-JUN-87 16:37:15

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 5
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTH

SAMPLE DESCRIPTION: 301228 #9
GEOMETRY DESCRIPTION: 50 ML POLY BOTTLE
SAMPLE SIZE: 5.0000E+01 ML / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 5.0000E+01 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 15-JUN-87 AT 16:25:24

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 601. SECONDS
DEAD TIME: 0.17 %

DECAYED TO 4. DAYS, 1.4233 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 27-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	161 - 178	169.43	116.77	1.4	21.	18.	3.	182.8	*****	
2	239 - 256	247.50	169.46	1.9	24.	15.	9.	62.4	*****	
3	509 - 527	517.98	352.03	1.4	13.	6.	7.	62.2	*****	PB-214
4	742 - 761	751.75	509.82	0.9	15.	7.	8.	58.2	*****	TL-208
5	948 - 968	958.17	649.18	1.4	6.	5.	2.	204.1	*****	
6	1289 - 1310	1299.59	879.69	0.8	6.	3.	3.	111.1	*****	
7	1723 - 1745	1734.42	1173.31	1.5	10.	1.	9.	36.2	*****	CO-60
8	1960 - 1982	1971.52	1333.43	2.7	9.	0.	9.	33.3	*****	CO-60

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

SAMPLE: 301228 #9

DATA COLLECTED ON 15-JUN-87 AT 16:25:24

DECAYED TO 4. DAYS, 1.4233 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci}/\text{ML}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	$1.17\text{E}-06$	$\pm 3.91\text{E}-07$	$1.17\text{E}-06$	$\pm 3.92\text{E}-07$
TOTAL	$1.17\text{E}-06$	$\pm 3.91\text{E}-07$	$1.17\text{E}-06$	$\pm 3.92\text{E}-07$

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
169.43	116.77	3.	182.6	9.15E-02
247.50	169.46	9.	62.4	3.25E-01
517.98	352.03	7.	62.2	4.32E-01
751.75	509.62	8.	58.2	7.22E-01
958.17	649.18	2.	204.1	1.80E-01
1299.59	879.69	3.	111.1	4.34E-01

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS [NM]: 62
COLLECT STARTED ON MCA 1 16-JUN-87 10:28:03
COLLECT DONE. 00.00 % DEAD TIME

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MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 5
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (10:28:03):
DECAY TIME: 12-JUN-87
TIME SAMPLE TAKEN: 12:00
DECAY TIME = 5668.05 MINUTES
% DEAD TIME (00.00):
SAMPLE DESCRIPTION: 301228 #10
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: ML
SIZE OF SAMPLE IN ML ; 50
UNITS CONVERSION FACTOR (1.0):

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 10:40:00

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 5
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #10
GEOMETRY DESCRIPTION: 50 ML POLY BOTTLE
SAMPLE SIZE: 5.0000E+01 ML / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 5.0000E+01 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 10:28:03

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 600. SECONDS
DEAD TIME: 00.00 %

DECAYED TO 3. DAYS, 22.4675 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 27-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	OFIT	NUCLIDES
1	743 - 761	752.19	510.12	2.3	16.	2.	14.	29.0	*****	TL-208,NA-22,ANN-RD
2	774 - 793	783.27	531.10	1.1	5.	3.	2.	111.6	*****	
3	813 - 832	822.21	557.39	1.2	5.	2.	3.	63.9	*****	
4	872 - 891	881.90	597.69	1.1	4.	3.	1.	180.3	*****	
5	890 - 909	899.55	609.60	1.3	17.	4.	13.	34.1	*****	BI-214
6	1007 - 1027	1017.24	689.05	1.6	6.	2.	5.	59.3	*****	

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

SAMPLE: 301226 #10

DATA COLLECTED ON 16-JUN-67 AT 10:28:03

DECAYED TO 3. DAYS, 22.4675 HOURS BEFORE THE START OF COLLECT.

RADIONUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci}/\text{ML}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
TOTAL	0.00E-01	+ 0.00E-01	0.00E-01	+ 0.00E-01

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
752.19	510.12	14.	29.0	1.34E+00
783.27	531.10	2.	111.6	2.29E-01
822.21	557.39	3.	83.9	3.09E-01
881.90	597.69	1.	180.3	1.47E-01
899.55	609.60	13.	34.1	1.46E+00
1017.24	689.05	5.	59.3	5.74E-01

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS [NM]: 62
COLLECT STARTED ON MCA 1 16-JUN-87 10:14:13
COLLECT DONE, 00.00 % DEAD TIME

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MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 5
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (10:14:13):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 10:35
DECAY TIME = 7179.22 MINUTES
% DEAD TIME (00.00):
SAMPLE DESCRIPTION: 301228 #11
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: ML
SIZE OF SAMPLE IN ML : 50
UNITS CONVERSION FACTOR (1.0):

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 10:25:43

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 5
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLIET ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #11
GEOMETRY DESCRIPTION: 50 ML POLY BOTTLE
SAMPLE SIZE: 5.0000E+01 ML / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 5.0000E+01 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 10:14:13

COLLECT LIVE TIME: 600. SECONDS
REAL TIME: 600. SECONDS
DEAD TIME: 00.00 %

DECAYED TO 4. DAYS, 23.6536 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 27-DEC-85

PEAK ANALYSIS

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	426 - 444	434.69	295.81	2.1	64.	36.	28.	33.1	*****	Pb-214
2	788 - 807	797.45	540.68	1.5	32.	22.	10.	68.3	*****	I-134
3	890 - 909	899.36	609.48	2.4	47.	27.	20.	41.1	*****	Bi-214
4	912 - 931	921.32	624.30	1.1	43.	31.	12.	64.6	*****	
5	1161 - 1181	1170.88	792.78	1.1	40.	34.	6.	129.3	*****	
6	1217 - 1237	1226.89	830.60	0.7	44.	37.	7.	116.7	*****	
7	1724 - 1746	1735.26	1173.88	1.9	602.	19.	583.	4.3	*****	Co-60
8	1897 - 1919	1907.89	1290.46	1.2	7.	5.	2.	138.5	*****	
9	1960 - 1982	1971.29	1333.28	1.9	566.	6.	560.	4.3	*****	Co-60

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

SAMPLE: 301228 #11

DATA COLLECTED ON 16-JUN-87 AT 10:14:13

DECAYED TO 4. DAYS, 23.6536 HOURS BEFORE THE START OF COLLECT.

RADIO NUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci}/\text{ML}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
CO-60	7.27E-05	+ 3.59E-06	7.29E-05	+ 3.60E-06
TOTAL	7.27E-05	+ 3.59E-06	7.29E-05	+ 3.60E-06

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
434.69	295.61	28.	33.1	1.56E+00
797.45	540.68	10.	68.3	9.99E-01
899.36	609.48	20.	41.1	2.22E+00
921.32	624.30	12.	64.6	1.42E+00
1170.88	792.78	6.	129.3	9.17E-01
1226.89	830.60	7.	116.7	1.11E+00
1907.89	1290.46	2.	138.5	5.65E-01

MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
ENTER PRESET TIME DIGITS (NM): 13
COLLECT STARTED ON MCA 1 16-JUN-87 11:01:27
COLLECT DONE. 0.30 % DEAD TIME

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MCA UNIT NUMBER (1):
ADC UNIT NUMBER (1.1):
DETECTOR NUMBER (2):
GEOMETRY NUMBER (1): 5
MCA MEMORY REGION (FULL):
NUMBER OF CHANNELS IN REGION (4096):
DATE SPECTRUM COLLECTED (16-JUN-87):
TIME COLLECT STARTED (11:01:27):
DECAY TIME: 11-JUN-87
TIME SAMPLE TAKEN: 17:12
DECAY TIME = 6829.45 MINUTES
% DEAD TIME (0.30):
SAMPLE DESCRIPTION: 301228 #12
USER IDENTIFICATION: NTH
DIMENSIONAL UNITS OF SAMPLE: ML
SIZE OF SAMPLE IN ML : 50
UNITS CONVERSION FACTOR (1.0):

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAH-F V3.00 SOFTWARE

U. S. NRC REGION I LABORATORY

16-JUN-87 11:29:36

ANALYSIS PARAMETERS

MCA UNIT NUMBER: 1 / ADC UNIT NUMBER: 1.1
DETECTOR NUMBER: 2 / GEOMETRY NUMBER: 5
SPECTRUM SIZE: 4096 CHANNELS FROM MCA REGION FULL
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 6 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 68.0%
IDENTIFICATION ENERGY WINDOW: +/- 1.00 KEV
ERROR QUOTATION: 1.00 SIGMA UNCERTAINTY

MULTIPLY ANALYSIS PERFORMED

REGULAR OUTPUT

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AND
ANALYZED BY: NTM

SAMPLE DESCRIPTION: 301228 #12
GEOMETRY DESCRIPTION: 50 ML POLY BOTTLE
SAMPLE SIZE: 5.0000E+01 ML / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 5.0000E+01 ML
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 16-JUN-87 AT 11:01:27

COLLECT LIVE TIME: 1000. SECONDS
REAL TIME: 1003. SECONDS
DEAD TIME: 0.30 %

DECAYED TO 4. DAYS, 17.8242 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 12-JUN-87
EFFICIENCY CALIBRATION PERFORMED 27-DEC-85

P E A K A N A L Y S I S

PK	START - STOP CHANNEL	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	GROSS COUNTS	BACKGND COUNTS	NET AREA COUNTS	ERROR %	GFIT	NUCLIDES
1	47 - 64	55.63	39.97	0.6	32.	21.	11.	59.3	*****	
2	75 - 92	83.32	58.66	1.2	32.	23.	10.	69.2	*****	AM-241
3	340 - 358	349.50	238.31	0.6	31.	22.	9.	75.0	*****	PB-212
4	523 - 541	532.10	361.56	1.5	19.	11.	9.	59.0	*****	
5	614 - 633	623.45	423.22	1.0	16.	6.	10.	44.7	*****	BA-140
6	742 - 761	751.39	509.58	1.8	22.	13.	9.	59.1	*****	
7	1267 - 1286	1277.71	864.91	1.5	5.	3.	2.	167.3	*****	CO-58
8	1312 - 1332	1322.18	894.94	1.0	6.	5.	2.	204.1	*****	LA-142
9	1725 - 1746	1735.64	1174.13	0.6	6.	2.	4.	81.2	*****	CO-60, CO-56
10	1960 - 1982	1971.50	1333.42	1.3	6.	4.	2.	131.1	*****	CO-60

ERROR QUOTATION AT 1.00 SIGMA
PEAK CONFIDENCE LEVEL AT 68.0%

SAMPLE: 301228 #12

DATA COLLECTED ON 16-JUN-67 AT 11:01:27

DECAYED TO 4. DAYS, 17.8242 HOURS BEFORE THE START OF COLLECT.

RADIO NUCLIDE ANALYSIS REPORT

NUCLIDE	ACTIVITY CONCENTRATION IN $\mu\text{Ci}/\text{ML}$			
	MEASURED	ERROR	DECAY CORRECTED	ERROR
AM-241	3.55E-07	+ 2.65E-07	3.55E-07	+ 2.65E-07
CO-60	1.82E-07	+ 2.39E-07	1.82E-07	+ 2.39E-07
TOTAL	5.37E-07	+ 3.56E-07	5.38E-07	+ 3.57E-07

ERROR QUOTATION AT 1.00 SIGMA

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
55.63	39.97	11.	59.3	4.86E-01
349.50	238.31	9.	75.0	2.46E-01
532.10	361.56	9.	59.0	3.43E-01
623.45	423.22	10.	44.7	4.70E-01
751.39	509.58	9.	59.1	5.27E-01
1277.71	864.91	2.	167.3	1.60E-01
1322.18	894.94	2.	204.1	1.49E-01