0057929 CH0016

CH-016
Batch Data Report
For
233-S ISOCS NDA Assays

Measurement and Analysis by: _____ **Date:** 6/24/02
Martin Winterrose

Data Review by: _____ **Date:** 6/24/02
Bruce Gillespie

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1. Introduction

This report documents results for four (4) items, one (1) 55-gallon drum, and three (3) HEPA Filters assayed by Canberra Hanford using the In Situ Object Counting System (ISOCS). All measurements were performed in accordance with the "Sampling and Analysis Plan for the 233-S Plutonium Concentration Facility" (DOE/RL-97-87 Rev. 1) and the Canberra Hanford Quality Control Plan and procedure. All items were assayed at the 233-S facility. The individual items and drum were assayed during the time period from June 10 to June 14, 2002.

2. Technical Information

The items were assayed within the assay trailer at the 233-S facility grounds. Assays were conducted in one of two manners: For smaller items, a single sample average spectrum was obtained by measuring the item, manually rotating it 180 degrees then continuing data acquisition. For larger items, two separate spectra were obtained and the assay results averaged or summed as appropriate. Total count times were fixed at 1800 seconds live time. Items were placed on a cart or turn table within a reduced background area of the trailer. The detector was positioned a minimum of 24 inches from the item with the detector face visually centered on the largest surface area of the package. The detector sides were shielded with a lead collimator to minimize scatter and background.

Individual ISOCS efficiency calibrations were created for each item. Box, and cylinder geometry models were used. An item's composition was determined as best as possible through a combination of the item's packaging description, visual inspection, and package handling. Some items proved very easy to model (e.g. Drum) while others more difficult. Model matrices were varied or the expected activity distribution adjusted to obtain reasonable correlation between the low and high energy Pu-239 and Am-241 emissions.

The drum was assayed for 1800 seconds live time and was continuously rotating at a speed of approximately 6 rpm during data acquisition. Rotating the drum helps average out and minimizes the potential of sample self-shielding. The HEPA filters were place on the turn table but only rotated 180 to allow for two (2) sides to be counted. The detector sides were shielded with a lead collimator to minimize scatter and background. One filter, 7040 required use of a single, 0.0312 inch thick cadmium attenuator to lessen the detector dead time and improve system performance.

Individual ISOCS efficiency calibrations were created for the drum based upon the assumption that the drum was full and had an average density based on the net weight of the drum (waste matrix) divided by the drum volume (208 liters). A tare weight of ~26 kg was assumed. The same approach was used on the HEPA filters only no tare weight was applied. Model matrices were varied somewhat with respect to density and material 'Z' to obtain reasonable correlation between the low and high energy Pu-239 and Am-241 emissions.

Final package results for the drum and filters were calculated using the Analysis V3.0b spreadsheet. Data analysis was conservative. Method selections (e.g. measured Am-241 versus Am-241 calculated from the measured Pu-239) normally favored higher final results. Additionally, in all measurements performed as a part of this batch, the actual total measurement uncertainty should be significantly lower than the reported value. This is expected as the uncertainty calculation for the Am-241 is based on the 59.5 keV gamma and most all the assays have good results for the higher energy Am-241 gamma emissions.

3. Quality Control Results

Daily background and quality control (QC) check source measurements were performed on the system prior to each day's measurements. Charts for these measurements are on pages 5 - 10. The control charts span the interval from May 14, 2002 to June 14, 2002. The peak area and centroid control charts indicate a very stable system.

No individual item was randomly selected for replicate measurement since ten (10) items have not been assayed since the last replicate was preformed. So the results from the previous replicate assayed on May 7, 2002 will be applied. As shown in the table below, the replicate satisfies the quality requirements of the difference in measurement values are within 2 sigma of the reported measurement uncertainties.

Replicate Analysis	Item 6785
| Pu-239(orig) – Pu-239(rep) |	5.5
$1.96 * \sqrt{[unc(orig)]^2 + [unc(rep)]^2}$	24.3

4. Summary of Results

Full data packages for each item are included as an attachment beginning on page 12. The following table summarizes the total TRU activity results and plutonium gram values for each item. The 'Pu Mass + 3-sigma' values in the table are based solely on counting statistics. The 'Pu Mass + 3-sigma TMU' values are not included here, but are reported on the final result spreadsheets.

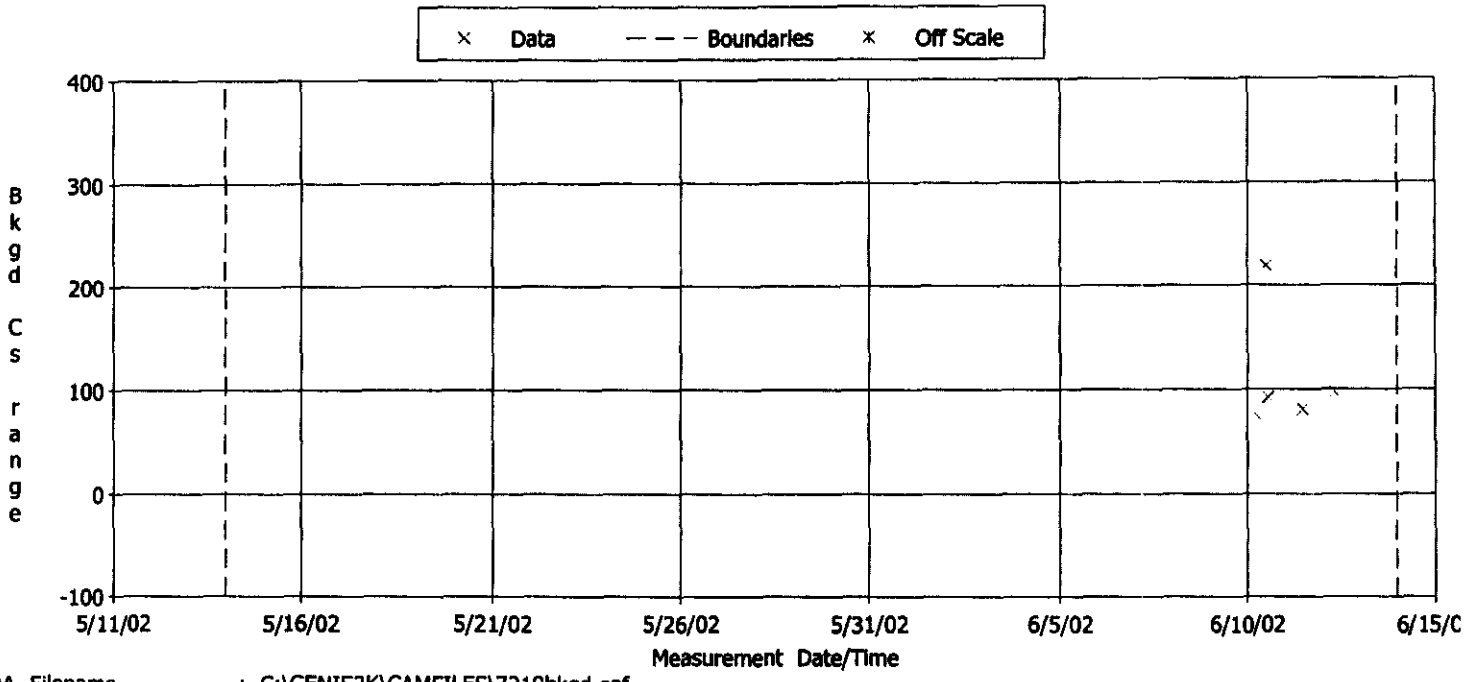
Summary of package assay results for Data Batch Report CH014

Package Item ID	Assay Weight (kg)	TRU Act (nCi/g)	TRU TMU (nCi/g)	Pu Mass (g)	Pu Mass(g) + 3 sigma	Description, calculation notes
6785	17	1.47E+02 ±	2.00E+01	2.09E-02	2.91E-02	Bagged HEPA filter.
6785 REP		1.58E+02 ±	2.09E+01	2.27E-02	3.11E-02	Previous replicate is of HEPA.
Filter-1	54.2	3.45E+03 ±	1.03E+03	1.09E+00	1.35E+00	Large HEPA from South wood
Filter-2	54.2	2.18E+03 ±	6.36E+02	6.69E-01	8.40E-01	Identical to above
7040	8.18	7.28E+04 ±	2.11E+04	3.35E+00	4.14E+00	Small HEPA from vacuum
0032	91	2.10E+02 ±	6.30E+01	7.62E-02	1.01E-01	Drum 233s-02-0032

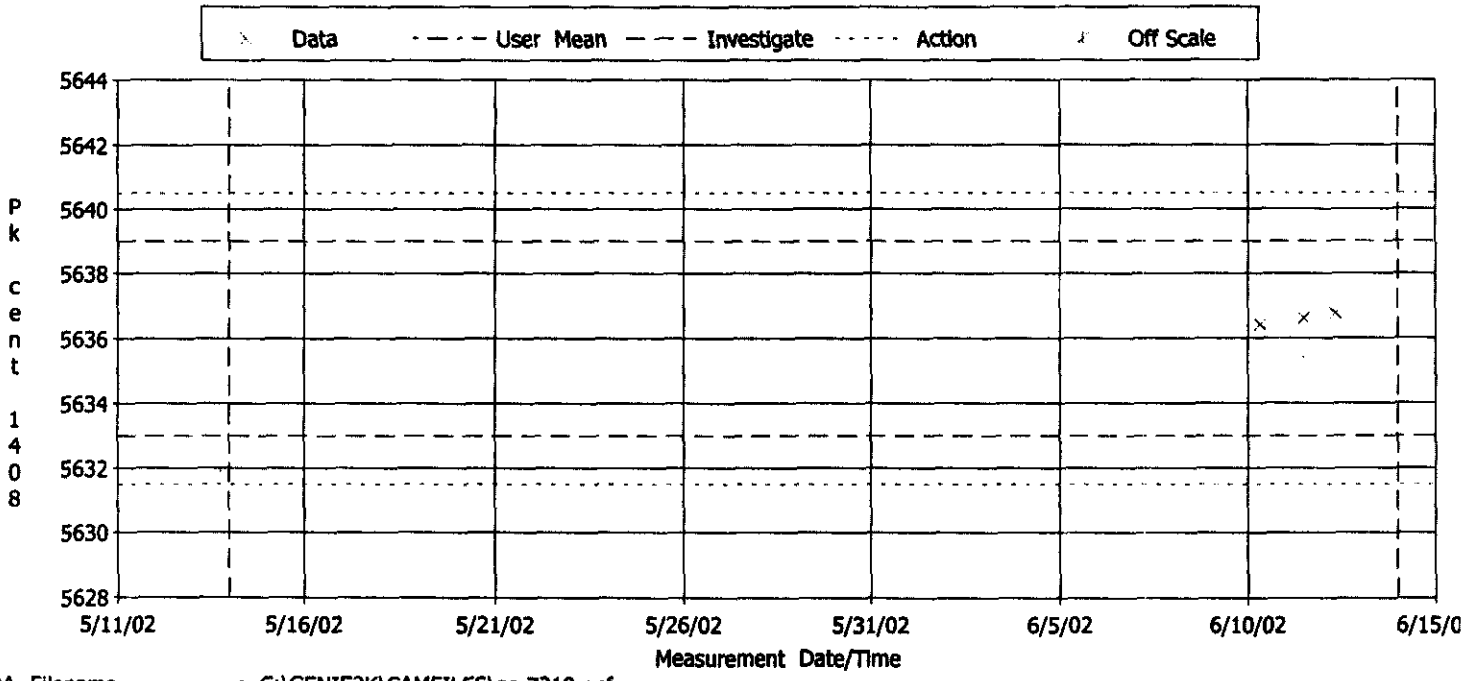
CHANGED SIGN FROM - TO + BMG 6/24/02

4 TRU packages
LLW packages

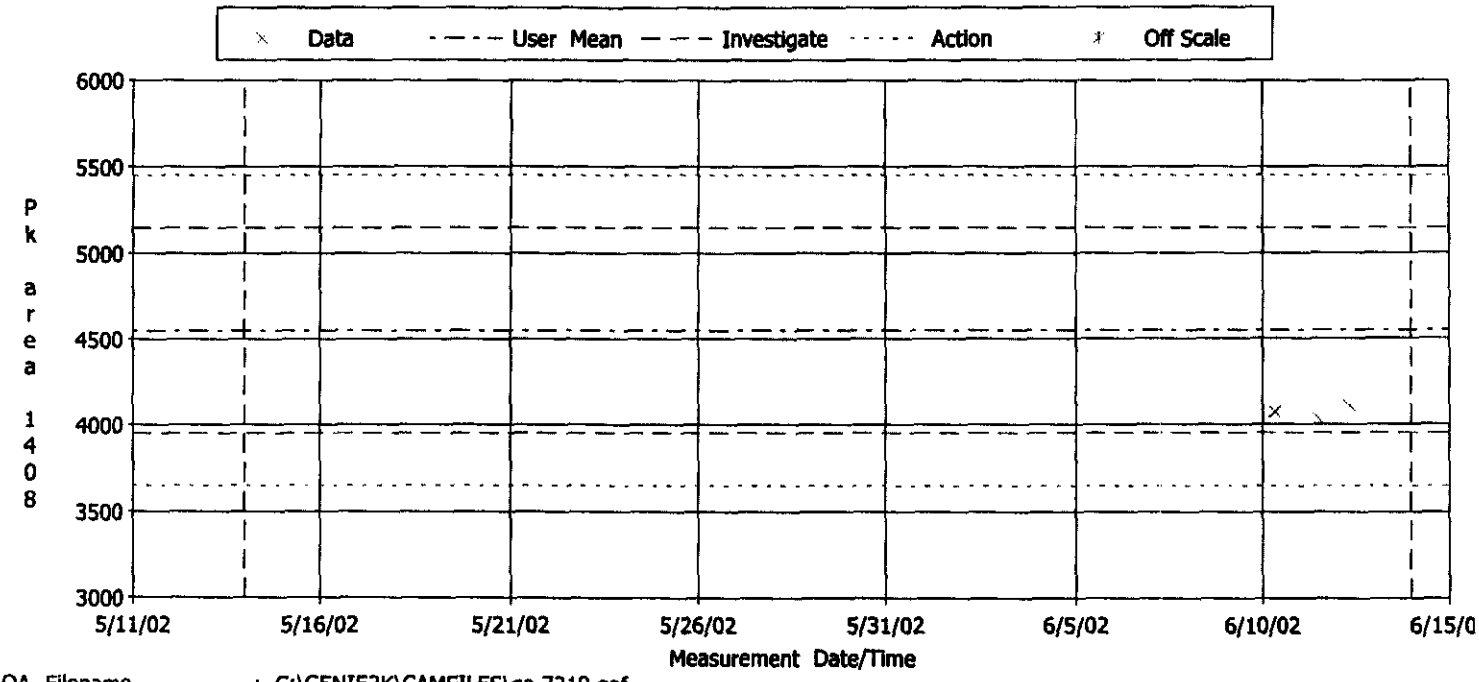
Control Charts



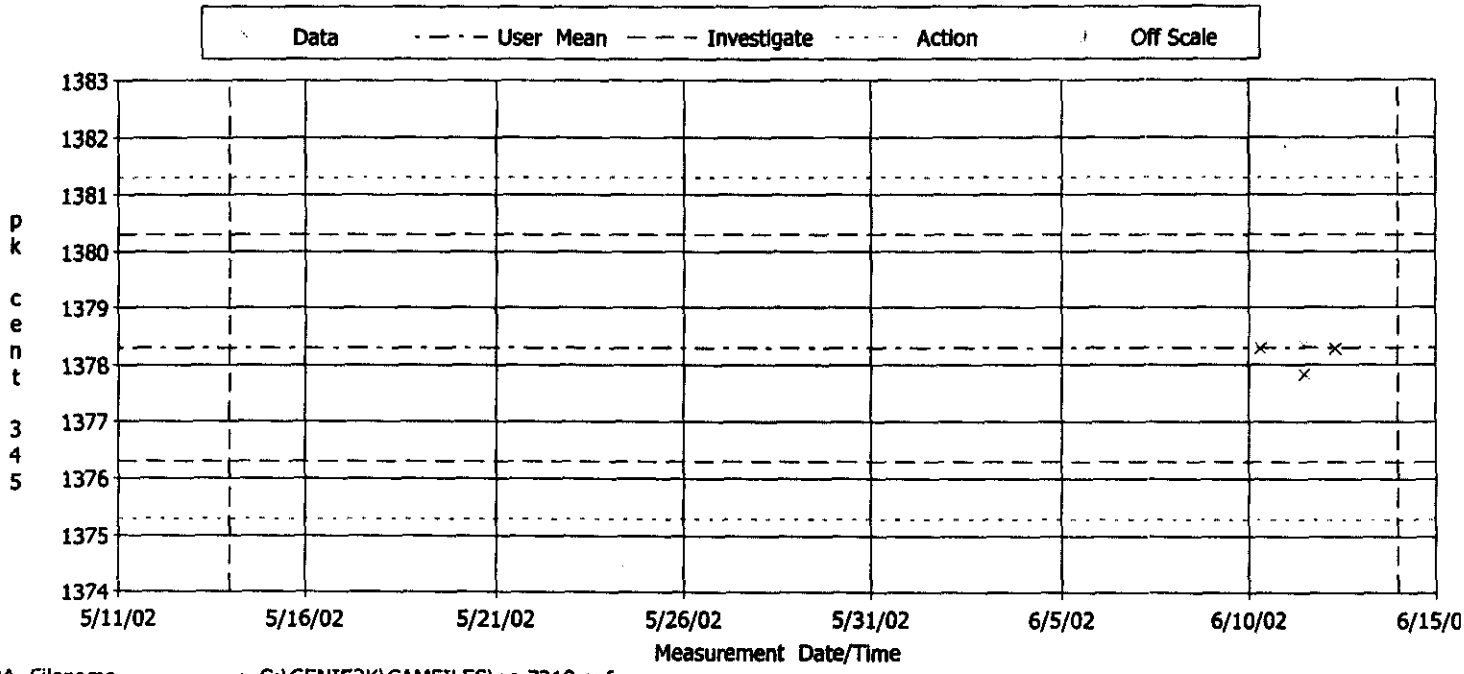
QA Filename : C:\GENIE2K\CAMFILES\7219bkgd.qaf
Parameter Description : Bkgd Cs range (counts)
Selection Dates : 5/14/02 12:00:00 AM - 6/14/02 12:00:00 AM
Lower/Upper Boundaries : 0.000 - 300.000



QA Filename : C:\GENIE2K\CAMFILES\qa 7219.qaf
Parameter Description : Pk cent 1408 (ch)
Selection Dates : 5/14/02 12:00:00 AM - 6/14/02 12:00:00 AM
User Mean +/- Std Dev : 5636.000 +/- 1.500



QA Filename : C:\GENIE2K\CAMFILES\qa 7219.qaf
Parameter Description : Pk area 1408 (counts)
Selection Dates : 5/14/02 12:00:00 AM - 6/14/02 12:00:00 AM
User Mean +/- Std Dev : 4550.000 +/- 3.00e+002



QA Filename : C:\GENIE2K\CAMFILES\qa 7219.qaf
Parameter Description : pk cent 345 (ch)
Selection Dates : 5/14/02 12:00:00 AM - 6/14/02 12:00:00 AM
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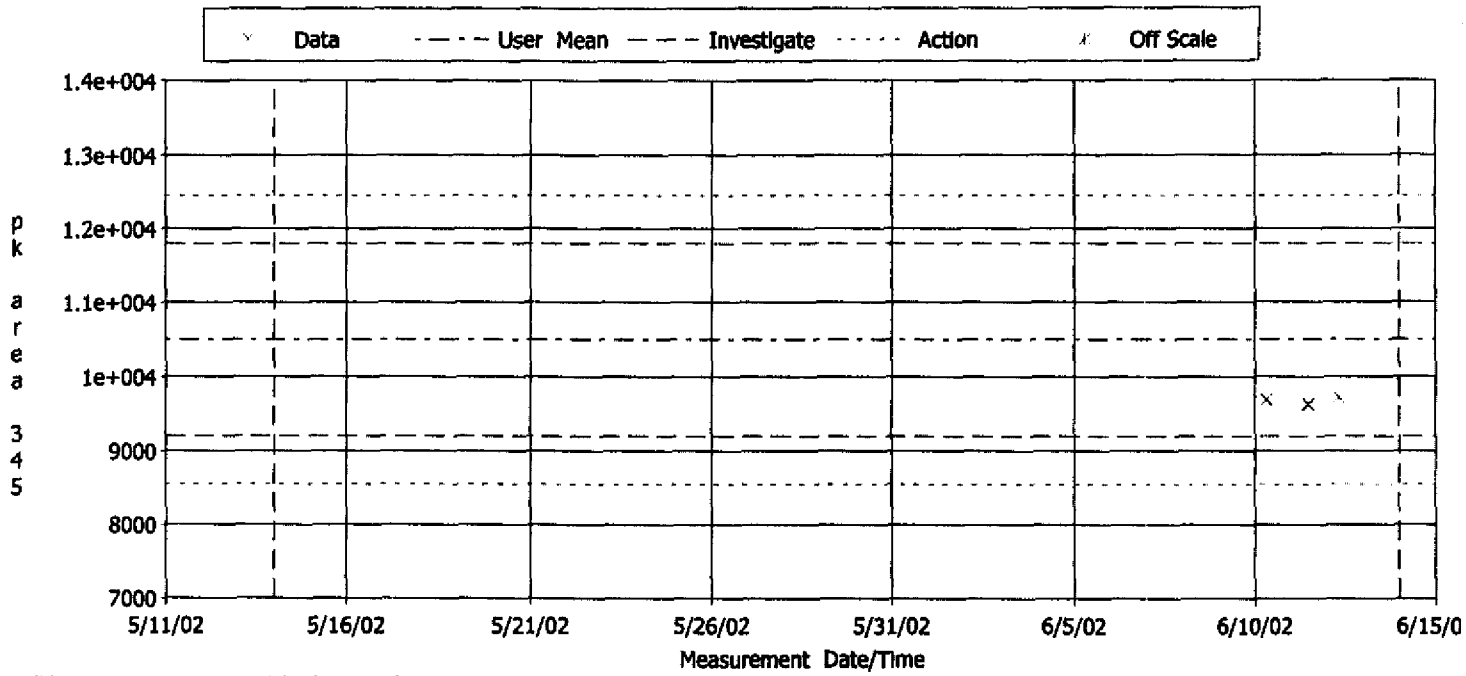
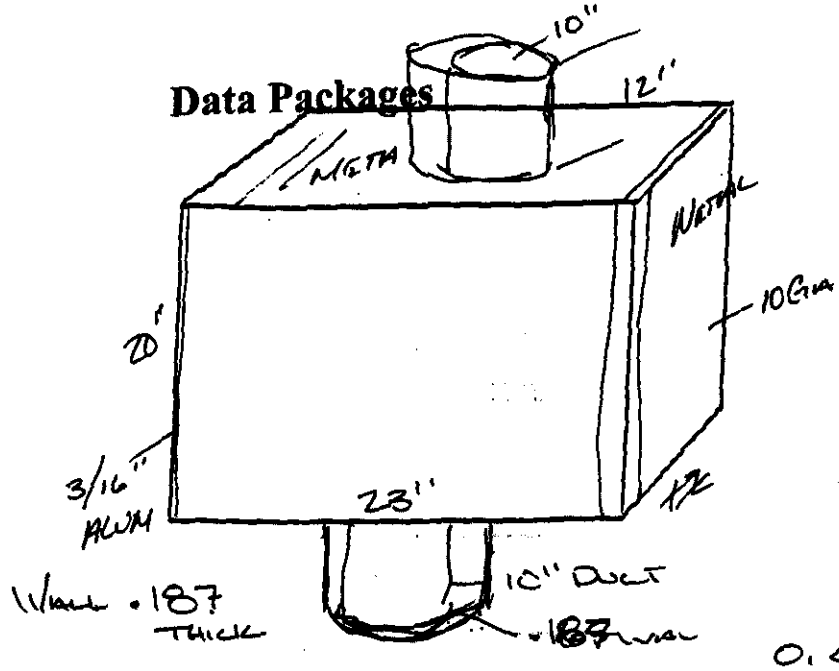


QA Filename : C:\GENIE2K\CAMFILES\qa 7219.qaf
Parameter Description : pk area 345 (counts)
Selection Dates : 5/14/02 12:00:00 AM - 6/14/02 12:00:00 AM
User Mean +/- Std Dev : 10500.000 +/- 6.50e+002

Data Packages

Bldg 233s
NDA Item Description Sheet
Box Geometry

Data Packages



0.4884

Put Dimensions on Box

Item ID: FILTER-1

Weight (kg): 54.2 120

Material Description: 20 x 23 HEPA

Packaging: 3 LAYER

Detector Distance (in): ~~24~~ 30"

Detector Filters: NONE

Dose Rate:

Comments: COUNT 1 (SIDE 1) ~~1800~~ 900
2002-03
COUNT 2 (SIDE 2) 1800
COUNT 3 (TOTAL) 1800

```
#Date & Time: Fri Jun 14 11:48:00 2002
~g=SIMPLE_BOX
~description=FILTER-1
~comment=FILTER_FROM_SOUTHWOOD.
~Ccollimator=50MM-180D
~crpn=4
~Detector=7219
~Convergence in %=1            ~MDRPN=4
~Lunit=IN  ~Tunit=C  ~Dunit=G/CU.C    ~Punit=MM.HG
~at=20        ~ap=760       ~rh=50
~Energies kev=   50.000,  100.000,  128.000,  130.000,  150.000,  200.000,#
                300.000,  500.000,  700.000, 1000.000, 1400.000, 2000.000,#
               4000.000,
~Error in %=     10.000,   10.000,   10.000,   10.000,   10.000,    8.000,#
                  8.000,    6.000,    6.000,    4.000,    4.000,    4.000,#
                  4.000,
~d1.1=0.125     ~d1.2=23        ~d1.3=20        ~d1.4=20        ~1mater=304SS    ~1den=7.81
~d3.1=19        ~3mater=HEPA     ~3den=0.575     ~3con=1
~sd1=30
```

233-S Item Analysis

Spreadsheet Version 3.0b

1/14/02

Sample Info:

Item ID:	FILTER-01	**Assay Date:**	10-Jun-02
File Name:	2002-04	**File Name:**	

Data Input:

Isotope	Activity (uCi/kg)	Meas Uncert	Activity (uCi/kg)	Meas Uncert
Pu-239 (129)				
Pu-239 (414)	1.07E+03	8.80E+01		
Am-241	1.14E+03	1.22E+02		
Np-237	8.40E-01	4.04E-02		
U-238				
U-235				
Cs-137	7.43E-03	5.25E-04		
Co-60				

Item Parameters:

Contamination:	Internal	Item Type:	Box	Calcs:	Use 1st

Dimensions:

Length (in):	23	Width (in):	20	Depth (in):	20
Weight (lbs):	120	Depth for TMU (in):	4	% Volume:	100

Am-241 Calcs:

Measured	1.14E+03	+/-	1.77E+03	Calc from Pu-239
Calculated	1.48E+03	+/-	9.82E+02	

Nuclide Activities:

Isotope	Activity (nCi/g)		Total Unc 1 sigma
Pu-238	4.34E+02	+/-	1.04E+02
Pu-239	1.07E+03	+/-	2.56E+02
Pu-240	5.58E+02	+/-	1.33E+02
Pu-241	2.08E+03	+/-	4.98E+02
Pu-242	5.63E-01	+/-	1.35E-01
Am-241	1.48E+03	+/-	9.82E+02
Np-237	8.40E-01	+/-	1.92E-01
U-238	0.00E+00	+/-	0.00E+00
U-235	0.00E+00	+/-	0.00E+00
Cs-137	7.43E-03	+/-	1.74E-03
Co-60	0.00E+00	+/-	0.00E+00

Results:

Total TRU Activity(nCi/g):		3.54E+03	+/-	1.03E+03	Calc from Pu-239 Act
Pu (g):	1.09E+00	**Pu (g) + 3 sigma TMU:**		1.87E+00	
		Pu(g) + 3 sigma:		1.35E+00	

Comments:

High Np-237 ratio does not affect final values. Eu-152 values of 2.19e-03 / 4.28e-04 Are correct.

Errors:High Np-237 ratio,

Analyst: Martin Winterrose

Date: 6/14/01

C A N B E R R A I S O C S A N A L Y S I S

Report Generated On : 6/14/02 12:01:58 PM

Sample Title : Filter-1 Count 2
Spectrum Description :
Sample Identification : 2002-04
Sample Size : 54.2 kg

Sample Taken On : 6/10/02 9:45:00 AM
Acquisition Started : 6/10/02 9:45:49 AM

Live Time: 1800.0 seconds Real Time: 1966.1 seconds

ISOCS Calibration : FILTER-1
Energy Calibration Used Done On : 2/27/01
Efficiency Calibration Used Done On : 6/14/02

P E A K A N A L Y S I S R E P O R T

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	239.21	59.89	4.71E+006	157174.	8.78E+004
2	292.06	73.10	2.96E+003	167.94	3.30E+004
3	301.09	75.35	6.42E+003	179.03	3.10E+004
4	347.26	86.89	7.41E+003	511.70	2.36E+004
5	379.76	95.01	9.55E+003	381.50	1.98E+004
6	396.10	99.10	3.60E+004	1084.36	1.77E+004
7	413.59	103.47	1.94E+004	697.24	1.54E+004
8	445.79	111.52	6.18E+003	312.48	1.31E+004
9	459.19	114.87	3.27E+003	224.84	1.22E+004
10	477.10	119.34	5.23E+003	139.13	1.05E+004
11	494.41	123.67	1.19E+003	199.72	9.08E+003
12	502.49	125.69	5.91E+003	149.23	8.70E+003
13	518.59	129.71	9.19E+003	126.64	7.94E+003
14	575.82	144.01	5.29E+002	80.88	6.05E+003
15	586.60	146.71	5.35E+002	92.23	5.84E+003
16	595.39	148.90	1.60E+003	91.32	5.67E+003
17	643.08	160.82	2.25E+002	64.13	4.77E+003
18	659.56	164.94	4.99E+002	69.27	4.42E+003
19	782.48	195.66	3.96E+002	48.55	2.74E+003
20	833.38	208.38	6.48E+003	151.98	2.31E+003
21	1088.10	272.04	2.86E+002	37.47	1.42E+003
22	1201.56	300.40	6.40E+003	88.27	1.06E+003
23	1248.64	312.16	3.80E+004	235.84	8.88E+002
24	1291.45	322.86	1.82E+002	28.08	7.10E+002
25	1331.90	332.97	1.07E+003	41.05	6.12E+002
26	1343.03	335.75	6.98E+002	39.52	5.87E+002
27	1362.96	340.73	4.17E+003	178.10	5.39E+002
28	1377.83	344.45	3.30E+002	88.25	4.98E+002
29	1474.41	368.59	3.89E+002	34.51	3.46E+002
30	1485.75	371.42	1.13E+002	28.57	3.36E+002
31	1500.89	375.21	1.37E+003	104.34	3.24E+002
32	1502.59	375.63	1.33E+003	104.56	3.22E+002
33	1521.86	380.45	3.11E+002	43.42	3.06E+002

34	1533.51	383.36	3.22E+002	29.14	2.96E+002
35	1572.52	393.11	6.00E+002	29.70	2.63E+002
36	1595.13	398.76	1.24E+003	38.92	2.42E+002
37	1656.00	413.97	1.83E+003	47.28	2.13E+002
38	1664.25	416.03	1.41E+003	42.60	2.14E+002
39	1691.19	422.76	1.29E+002	18.36	2.02E+002
40	1807.42	451.81	2.24E+002	19.80	1.65E+002
41	2044.30	511.01	1.27E+002	17.47	1.22E+002
42	2333.20	583.22	1.02E+002	13.79	9.78E+001

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
43	2438.32	609.49	1.33E+002	15.54	7.50E+001
44	2647.58	661.79	6.30E+002	39.84	7.25E+001
45	2650.67	662.56	2.47E+002	35.18	7.27E+001
46	2888.37	721.96	1.45E+002	14.86	6.44E+001
47	3645.25	911.12	6.27E+001	10.25	2.94E+001
48	5634.65	1408.31	3.11E+001	7.20	1.20E+001
49	5847.84	1461.59	6.46E+002	26.17	1.20E+001
50	7064.77	1765.72	5.54E+001	8.63	2.36E+000

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi)	Activity Uncertainty
CS-137	0.999	661.65*	85.12	7.43454E-003	5.25227E-004
EU-152	0.232	121.78*	28.40	3.72769E-002	6.60233E-003
		244.69	7.49		
		344.27*	26.50	1.02993E-002	2.79897E-003
		411.11	2.21		
		443.98	3.11		
		778.89	12.74		
		867.32	4.16		
		964.01	14.40		
		1085.78	10.00		
		1112.02	13.30		
		1407.95*	20.70	1.85074E-003	4.33914E-004
NP-237	0.999	300.17*	6.20	8.10679E-001	4.06747E-002
		312.00*	36.00	8.39929E-001	4.04903E-002
		340.60*	4.20	8.17690E-001	5.15216E-002
		375.45*	0.68	1.67070E+000	1.50709E-001
		415.76*	1.75	7.12790E-001	3.64607E-002
Pu-239	0.994	129.28*	0.01	1.24497E+003	2.09735E+002
		375.00*	0.00	7.37980E+002	8.01105E+001
		413.70*	0.00	1.07149E+003	8.81087E+001
		451.50* @	0.00	1.07820E+003	1.04225E+002
AM-241	0.995	59.54*	35.70	2.55222E+003	2.19961E+002
		125.28*	0.00	1.28854E+003	7.03945E+001
		335.40*	0.00	1.15486E+003	8.46985E+001
		662.42* @	0.00	6.89066E+002	1.00533E+002
		722.70*	0.00	1.14396E+003	1.22226E+002
PU-241	0.973	114.00*	0.02	1.41754E+002	1.24265E+001
		332.60*	0.00	3.02300E+002	1.82807E+001

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 (uCi/kg)	Wt mean Activity Uncertainty
CS-137	0.999	7.434541E-003	5.252268E-004
EU-152	0.232	2.196988E-003	4.278904E-004
NP-237	0.999	8.042751E-001	2.046634E-002
Pu-239 @	0.994	9.152494E+002	5.703902E+001
AM-241 @	0.995	1.283425E+003	4.829159E+001
PU-241	0.973	1.924933E+002	1.027695E+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 1.000 sigma

****
**** N U C L I D E M D A R E P O R T *****
****

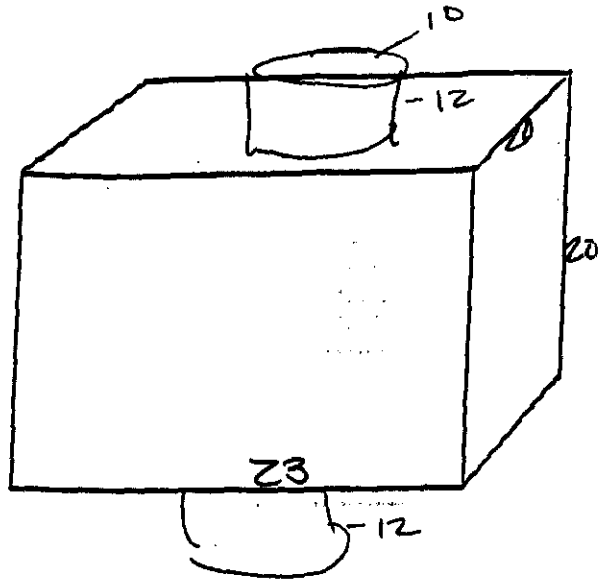
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (uCi/kg)	Nuclide MDA (uCi/kg)	Activity (uCi/kg)
	CO-60	1173.22	100.00	6.4307E-004	5.32E-004	4.4478E-004
		1332.49	100.00	5.3165E-004		-5.1435E-005
	CS-134	475.35	1.46	5.9993E-002	7.54E-004	-6.9198E-003
		563.23	8.38	9.2033E-003		-5.0592E-003
		569.32	15.43	5.0649E-003		-1.2255E-003
		604.70	97.60	9.5164E-004		-1.7702E-004
		795.84	85.40	7.5354E-004		-2.3047E-004
		801.93	8.73	7.4046E-003		-1.3672E-003
		1038.57	1.00	6.2746E-002		4.0982E-002
		1167.94	1.80	3.3947E-002		-7.2013E-003
		1365.15	3.04	1.6229E-002		-8.9086E-004
+	CS-137	661.65*	85.12	4.9962E-004	5.00E-004	7.4345E-003
+	NP-237	300.17*	6.20	1.9510E-002	3.13E-003	8.1068E-001
		312.00*	36.00	3.1283E-003		8.3993E-001
		340.60*	4.20	2.1707E-002		8.1769E-001
		375.45*	0.68	1.0845E-001		1.6707E+000
		415.76*	1.75	3.5887E-002		7.1279E-001
+	Pu-239	129.28*	0.01	5.6504E+001	4.13E+001	1.2450E+003
		375.00*	0.00	4.6710E+001		7.3798E+002
		413.70*	0.00	4.1291E+001		1.0715E+003
		451.50*	0.00	3.0091E+002		1.0782E+003
+	AM-241	59.54*	35.70	7.4839E-001	7.48E-001	2.5522E+003
		125.28*	0.00	9.5285E+001		1.2885E+003
		335.40*	0.00	1.9106E+002		1.1549E+003
		662.42*	0.00	1.1827E+002		6.8907E+002
		722.70*	0.00	3.1539E+002		1.1440E+003
+	PU-241	114.00*	0.02	2.2382E+001	2.24E+001	1.4175E+002
		332.60*	0.00	3.3254E+001		3.0230E+002
	CM-243	209.70	3.27	1.1216E-001	1.53E-002	1.0265E+000
		228.18	10.56	2.1453E-002		5.4706E-003
		277.60	14.00	1.5307E-002		1.7604E-003

+ = 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

N U C L I D E T O T A L S

Nuclide	Mass (g)
Pu-239	8.00E-001 +/- 4.99E-002

Bldg 233s
NDA Item Description Sheet
Box Geometry



Put Dimensions on Box

Item ID: FILTER-2

Weight (kg): 54 kg 120 LBS

Material Description: HEPA

Packaging: 3 LAYER

Detector Distance (in): 30

Detector Filters: NONE

Dose Rate:

Comments: COUNT 1 SIDE A 900
COUNT 2 SIDE C 1800
COUNT 3 RT 1800

233-S Item Analysis

Spreadsheet Version 3.0b

1/14/02

Sample Info:

Item ID: FILTER-02

File Name: 2002-11

Assay Date: 11-Jun-02

File Name:

Data Input:

Isotope	Activity (uCi/kg)	Meas Uncert
Pu-239 (129)		
Pu-239 (414)	6.59E+02	5.62E+01
Am-241	3.21E+02	8.44E+01
Np-237	3.95E-01	1.91E-02
U-238		
U-235		
Cs-137	3.88E-02	1.41E-03
Co-60		

Activity (uCi/kg)	Meas Uncert

Item Parameters:

Contamination: Internal

Item Type: Box

Calcs: Use 1st

Dimensions:

Length (in): 23

Width (in): 20

Depth (in): 20

Weight (lbs): 120

Depth for TMU (in): 4

% Volume: 100

Am-241 Calcs:

Measured	3.21E+02	+/-	5.05E+02	Calc from Pu-239
Calculated	9.12E+02	+/-	6.07E+02	

Nuclide Activities:

Isotope	Activity (nCi/g)		Total Unc 1 sigma
Pu-238	2.67E+02	+/-	6.41E+01
Pu-239	6.59E+02	+/-	1.58E+02
Pu-240	3.43E+02	+/-	8.25E+01
Pu-241	1.28E+03	+/-	3.08E+02
Pu-242	3.47E-01	+/-	8.33E-02
Am-241	9.12E+02	+/-	6.07E+02
Np-237	3.95E-01	+/-	9.03E-02
U-238	0.00E+00	+/-	0.00E+00
U-235	0.00E+00	+/-	0.00E+00
Cs-137	3.88E-02	+/-	8.79E-03
Co-60	0.00E+00	+/-	0.00E+00

Results:

Total TRU Activity(nCi/g):	2.18E+03	+/-	6.36E+02	Calc from Pu-239 Act
Pu (g):	6.69E-01	**Pu (g) + 3 sigma TMU:**	1.15E+00	
		Pu(g) + 3 sigma:	8.40E-01	

Comments:

High Np-237 ratio does not affect final values.

Errors:High Np-237 ratio,

Analyst: Martin Winterrose

Date: 6/10/02

```
‡Date & Time: Fri Jun 14 11:48:00 2002
~g=SIMPLE_BOX
~description=FILTER-1
~comment=FILTER_FROM_SOUTHWOOD.
~Ccollimator=50MM-180D
~crpn=4
~Detector=7219
~Convergence in %=1            ~MDRPN=4
~Lunit=IN  ~Tunit=C  ~Dunit=G/CU.C    ~Punit=MM.HG
~at=20        ~ap=760       ~rh=50
~Energies kev=   50.000,  100.000,  128.000,  130.000,  150.000,  200.000,#
                300.000,  500.000,  700.000, 1000.000, 1400.000, 2000.000,#
               4000.000,
~Error in %=     10.000,   10.000,   10.000,   10.000,   10.000,    8.000,#
                  8.000,    6.000,    6.000,    4.000,    4.000,    4.000,#
                  4.000,
~d1.1=0.125     ~d1.2=23        ~d1.3=20        ~d1.4=20        ~1mater=304SS    ~1den=7.81
~d3.1=19        ~3mater=HEPA     ~3den=0.575     ~3con=1
~sd1=30
```

C A N B E R R A I S O C S A N A L Y S I S

eport Generated On : 6/14/02 11:54:07 AM

ample Title : Filter-2
pectrum Description :
ample Identification : 2002-11
ample Size : 54.0 kg

ample Taken On : 6/11/02 12:57:00 PM
cquisition Started : 6/11/02 12:58:03 PM

ive Time: 1800.0 seconds Real Time: 1865.8 seconds

ISOCS Calibration : FILTER-1
Energy Calibration Used Done On : 2/27/01
Efficiency Calibration Used Done On : 6/14/02

P E A K A N A L Y S I S R E P O R T

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	239.20	59.88	1.79E+006	69183.3	2.62E+004
2	291.98	73.08	2.01E+003	137.33	1.06E+004
3	301.06	75.34	4.22E+003	154.56	1.04E+004
4	347.67	86.99	3.24E+003	321.83	9.50E+003
5	379.75	95.01	4.74E+003	187.77	8.76E+003
6	396.02	99.08	1.64E+004	493.89	8.37E+003
7	413.67	103.49	8.53E+003	355.26	7.93E+003
8	445.51	111.45	3.16E+003	168.67	7.57E+003
9	459.97	115.06	1.64E+003	126.24	7.13E+003
10	475.73	119.00	3.81E+002	108.57	6.68E+003
11	502.74	125.75	2.33E+003	142.76	5.87E+003
12	518.65	129.73	5.68E+003	101.87	5.39E+003
13	576.20	144.11	2.98E+002	69.81	4.11E+003
14	587.09	146.83	3.86E+002	78.81	3.98E+003
15	595.82	149.01	6.38E+002	69.09	3.86E+003
16	643.09	160.83	2.37E+002	55.68	3.19E+003
17	833.44	208.40	2.63E+003	88.96	1.54E+003
18	1112.93	278.25	1.16E+002	28.71	9.14E+002
19	1201.71	300.44	3.13E+003	63.88	7.18E+002
20	1248.72	312.18	1.78E+004	141.91	5.99E+002
21	1331.87	332.96	5.94E+002	32.27	4.43E+002
22	1343.12	335.78	3.70E+002	29.63	4.36E+002
23	1363.33	340.83	1.96E+003	88.27	4.25E+002
24	1378.20	344.54	2.36E+002	54.50	4.13E+002
25	1474.19	368.53	1.75E+002	22.56	3.52E+002
26	1501.66	375.40	1.34E+003	174.76	3.30E+002
27	1502.09	375.50	1.27E+003	244.87	3.30E+002
28	1522.22	380.54	1.88E+002	27.77	3.13E+002
29	1533.71	383.41	1.64E+002	20.94	3.01E+002
30	1572.98	393.22	4.02E+002	25.87	2.83E+002
31	1595.14	398.76	5.81E+002	29.52	2.82E+002
32	1656.00	413.97	1.12E+003	38.46	2.65E+002
33	1664.25	416.03	6.66E+002	31.68	2.60E+002

34	1808.08	451.98	1.57E+002	18.66	2.07E+002
35	2043.66	510.85	1.69E+002	17.72	1.40E+002
36	2335.17	583.71	9.09E+001	13.26	8.57E+001
37	2438.98	609.65	1.28E+002	14.73	8.19E+001
38	2647.63	661.80	3.28E+003	58.61	7.76E+001
39	2889.00	722.12	4.06E+001	10.61	5.47E+001
40	3646.74	911.49	1.03E+002	12.00	3.02E+001
41	5848.52	1461.76	6.62E+002	26.36	7.59E+000
42	7065.82	1765.99	4.54E+001	8.08	1.82E+000

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi)	Activity Uncertainty
CS-137	0.999	661.65*	85.12	3.88217E-002	1.40528E-003
NP-237	0.998	300.17*	6.20	3.97391E-001	2.08186E-002
		312.00*	36.00	3.94904E-001	1.91391E-002
		340.60*	4.20	3.86733E-001	2.49544E-002
		375.45*	0.68	1.69485E+000	2.32913E-001
		415.76*	1.75	3.39167E-001	2.13458E-002
Pu-239	0.993	129.28*	0.01	7.71293E+002	1.30238E+002
		375.00*	0.00	7.28355E+002	1.10194E+002
		413.70*	0.00	6.59080E+002	5.61955E+001
		451.50* @	0.00	7.57244E+002	9.48909E+001
AM-241	0.995	59.54*	35.70	9.76092E+002	8.62137E+001
		125.28*	0.00	5.10310E+002	3.98309E+001
		335.40*	0.00	6.14217E+002	5.69332E+001
		662.42* @	0.00	9.17918E+003	3.31343E+002
		722.70*	0.00	3.21025E+002	8.44287E+001
PU-241	0.960	114.00*	0.02	7.10761E+001	6.69688E+000
		332.60*	0.00	1.68252E+002	1.20640E+001
CM-243	0.368	209.70*	3.27	5.66961E-001	3.20534E-002
		228.18	10.56		
		277.60*	14.00	6.33696E-003	1.59972E-003

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 (uCi/kg)	Wt mean Activity Uncertainty
CS-137	0.999	3.642588E-002	1.406605E-003
NP-237	0.998	3.795665E-001	1.062675E-002
Pu-239 @	0.993	7.011821E+002	2.523204E+001
AM-241 @	0.995	5.664776E+002	2.870467E+001
PU-241	0.960	9.396703E+001	5.855225E+000
CM-243	0.368	7.729897E-003	1.597736E-003

? = 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 1.000 sigma

****
**** N U C L I D E M D A R E P O R T *****
****

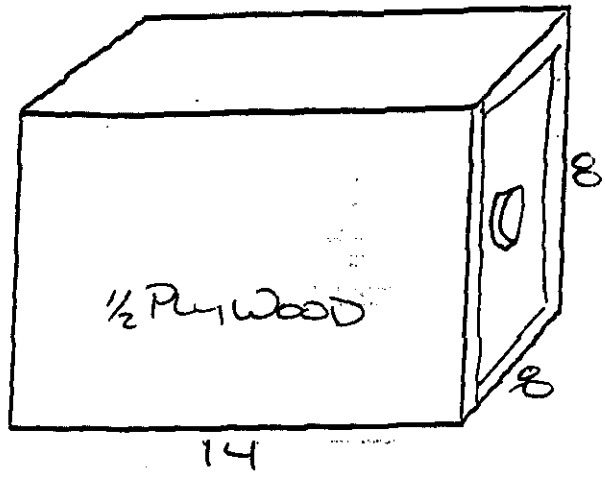
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (uCi/kg)	Nuclide MDA (uCi/kg)	Activity (uCi/kg)
	CO-60	1173.22	100.00	6.5015E-004	4.94E-004	-5.3199E-004
		1332.49	100.00	4.9402E-004		-4.2805E-004
	CS-134	475.35	1.46	7.3545E-002	7.45E-004	5.7736E-002
		563.23	8.38	9.8361E-003		-2.7630E-003
		569.32	15.43	5.2306E-003		1.6842E-003
		604.70	97.60	9.4916E-004		-1.0571E-004
		795.84	85.40	7.4494E-004		-1.0850E-003
		801.93	8.73	7.6494E-003		-5.1974E-003
		1038.57	1.00	5.8774E-002		-3.3290E-002
		1167.94	1.80	3.6213E-002		3.0518E-003
		1365.15	3.04	1.2773E-002		-2.7145E-003
+	CS-137	661.65*	85.12	5.1753E-004	5.18E-004	3.8822E-002
+	NP-237	300.17*	6.20	1.6183E-002	2.59E-003	3.9739E-001
		312.00*	36.00	2.5889E-003		3.9490E-001
		340.60*	4.20	1.9412E-002		3.8673E-001
		375.45*	0.68	1.1016E-001		1.6948E+000
		415.76*	1.75	3.9620E-002		3.3917E-001
+	Pu-239	129.28*	0.01	4.6792E+001	4.61E+001	7.7129E+002
		375.00*	0.00	4.7340E+001		7.2836E+002
		413.70*	0.00	4.6108E+001		6.5908E+002
		451.50*	0.00	3.3605E+002		7.5724E+002
+	AM-241	59.54*	35.70	4.1154E-001	4.12E-001	9.7609E+002
		125.28*	0.00	7.8631E+001		5.1031E+002
		335.40*	0.00	1.6594E+002		6.1422E+002
		662.42*	0.00	1.2237E+002		9.1792E+003
		722.70*	0.00	2.9337E+002		3.2103E+002
+	PU-241	114.00*	0.02	1.7148E+001	1.71E+001	7.1076E+001
		332.60*	0.00	2.8517E+001		1.6825E+002
+	CM-243	209.70*	3.27	3.9919E-002	7.84E-003	5.6696E-001
		228.18	10.56	1.7913E-002		4.1499E-003
		277.60*	14.00	7.8375E-003		6.3370E-003

+ = 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

N U C L I D E T O T A L S

Nuclide	Mass (g)
Pu-239	6.11E-001 +/- 2.20E-002

Bldg 233s
NDA Item Description Sheet
Box Geometry



Put Dimensions on Box

Item ID: 7050

•5572

Weight (kg): 18 LBS

Material Description: HEPA

Packaging: 3 LAYERS

Detector Distance (in): 24"

Detector Filters: 1 CAD

Dose Rate:

Comments: 900 A 2002-16
BOD B 2002-17

233-S Item Analysis

Spreadsheet Version 3.0b 1/14/02

Sample Info:

Item ID:	7040	**Assay Date:**	12-Jun-02
File Name:	2002-17	**File Name:**	

Data Input:

Isotope	Activity (uCi/kg)	Meas Uncert	Activity (uCi/kg)	Meas Uncert
Pu-239 (129)				
Pu-239 (414)	2.20E+04	1.73E+03		
Am-241	1.86E+04	8.05E+02		
Np-237	7.27E-01	3.52E-02		
U-238				
U-235				
Cs-137	2.55E-02	2.32E-03		
Co-60				

Item Parameters:

Contamination:	Internal	Item Type:	Box	Calcs:	Use 1st

Dimensions:

Length (in):	14	Width (in):	8	Depth (in):	8
Weight (lbs):	18	Depth for TMU (in):	4	% Volume:	100

Am-241 Calcs:

Measured	1.86E+04	+/-	2.89E+04	Calc from Pu-239
Calculated	3.05E+04	+/-	2.01E+04	

Nuclide Activities:

Isotope	Activity (nCi/g)		Total Unc 1 sigma
Pu-238	8.92E+03	+/-	2.12E+03
Pu-239	2.20E+04	+/-	5.23E+03
Pu-240	1.15E+04	+/-	2.73E+03
Pu-241	4.28E+04	+/-	1.02E+04
Pu-242	1.16E+01	+/-	2.75E+00
Am-241	3.05E+04	+/-	2.01E+04
Np-237	7.27E-01	+/-	1.66E-01
U-238	0.00E+00	+/-	0.00E+00
U-235	0.00E+00	+/-	0.00E+00
Cs-137	2.55E-02	+/-	6.16E-03
Co-60	0.00E+00	+/-	0.00E+00

Results:

Total TRU Activity(nCi/g):		7.28E+04	+/-	2.11E+04	Calc from Pu-239 Act
Pu (g):	3.35E+00	**Pu (g) + 3 sigma TMU:**		5.74E+00	
		Pu(g) + 3 sigma:		4.14E+00	

Comments:

Errors:

Analyst: Martin Winterrose **Date:** 6/12/02

```
#Date & Time: Wed Jun 12 09:44:17 2002
~g=SIMPLE_BOX
~description=7040_HEPAFLT
~comment=HEPA_FILTER_FROM_VAC
~Ccollimator=50MM-180D
~crpn=4
~Detector=7219
~Convergence in %=1            ~MDRPN=4
~Lunit=IN  ~Tunit=C  ~Dunit=G/CU.C    ~Punit=MM.HG
~at=20        ~ap=760       ~rh=50
~Energies kev=   50.000,  100.000,  128.000,  130.000,  150.000,  200.000,#
                300.000,  500.000,  700.000, 1000.000, 1400.000, 2000.000,#
               4000.000,
~Error in %=     10.000,   10.000,   10.000,   10.000,   10.000,    8.000,#
                  8.000,    6.000,    6.000,    4.000,    4.000,    4.000,#
                  4.000,
~d1.1=0.25      ~d1.2=14        ~d1.3=8         ~d1.4=8         ~1mater=CELLULOS ~1den=0.45
~d3.1=7.5       ~3mater=HEPA     ~3den=0.5       ~3con=1
~1Absor=0.0312    ~1Amater=CADMIUM  ~1Aden=8.642
~sd1=24
```

C A N B E R R A I S O C S A N A L Y S I S

Report Generated On : 6/12/02 10:21:38 AM

Sample Title : 7040 Side B
Spectrum Description :
Sample Identification : 2002-17
Sample Size : 8.2 kg

Sample Taken On : 6/12/02 10:05:00 AM
Acquisition Started : 6/12/02 10:06:05 AM

Live Time: 1800.0 seconds Real Time: 1850.9 seconds

ISOCS Calibration : 7040 HEPAFLT
Energy Calibration Used Done On : 2/27/01
Efficiency Calibration Used Done On : 6/12/02

P E A K A N A L Y S I S R E P O R T

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	239.21	59.89	9.15E+005	33025.2	1.86E+004
2	291.97	73.07	9.07E+003	411.93	1.50E+004
3	301.04	75.34	1.71E+004	490.89	1.57E+004
4	340.17	85.12	6.17E+003	336.11	1.75E+004
5	396.29	99.15	8.39E+004	2781.03	1.75E+004
6	413.65	103.48	5.89E+004	2429.20	1.71E+004
7	445.41	111.42	1.50E+004	788.24	1.72E+004
8	459.97	115.06	9.95E+003	1155.74	1.66E+004
9	502.58	125.71	2.37E+004	1376.07	1.35E+004
10	518.64	129.72	6.51E+004	574.80	1.22E+004
11	576.28	144.13	1.46E+003	427.93	1.07E+004
12	586.94	146.79	3.18E+003	509.36	1.06E+004
13	595.85	149.02	6.82E+003	309.21	1.05E+004
14	644.47	161.17	2.35E+003	245.52	9.91E+003
15	660.29	165.12	2.42E+003	194.53	9.68E+003
16	680.23	170.11	1.33E+003	274.27	1.00E+004
17	718.22	179.60	1.02E+003	88.29	9.29E+003
18	758.03	189.55	1.30E+003	93.47	8.46E+003
19	784.07	196.06	1.96E+003	94.24	7.86E+003
20	792.73	198.22	2.64E+002	211.22	7.63E+003
21	815.90	204.01	9.30E+003	378.25	7.04E+003
22	833.34	208.37	3.56E+004	283.97	6.59E+003
23	886.93	221.77	5.52E+002	67.82	5.52E+003
24	953.69	238.45	4.55E+002	63.05	4.75E+003
25	975.29	243.85	3.30E+002	65.95	4.94E+003
26	1022.57	255.66	1.34E+003	60.96	4.58E+003
27	1071.24	267.83	1.03E+003	80.39	4.20E+003
28	1192.94	298.24	6.21E+002	101.15	3.36E+003
29	1201.62	300.41	3.05E+003	122.65	3.32E+003
30	1248.65	312.17	1.90E+004	149.28	3.02E+003
31	1292.60	323.15	1.57E+003	168.75	2.71E+003
32	1331.99	332.99	9.82E+003	130.75	2.57E+003
33	1343.32	335.83	5.70E+003	151.28	2.46E+003

34	1381.32	345.32	8.00E+003	484.38	2.08E+003
35	1474.20	368.54	3.21E+003	264.79	1.51E+003
36	1501.35	375.32	2.12E+004	660.95	1.37E+003
37	1503.06	375.75	3.00E+003	602.33	1.36E+003
38	1521.33	380.31	3.87E+003	537.52	1.26E+003
39	1534.23	383.54	2.43E+003	462.48	1.18E+003
40	1572.76	393.17	7.44E+003	145.58	1.02E+003
41	1595.51	398.85	5.88E+002	36.43	9.28E+002
42	1645.58	411.37	9.78E+001	29.70	7.61E+002

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
43	1655.95	413.96	2.08E+004	146.96	7.46E+002
44	1664.18	416.02	7.92E+002	63.98	7.09E+002
45	1691.53	422.85	1.64E+003	52.36	6.17E+002
46	1707.35	426.80	4.82E+002	32.75	5.59E+002
47	1806.92	451.69	2.57E+003	55.54	4.28E+002
48	2044.98	511.18	2.67E+002	25.52	2.56E+002
49	2333.64	583.33	1.25E+002	16.62	1.71E+002
50	2476.67	619.07	4.35E+002	24.11	1.44E+002
51	2564.61	641.05	9.34E+001	15.55	1.32E+002
52	2584.98	646.14	1.09E+002	20.47	1.23E+002
53	2612.17	652.94	2.73E+002	22.74	1.12E+002
54	2647.12	661.67	1.11E+003	94.56	1.03E+002
55	2650.20	662.44	2.70E+003	109.86	1.01E+002
56	2755.67	688.80	2.18E+002	18.00	8.19E+001
57	2888.89	722.09	1.20E+003	36.40	6.57E+001
58	3025.08	756.13	1.01E+002	12.52	4.41E+001
59	3073.20	768.16	6.10E+001	17.55	5.04E+001
60	5847.81	1461.58	5.10E+002	23.30	9.04E+000
61	7065.05	1765.79	5.42E+001	8.56	2.67E+000

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi)	Activity Uncertainty
CS-137	1.000	661.65*	85.12	2.55515E-002	2.31871E-003
NP-237	0.864	300.17*	6.20	6.61926E-001	4.15791E-002
		312.00*	36.00	7.27074E-001	3.52217E-002
		340.60	4.20		
		375.45*	0.68	4.74789E+001	2.56290E+000
		415.76*	1.75	7.27399E-001	6.59950E-002
Pu-239	0.994	129.28*	0.01	1.59731E+004	2.68562E+003
		375.00*	0.00	2.04039E+004	1.69701E+003
		413.70*	0.00	2.20156E+004	1.72578E+003
		451.50* @	0.00	2.27129E+004	1.01617E+003
AM-241	0.995	59.54*	35.70	3.52116E+003	3.07284E+002
		125.28*	0.00	9.54440E+003	7.21673E+002
		335.40*	0.00	1.67491E+004	8.94801E+002
		662.42* @	0.00	1.46754E+004	7.54075E+002
		722.70*	0.00	1.86379E+004	8.05456E+002
PU-241	0.960	114.00*	0.02	8.44018E+002	1.08240E+002
		332.60*	0.00	4.83767E+003	2.35245E+002

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 (uCi/kg)	Wt mean Activity Uncertainty
CS-137	1.000	2.555148E-002	2.318708E-003
NP-237	0.864	7.040641E-001	2.488948E-002
Pu-239 @	0.994	1.878129E+004	5.173296E+002
AM-241 @	0.995	6.879574E+003	2.556463E+002
PU-241	0.960	1.541780E+003	9.833064E+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 1.000 sigma

****
***** N U C L I D E M D A R E P O R T *****
****

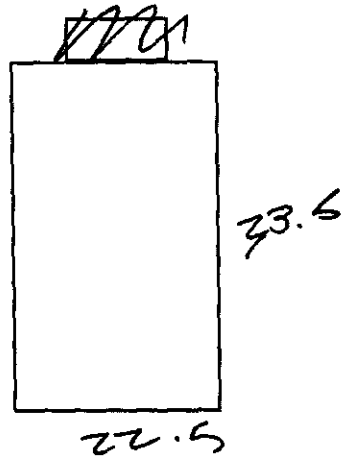
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (uCi/kg)	Nuclide MDA (uCi/kg)	Activity (uCi/kg)
	CO-60	1173.22	100.00	1.3172E-003	1.23E-003	7.9345E-004
		1332.49	100.00	1.2252E-003		9.0829E-004
	CS-134	475.35	1.46	1.6550E-001	1.51E-003	-2.0599E-001
		563.23	8.38	2.3868E-002		4.6223E-003
		569.32	15.43	1.2810E-002		1.3769E-002
		604.70	97.60	2.1383E-003		-3.3506E-003
		795.84	85.40	1.5138E-003		-1.4977E-003
		801.93	8.73	1.5156E-002		-3.4826E-004
		1038.57	1.00	1.2589E-001		-8.3758E-002
		1167.94	1.80	6.8524E-002		-7.2069E-002
		1365.15	3.04	3.8390E-002		1.9695E-002
+	CS-137	661.65*	85.12	1.1464E-003	1.15E-003	2.5551E-002
+	NP-237	300.17*	6.20	5.8796E-002	9.86E-003	6.6193E-001
		312.00*	36.00	9.8618E-003		7.2707E-001
		340.60	4.20	2.2298E-001		5.8819E-001
		375.45*	0.68	3.9104E-001		4.7479E+001
		415.76*	1.75	1.1629E-001		7.2740E-001
+	Pu-239	129.28*	0.01	1.2709E+002	1.27E+002	1.5973E+004
		375.00*	0.00	1.6805E+002		2.0404E+004
		413.70*	0.00	1.3743E+002		2.2016E+004
		451.50*	0.00	8.7463E+002		2.2713E+004
+	AM-241	59.54*	35.70	2.4528E+000	2.45E+000	3.5212E+003
		125.28*	0.00	2.1870E+002		9.5444E+003
		335.40*	0.00	6.7487E+002		1.6749E+004
		662.42*	0.00	2.6965E+002		1.4675E+004
		722.70*	0.00	6.2832E+002		1.8638E+004
+	PU-241	114.00*	0.02	5.1036E+001	5.10E+001	8.4402E+002
		332.60*	0.00	1.1757E+002		4.8377E+003
	CM-243	209.70	3.27	3.8226E-001	4.26E-002	1.2320E+001
		228.18	10.56	6.0650E-002		9.3688E-003
		277.60	14.00	4.2578E-002		-4.1276E-002

+ = 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

N U C L I D E T O T A L S

Nuclide	Mass (g)
Pu-239	2.48E+000 +/- 6.83E-002

Bldg 233-S
NDA Item Description Sheet
Bottle or Cylinder Geometry



Put Dimensions on Bottle

.2957

Item ID: 2335-02-0032

Weight (kg): 91 kg 142 NET 64.63

Material Description: PORTA BAR / TOOLS

Packaging: 55 GAL

Detector Distance (in): 24

Detector Filters: N/A

Dose Rate: < 5

Comments: / 1800 COUNT 2002-13

233-S Item Analysis Spreadsheet Version 3.0b 1/14/02

Sample Info:

Item ID:	233s-02-0032	**Assay Date:**	11-Jun-02
File Name:	2002-13	**File Name:**	

Data Input:

Isotope	Activity (uCi/kg)	Meas Uncert
Pu-239 (129)		
Pu-239 (414)	6.34E+01	6.82E+00
Am-241	2.15E+01	1.88E+00
Np-237	1.65E-03	1.87E-04
U-238		
U-235		
Cs-137	5.33E-04	1.51E-04
Co-60		

Activity (uCi/kg)	Meas Uncert

Item Parameters:

Contamination: Internal Item Type: Barrel Calcs: Use 1st

Dimensions:

Length (in):	33.5	Width (in):	22.5	Depth (in):	22.5
Weight (lbs):	142	Depth for TMU (in):	4	% Volume:	50

Am-241 Calcs:

Measured	2.15E+01	+/-	2.32E+01	Calc from Pu-239
Calculated	8.78E+01	+/-	6.01E+01	

Nuclide Activities:

Isotope	Activity (nCi/g)		Total Unc 1 sigma
Pu-238	2.57E+01	+/-	6.40E+00
Pu-239	6.34E+01	+/-	1.58E+01
Pu-240	3.30E+01	+/-	8.22E+00
Pu-241	1.23E+02	+/-	3.07E+01
Pu-242	3.34E-02	+/-	8.31E-03
Am-241	8.78E+01	+/-	6.01E+01
Np-237	1.65E-03	+/-	4.13E-04
U-238	0.00E+00	+/-	0.00E+00
U-235	0.00E+00	+/-	0.00E+00
Cs-137	5.33E-04	+/-	1.92E-04
Co-60	0.00E+00	+/-	0.00E+00

Results:

Total TRU Activity(nCi/g):	2.10E+02	+/-	6.30E+01	Calc from Pu-239 Act	
Pu (g):	7.62E-02	**Pu (g) + 3 sigma TMU:**	1.33E-01		
		Pu(g) + 3 sigma:	1.01E-01		

Comments: Errors:

Analyst: Martin Winterrose **Date:** 6/11/02

```
#Date & Time: Tue Jun 11 14:11:22 2002
~g=SIMPLE_CYLINDER
~description=233S-02-0032
~comment=DRUM_WITH_SAMPLES
~Ccollimator=50MM-180D
~crpn=4
~Detector=7219
~Convergence in %=1            ~MDRPN=4
~Lunit=IN  ~Tunit=C  ~Dunit=G/CU.C    ~Punit=MM.HG
~at=20        ~ap=760       ~rh=50
~Energies kev=   50.000,  100.000,  128.000,  130.000,  150.000,  200.000,#
                300.000,  500.000,  700.000, 1000.000, 1400.000, 2000.000,#
               4000.000,
~Error in %=     10.000,   10.000,   10.000,   10.000,   10.000,    8.000,#
                  8.000,    6.000,    6.000,    4.000,    4.000,    4.000,#
                  4.000,
~d1.1=0.0416    ~d1.2=22.5      ~d1.3=33.5      ~1mater=CSTEEL   ~1den=7.86
~d3.1=33        ~3mater=SAMPLMS  ~3den=0.3       ~3con=1
~sd1=24
```

C A N B E R R A I S O C S A N A L Y S I S

eport Generated On : 6/14/02 12:16:45 PM

ample Title : 233s-02-0032
pectrum Description :
ample Identification : 2002-13
ample Size : 64.6 kg

ample Taken On : 6/11/02 2:12:00 PM
cquisition Started : 6/11/02 2:13:14 PM

ive Time: 1800.0 seconds Real Time: 1809.1 seconds

ISOCS Calibration : 233S-02-0032
Energy Calibration Used Done On : 2/27/01
Efficiency Calibration Used Done On : 6/11/02

P E A K A N A L Y S I S R E P O R T

Peak No.	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	239.20	59.89	1.81E+005	6698.76	3.78E+003
2	339.55	84.96	5.84E+002	64.20	3.39E+003
3	379.74	95.01	4.31E+002	89.18	3.47E+003
4	396.09	99.09	1.59E+003	109.35	3.45E+003
5	413.92	103.55	7.48E+002	90.49	3.41E+003
6	445.18	111.36	3.52E+002	57.60	3.51E+003
7	501.84	125.52	2.87E+002	55.38	3.11E+003
8	518.71	129.74	1.30E+003	63.05	2.97E+003
9	833.38	208.38	2.34E+002	26.60	5.78E+002
10	955.66	238.94	1.70E+002	22.99	4.12E+002
11	1201.20	300.31	4.72E+001	16.27	2.48E+002
12	1249.15	312.29	1.94E+002	19.93	2.31E+002
13	1332.58	333.14	7.72E+001	16.38	2.05E+002
14	1380.81	345.19	1.17E+002	17.05	1.80E+002
15	1408.91	352.22	9.96E+001	15.53	1.66E+002
16	1501.33	375.32	3.31E+002	22.62	1.65E+002
17	1571.55	392.86	1.07E+002	15.38	1.45E+002
18	1656.05	413.98	2.75E+002	20.33	1.36E+002
19	2044.67	511.11	1.36E+002	16.68	8.32E+001
20	2333.83	583.37	1.02E+002	13.30	7.39E+001
21	2438.04	609.42	1.23E+002	13.97	6.50E+001
22	2646.78	661.59	1.06E+002	29.77	5.94E+001
23	2650.42	662.50	5.01E+001	30.85	5.93E+001
24	3646.72	911.49	8.13E+001	11.28	3.54E+001
25	3877.45	969.15	6.50E+001	10.63	2.95E+001
26	5847.67	1461.55	5.78E+002	24.69	6.41E+000
27	7065.53	1765.91	5.27E+001	8.37	1.86E+000

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi)	Activity Uncertainty
CS-137	1.000	661.65*	85.12	5.33324E-004	1.51052E-004
NP-237	0.857	300.17*	6.20	2.28796E-003	7.96301E-004
		312.00*	36.00	1.64651E-003	1.86577E-004
		340.60	4.20		
		375.45*	0.68	1.62211E-001	1.31809E-002
		415.76*	1.75	5.48839E-002	4.64572E-003
Pu-239	0.963	129.28*	0.01	6.68934E+001	1.16935E+001
		375.00*	0.00	6.97096E+001	7.17923E+000
		413.70*	0.00	6.34254E+001	6.81652E+000
		451.50 @	0.00		
AM-241	0.995	59.54*	35.70	2.14935E+001	1.88347E+000
		125.28*	0.00	2.37947E+001	4.74052E+000
		335.40	0.00		
		662.42* @	0.00	5.97681E+001	3.68486E+001
		722.70	0.00		

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 (uCi/kg)	Wt mean Activity Uncertainty
CS-137	1.000	5.333239E-004	1.510523E-004
NP-237	0.857	1.675540E-003	1.815762E-004
Pu-239 @	0.963	6.583173E+001	2.949288E+000
AM-241 @	0.995	2.180719E+001	1.750372E+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 1.000 sigma

****
**** N U C L I D E M D A R E P O R T *****
****

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (uCi/kg)	Nuclide MDA (uCi/kg)	Activity (uCi/kg)
	CO-60	1173.22	100.00	2.6470E-004	2.64E-004	-1.9098E-005
		1332.49	100.00	2.6422E-004		1.7966E-004
	CS-134	475.35	1.46	2.0120E-002	3.34E-004	2.8086E-003
		563.23	8.38	3.4201E-003		-4.4339E-004
		569.32	15.43	1.8702E-003		-2.2429E-003
		604.70	97.60	3.7081E-004		-5.8733E-005
		795.84	85.40	3.3418E-004		1.6886E-004
		801.93	8.73	2.9808E-003		-4.4721E-003
		1038.57	1.00	2.7058E-002		4.7554E-003
		1167.94	1.80	1.5715E-002		-9.5702E-003
		1365.15	3.04	7.2217E-003		2.2830E-003
+	CS-137	661.65*	85.12	1.9452E-004	1.95E-004	5.3332E-004
+	NP-237	300.17*	6.20	3.6845E-003	6.23E-004	2.2880E-003
		312.00*	36.00	6.2295E-004		1.6465E-003
		340.60	4.20	9.5568E-003		2.3230E-003
		375.45*	0.68	3.0579E-002		1.6221E-001
		415.76*	1.75	1.1374E-002		5.4884E-002
+	Pu-239	129.28*	0.01	1.3220E+001	1.31E+001	6.6893E+001
		375.00*	0.00	1.3141E+001		6.9710E+001
		413.70*	0.00	1.3144E+001		6.3425E+001
		451.50	0.00	1.6991E+002		-1.0113E+002
+	AM-241	59.54*	35.70	3.4235E-002	3.42E-002	2.1493E+001
		125.28*	0.00	2.1772E+001		2.3795E+001
		335.40	0.00	8.1569E+001		7.5223E+001
		662.42*	0.00	4.5986E+001		5.9768E+001
		722.70	0.00	2.2726E+002		-3.9496E+001
	PU-241	114.00	0.02	8.0680E+000	8.07E+000	6.1734E+000
		332.60	0.00	1.3786E+001		7.2240E+000
	CM-243	209.70	3.27	1.6316E-002	2.73E-003	-7.4356E-003
		228.18	10.56	4.2557E-003		-3.0610E-003
		277.60	14.00	2.7348E-003		4.0028E-004

+ = 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

N U C L I D E T O T A L S

Nuclide	Mass (g)
Pu-239	6.86E-002 +/- 3.07E-003