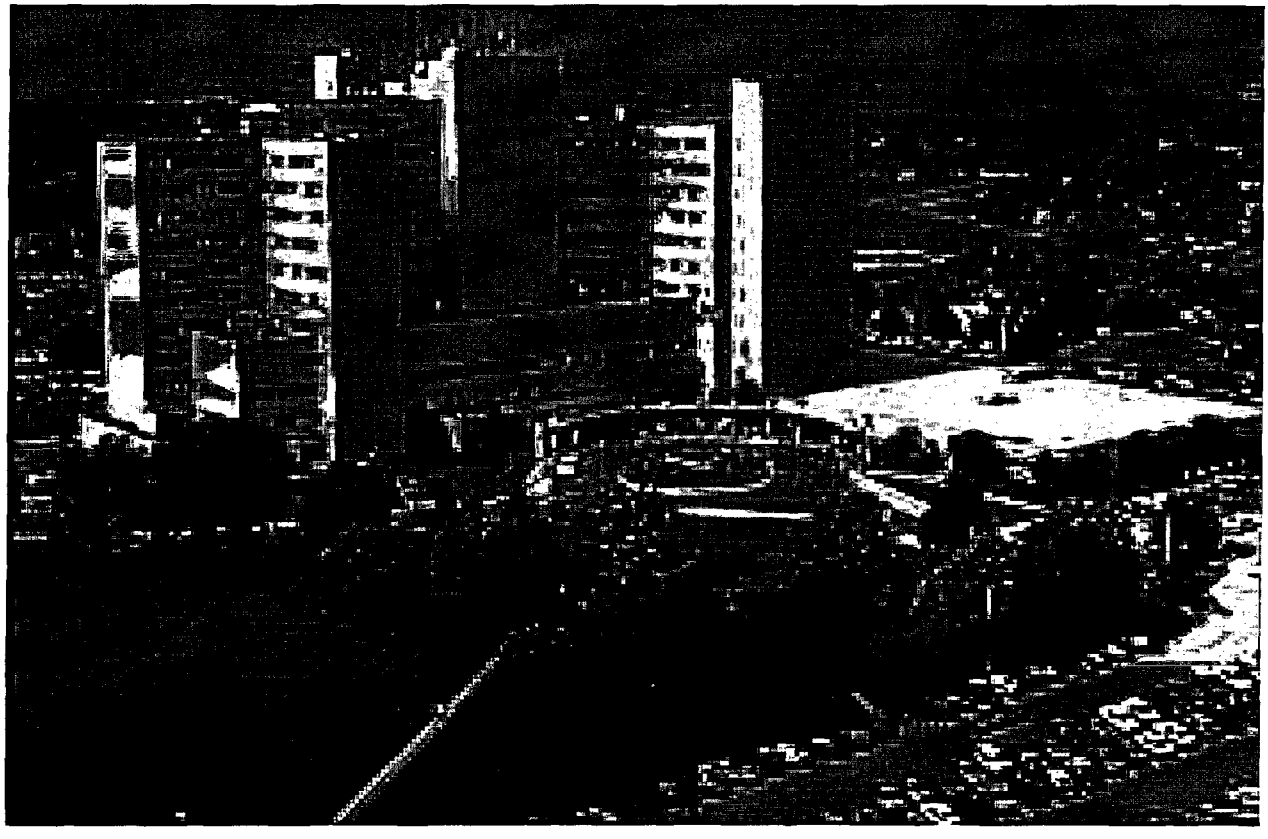
Alan J. Blotcky Reactor Facility
Omaha Veterans Administration Medical Center
Omaha, Nebraska

Characterization QA/QC Data

APPENDIX E



****
***** G A M M A S P E C T R U M A N A L Y S I S *****
****

Report Generated On	11/17/02 5:58:08 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\ENCAL01.CNF
Spectrum Number	1L STD
Sample Description	1 Liter marinelli with 1.15 g/cc
Sample Type	
Sample Geometry	1
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 Unit
Sample Collection Date	
Spectrum Collection Date	11/13/02 6:58:59 PM
Decay Corrected To	
Collected By	P. Jones
Live Time	3600.0 seconds
Real Time	3649.2 seconds
% Dead Time	1.35 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	1

Reprint

Performed & Reviewed By _____ Date 11/17/02

Supervisory Review _____ Date 12/17/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\ENCAL01.CNF
Spectrum Number 1L STD
Sample Description 1 Liter marinelli with 1.15 g/cc ma
Sample Type

Peak Locate Performed on 11/17/02 5:58:07 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.08	0.1473	42.24	16.82	0.6779
2	237.05	0.0624	59.55	80.33	1.1273
3	351.06	0.0471	88.05	135.12	1.1351
4	487.21	0.0523	122.08	105.71	1.1318
5	544.98	0.0949	136.51	31.99	1.1796
6	662.54	0.0557	165.89	84.33	1.1936
7	1019.41	0.1865	255.07	7.78	1.1377
8	1115.98	0.1188	279.18	17.67	1.2757
9	1566.22	0.0556	391.70	71.45	1.4194
10	2646.37	0.0373	661.60	132.96	1.6737
11	3255.39	0.2135	813.79	4.03	1.5370
12	3592.21	0.0469	897.96	76.29	1.8903
13	4693.53	0.0341	1173.15	127.33	2.1958
14	5301.17	0.1591	1325.22	6.27	2.3383
15	5331.04	0.0341	1332.44	121.74	2.3431
16	7346.82	0.0471	1836.15	54.14	2.8199

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\ENCAL01.CNF
Spectrum Number 1L STD
Sample Description 1 Liter marinelli with 1.15 g/cc matrix

Peak Analysis Performed on 11/17/02 5:58:07 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	173	167.77	42.24	1.89E+003	110.49	3.19E+003
F	2	221-	246	237.02	59.55	3.22E+004	369.12	2.32E+004
F	3	334-	366	351.08	88.05	7.37E+004	531.53	3.12E+004
F	4	474-	501	487.28	122.08	4.15E+004	406.72	1.83E+004
F	5	535-	562	545.02	136.51	5.48E+003	188.50	1.43E+004
F	6	652-	682	662.60	165.89	2.64E+004	327.06	1.40E+004
F	7	1012-	1030	1019.49	255.07	6.88E+002	120.69	6.72E+003
F	8	1107-	1124	1115.97	279.18	1.88E+003	135.19	5.81E+003
F	9	1550-	1588	1566.26	391.70	1.54E+004	251.02	8.62E+003
F	10	2625-	2675	2646.38	661.60	4.85E+004	423.44	7.09E+003
F	11	3246-	3269	3255.44	813.79	2.05E+002	82.36	2.89E+003
F	12	3576-	3614	3592.27	897.96	1.75E+004	266.28	5.49E+003
F	13	4664-	4721	4693.54	1173.15	5.11E+004	431.13	3.42E+003
M	14	5288-	5357	5302.11	1325.22	3.42E+002	55.80	8.68E+002
m	15	5288-	5357	5331.03	1332.44	4.66E+004	411.65	9.00E+002
F	16	7322-	7372	7346.82	1836.15	1.12E+004	202.77	3.07E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\ENCAL01.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/Unit)	Activity Uncertainty
CO-57	1.000	122.06*	85.51	1.172E-002	7.119E-004
		136.48*	10.60	1.230E-002	9.358E-004
CO-60	0.999	1173.22*	100.00	4.676E-002	2.375E-003
		1332.49*	100.00	4.735E-002	2.550E-003
Y-88	0.998	898.02*	93.40	1.376E-002	6.863E-004
		1836.01*	99.38	1.416E-002	1.205E-003
CD-109	1.000	88.03*	3.72	6.251E-001	6.101E-002
SN-113	1.000	255.12*	1.93	1.067E-002	2.292E-003
		391.69*	64.90	9.315E-003	6.117E-004
CS-137	1.000	661.65*	85.12	3.265E-002	1.884E-003
CE-139	1.000	165.85*	80.35	8.028E-003	5.384E-004
HG-203	1.000	279.19*	77.30	7.675E-004	7.771E-005
AM-241	1.000	59.54*	35.90	8.013E-002	8.331E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\ENCAL01.CNF
Spectrum Number 1L STD

Performed & Reviewed By Pal Ogs Date 11/17/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/Unit)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	1.000	1.19E-002	5.67E-004	4.7
CO-60	0.999	4.70E-002	1.74E-003	3.7
Y-88	0.998	1.39E-002	5.96E-004	4.3
CD-109	1.000	6.25E-001	6.10E-002	9.8
SN-113	1.000	9.41E-003	5.91E-004	6.3
CS-137	1.000	3.27E-002	1.88E-003	5.8
CE-139	1.000	8.03E-003	5.38E-004	6.7
HG-203	1.000	7.68E-004	7.77E-005	10.1
AM-241	1.000	8.01E-002	8.33E-003	10.4

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.24	5.2527E-001	5.84
F	11	813.79	5.6830E-002	40.26
M	14	1325.22	9.5011E-002	16.31

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

GTS # 100201

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

62866-521

1.0 Liter Solid in 133N GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.
Density of solid matrix 1.15 g/cc.

Calibration date: January 1, 2002 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1057	5.0
Cd-109	88	462.6	d	1390	4.8
Co-57	122	271.79	d	838.8	4.9
Ce-139	166	137.6	d	1159	4.5
Hg-203	279	46.61	d	2828	4.6
Sn-113	392	115.1	d	1470	4.2
Cs-137	662	30.07	y	1032	4.0
Y-88	898	106.6	d	3931	4.2
Co-60	1173	5.2714	y	1928	4.0
Co-60	1332	5.2714	y	1941	4.0
Y-88	1836	106.6	d	4112	4.2

P O NUMBER 14531, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 2-6-02

This standard will expire one year after the calibration date.

****
***** C E R T I F I C A T E F I L E R E P O R T *****
****

Filename: C:\GENIE2K\CAMFILES\100201.CTF

Certificate Description:

Certificate Title: 62866-521 1L Solid Matrix in mar

Quantity : 1.00 units

Assay date : 1/1/2002 12:00:00 PM

Nuclide Name	Half-Life (Days)	Energy (keV)	Emission Rate GPS/Unit	Emission Rate % Uncert.(+-)
Am-241	1.579E+005	59.537*	1057.0	5.00
Cd-109	4.640E+002	88.032	1390.0	4.80
Co-57	2.709E+002	122.063	838.8	4.90
Ce-139	1.377E+002	165.853	1159.0	4.50
Hg-203	4.660E+001	279.189	2828.0	4.60
Sn-113	1.151E+002	391.688	1470.0	4.20
Cs-137	1.102E+004	661.649*	1032.0	4.00
Y-88	1.066E+002	898.021	3931.0	4.20
-60	1.925E+003	1173.220	1928.0	4.00
-60	1.925E+003	1332.490	1941.0	4.00
Y-88	1.066E+002	1836.010*	4112.0	4.20

* = Used for Calib/INIT

```
*************************************************************************
*****        G A M M A   S P E C T R U M   A N A L Y S I S        *****
*************************************************************************


Filename: C:\GENIE2K\CAMFILES\ENCAL01.CNF
Report Generated On                : 11/13/2002  8:51:43 PM

Sample Title                       : 1 Liter Water calibration spectrum
Spectrum Description               : Calibration Spectrum
Sample Identification              : 1L STD
Sample Type                        :
Sample Geometry                    : 1

Peak Locate Threshold              :  5.00
Peak Locate Range (in channels)    :     1 -  4096
Peak Area Range (in channels)      :     1 -  4096
Identification Energy Tolerance    :    1.000 keV

Sample Size                        :  1.000E+000 Unit

Sample Taken On                    :
Acquisition Started                : 11/13/2002  6:58:59 PM

Live Time                          :     3600.0 seconds
Real Time                          :     3649.2 seconds

Dead Time                          :   1.35 %

          Energy Calibration Used Done On       : 11/13/2002
          Efficiency Calibration Used Done On   : 11/13/2002
          Efficiency ID                         : 1
```

****
***** E F F I C I E N C Y C A L I B R A T I O N R E P O R T *****
****

Detector Name: DET01
Sample Title: 1 Liter Water calibration spectrum

Geometry Description: 1
Efficiency Calibration Performed on: 11/13/2002 8:36:02 PM
by:
Geometry Type Used: DUAL

Efficiency Triplets

Energy	Efficiency	Error
59.54	8.41E-003	4.25E-004
88.03	2.37E-002	1.14E-003
122.06	3.10E-002	1.53E-003
165.85	3.14E-002	1.43E-003
279.19	2.13E-002	1.46E-003
391.69	1.97E-002	8.49E-004
661.65	1.34E-002	5.39E-004
898.02	9.76E-003	4.19E-004
1173.22	8.29E-003	3.34E-004
1332.49	7.50E-003	3.02E-004
1836.01	5.96E-003	2.57E-004

DUAL Efficiency Calibration Equation

Single Equation Terms ->	Offset:	-441.296
	Slope:	355.603
	Quadratic:	-115.039
	Cubic:	18.562
	4th Order:	-1.496
	5th Order:	0.048
	6th Order:	0.000
	7th Order:	0.000
	8th Order:	0.000
	9th Order:	0.000

****
***** E N E R G Y C A L I B R A T I O N R E P O R T *****
****

Detector Name: DET01
Sample Title: 1 Liter Water calibration spectrum

********** ENERGY CALIBRATION COEFFICIENTS **********

Energy Calibrate Performed on: 11/13/2002 8:26:10 PM
by: PAUL JONES
Energy Calibrate Type: POLY

Energy(keV) = 0.320 + 0.250*ch + 0.00E+000*ch^2 + 0.00E+000*ch^3

********** SHAPE CALIBRATION COEFFICIENTS **********

Shape Calibrate Performed on: 11/13/2002 8:26:10 PM
by:

FWHM = 0.623 + 0.046*E^1/2

LOW TAIL = 6.9E-001 + 8.4E-004*E

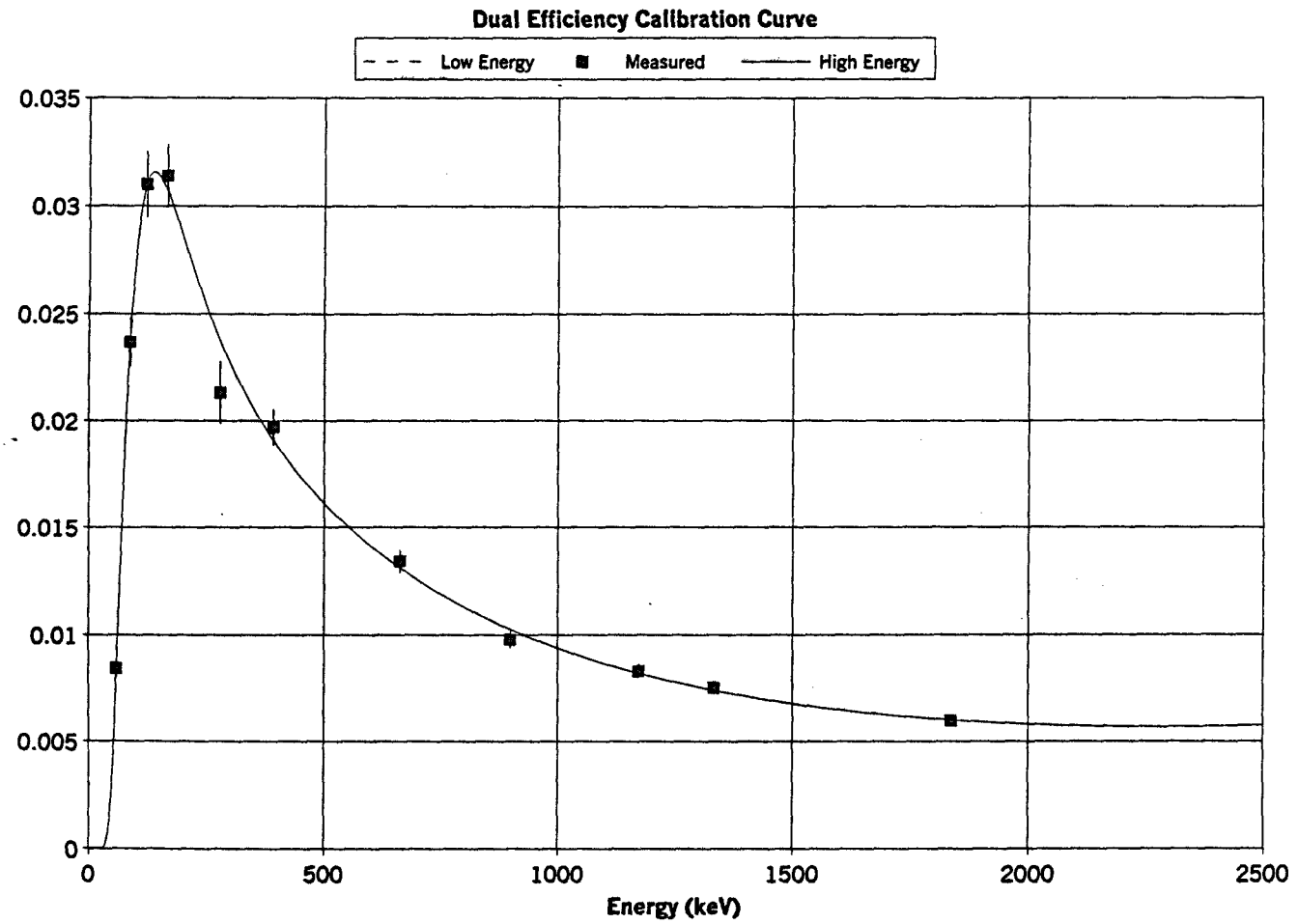
********** ENERGY CALIBRATION RESULTS TABLE **********

Centroid Channel	Centroid error	Energy (keV)
237.04	0.03	59.54
351.09	0.03	88.03
487.28	0.02	122.06
662.58	0.03	165.85
1116.02	0.10	279.19
1566.26	0.03	391.69
2646.36	0.03	661.65
3592.25	0.03	898.02
4693.53	0.04	1173.22
5331.04	0.04	1332.49
7346.81	0.04	1836.01

********* SHAPE CALIBRATION RESULTS TABLE *********

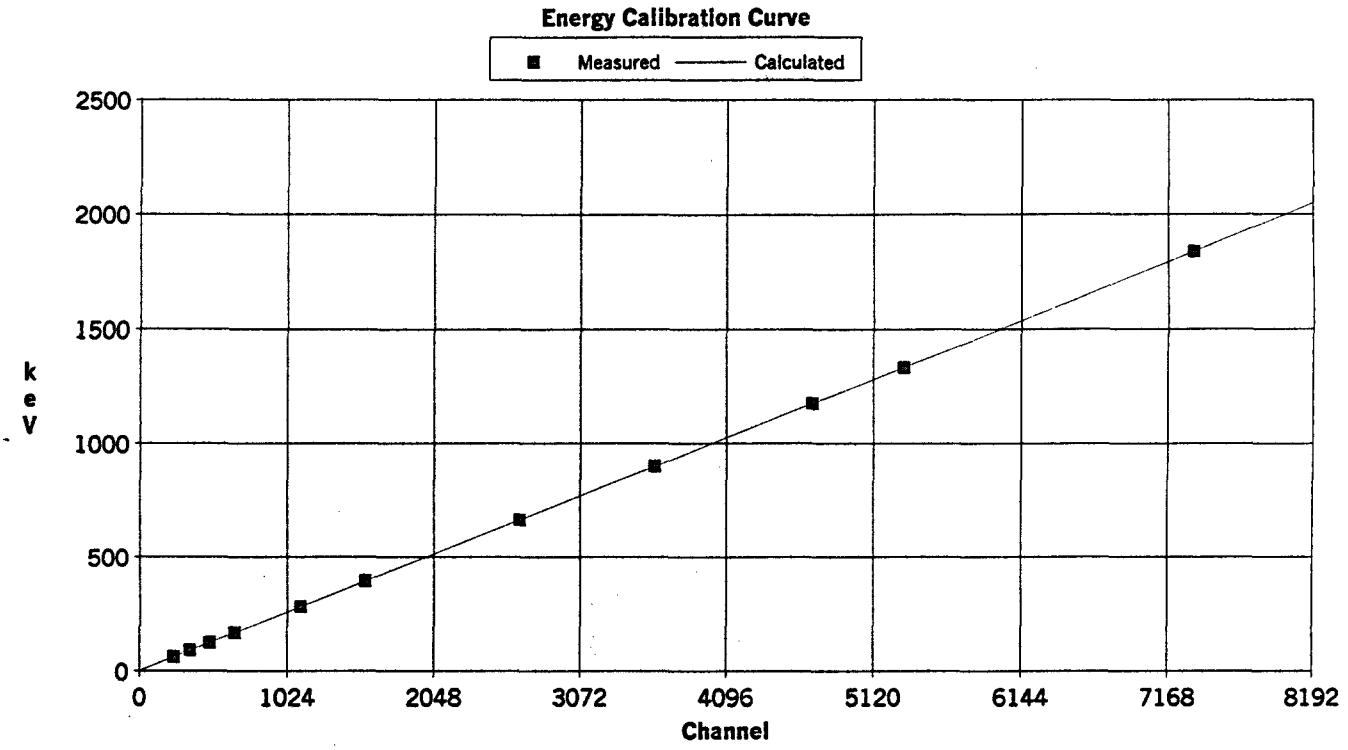
Energy (keV)	FWHM channels	FWHM error	TAIL channels	TAIL error
59.54	4.34	0.07	2.57	0.21
88.03	4.53	0.06	3.16	0.29
122.06	4.59	0.05	3.82	0.48
165.85	4.87	0.06	4.80	1.48
279.19	5.19	0.26	2.85	0.71
391.69	5.70	0.07	4.60	0.59
661.65	6.74	0.06	5.47	0.41
898.02	7.60	0.06	6.09	0.42
1173.22	8.78	0.07	6.83	0.34
1332.49	9.36	0.08	7.47	0.45
1836.01	11.26	0.07	8.51	0.33

****
**** G A M M A S P E C T R U M A N A L Y S I S *****



Datasource: DET01

$$\ln(Eff) = -4.413e+002 + 3.556e+002*\ln(E) - 1.150e+002*\ln(E)^2 + 1.856e+001*\ln(E)^3 - 1.496e+000*\ln(E)^4 + 4.810e-002*\ln(E)^5$$



Datasource: DET01
Energy = 3.203e-001 keV + 2.499e-001*Ch
FWHM = 6.229e-001 keV + 4.624e-002*E^1/2
Lo Tail = 6.871e-001 keV + 8.395e-004*E

1L Solid. 100201.CNF

Date: 11-14-02
250 mL Marinelli Beaker Filled With Sand to Top
Quantification check of ISOCS at Veterans Affairs Medical Center
Mixed Gamma Standard source Analytics S/N 64091-466 Duratek# 080201

			Source Activity on		1-Jul-02	Count Date:	13-Nov-02	
Isotope	Energy (keV)	Yield (gam/dis.)	Activity (gam./sec)	Activity (uCi)	Total Source Uncertainty (%)	Activity Current (uCi)	Activity Original (uCi)	Activity % difference
Am-241	59.5	0.359	994.2	7.485E-02	5.0	7.260E-02	7.264E-02	-2.95
Cd-109	88	0.0372	1439	1.045E+00	5.0	8.240E-01	1.008E+00	-3.57
Co-57	122	0.8551	759.8	2.401E-02	4.7	1.630E-02	2.303E-02	-4.12
Ce-139	166	0.8035	1086	3.653E-02	4.3	1.800E-02	3.552E-02	-2.76
Hg-203	279	0.773	2358	8.244E-02	4.1	1.050E-02	7.821E-02	-5.13
Sn-113	392	0.649	1600	6.663E-02	4.1	2.890E-02	6.516E-02	-2.21
Cs-137	662	0.8512	1009	3.204E-02	4.8	3.160E-02	3.187E-02	-0.52
Y-88	898	0.934	3704	1.072E-01	4.2	4.190E-02	1.008E-01	-5.96
Co-60	1173	1	1799	4.862E-02	4.1	4.637E-02	4.868E-02	0.12
Co-60	1332	1	1821	4.922E-02	4.2	4.700E-02	4.934E-02	0.25
Y-88	1836	0.9938	3873	1.053E-01	4.0	4.310E-02	1.037E-01	-1.56

1. Source quantification following calibration on Nov. 13, 2002
2. Gamma ray yields obtained from "Radioactive Decay Data Tables" D.C. Kocher
3. Activity % difference = (Original Activity - Certified Activity) / Certified Activity*100

Reviewed: E. Langille 12/17/02

****
**** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	11/14/02 6:47:11 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\250ml calibration.CNF
Spectrum Number	250mL STD
Sample Description	250 mL marinelli with 1.58 g/cc
Sample Type	
Sample Geometry	1
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 Unit
Sample Collection Date	
Spectrum Collection Date	11/13/02 9:02:22 PM
Decay Corrected To	
Collected By	P. Jones
Live Time	2913.9 seconds
Real Time	3000.1 seconds
% Dead Time	2.87 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By Pol a Jo Date 11/14/02

Supervisory Review E. Langille Date 12/17/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\250ml calibration.CNF
Spectrum Number 250mL STD
Sample Description 250 mL marinelli with 1.58 g/cc mat
Sample Type

Peak Locate Performed on 11/14/02 6:47:11 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.20	0.1301	42.37	21.06	0.7627
2	236.72	0.0648	59.46	74.13	1.1540
3	281.49	0.2916	70.65	3.70	1.0578
4	290.11	0.2180	72.73	8.04	1.0637
5	350.84	0.0427	87.99	163.74	1.1771
6	487.01	0.0466	122.03	132.04	1.1932
7	544.85	0.0852	136.46	39.61	1.2068
8	662.31	0.0432	165.84	142.77	1.2526
9	953.88	0.1977	238.70	6.79	0.9910
10	1019.60	0.1221	255.11	16.66	1.3060
11	1115.89	0.0486	279.18	100.92	1.3384
12	1406.80	0.2443	352.02	3.92	1.8353
13	1566.03	0.0394	391.66	141.25	1.4687
14	2042.67	0.1790	510.79	5.29	2.3836
15	2436.10	0.2437	609.05	4.11	0.8965
16	2646.16	0.0367	661.56	138.78	1.7402
17	3255.77	0.1427	813.89	7.96	1.9374
18	3592.00	0.0341	897.91	143.02	1.9935
19	4693.29	0.0333	1173.10	133.75	2.2802
20	5300.52	0.1275	1324.97	8.82	2.4640
21	5330.79	0.0335	1332.40	124.43	2.4688
22	7346.57	0.0351	1836.09	97.72	2.9765

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\250ml calibration.CNF
Spectrum Number 250mL STD
Sample Description 250 mL marinelli with 1.58 g/cc matrix

Peak Analysis Performed on 11/14/02 6:47:11 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	176	168.27	42.37	3.74E+003	144.40	6.88E+003
F	2	221-	252	236.68	59.46	3.25E+004	386.71	4.17E+004
M	3	265-	294	281.45	70.65	1.10E+003	207.95	2.29E+004
m	4	265-	294	289.79	72.73	1.33E+003	223.82	2.28E+004
F	5	333-	367	350.86	87.99	1.18E+005	669.60	5.41E+004
F	6	474-	505	487.09	122.03	7.21E+004	533.89	3.67E+004
F	7	532-	562	544.82	136.46	9.42E+003	253.42	3.05E+004
F	8	642-	681	662.40	165.84	7.60E+004	537.95	3.42E+004
F	9	947-	960	953.97	238.70	6.45E+002	159.38	1.00E+004
F	10	1009-	1029	1019.64	255.11	2.45E+003	173.91	1.27E+004
F	11	1107-	1138	1115.98	279.18	3.28E+004	365.30	1.67E+004
F	12	1401-	1416	1407.48	352.02	5.02E+002	135.17	6.25E+003
F	13	1541-	1590	1566.12	391.66	5.91E+004	469.08	1.75E+004
F	14	2027-	2056	2042.86	510.79	1.13E+003	133.91	8.19E+003
F	15	2430-	2443	2436.06	609.05	1.84E+002	96.25	3.54E+003
F	16	2624-	2671	2646.21	661.56	5.68E+004	459.91	1.30E+004
F	17	3247-	3270	3255.83	813.89	7.72E+002	112.68	4.42E+003
F	18	3569-	3620	3592.07	897.91	6.40E+004	486.48	1.06E+004
F	19	4671-	4728	4693.33	1173.10	6.02E+004	468.90	5.38E+003
M	20	5286-	5359	5301.13	1324.97	9.44E+002	88.33	2.07E+003
m	21	5286-	5359	5330.83	1332.40	5.49E+004	446.12	2.13E+003
F	22	7317-	7374	7346.55	1836.09	3.98E+004	378.57	9.06E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\250ml calibration.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/Unit)	Activity Uncertainty
CO-57	1.000	122.06*	85.51	1.611E-002	9.356E-004
		136.48*	10.60	1.657E-002	1.158E-003
CO-60	0.998	1173.22*	100.00	4.637E-002	2.586E-003
		1332.49*	100.00	4.704E-002	2.782E-003
Y-88	0.999	898.02*	93.40	4.190E-002	2.141E-003
		1836.01*	99.38	4.316E-002	3.718E-003
CD-109	1.000	88.03*	3.72	8.240E-001	7.999E-002
SN-113	1.000	255.12*	1.93	2.967E-002	4.091E-003
		391.69*	64.90	2.871E-002	1.736E-003
CS-137	0.999	661.65*	85.12	3.162E-002	1.897E-003
CE-139	1.000	165.85*	80.35	1.796E-002	1.070E-003
HG-203	1.000	279.19*	77.30	1.051E-002	6.597E-004
AM-241	0.999	59.54*	35.90	7.258E-002	7.792E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\250ml calibration.CNF
Spectrum Number 250mL STD

Performed & Reviewed By Rlo Qs Date 11/14/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/Unit)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	1.000	1.63E-002	7.28E-004	4.5
CO-60	0.998	4.67E-002	1.89E-003	4.1
Y-88	0.999	4.22E-002	1.86E-003	4.4
CD-109	1.000	8.24E-001	8.00E-002	9.7
SN-113	1.000	2.89E-002	1.60E-003	5.5
CS-137	0.999	3.16E-002	1.90E-003	6.0
CE-139	1.000	1.80E-002	1.07E-003	6.0
HG-203	1.000	1.05E-002	6.60E-004	6.3
AM-241	0.999	7.26E-002	7.79E-003	10.7

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.37	1.2839E+000	3.86
M	3	70.65	3.7665E-001	18.95
m	4	72.73	4.5612E-001	16.84
F	9	238.70	2.2139E-001	24.71
F	12	352.02	1.7244E-001	26.90
F	14	510.79	3.8689E-001	11.88
F	15	609.05	6.3069E-002	52.37
F	17	813.89	2.6505E-001	14.59
M	20	1324.97	3.2411E-001	9.35

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

Thomas G. Scott
8-20-02 Durak 080201

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

64091-466

Sand in 250 mL Marinelli Beaker Filled to Top

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: July 1, 2002 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	994.2	5.0
Cd-109	88	462.6	d	1439	5.0
Co-57	122	271.79	d	759.8	4.7
Ce-139	166	137.6	d	1086	4.3
Hg-203	279	46.61	d	2358	4.1
Sn-113	392	115.1	d	1600	4.1
Cs-137	662	30.07	y	1009	4.8
Y-88	898	106.6	d	3704	4.2
Co-60	1173	5.2714	y	1799	4.1
Co-60	1332	5.2714	y	1821	4.2
Y-88	1836	106.6	d	3873	4.0

490 grams/310 mL of sand.
P O NUMBER 14630, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: RCW 8/6/02

This standard will expire one year after the calibration date.

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 - U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837
email: analytics@mindspring.com
www.analyticsinc.com

Reviewed
Thomas J. Sent
8-20-02

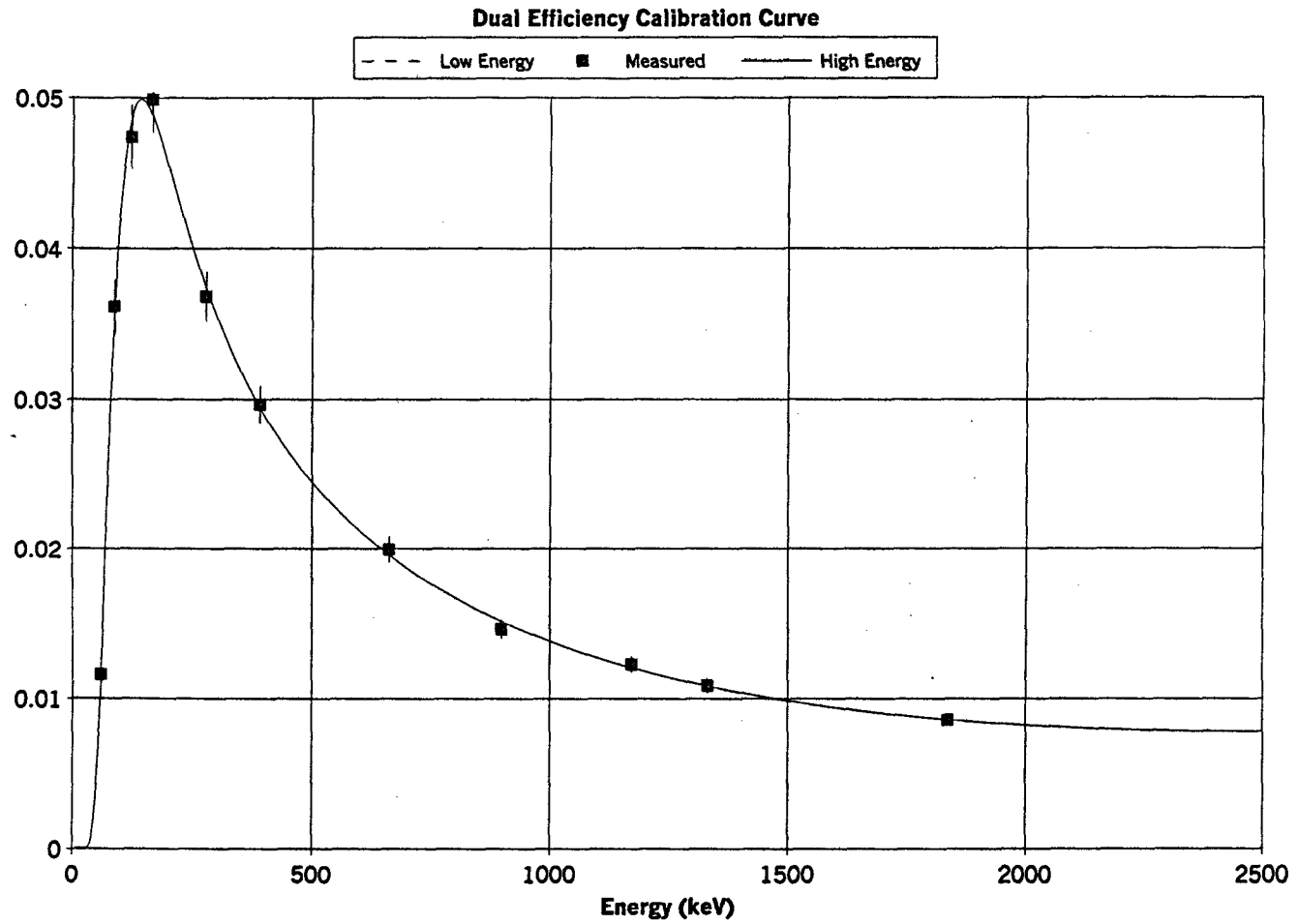
ANALYSIS OF UNCERTAINTY

BATCH 109 MIXED GAMMA STANDARDS WITH Am-241
CALIBRATION DATE: July 1, 2002 12:00 EST

GAMMA RAY ENERGY (keV)	RANDOM ERROR % (99 % CL)	SYSTEMATIC ERROR %	TOTAL %
59.5	2.0	3.0	5.0
88	1.8	3.2	5.0
122	2.0	2.7	4.7
166	1.5	2.8	4.3
279	1.1	3.0	4.1
392	1.3	2.8	4.1
662	1.8	3.0	4.8
898	1.2	3.0	4.2
1173	1.3	2.8	4.1
1332	1.4	2.8	4.2
1836	1.0	3.0	4.0

The systematic error includes the error in calibration standards, weighing error, and estimated counting corrections. All uncertainties are stated at the 99% confidence level.

No interfering gamma emitting impurities were detected during calibration. Depending on the resolution and energy dispersion (kev/channel) of the measuring system, the following spectral conflicts may occur: (1) between the 88 keV gamma-ray and the X-rays emitted in the decay of Hg-203, (2) between the 1333 keV gamma-ray and the 1325 keV single escape peak from the 1836 keV gamma-ray.



Datasource: DET01

$$\ln(Eff) = -4.144e+002 + 3.289e+002*\ln(E) - 1.047e+002*\ln(E)^2 + 1.664e+001*\ln(E)^3 - 1.322e+000*\ln(E)^4 + 4.197e-002*\ln(E)^5$$

250 mL 11/13/02 P. J

reviewed E. Longille 12/17/02

****
**** CERTIFICATE FILE REPORT *****
****

Filename: C:\GENIE2K\CAMFILES\080201.CTF

Certificate Description:

Certificate Title: 64091-466 250 mL Sand Matrix in

Quantity : 1.00 units

Assay date : 7/1/2002 12:00:00 PM

Nuclide Name	Half-Life (Days)	Energy (keV)	Emission Rate GPS/Unit	Emission Rate % Uncert.(+-)
Am-241	1.579E+005	59.537*	994.2	5.00
Cd-109	4.640E+002	88.032	1439.0	5.00
Co-57	2.709E+002	122.063	759.8	4.40
Ce-139	1.377E+002	165.853	1086.0	4.30
Hg-203	4.660E+001	279.189	2358.0	4.40
Sn-113	1.151E+002	391.688	1600.0	4.20
Cs-137	1.102E+004	661.649*	1009.0	4.30
Y-88	1.066E+002	898.021	3704.0	4.40
Co-60	1.925E+003	1173.220	1799.0	4.40
Co-60	1.925E+003	1332.490	1821.0	4.60
Y-88	1.066E+002	1836.010*	3873.0	4.40

* = Used for Calib/INIT

250 mL 11/13/02 P.J.
12/17/02 E. Hungerville

****
**** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	12/12/02 1:21:05 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 120802C.CNF
Spectrum Number	QC120802C.CNF
Sample Description	Mixed Gamma un 250ml Marinelli
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.50 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/8/02 3:09:01 PM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	616.2 seconds
% Dead Time	2.63 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By _____ Date 12/12/02

Supervisory Review _____ Date 12/17/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120802C.CNF
Spectrum Number QC120802C.CNF
Sample Description Mixed Gamma un 250ml Marinelli
Sample Type Marinelli

Peak Locate Performed on 12/12/02 1:21:04 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	164.13	0.1939	41.61	10.81	0.9661
2	236.05	0.1145	59.33	16.91	1.6042
3	350.08	0.0754	87.83	40.72	1.5861
4	486.26	0.0816	121.86	34.45	1.5877
5	543.75	0.1478	136.25	9.98	1.5778
6	661.37	0.0768	165.62	36.84	1.6371
7	1018.85	0.1967	254.92	5.75	1.5360
8	1114.82	0.0911	278.92	24.43	1.7360
9	1564.84	0.0661	391.38	43.88	1.7717
10	2644.94	0.0570	661.26	52.29	1.9741
11	3590.82	0.0541	897.60	53.28	2.1372
12	4691.98	0.0499	1172.77	57.06	2.3375
13	5297.71	0.1827	1324.24	3.55	2.4677
14	5329.39	0.0499	1332.04	53.87	2.4727
15	7344.88	0.0525	1835.69	43.66	2.7699

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120802C.CNF
Spectrum Number QC120802C.CNF
Sample Description Mixed Gamma un 250ml Marinelli

Peak Analysis Performed on 12/12/02 1:21:04 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	160-	175	165.23	41.61	8.87E+002	67.93	1.58E+003
F	2	220-	244	236.15	59.33	7.01E+003	173.13	6.14E+003
F	3	335-	365	350.22	87.83	2.43E+004	288.90	8.81E+003
F	4	473-	501	486.38	121.86	1.47E+004	229.72	6.13E+003
F	5	536-	553	544.00	136.25	1.77E+003	109.27	3.32E+003
F	6	650-	679	661.52	165.62	1.41E+004	221.26	4.58E+003
F	7	1010-	1028	1018.89	254.92	4.75E+002	75.55	2.09E+003
F	8	1101-	1124	1114.92	278.92	4.70E+003	137.51	2.39E+003
F	9	1553-	1585	1565.00	391.38	1.10E+004	196.15	2.28E+003
F	10	2631-	2664	2645.00	661.26	1.19E+004	206.29	1.70E+003
F	11	3573-	3608	3590.81	897.60	1.15E+004	204.13	1.38E+003
F	12	4674-	4712	4692.02	1172.77	1.24E+004	211.05	6.43E+002
M	13	5283-	5349	5298.21	1324.24	2.20E+002	37.30	2.98E+002
m	14	5283-	5349	5329.40	1332.04	1.13E+004	201.31	3.05E+002
F	15	7323-	7367	7344.95	1835.69	7.12E+003	161.77	1.53E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 120802C.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.997	122.06*	85.51	1.599E-002	9.552E-004
		136.48*	10.60	1.510E-002	1.349E-003
CO-60	0.986	1173.22*	100.00	4.636E-002	2.678E-003
		1332.49*	100.00	4.689E-002	2.871E-003
Y-88	0.990	898.02*	93.40	3.646E-002	1.953E-003
		1836.01*	99.38	3.754E-002	3.322E-003
CD-109	0.997	88.03*	3.72	8.286E-001	8.094E-002
SN-113	0.994	255.12*	1.93	2.791E-002	5.531E-003
		391.69*	64.90	2.584E-002	1.616E-003
CS-137	0.989	661.65*	85.12	3.215E-002	1.991E-003
CE-139	0.996	165.85*	80.35	1.613E-002	9.862E-004
HG-203	0.995	279.19*	77.30	7.313E-003	5.000E-004
AM-241	0.997	59.54*	35.90	7.682E-002	8.480E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.500
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 120802C.CNF
Spectrum Number QC120802C.CNF

Performed & Reviewed By _____ Date 12/12/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.997	1.57E-002	7.80E-004	5.0
CO-60	0.986	4.66E-002	1.96E-003	4.2
Y-88	0.990	3.67E-002	1.68E-003	4.6
CD-109	0.997	8.29E-001	8.09E-002	9.8
SN-113	0.994	2.60E-002	1.55E-003	6.0
CS-137	0.989	3.21E-002	1.99E-003	6.2
CE-139	0.996	1.61E-002	9.86E-004	6.1
HG-203	0.995	7.31E-003	5.00E-004	6.8
AM-241	0.997	7.68E-002	8.48E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	41.61	1.4782E+000	7.66
M	13	1324.24	3.6716E-001	16.93

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

Date: 12-07-02
250 mL Marinelli Beaker Filled With Sand to Top
Quantification check of ISOCS at Veterans Affairs Medical Center
Mixed Gamma Standard source Analytics S/N 64091-466 Duratek# 080201

Isotope	Energy (keV)	Yield (gam/dis.)	Source Activity on 1-Jul-02 Activity (gam./sec)	Activity (uCi)	Total Source Uncertainty (%)	Count Date: 7-Dec-02 Activity Current (uCi)	Activity Original (uCi)	Activity % difference
Am-241	59.5	0.359	994.2	7.485E-02	5.0	8.130E-02	8.136E-02	8.70
Cd-109	88	0.0372	1439	1.045E+00	5.0	8.470E-01	1.074E+00	2.74
Co-57	122	0.8551	759.8	2.401E-02	4.7	1.590E-02	2.388E-02	-0.55
Ce-139	166	0.8035	1086	3.653E-02	4.3	1.660E-02	3.697E-02	1.20
Hg-203	279	0.773	2358	8.244E-02	4.1	7.870E-03	8.377E-02	1.61
Sn-113	392	0.649	1600	6.663E-02	4.1	2.600E-02	6.774E-02	1.66
Cs-137	662	0.8512	1009	3.204E-02	4.8	3.280E-02	3.313E-02	3.41
Y-88	898	0.934	3704	1.072E-01	4.2	3.710E-02	1.043E-01	-2.67
Co-60	1173	1	1799	4.862E-02	4.1	4.730E-02	5.009E-02	3.01
Co-60	1332	1	1821	4.922E-02	4.2	4.730E-02	5.009E-02	1.77
Y-88	1836	0.9938	3873	1.053E-01	4.0	3.710E-02	1.043E-01	-0.96

Isotope	½ life years
Am-241	432.2
Cd-109	1.2704
Co-57	0.7417
Ce-139	0.3769
Hg-203	0.12759
Sn-113	0.31514
Cs-137	30.17
Y-88	0.29186
Co-60	5.271
Co-60	5.271
Y-88	0.29186

1. Source quantification following calibration on Nov. 13, 2002
2. Gamma ray yields obtained from "Radioactive Decay Data Tables" D.C. Kocher
3. Activity % difference = (Original Activity - Certified Activity) / Certified Activity*100

Paul A. Jones

****
**** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	1/21/03 12:39:11 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 120702B.CNF
Spectrum Number	QC120702B.CNF
Sample Description	Mixed Gamma in Marinelli
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.50 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/7/02 1:30:01 PM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	616.6 seconds
% Dead Time	2.70 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Reprint

Performed & Reviewed By LC Finn Date 1/27/03

Supervisory Review PLG Jos Date 1/27/03

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120702B.CNF
Spectrum Number QC120702B.CNF
Sample Description Mixed Gamma in Marinelli
Sample Type Marinelli

Peak Locate Performed on 1/21/03 12:39:11 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	163.65	0.2001	41.45	9.29	0.9089
2	236.55	0.1002	59.42	27.25	1.3447
3	350.46	0.0666	87.91	58.89	1.3043
4	486.69	0.0724	121.94	49.11	1.3099
5	544.34	0.1305	136.33	15.23	1.3014
6	662.03	0.0684	165.77	53.18	1.3678
7	1019.37	0.1900	255.17	6.45	1.4929
8	1115.74	0.0793	279.14	35.54	1.4051
9	1566.19	0.0609	391.70	57.01	1.5030
10	2647.15	0.0532	661.80	64.09	1.6974
11	3256.09	0.2324	813.98	4.00	1.1527
12	3593.76	0.0514	898.33	62.26	1.8955
13	4695.82	0.0480	1173.73	65.68	2.1014
14	5303.14	0.1578	1325.57	5.80	2.2157
15	5333.69	0.0473	1333.10	64.18	2.2206
16	7351.16	0.0505	1837.19	49.83	2.5209

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120702B.CNF
Spectrum Number QC120702B.CNF
Sample Description Mixed Gamma in Marinelli

Peak Analysis Performed on 1/21/03 12:39:11 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	160-	173	164.61	41.45	8.25E+002	67.74	1.48E+003
F	2	220-	247	236.51	59.42	7.47E+003	178.70	6.95E+003
F	3	341-	361	350.54	87.91	2.49E+004	301.78	6.39E+003
F	4	478-	496	486.73	121.94	1.47E+004	237.10	4.28E+003
F	5	531-	558	544.31	136.33	1.85E+003	111.67	5.25E+003
F	6	645-	675	662.10	165.77	1.45E+004	231.43	4.95E+003
F	7	1013-	1029	1019.88	255.17	5.11E+002	77.74	1.98E+003
F	8	1104-	1127	1115.82	279.14	5.05E+003	145.03	2.37E+003
F	9	1556-	1579	1566.25	391.70	1.09E+004	200.93	1.70E+003
F	10	2633-	2659	2647.19	661.80	1.21E+004	212.94	1.41E+003
F	11	3249-	3272	3256.21	813.98	9.94E+001	44.16	8.73E+002
F	12	3579-	3608	3593.76	898.33	1.16E+004	207.87	1.11E+003
F	13	4677-	4712	4695.86	1173.73	1.24E+004	213.80	7.26E+002
M	14	5290-	5350	5303.52	1325.57	2.57E+002	38.39	2.38E+002
m	15	5290-	5350	5333.64	1333.10	1.17E+004	207.86	2.63E+002
F	16	7330-	7371	7350.98	1837.19	7.21E+003	163.96	1.33E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 120702B.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.999	122.06*	85.51	1.601E-002	9.578E-004
		136.48*	10.60	1.581E-002	1.396E-003
CO-60	0.978	1173.22*	100.00	4.622E-002	2.675E-003
		1332.49*	100.00	4.863E-002	2.977E-003
Y-88	0.947	898.02*	93.40	3.677E-002	1.972E-003
		1836.01*	99.38	3.802E-002	3.377E-003
CD-109	0.999	88.03*	3.72	8.474E-001	8.278E-002
SN-113	1.000	255.12*	1.93	3.006E-002	5.790E-003
		391.69*	64.90	2.572E-002	1.613E-003
CS-137	0.998	661.65*	85.12	3.284E-002	2.035E-003
CE-139	0.999	165.85*	80.35	1.664E-002	1.019E-003
HG-203	1.000	279.19*	77.30	7.867E-003	5.359E-004
AM-241	0.999	59.54*	35.90	8.131E-002	8.914E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.500
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 120702B.CNF
Spectrum Number QC120702B.CNF

Performed & Reviewed By K. Fuma Date 1/27/03

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.999	1.59E-002	7.90E-004	5.0
CO-60	0.978	4.73E-002	1.99E-003	4.2
Y-88	0.947	3.71E-002	1.70E-003	4.6
CD-109	0.999	8.47E-001	8.28E-002	9.8
SN-113	1.000	2.60E-002	1.55E-003	6.0
CS-137	0.998	3.28E-002	2.04E-003	6.2
CE-139	0.999	1.66E-002	1.02E-003	6.1
HG-203	1.000	7.87E-003	5.36E-004	6.8
AM-241	0.999	8.13E-002	8.91E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	41.45	1.3750E+000	8.21
F	11	813.98	1.6572E-001	44.41
M	14	1325.57	4.2850E-001	14.93

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

****
**** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	1/21/03 12:51:38 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 120602.CNF
Spectrum Number	QC120602.CNF
Sample Description	Mixed Gamma in 250ml
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.50 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/6/02 6:37:12 AM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	616.6 seconds
% Dead Time	2.70 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Reprint

Performed & Reviewed By LC. Finn Date 1/21/03

Supervisory Review [signature] Date 1/27/03

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120602.CNF
Spectrum Number QC120602.CNF
Sample Description Mixed Gamma in 250ml
Sample Type Marinelli

Peak Locate Performed on 1/21/03 12:51:38 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.21	0.1849	42.31	12.12	0.6248
2	236.44	0.1021	59.40	27.61	1.3222
3	350.50	0.0680	87.92	59.29	1.3366
4	486.81	0.0740	121.97	50.55	1.3431
5	544.55	0.1354	136.36	13.88	1.3346
6	662.08	0.0703	165.79	52.90	1.3896
7	1019.87	0.1917	255.20	5.94	1.3719
8	1115.58	0.0832	279.10	32.99	1.5037
9	1565.81	0.0628	391.61	54.13	1.5859
10	2645.96	0.0557	661.51	58.78	1.8568
11	3591.90	0.0533	897.90	57.14	2.0569
12	4693.30	0.0500	1173.09	58.24	2.3502
13	5299.60	0.1865	1324.87	3.70	2.5461
14	5330.75	0.0507	1332.39	53.90	2.5510
15	7346.51	0.0538	1836.07	40.85	2.9951

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120602.CNF
Spectrum Number QC120602.CNF
Sample Description Mixed Gamma in 250ml

Peak Analysis Performed on 1/21/03 12:51:38 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	172	168.03	42.31	5.63E+002	65.06	8.22E+002
F	2	220-	252	236.44	59.40	6.87E+003	173.83	8.21E+003
F	3	333-	367	350.58	87.92	2.38E+004	295.69	1.09E+004
F	4	472-	504	486.83	121.97	1.44E+004	234.23	7.35E+003
F	5	530-	552	544.41	136.36	1.73E+003	111.00	4.42E+003
F	6	652-	681	662.20	165.79	1.38E+004	226.61	4.74E+003
F	7	1014-	1029	1019.99	255.20	4.06E+002	76.35	1.95E+003
F	8	1104-	1131	1115.67	279.10	4.96E+003	143.50	2.92E+003
F	9	1551-	1585	1565.91	391.61	1.07E+004	198.65	2.66E+003
F	10	2623-	2671	2646.03	661.51	1.17E+004	207.34	2.60E+003
F	11	3577-	3618	3592.01	897.90	1.15E+004	206.13	1.74E+003
F	12	4667-	4722	4693.31	1173.09	1.24E+004	211.48	9.64E+002
M	13	5288-	5357	5300.71	1324.87	1.81E+002	38.32	3.49E+002
m	14	5288-	5357	5330.79	1332.39	1.11E+004	199.34	4.30E+002
F	15	7320-	7371	7346.48	1836.07	7.27E+003	162.07	2.03E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 120602.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.999	122.06*	85.51	1.559E-002	9.336E-004
		136.48*	10.60	1.479E-002	1.344E-003
CO-60	0.999	1173.22*	100.00	4.635E-002	2.679E-003
		1332.49*	100.00	4.608E-002	2.823E-003
Y-88	0.999	898.02*	93.40	3.645E-002	1.954E-003
		1836.01*	99.38	3.832E-002	3.391E-003
CD-109	0.999	88.03*	3.72	8.113E-001	7.928E-002
SN-113	1.000	255.12*	1.93	2.386E-002	5.302E-003
		391.69*	64.90	2.517E-002	1.580E-003
CS-137	0.999	661.65*	85.12	3.159E-002	1.960E-003
CE-139	1.000	165.85*	80.35	1.582E-002	9.708E-004
HG-203	0.999	279.19*	77.30	7.728E-003	5.271E-004
AM-241	0.999	59.54*	35.90	7.489E-002	8.241E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.500
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 120602.CNF
Spectrum Number QC120602.CNF

Performed & Reviewed By _____ Date 1/27/03

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.999	1.53E-002	7.67E-004	5.0
CO-60	0.999	4.62E-002	1.94E-003	4.2
Y-88	0.999	3.69E-002	1.69E-003	4.6
CD-109	0.999	8.11E-001	7.93E-002	9.8
SN-113	1.000	2.51E-002	1.51E-003	6.0
CS-137	0.999	3.16E-002	1.96E-003	6.2
CE-139	1.000	1.58E-002	9.71E-004	6.1
HG-203	0.999	7.73E-003	5.27E-004	6.8
AM-241	0.999	7.49E-002	8.24E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.31	9.3766E-001	11.56
M	13	1324.87	3.0242E-001	21.12

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

Date: 12-06-02
250 mL Marinelli Beaker Filled With Sand to Top
Quantification check of ISOCS at Veterans Affairs Medical Center
Mixed Gamma Standard source Analytics S/N 64091-466 Duratek# 080201

Isotope	Energy (keV)	Yield (gam/dis.)	Source Activity on 1-Jul-02 Activity (gam./sec)	Activity (uCi)	Total Source Uncertainty (%)	Count Date: 6-Dec-02 Activity Current (uCi)	Activity Original (uCi)	Activity % difference
Am-241	59.5	0.359	994.2	7.485E-02	5.0	7.490E-02	7.495E-02	0.14
Cd-109	88	0.0372	1439	1.045E+00	5.0	8.110E-01	1.027E+00	-1.78
Co-57	122	0.8551	759.8	2.401E-02	4.7	1.530E-02	2.292E-02	-4.55
Ce-139	166	0.8035	1086	3.653E-02	4.3	1.580E-02	3.501E-02	-4.16
Hg-203	279	0.773	2358	8.244E-02	4.1	7.730E-03	8.107E-02	-1.67
Sn-113	392	0.649	1600	6.663E-02	4.1	2.510E-02	6.500E-02	-2.45
Cs-137	662	0.8512	1009	3.204E-02	4.8	3.160E-02	3.192E-02	-0.38
Y-88	898	0.934	3704	1.072E-01	4.2	3.690E-02	1.031E-01	-3.82
Co-60	1173	1	1799	4.862E-02	4.1	4.620E-02	4.890E-02	0.58
Co-60	1332	1	1821	4.922E-02	4.2	4.620E-02	4.890E-02	-0.63
Y-88	1836	0.9938	3873	1.053E-01	4.0	3.690E-02	1.031E-01	-2.13

Isotope	½ life years
Am-241	432.2
Cd-109	1.2704
Co-57	0.7417
Ce-139	0.3769
Hg-203	0.12759
Sn-113	0.31514
Cs-137	30.17
Y-88	0.29186
Co-60	5.271
Co-60	5.271
Y-88	0.29186

1. Source quantification following calibration on Nov. 13, 2002
2. Gamma ray yields obtained from "Radioactive Decay Data Tables" D.C. Kocher
3. Activity % difference = (Original Activity - Certified Activity) / Certified Activity*100

****
***** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	12/5/02 10:32:21 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 120502A.CNF
Spectrum Number	QC120502A.CNF
Sample Description	Mixed Gamma in 250ml
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.50 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/5/02 10:17:04 AM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	616.6 seconds
% Dead Time	2.70 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By L. Finn Date 12/05/02

Supervisory Review [illegible] Date 12/5/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120502A.CNF
Spectrum Number QC120502A.CNF
Sample Description Mixed Gamma in 250ml
Sample Type Marinelli

Peak Locate Performed on 12/5/02 10:32:20 AM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.10	0.1938	42.40	9.91	0.8441
2	236.18	0.0955	59.34	33.77	1.1653
3	350.23	0.0638	87.86	73.70	1.1865
4	486.53	0.0699	121.90	57.38	1.1794
5	544.32	0.1256	136.34	17.30	1.1220
6	661.91	0.0663	165.72	62.66	1.2227
7	1019.03	0.1856	254.94	6.74	1.3252
8	1115.47	0.0794	279.06	37.15	1.3116
9	1565.66	0.0607	391.56	59.74	1.4456
10	2645.86	0.0543	661.49	63.53	1.7395
11	3591.98	0.0524	897.91	60.34	1.9951
12	4693.31	0.0493	1173.10	61.09	2.2829
13	5300.57	0.1614	1325.00	4.89	2.4620
14	5330.82	0.0497	1332.39	57.15	2.4668
15	7346.71	0.0533	1836.13	42.80	2.9139

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120502A.CNF
Spectrum Number QC120502A.CNF
Sample Description Mixed Gamma in 250ml

Peak Analysis Performed on 12/5/02 10:32:21 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	176	168.40	42.40	7.75E+002	66.60	1.33E+003
F	2	225-	251	236.17	59.34	6.81E+003	175.77	6.86E+003
F	3	333-	367	350.31	87.86	2.40E+004	301.02	1.03E+004
F	4	468-	504	486.57	121.90	1.41E+004	235.73	8.31E+003
F	5	538-	551	544.34	136.34	1.66E+003	110.63	2.83E+003
F	6	651-	681	661.91	165.72	1.37E+004	230.16	5.07E+003
F	7	1011-	1025	1018.96	254.94	4.32E+002	75.81	1.78E+003
F	8	1105-	1124	1115.49	279.06	4.68E+003	142.71	2.23E+003
F	9	1554-	1585	1565.71	391.56	1.07E+004	200.80	2.38E+003
F	10	2626-	2664	2645.94	661.49	1.18E+004	209.57	2.01E+003
F	11	3543-	3615	3592.05	897.91	1.16E+004	207.04	2.94E+003
F	12	4669-	4723	4693.33	1173.10	1.24E+004	212.69	9.91E+002
M	13	5288-	5359	5301.23	1325.00	2.74E+002	40.22	2.85E+002
m	14	5288-	5359	5330.80	1332.39	1.11E+004	200.41	3.29E+002
F	15	7322-	7369	7346.73	1836.13	7.15E+003	161.43	1.92E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 120502A.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.998	122.06*	85.51	1.527E-002	9.167E-004
		136.48*	10.60	1.418E-002	1.315E-003
CO-60	0.999	1173.22*	100.00	4.640E-002	2.682E-003
		1332.49*	100.00	4.630E-002	2.837E-003
Y-88	0.999	898.02*	93.40	3.675E-002	1.970E-003
		1836.01*	99.38	3.772E-002	3.340E-003
CD-109	0.998	88.03*	3.72	8.191E-001	8.008E-002
SN-113	0.999	255.12*	1.93	2.540E-002	5.373E-003
		391.69*	64.90	2.511E-002	1.578E-003
CS-137	0.998	661.65*	85.12	3.179E-002	1.972E-003
CE-139	0.999	165.85*	80.35	1.571E-002	9.656E-004
HG-203	0.999	279.19*	77.30	7.278E-003	5.016E-004
AM-241	0.997	59.54*	35.90	7.464E-002	8.255E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.500
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 120502A.CNF
Spectrum Number QC120502A.CNF

Performed & Reviewed By SC. Fuma Date 12/05/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.998	1.49E-002	7.52E-004	5.0
CO-60	0.999	4.64E-002	1.95E-003	4.2
Y-88	0.999	3.70E-002	1.70E-003	4.6
CD-109	0.998	8.19E-001	8.01E-002	9.8
SN-113	0.999	2.51E-002	1.51E-003	6.0
CS-137	0.998	3.18E-002	1.97E-003	6.2
CE-139	0.999	1.57E-002	9.66E-004	6.1
HG-203	0.999	7.28E-003	5.02E-004	6.9
AM-241	0.997	7.46E-002	8.25E-003	11.1

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.40	1.2916E+000	8.59
M	13	1325.00	4.5586E-001	14.70

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

****
***** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	12/4/02 7:36:10 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 120402..CNF
Spectrum Number	QC120402.CNF
Sample Description	Mixed Gamma in 250ml marinelli
Sample Type	marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/4/02 6:51:44 AM
Decay Corrected To	
Collected By	P. Jones
Live Time	600.6 seconds
Real Time	617.3 seconds
% Dead Time	2.70 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By SC. Fenn Date 12/04/02

Supervisory Review [illegible] Date 12/5/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120402..CNF
Spectrum Number QC120402.CNF
Sample Description Mixed Gamma in 250ml marinelli
Sample Type marinelli

Peak Locate Performed on 12/4/02 7:36:10 AM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.17	0.1911	42.32	9.52	0.8000
2	235.93	0.0945	59.26	35.15	1.1330
3	289.43	0.2926	72.59	4.24	0.4750
4	350.05	0.0636	87.81	73.86	1.1495
5	486.22	0.0702	121.85	58.93	1.1803
6	544.04	0.1232	136.27	18.69	1.1276
7	661.54	0.0655	165.65	60.21	1.2472
8	1019.28	0.1817	255.04	7.54	1.2541
9	1115.17	0.0785	278.98	39.70	1.2710
10	1565.30	0.0600	391.48	60.97	1.4639
11	2645.42	0.0542	661.38	62.37	1.7440
12	3591.31	0.0523	897.74	60.88	2.0053
13	4692.62	0.0492	1172.93	61.55	2.2510
14	5299.51	0.1730	1324.69	3.79	2.4169
15	5329.92	0.0495	1332.20	57.52	2.4217
16	7345.82	0.0529	1835.93	43.15	2.8893

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 120402..CNF
Spectrum Number QC120402.CNF
Sample Description Mixed Gamma in 250ml marinelli

Peak Analysis Performed on 12/4/02 7:36:10 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	175	168.10	42.32	7.02E+002	64.21	1.18E+003
F	2	222-	246	235.89	59.26	6.70E+003	175.50	6.64E+003
F	3	285-	293	289.21	72.59	1.47E+002	80.16	2.92E+003
F	4	340-	366	350.12	87.81	2.31E+004	298.91	8.33E+003
F	5	474-	504	486.35	121.85	1.40E+004	235.80	6.92E+003
F	6	537-	552	544.06	136.27	1.80E+003	111.61	3.08E+003
F	7	644-	681	661.65	165.65	1.42E+004	233.08	6.23E+003
F	8	1012-	1027	1019.36	255.04	4.60E+002	76.32	1.91E+003
F	9	1104-	1124	1115.15	278.98	4.72E+003	144.29	2.36E+003
F	10	1544-	1588	1565.36	391.48	1.11E+004	203.92	3.06E+003
F	11	2631-	2672	2645.51	661.38	1.18E+004	209.20	2.24E+003
F	12	3567-	3618	3591.37	897.74	1.17E+004	208.03	1.93E+003
F	13	4669-	4718	4692.68	1172.93	1.23E+004	212.06	8.97E+002
M	14	5283-	5357	5300.01	1324.69	2.31E+002	38.27	3.24E+002
m	15	5283-	5357	5330.04	1332.20	1.11E+004	200.59	3.27E+002
F	16	7322-	7371	7345.92	1835.93	7.28E+003	162.99	1.97E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 120402..CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.993	122.06*	85.51	1.520E-002	9.128E-004
		136.48*	10.60	1.537E-002	1.375E-003
CO-60	0.987	1173.22*	100.00	4.593E-002	2.656E-003
		1332.49*	100.00	4.608E-002	2.825E-003
Y-88	0.993	898.02*	93.40	3.722E-002	1.993E-003
		1836.01*	99.38	3.838E-002	3.395E-003
CD-109	0.992	88.03*	3.72	7.869E-001	7.699E-002
SN-113	0.993	255.12*	1.93	2.703E-002	5.505E-003
		391.69*	64.90	2.623E-002	1.644E-003
CS-137	0.989	661.65*	85.12	3.182E-002	1.974E-003
CE-139	0.994	165.85*	80.35	1.627E-002	9.982E-004
HG-203	0.993	279.19*	77.30	7.344E-003	5.062E-004
AM-241	0.988	59.54*	35.90	7.373E-002	8.196E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 120402..CNF
Spectrum Number QC120402.CNF

Performed & Reviewed By K. Finn Date 12/04/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.993	1.53E-002	7.60E-004	5.0
CO-60	0.987	4.60E-002	1.94E-003	4.2
Y-88	0.993	3.75E-002	1.72E-003	4.6
CD-109	0.992	7.87E-001	7.70E-002	9.8
SN-113	0.993	2.63E-002	1.58E-003	6.0
CS-137	0.989	3.18E-002	1.97E-003	6.2
CE-139	0.994	1.63E-002	9.98E-004	6.1
HG-203	0.993	7.34E-003	5.06E-004	6.9
AM-241	0.988	7.37E-002	8.20E-003	11.1

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.32	1.1688E+000	9.15
F	3	72.59	2.4415E-001	54.66
M	14	1324.69	3.8491E-001	16.55

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

****
***** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	12/3/02 6:17:57 PM
Detector	DET01
Sample I.D.	DET01
Spectrum Number	QC120302.CNF
Sample Description	Mixed Gamma in 250ml marinelli
Sample Type	marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	12/3/02 5:40:41 PM
Decay Corrected To	
Collected By	P. Jones
Live Time	600.6 seconds
Real Time	617.5 seconds
% Dead Time	2.73 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By P. Jones Date 12/3/02

Supervisory Review M. Fenn Date 12/05/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. DET01
Spectrum Number QC120302.CNF
Sample Description Mixed Gamma in 250ml marinelli
Sample Type marinelli

Peak Locate Performed on 12/3/02 6:17:37 PM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.53	0.1912	42.18	9.57	0.6063
2	236.68	0.0968	59.44	33.37	1.1747
3	290.27	0.3021	72.90	4.37	0.3374
4	350.78	0.0640	87.97	73.01	1.1770
5	487.00	0.0696	122.03	60.11	1.1966
6	544.59	0.1247	136.42	18.74	1.0622
7	662.24	0.0659	165.83	61.11	1.2350
8	1019.53	0.1980	255.10	6.13	1.2749
9	1115.80	0.0776	279.16	40.23	1.2940
10	1565.99	0.0596	391.65	61.35	1.4515
11	2329.93	0.2239	582.53	4.30	1.2856
12	2646.05	0.0542	661.53	63.26	1.7325
13	3256.32	0.2200	814.03	3.69	2.1298
14	3591.89	0.0516	897.88	62.69	1.9468
15	4693.23	0.0491	1173.08	62.84	2.2115
16	5299.23	0.1797	1324.75	4.05	2.3782
17	5330.56	0.0492	1332.36	58.40	2.3832
18	5844.45	0.1823	1460.75	4.81	1.6900
19	7346.41	0.0519	1836.05	46.17	2.8327

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. DET01
Spectrum Number QC120302.CNF
Sample Description Mixed Gamma in 250ml marinelli

Peak Analysis Performed on 12/3/02 6:17:56 PM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	171	167.52	42.18	4.52E+002	62.26	7.94E+002
F	2	221-	248	236.61	59.44	6.73E+003	174.61	7.20E+003
F	3	284-	294	290.46	72.90	1.47E+002	118.62	3.80E+003
F	4	334-	367	350.78	87.97	2.38E+004	301.70	1.08E+004
F	5	472-	505	487.07	122.03	1.44E+004	237.60	7.39E+003
F	6	537-	557	544.65	136.42	1.68E+003	109.19	3.94E+003
F	7	653-	681	662.35	165.83	1.39E+004	232.48	4.96E+003
F	8	1014-	1029	1019.61	255.10	3.68E+002	75.84	1.97E+003
F	9	1108-	1129	1115.88	279.16	4.99E+003	146.37	2.39E+003
F	10	1552-	1588	1566.07	391.65	1.11E+004	204.52	2.64E+003
F	11	2324-	2338	2329.93	582.53	1.27E+002	50.31	7.20E+002
F	12	2624-	2669	2646.10	661.53	1.18E+004	210.05	2.51E+003
F	13	3248-	3269	3256.39	814.03	1.65E+002	50.16	7.70E+002
F	14	3573-	3619	3591.93	897.88	1.18E+004	209.08	1.72E+003
F	15	4671-	4721	4693.25	1173.08	1.21E+004	211.39	9.87E+002
M	16	5288-	5359	5300.22	1324.75	1.94E+002	37.75	3.14E+002
m	17	5288-	5359	5330.68	1332.36	1.13E+004	202.84	3.53E+002
F	18	5836-	5855	5844.48	1460.75	9.37E+001	32.01	2.08E+002
F	19	7323-	7371	7346.41	1836.05	7.45E+003	165.25	1.42E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. DET01
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	1.000	122.06*	85.51	1.560E-002	9.349E-004
		136.48*	10.60	1.434E-002	1.313E-003
CO-60	0.997	1173.22*	100.00	4.528E-002	2.622E-003
		1332.49*	100.00	4.688E-002	2.872E-003
Y-88	0.998	898.02*	93.40	3.748E-002	2.006E-003
		1836.01*	99.38	3.926E-002	3.472E-003
CD-109	0.999	88.03*	3.72	8.101E-001	7.917E-002
SN-113	1.000	255.12*	1.93	2.159E-002	5.134E-003
		391.69*	64.90	2.621E-002	1.643E-003
CS-137	0.998	661.65*	85.12	3.175E-002	1.971E-003
CE-139	1.000	165.85*	80.35	1.599E-002	9.821E-004
HG-203	1.000	279.19*	77.30	7.760E-003	5.307E-004
AM-241	0.999	59.54*	35.90	7.308E-002	8.033E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. DET01
Spectrum Number QC120302.CNF

Performed & Reviewed By [illegible] Date 12/3/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	1.000	1.52E-002	7.61E-004	5.0
CO-60	0.997	4.60E-002	1.94E-003	4.2
Y-88	0.998	3.79E-002	1.74E-003	4.6
CD-109	0.999	8.10E-001	7.92E-002	9.8
SN-113	1.000	2.58E-002	1.56E-003	6.1
CS-137	0.998	3.18E-002	1.97E-003	6.2
CE-139	1.000	1.60E-002	9.82E-004	6.1
HG-203	1.000	7.76E-003	5.31E-004	6.8
AM-241	0.999	7.31E-002	8.03E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.18	7.5203E-001	13.78
F	3	72.90	2.4556E-001	80.42
F	11	582.53	2.1186E-001	39.54
F	13	814.03	2.7421E-001	30.46
M	16	1324.75	3.2364E-001	19.42
F	18	1460.75	1.5600E-001	34.16

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

****
*** G A M M A S P E C T R U M A N A L Y S I S *****
****

Report Generated On	11/26/02 8:57:42 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 112602.CNF
Spectrum Number	QC112602.CNF
Sample Description	Mixed Gamma in 250ml Marinelli
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	11/26/02 8:38:54 AM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	617.1 seconds
% Dead Time	2.77 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By L. Finn Date 11/26/02

Supervisory Review [illegible] Date 12/6/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112602.CNF
Spectrum Number QC112602.CNF
Sample Description Mixed Gamma in 250ml Marinelli
Sample Type Marinelli

Peak Locate Performed on 11/26/02 8:57:41 AM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	167.82	0.1926	42.06	10.05	0.4835
2	236.50	0.0986	59.42	32.21	1.1743
3	350.65	0.0639	87.94	73.77	1.1684
4	486.87	0.0698	121.99	59.16	1.1906
5	544.74	0.1294	136.44	16.60	1.2064
6	662.07	0.0653	165.79	63.92	1.2370
7	953.18	0.2683	238.50	4.17	0.8611
8	1019.24	0.1938	255.02	5.48	1.7176
9	1115.53	0.0755	279.10	41.31	1.3119
10	1565.77	0.0597	391.60	61.61	1.4575
11	2645.75	0.0544	661.47	63.12	1.7362
12	3591.60	0.0516	897.80	62.22	1.9757
13	4692.86	0.0497	1172.99	60.55	2.2664
14	5299.88	0.1659	1324.75	4.83	2.4616
15	5330.23	0.0496	1332.26	56.98	2.4664
16	7345.75	0.0531	1835.91	42.29	2.9504

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112602.CNF
Spectrum Number QC112602.CNF
Sample Description Mixed Gamma in 250ml Marinelli

Peak Analysis Performed on 11/26/02 8:57:41 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	170	167.02	42.06	3.72E+002	57.41	6.81E+002
F	2	224-	251	236.50	59.42	6.66E+003	174.76	7.41E+003
F	3	333-	367	350.66	87.94	2.40E+004	302.94	1.09E+004
F	4	474-	505	486.93	121.99	1.43E+004	238.17	7.31E+003
F	5	534-	556	544.74	136.44	1.77E+003	111.61	4.50E+003
F	6	652-	681	662.18	165.79	1.47E+004	237.45	4.89E+003
F	7	949-	958	953.16	238.50	1.29E+002	68.34	1.37E+003
F	8	1004-	1028	1019.28	255.02	5.80E+002	81.01	2.90E+003
F	9	1101-	1129	1115.63	279.10	5.60E+003	152.69	3.05E+003
F	10	1551-	1590	1565.87	391.60	1.13E+004	205.91	2.89E+003
F	11	2624-	2668	2645.84	661.47	1.16E+004	208.76	2.41E+003
F	12	3570-	3614	3591.62	897.80	1.21E+004	212.33	1.80E+003
F	13	4671-	4713	4692.91	1172.99	1.21E+004	210.93	9.95E+002
M	14	5285-	5357	5300.25	1324.75	2.44E+002	40.28	3.60E+002
m	15	5285-	5357	5330.28	1332.26	1.13E+004	201.74	3.78E+002
F	16	7323-	7372	7345.86	1835.91	7.45E+003	164.44	1.94E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 112602.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.999	122.06*	85.51	1.555E-002	9.323E-004
		136.48*	10.60	1.515E-002	1.365E-003
CO-60	0.992	1173.22*	100.00	4.521E-002	2.618E-003
		1332.49*	100.00	4.684E-002	2.869E-003
Y-88	0.995	898.02*	93.40	3.863E-002	2.065E-003
		1836.01*	99.38	3.927E-002	3.471E-003
CD-109	0.999	88.03*	3.72	8.188E-001	8.003E-002
SN-113	0.999	255.12*	1.93	3.409E-002	6.239E-003
		391.69*	64.90	2.660E-002	1.667E-003
CS-137	0.995	661.65*	85.12	3.143E-002	1.952E-003
CE-139	0.999	165.85*	80.35	1.691E-002	1.036E-003
HG-203	0.999	279.19*	77.30	8.720E-003	5.888E-004
AM-241	0.998	59.54*	35.90	7.248E-002	7.985E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 112602.CNF
Spectrum Number QC112602.CNF

Performed & Reviewed By RC. Ferri Date 11/26/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.999	1.54E-002	7.70E-004	5.0
CO-60	0.992	4.60E-002	1.93E-003	4.2
Y-88	0.995	3.88E-002	1.77E-003	4.6
CD-109	0.999	8.19E-001	8.00E-002	9.8
SN-113	0.999	2.71E-002	1.61E-003	5.9
CS-137	0.995	3.14E-002	1.95E-003	6.2
CE-139	0.999	1.69E-002	1.04E-003	6.1
HG-203	0.999	8.72E-003	5.89E-004	6.8
AM-241	0.998	7.25E-002	7.98E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.06	6.2016E-001	15.43
F	7	238.50	2.1574E-001	52.79
M	14	1324.75	4.0689E-001	16.50

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

Date: 11- 25-02
250 mL Marinelli Beaker Filled With Sand to Top
Quantification check of ISOCS at Veterans Affairs Medical Center
Mixed Gamma Standard source Analytics S/N 64091-466 Duratek# 080201

			Source Activity on		1-Jul-02	Count Date:	25-Nov-02	
Isotope	Energy (keV)	Yield (gam/dis.)	Activity (gam./sec)	Activity (uCi)	Total Source Uncertainty (%)	Activity Current (uCi)	Activity Original (uCi)	Activity % difference
Am-241	59.5	0.359	994.2	7.485E-02	5.0	7.310E-02	7.315E-02	-2.27
Cd-109	88	0.0372	1439	1.045E+00	5.0	6.170E-01	1.018E+00	-2.66
Co-57	122	0.8551	759.8	2.401E-02	4.7	1.570E-02	2.287E-02	-4.77
Ce-139	166	0.8035	1086	3.653E-02	4.3	1.680E-02	3.522E-02	-3.59
Hg-203	279	0.773	2358	8.244E-02	4.1	8.910E-03	7.934E-02	-3.77
Sn-113	392	0.649	1600	6.663E-02	4.1	2.720E-02	6.592E-02	-1.06
Cs-137	662	0.8512	1009	3.204E-02	4.8	3.250E-02	3.280E-02	2.39
Y-88	898	0.934	3704	1.072E-01	4.2	3.940E-02	1.025E-01	-4.39
Co-60	1173	1	1799	4.862E-02	4.1	4.570E-02	4.818E-02	-0.90
Co-60	1332	1	1821	4.922E-02	4.2	4.570E-02	4.818E-02	-2.10
Y-88	1836	0.9938	3873	1.053E-01	4.0	3.940E-02	1.025E-01	-2.71

1. Source quantification following calibration on Nov. 13, 2002
2. Gamma ray yields obtained from "Radioactive Decay Data Tables" D.C. Kocher
3. Activity % difference = (Original Activity - Certified Activity) / Certified Activity*100

****
***** G A M M A S P E C T R U M A N A L Y S I S *****
****

Report Generated On	11/25/02 7:41:16 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 112502.CNF
Spectrum Number	QC112502.CNF
Sample Description	MixedGamma in 250ml Marinelli
Sample Type	Marinelli
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 ea
Sample Collection Date	
Spectrum Collection Date	11/25/02 7:28:33 AM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	617.1 seconds
% Dead Time	2.78 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By L. Finn Date 11/25/02

Supervisory Review Paul A. Jones Date 1/24/03

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112502.CNF
Spectrum Number QC112502.CNF
Sample Description MixedGamma in 250ml Marinelli
Sample Type Marinelli

Peak Locate Performed on 11/25/02 7:41:15 AM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	168.29	0.1819	42.24	10.19	0.6879
2	236.60	0.0973	59.45	32.03	1.1634
3	350.69	0.0638	87.96	73.81	1.1759
4	486.91	0.0694	122.00	60.31	1.1867
5	544.83	0.1276	136.45	17.02	1.1933
6	662.25	0.0655	165.82	62.26	1.2522
7	953.82	0.2528	238.60	4.60	0.7317
8	1019.58	0.1790	255.12	7.65	1.2577
9	1115.73	0.0761	279.15	41.06	1.3600
10	1566.00	0.0592	391.64	63.10	1.4560
11	2646.09	0.0540	661.55	64.04	1.7428
12	3256.72	0.2163	814.05	4.21	1.1926
13	3592.11	0.0517	897.94	61.98	2.0113
14	4693.41	0.0494	1173.14	60.18	2.2477
15	5300.24	0.1931	1324.81	4.49	2.4187
16	5330.94	0.0498	1332.43	56.23	2.4235
17	7346.77	0.0526	1836.14	43.50	2.9416

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112502.CNF
Spectrum Number QC112502.CNF
Sample Description MixedGamma in 250ml Marinelli

Peak Analysis Performed on 11/25/02 7:41:15 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	172	167.74	42.24	6.16E+002	65.98	9.10E+002
F	2	223-	249	236.62	59.45	6.73E+003	175.60	7.19E+003
F	3	333-	367	350.72	87.96	2.40E+004	301.54	1.05E+004
F	4	473-	501	486.93	122.00	1.46E+004	240.45	6.99E+003
F	5	533-	557	544.79	136.45	1.79E+003	111.84	4.89E+003
F	6	650-	681	662.32	165.82	1.46E+004	236.81	5.52E+003
F	7	949-	960	953.57	238.60	1.38E+002	66.77	1.74E+003
F	8	1014-	1030	1019.69	255.12	4.76E+002	78.11	2.09E+003
F	9	1105-	1130	1115.85	279.15	5.72E+003	153.79	2.67E+003
F	10	1551-	1584	1566.03	391.64	1.15E+004	208.11	2.60E+003
F	11	2626-	2668	2646.19	661.55	1.20E+004	211.02	2.28E+003
F	12	3250-	3265	3256.48	814.05	9.05E+001	44.31	5.88E+002
F	13	3573-	3618	3592.17	897.94	1.23E+004	213.57	1.95E+003
F	14	4676-	4713	4693.49	1173.14	1.23E+004	212.25	7.82E+002
M	15	5289-	5357	5300.48	1324.81	1.57E+002	39.45	4.01E+002
m	16	5289-	5357	5330.99	1332.43	1.09E+004	199.97	4.67E+002
F	17	7322-	7369	7346.76	1836.14	7.65E+003	166.56	1.76E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 112502.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ea)	Activity Uncertainty
CO-57	0.999	122.06*	85.51	1.581E-002	9.473E-004
		136.48*	10.60	1.532E-002	1.374E-003
CO-60	0.999	1173.22*	100.00	4.588E-002	2.655E-003
		1332.49*	100.00	4.555E-002	2.795E-003
Y-88	0.998	898.02*	93.40	3.913E-002	2.090E-003
		1836.01*	99.38	4.033E-002	3.563E-003
CD-109	0.999	88.03*	3.72	8.170E-001	7.984E-002
SN-113	1.000	255.12*	1.93	2.801E-002	5.662E-003
		391.69*	64.90	2.716E-002	1.700E-003
CS-137	0.999	661.65*	85.12	3.246E-002	2.012E-003
CE-139	1.000	165.85*	80.35	1.678E-002	1.028E-003
HG-203	1.000	279.19*	77.30	8.906E-003	6.000E-004
AM-241	0.999	59.54*	35.90	7.312E-002	8.039E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 112502.CNF
Spectrum Number QC112502.CNF

Performed & Reviewed By K. Finn Date 11/25/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ea)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.999	1.57E-002	7.80E-004	5.0
CO-60	0.999	4.57E-002	1.92E-003	4.2
Y-88	0.998	3.94E-002	1.80E-003	4.6
CD-109	0.999	8.17E-001	7.98E-002	9.8
SN-113	1.000	2.72E-002	1.63E-003	6.0
CS-137	0.999	3.25E-002	2.01E-003	6.2
CE-139	1.000	1.68E-002	1.03E-003	6.1
HG-203	1.000	8.91E-003	6.00E-004	6.7
AM-241	0.999	7.31E-002	8.04E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.24	1.0263E+000	10.71
F	7	238.60	2.3070E-001	48.24
F	12	814.05	1.5083E-001	48.97
M	15	1324.81	2.6110E-001	25.18

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

Date: 11-24-02
250 mL Marinelli Beaker Filled With Sand to Top
Quantification check of ISOCS at Veterans Affairs Medical Center
Mixed Gamma Standard source Analytics S/N 64091-466 Duratek# 080201

			Source Activity on		1-Jul-02	Count Date:	24-Nov-02	
Isotope	Energy (keV)	Yield (gam/dis.)	Activity (gam./sec)	Activity (uCi)	Total Source Uncertainty (%)	Activity Current (uCi)	Activity Original (uCi)	Activity % difference
Am-241	59.5	0.359	994.2	7.485E-02	5.0	7.260E-02	7.265E-02	-2.94
Cd-109	88	0.0372	1439	1.045E+00	5.0	8.040E-01	9.999E-01	-4.36
Co-57	122	0.8551	759.8	2.401E-02	4.7	1.550E-02	2.252E-02	-6.22
Ce-139	166	0.8035	1086	3.653E-02	4.3	1.700E-02	3.546E-02	-2.93
Hg-203	279	0.773	2358	8.244E-02	4.1	9.000E-03	7.896E-02	-4.23
Sn-113	392	0.649	1600	6.663E-02	4.1	2.730E-02	6.577E-02	-1.30
Cs-137	662	0.8512	1009	3.204E-02	4.8	3.170E-02	3.199E-02	-0.14
Y-88	898	0.934	3704	1.072E-01	4.2	3.960E-02	1.023E-01	-4.53
Co-60	1173	1	1799	4.862E-02	4.1	4.620E-02	4.869E-02	0.15
Co-60	1332	1	1821	4.922E-02	4.2	4.620E-02	4.869E-02	-1.06
Y-88	1836	0.9938	3873	1.053E-01	4.0	3.960E-02	1.023E-01	-2.85

1. Source quantification following calibration on Nov. 13, 2002
2. Gamma ray yields obtained from "Radioactive Decay Data Tables" D.C. Kocher
3. Activity % difference = (Original Activity - Certified Activity) / Certified Activity*100

****
***** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	11/24/02 8:05:06 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\QC 112402.CNF
Spectrum Number	QC
Sample Description	mixed gamma source in 250 mL mar
Sample Type	Source
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	1.000E+000 unit
Sample Collection Date	
Spectrum Collection Date	11/24/02 7:42:12 AM
Decay Corrected To	
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	617.1 seconds
% Dead Time	2.78 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By LC. Finn Date 11/24/02

Supervisory Review [illegible] Date 11/24/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112402.CNF
Spectrum Number QC
Sample Description mixed gamma source in 250 mL marine
Sample Type Source

Peak Locate Performed on 11/24/02 8:05:05 AM
Peak Locate From Channel 100
Peak Locate To Channel 8192
Peak Search Sensitivity 3.50
MDA Confidence 5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	167.94	0.2026	42.14	9.47	0.5938
2	236.44	0.0961	59.39	33.82	1.1382
3	350.47	0.0646	87.91	70.68	1.1746
4	486.80	0.0697	121.96	59.31	1.1783
5	544.37	0.1313	136.34	16.12	1.2521
6	662.03	0.0654	165.77	64.24	1.2443
7	1019.18	0.1775	255.07	8.12	1.3606
8	1115.61	0.0755	279.11	41.83	1.3389
9	1565.81	0.0589	391.60	63.52	1.4277
10	2041.36	0.2407	510.30	3.53	1.6919
11	2645.92	0.0543	661.51	63.31	1.7373
12	3255.03	0.2114	813.70	4.25	1.5320
13	3591.96	0.0512	897.91	63.13	1.9616
14	4693.32	0.0496	1173.10	60.39	2.2864
15	5299.47	0.1707	1324.79	5.12	2.4543
16	5330.90	0.0496	1332.42	56.87	2.4593
17	7346.67	0.0528	1836.11	42.62	2.9602

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\QC 112402.CNF
Spectrum Number QC
Sample Description mixed gamma source in 250 mL marinelli

Peak Analysis Performed on 11/24/02 8:05:05 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	164-	171	167.37	42.14	4.48E+002	59.68	7.44E+002
F	2	220-	252	236.38	59.39	6.65E+003	173.86	8.33E+003
F	3	334-	367	350.52	87.91	2.36E+004	300.39	1.07E+004
F	4	475-	504	486.79	121.96	1.43E+004	238.63	6.90E+003
F	5	530-	553	544.35	136.34	1.80E+003	112.40	4.75E+003
F	6	643-	679	662.13	165.77	1.48E+004	238.36	6.45E+003
F	7	1010-	1031	1019.47	255.07	5.57E+002	78.84	2.61E+003
F	8	1104-	1134	1115.69	279.11	5.78E+003	154.09	3.13E+003
F	9	1543-	1581	1565.87	391.60	1.14E+004	207.54	2.92E+003
F	10	2025-	2047	2040.87	510.30	1.66E+002	55.37	1.28E+003
F	11	2622-	2672	2646.01	661.51	1.17E+004	208.51	2.68E+003
F	12	3246-	3264	3255.05	813.70	1.27E+002	49.68	7.53E+002
F	13	3572-	3618	3592.06	897.91	1.23E+004	214.07	1.91E+003
F	14	4668-	4717	4693.35	1173.10	1.22E+004	211.17	9.42E+002
M	15	5290-	5353	5300.40	1324.79	2.15E+002	40.01	3.30E+002
m	16	5290-	5353	5330.94	1332.42	1.12E+004	202.10	4.36E+002
F	17	7322-	7374	7346.67	1836.11	7.72E+003	166.92	1.71E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\QC 112402.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\CALIB.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/unit)	Activity Uncertainty
CO-57	0.998	122.06*	85.51	1.557E-002	9.340E-004
		136.48*	10.60	1.534E-002	1.379E-003
CO-60	0.999	1173.22*	100.00	4.570E-002	2.644E-003
		1332.49*	100.00	4.678E-002	2.866E-003
Y-88	0.998	898.02*	93.40	3.920E-002	2.094E-003
		1836.01*	99.38	4.068E-002	3.592E-003
CD-109	0.998	88.03*	3.72	8.041E-001	7.862E-002
SN-113	0.999	255.12*	1.93	3.274E-002	6.039E-003
		391.69*	64.90	2.687E-002	1.683E-003
CS-137	0.997	661.65*	85.12	3.166E-002	1.964E-003
CE-139	0.999	165.85*	80.35	1.703E-002	1.043E-003
HG-203	0.999	279.19*	77.30	8.999E-003	6.055E-004
AM-241	0.996	59.54*	35.90	7.253E-002	8.004E-003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** INTERFERENCE CORRECTED REPORT ***
****

Sample I.D. C:\GENIE2K\CAMFILES\QC 112402.CNF
Spectrum Number QC

Performed & Reviewed By SC. Fenn Date 11/24/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/unit)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
CO-57	0.998	1.55E-002	7.73E-004	5.0
CO-60	0.999	4.62E-002	1.94E-003	4.2
Y-88	0.998	3.96E-002	1.81E-003	4.6
CD-109	0.998	8.04E-001	7.86E-002	9.8
SN-113	0.999	2.73E-002	1.62E-003	5.9
CS-137	0.997	3.17E-002	1.96E-003	6.2
CE-139	0.999	1.70E-002	1.04E-003	6.1
HG-203	0.999	9.00E-003	6.05E-004	6.7
AM-241	0.996	7.25E-002	8.00E-003	11.0

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
F	1	42.14	7.4604E-001	13.33
F	10	510.30	2.7651E-001	33.38
F	12	813.70	2.1176E-001	39.10
M	15	1324.79	3.5794E-001	18.63

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

****
***** G A M M A S P E C T R U M A N A L Y S I S *****
****

Report Generated On	12/4/02 5:36:44 PM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\BKG120402.CNF
Spectrum Number	BKG120402.CNF
Sample Description	Bkg Check
Sample Type	Water
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	2.00 keV
Sample Size	2.500E+002 ml
Sample Collection Date	12/4/02 5:22:00 PM
Spectrum Collection Date	12/4/02 5:22:41 PM
Decay Corrected To	12/4/02 5:22:00 PM
Collected By	L. Finn
Live Time	600.0 seconds
Real Time	600.1 seconds
% Dead Time	0.01 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By L. Finn Date 12/04/02

Supervisory Review [illegible] Date 1/21/03

No peak locate results available for reporting purposes

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

Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\BKG120402.CNF
Spectrum Number	BKG120402.CNF
Sample Description	Bkg Check

Peak Analysis Performed on	12/4/02 5:36:44 PM
Peak Analysis From Channel	100
Peak Analysis To Channel	8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts

One or more peaks were dropped due to multiplet de-convolution.
M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\BKG120402.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\MYAP.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ml)	Activity Uncertainty

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 2.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\BKG120402.CNF
Spectrum Number BKG120402.CNF

Performed & Reviewed By K. Linx Date 12/04/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ml)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty

? = 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 1.96 sigma

No peak search results available for nuclide analysis.

****
**** GAMMA SPECTRUM ANALYSIS *****
****

Report Generated On	11/25/02 7:47:46 AM
Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\BKG112402.CNF
Spectrum Number	BKG112402.CNF
Sample Description	Weekly BKG Check
Sample Type	Water
Sample Geometry	2
Peak Locate Threshold	3.50
Peak Locate Range (in channels)	100 - 8192
Peak Area Range (in channels)	100 - 8192
Identification Energy Tolerance	1.00 keV
Sample Size	2.500E+002 ml
Sample Collection Date	11/24/02 3:14:00 PM
Spectrum Collection Date	11/24/02 3:14:29 PM
Decay Corrected To	11/24/02 3:14:00 PM
Collected By	L. Finn
Live Time	3600.0 seconds
Real Time	3600.3 seconds
% Dead Time	0.01 %
Background Type	STEP

Energy Calibration Performed On	11/13/02
Efficiency Calibration Performed On	11/13/02
Calibration Geometry Used	2

Performed & Reviewed By L. Finn Date 11/25/02

Supervisory Review [illegible] Date 12/3/02

****
****** P E A K L O C A T E R E P O R T ******
****

Detector	DET01
Sample I.D.	C:\GENIE2K\CAMFILES\BKG112402.CNF
Spectrum Number	BKG112402.CNF
Sample Description	Weekly BKG Check
Sample Type	Water
Peak Locate Performed on	11/25/02 7:47:45 AM
Peak Locate From Channel	100
Peak Locate To Channel	8192
Peak Search Sensitivity	3.50
MDA Confidence	5.00

Peak No.	Centroid Channel	Centroid Uncertainty	Energy (keV)	Peak Significance	FWHM (keV)
1	741.61	0.2638	185.61	3.83	1.1612
2	4693.58	0.2048	1173.14	3.95	1.4729
3	5844.44	0.1805	1460.82	3.76	3.0036

Errors quoted at 1.96 sigma

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

Detector DET01
Sample I.D. C:\GENIE2K\CAMFILES\BKG112402.CNF
Spectrum Number BKG112402.CNF
Sample Description Weekly BKG Check

Peak Analysis Performed on 11/25/02 7:47:45 AM
Peak Analysis From Channel 100
Peak Analysis To Channel 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
F	1	734-	749	741.52	185.61	5.95E+001	18.59	6.52E+001
F	2	4686-	4701	4693.53	1173.14	2.91E+001	11.33	3.99E+000
F	3	5837-	5852	5844.79	1460.82	5.18E+001	16.85	7.70E+000

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

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

Sample I.D. C:\GENIE2K\CAMFILES\BKG112402.CNF
Nuclide Library Used C:\GENIE2K\CAMFILES\MYAP.NLB

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

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (uCi/ml)	Activity Uncertainty
K-40	1.000	1460.81*	10.67	1.449E-006	4.800E-007
CO-60	0.221	1173.22*	100.00	7.265E-008	2.853E-008
		1332.49	100.00		
RA-226	0.944	186.21*	3.28	1.158E-006	3.693E-007
U-235	0.684	89.95	2.70		
		143.76	10.50		
		185.71*	54.00	7.033E-008	2.240E-008

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy tolerance used was 1.000
Nuclide confidence index threshold = 0.10
Errors quoted at 1.960 sigma

****
*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***
****

Sample I.D. C:\GENIE2K\CAMFILES\BKG112402.CNF
Spectrum Number BKG112402.CNF

Performed & Reviewed By K.C. Fenn Date 11/25/02

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/ml)	Wt mean Activity Uncertainty	Wt mean Activity % Uncertainty
K-40	1.000	1.45E-006	4.80E-007	33.1
CO-60	0.221	7.26E-008	2.85E-008	39.3 ✓ ok P.J.
? RA-226	0.944	1.16E-006	3.69E-007	31.9
? U-235	0.684	7.03E-008	2.24E-008	31.8

? = 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 1.96 sigma

********** U N I D E N T I F I E D P E A K S **********

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty

All peaks were identified.

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 1.96 sigma

ATTACHMENT 6.4
INITIAL REFERENCE RESPONSE TEST FORM
(example)

Instrument Model Number: Eberline RO7 (mid-range) Instrument ID: 121

Scale or Decade	Reference Reading	±20% Value of Reference Reading	Jig and Source ID Number	Geometry	Remarks
* 7R	6.8	yes	Shepard	12" w/shields A+B	cal. due 2/15/03

Performed by/Date K.C. Fons for P. Sparo 1 1-27-03 Reviewed by/Date [signature] 1 1/27/03

checked on client Shepard.

ATTACHMENT 6.3
RESPONSE TEST FORM
(example)

Instrument	Instrument ID	Pass	Fail	Performed by	Date
RO-7	121	✓		sic. for P. Szaro	11/18/02
RO-7 (w/mid range)	121	✓		[illegible]	12/5/02

[illegible], 1/27/03
Reviewed by Date

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: [illegible] Date: 10-29-02

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	SEG ID / Serial No.	119650
Instrument Serial No.	117566	4-8-03	1071	1309	0.237	Certification Date	8-9-96
Detector Model No.	43-106	Cal Due Date	Operating Conditions: ☑ Normal ☐ Abnormal ☐ Altitude ____ ft.			Nuclide	Tc-99
Detector Serial No.	133864	4-8-03	☑ Cable Length 25' ft. ☐ Temperature ____ °F			Activity in dpm	5016

SECTION 1 Reviewed By: [illegible] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data							Tolerance		Efficiency	Performed by See Note 1	
						Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR					
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
~~N/A~~ SAT	✓		10	3534	353.4	1447	1093.6	1637	1283.6	1546	1192.6	1190			0.237	R. Szaro (RS)	10/29/02 0805
~~N/A~~ Used	✓		10	2549	254.9	1539	1284.1	1532	1277.1	1476	1221.1	1261	✓		0.251	RSzaro (RS)	10/30 0730
~~N/A~~ SAT	✓		10	2878	287.8	1359	1071.2	1460	1172.2	1426	1138.2	1127.2	✓		0.225	RSzaro (RS)	10-31 0730
~~N/A~~ SAT		✓	10	2613	261.3	1357 ~~1344~~	1095.7	1475	1213.7	1446	1184.7	1164.7	✓		0.232	RSzaro (RS)	10-31 1530
N/A	✓		10	2763	276.3	1447	1170.7	1474	1197.7	1486	1209.7	1192.7	✓		0.238	RSzaro (RS)	11-1-02 0720
N/A		✓	10	~~2859~~	~~285.9~~	1371	1085.1	1513	1227.1	1445	1157.1	1157.1	✓		0.231	RSzaro (RS)	11-1-02 1450
N/A	✓		10	~~2819~~ 2859	~~281.9~~ 285.9	1421	1135.1	1503	1217.1	1460	1174.1	1175.4	✓		0.234	RSzaro (RS)	11-4-02 0813
N/A		✓	10	2519	251.9	1432	1181.1	1601	1349.1	1449	1197.1	1262.1	✓		0.248	RSzaro (RS)	11-4-02 1600

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [illegible] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	117566	4-8-03	43-1063	133864	119650

Alarm Test	Test Type		Background Data			Source Count Data – Source dpm @ 5016									1071 – 1309 Tolerance		Performed by See Note 1	
						Count Time (min)	Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Eff				
Set/ Unset	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM			Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
N/A	✓		10	2870	287	1	1519	1232	1531	1244	1521	1234	1232.7	.246	✓		R. Szaro (RS)	11-5-02 0725
N/A		✓	10	2811	281.1	1	1356	1074.9	1563	1281.9	1469 ~~1527~~ (RS)	1187.9	1181.6	.236	✓		R Szaro (RS)	11-5-02 1605
NOT USED N/A	✓		10	2779	277.9	1	1428	1150.1	1463	1185.1 ~~1463~~ (RS) 11-6	1552	1274.1	1203.1	.240	✓		R Szaro (RS)	11-6-02 0730
N/A	✓		10	3067	306.7	1	1515	1208.3	1520	1213.3	1532	1225.3	1215.6	.242	✓		R Szaro (RS)	11-7-02 0720
N/A		✓	10	3365	336.5	1	1501	1164.5	1569	1232.5	1493	1156.5	1184.5	.236	✓		R Szaro (RS)	11-7-02 1517
(Early Scan Pm.) N/A	✓		10	3186	318.6	1	1423	1114.4	1560	1241.4	1624	1305.4	1220.4	.243	✓		R Szaro (RS)	11-8-02 0717
SAT		✓	10	3167	316.7	1	1470	1153.3	1615	1298.3	1573	1256.3	1236	.246	✓		R Szaro (RS)	11-8 1547
SAT ~~NOT USED~~	✓	✓ (RS)	11-13 10	2586	258.6	1	1460	1201	1523	1264	1508	1249	1238	.247	✓		R Szaro (RS)	11-11 0735
SAT	✓		10	3045	304.5	1	1525	1221	1530	1226	1510	1206	1218	.243	✓		R Szaro (RS)	11-13 0715
SAT		✓	10	3289	328.9	1	1517	1188	1622	1293	1580	1251	1244	.248	✓		R Szaro (RS)	11-13 1645
SAT	✓		10	3092	309.2	1	1489	1180	1529	1220	1557	1248	1216	.242	✓		R Szaro (RS)	11-14 0725
SAT		✓	10	3247	324.7	1	1473	1148	1618	1293	1604	1279	1240	.247	✓		R Szaro (RS)	11-14 1655
NOT USED	✓		10	3022	302.2	1	1426	1196	1597	1295	1504	1202	1198	.259	✓		R Szaro (RS)	11-15 0800

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] **Date:** 1/27/03

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	117566	4-8-03	43-1063	133864	119650

Alarm Test	Test Type		Background Data			Source Count Data									1071-1309 Tolerance		Performed by See Note 1	
							Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)			5016				
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Count Time (min)	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Mean Net Source Count Rate MNSCR	Eff	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
	✓		10	2911	291.1	1	1505	1214	1553	1262	1459	1168	1215	.242	✓		RSzapo (RS)	11-17-02 0840
	✓		10	3263	326.3	1	1398	1072	1559	1233	1531	1205	1170	.233	✓		RSzapo (RS)	11-25 1020
		✓	10	3079	307.9	1	1412	1104	1511	1203	1520	1212	1173	.234	✓		RSzapo (RS)	11-25 1625
										A								
									N									

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [illegible] **Date:** 1/27/03

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: J. Mucia Date: 12/3/02

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	SEG ID / Serial No.	119650
Instrument Serial No.	95346	2-21-03	493	602	.11	Certification Date	8-9-96
Detector Model No.	4440	Cal Due Date	Operating Conditions: ☐ Normal ☐ Abnormal ☐ Altitude ____ ft. ☑ Cable Length 5 ft. ☐ Temperature 70 °F			Nuclide	TC-99
Detector Serial No.	125861	1-16-03				Activity in dpm	5016

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by See Note 1	
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF .109	Technician (Name Printed & Initialed)	Date/ Time
SAT	✓		10	340	34	610	576	571	537	570	536	548	✓		.110	J. MUCIA [initials]	12-3 1130
SAT		✓	10	320	32	547	515	576	544	556	524	528	✓		.105	J. MUCIA [initials]	12-3 1600

A

N

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

GAMMA DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: LC. Finn Date: 10-29-02

INSTRUMENT & DETECTOR INFORMATION			ACCEPTABLE INSTRUMENT RESPONSE RANGES			SOURCE INFORMATION	
			Geometry	Minus 20 %Net Counts	Plus 20 %Net Counts	SEG I/D No.	0 194-55
Instrument Model Number	2350-1	Cal Due Date	Position 1 @ Contact	331,354	497,030	Certificate Date	1-1-92
Instrument Serial Number	95346	2-21-03	Position 2 @ 6 Inches	38,171	57,257	Nuclide	CS-137
Detector Model Number	44-10	Cal Due Date	Position 3 @ 18 Inches	5,909	8,863	Activity in µCi	4..86
Detector Serial Number	162409	4-8-03	Operating Conditions: ☑ Normal ☐ Abnormal: ☐ Altitude ____ ft. ☐ Cable Length 6 ft. ☐ Temperature 70 °F				

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician). Prior to beginning, verify the Instrument SNs listed above.

IF the above information is incorrect, DO NOT CONTINUE.

ACTUAL INSTRUMENT RESPONSE

Alarm Test	Test Type		Count Time	Gross BKG Counts	BKG CPM	Position 1 @ Contact		Position 2 @ 6 Inches		Position 3 @ 18 Inches		Pass	Fail	Performed by See Note 1	
Sat/ Unsat	Pre	Post	(min)			Gross Counts	Net CPM	Gross Counts	Net CPM	Gross Counts	Net CPM			Technician Name Printed & Initialed	Date/ Time
SAT	✓		5	55453	11,086	425,278	414,192	58,800	47,714	18472	7386	✓		LC. Finn /RCT	10-29-02 1500
SAT	✓		5	54656	10,930	436,744	425,814	59,650	48,720	18,578	7648	✓		LC. Finn /RCT	10-30-02 0800
SAT	✓		5	54,697	10,939	414,636	403,697	57,728	46,789	18,299	7360	✓		LC. Finn /RCT	11-7-02 0725
SAT	✓		5	53,404	10,681	361,616	350,935	57,005	46,324	18,301	7620	✓		[illegible] /RCT	11/20/02 0900
SAT		✓	5	52,256	10451	324035	313574	57303	46852	18188	7737	✓		[illegible]	1/10/02 1120
N/A						389858	379401	N/A							

Remarks:

NOTE 1: By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

GAMMA DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician).

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
22501	95346	2/21/03	4410	162409	5044

Alarm Test	Test Type		Background Data			Source Count Data							Tolerance		Performed by See Note 1	
						Count Time (min)	Position 1 @ contact		Position 2 @ 6 inches		Position 3 @ 18 inches					
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
✓	✓		5	54270	10944	1	417566	406622	56858	45914	18224	7280	✓		Jacen Murcia	[illegible]
✓		✓	5	54619	10925	1	418537	407612	57450	46495	18533	7608	✓		Jacen Murcia	[illegible]
										A						
										N						

REMARKS:

NOTE 1: By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: RC. Finn Date: 10-29-02

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	SEG ID / Serial No.	119650/FD179
Instrument Serial No.	95340	1-22-03	1030.5	1259.5	0.228	Certification Date	8-9-96
Detector Model No.	43-106B	Cal Due Date	Operating Conditions: ☑ Normal ☐ Abnormal ☐ Altitude ____ ft. ☐ Cable Length 25 ft. ☐ Temperature 70 °F			Nuclide	TC-99
Detector Serial No.	133988	4-9-03				Activity in dpm	5,016

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

	Alarm Test	Test Type		Background Data			Source Count Data: Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Tolerance		Efficiency	Performed by See Note 1	
	Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
*	SAT	✓		10	3001	300	1326	1026	1522	1222	1487	1187	1145	✓		0.228	LC. Finn / RC7	10-29-02 0820
*	SAT	✓		10	3014	301	1410	1109	1479	1178	1387	1086	1124	✓		0.224	LC. Finn / RC7	10-30-02 0820
*	SAT	✓		10	2659	266	1358	1092	1434	1168	1368	1102	1121	✓		0.223	LC. Finn / RC7	10-31-02 0715
	SAT	✓		10	2770	277	1278	1001	1449	1172	1398	1121	1098	✓		0.219	LC. Finn / RC7	11-1-02 1000
	SAT		✓	10	2723	272	1364	1092	1506	1234	1414	1142	1156	✓		0.230	LC. Finn / RC7	11-1-02 1445
	SAT	✓		10	2724	272	1273	1001	1512	1240	1367	1095	1112	✓		0.222	LC. Finn / RC7	11-4-02 0910
	SAT		✓	10	2783	278	1377	1099	1411	1133	1472	1194	1142	✓		0.223	LC. Finn / RC7	11-4-02 1600
	SAT	✓		10	2763	276	1393	1117	1401	1125	1439	~~1439~~ 1163	~~1163~~ 1135	✓		0.226	LC. Finn / RC7	11-5-02 0730

REMARKS: *Pre only - instrument not used for surveying. RC7 11-5-02

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	95340	1-22-03	43-1067	133988	179650

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by See Note 1	
						Count Time (min)	Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Eff				
Set/ Unset	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM			Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT		✓	10	2908	291	1	1453	1163	1428	1137	1447	1156	1152	.230	✓		LC. Finn/SC7	11-5-02 1615
SAT	✓	✓ 11-8-02	10	2985	299	1	1539	1240	1581	1282	1501	1202	1241	.247	✓		LC. Finn/SC7	11-8-02 0905
SAT		✓	10	3011	301	1	1405	1104	1557	1256	1489	1183 ~~1108~~ SC7 11-8-02	1183	.236	✓		LC. Finn/SC7	11-8-02 1430
** SAT	✓		10	2805	281	1	1355	1074	1453	1172	1356	1075	1107	.221	✓		LC. Finn/SC7	11-13-02 ~~1445~~ 1000
SAT		✓	10	2955	296	1	1399	1103	1456	1160	1460	1164	1142	.228	✓		LC. Finn/SC7	11-13-02 1700
* SAT	✓		10	2789	279	1	1372	1083	1413	1134	1401	1122	1116	.223	✓		LC. Finn/SC7	11-17-02 0900
SAT	✓		10	2808	281	1	1346	1065	1488	1207	1435	1154	1142	.228	✓		LC. Finn/SC7	11-18-02 0730
SAT		✓	10	2730	273	1	1380	1107	1449	1176	1519	1246	1176	.235	✓		LC. Finn/SC7	11-18-02 1535
SAT	✓		10	2513	251	1	1297	1046	1485	1234	1355	1104	1128	.225	✓		LC. Finn/SC7	11-19-02 1020
SAT		✓	10	2659	266	1	1328	1062	1438	1172	1439	1173	1136	.226	✓		LC. Finn/SC7	11-19-02 1715
SAT	✓		10	2584	258	1	1346	1088	1429	1171	1339	1081	1113	.222	✓		LC. Finn/SC7	11-20-02 0230
SAT		✓	10	2535	254	1	1279	1025	1453	1199	1415	1161	1128	.225	✓		LC. Finn/SC7	11-20-02 1615
SAT	✓		10	2526	253	1	1334	1081	1501	1248	1414	1161	1163	.232	✓		LC. Finn/SC7	11-21-02 0800

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

** Chg. out P-10 Bottle SC7

* Instrument not used SC7

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	95340	1-22-03	43-106B	133988	119650

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by (See Note 1) 1-D179	
						Count Time (min)	Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Eff				
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM			Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT		✓	10	2406	241	1	1259	1018	1388	1147	1339	1098	1088	.217	✓		LC. Finn/SCF	11-21-02 1700
SAT	✓		10	2511	251	1	1274	1023	1391	1140	1336	1085	1083	.216	✓		J. Alucia/JA	11/22/02 1060
SAT		✓	10	2505	251	1	1206	955	1392	1141	1323	1072	1056	.211	✓		LC. Finn/SCF	11-22-02 1700
SAT	✓		10	2558	256	1	1290	1034	1357	1101	1293	1037	1057	.211	✓		J. Alucia	11-23-02 0800
SAT		✓	10	2478	248	1	1271	1023	1428	1180	1358	1110	1104	.220	✓		J. Alucia	11-23-02 1200
SAT	✓		10	2619	262	1	1270	1008	1411	1149	1272	1010	1056	.211	✓		LC. Finn/SCF	11-24-02 0945
SAT		✓	10	2600	266	1	1294	1028	1403	1137	1400	1134	1099	.219	✓		J. Alucia	11-24-02 1530
SAT	✓		10	2664	266	1	1247	981	1408	1142	1322	1058	1060	.211	✓		J. Alucia	11-25-02 850
SAT		✓	10	2665	267	1	1226	959	1419	1152	1337	1070	1060	.211	✓		J. Alucia	11-25-02 1650
SAT	✓		10	2657	265	1	1272	1007	1434	1169	1373	1108	1095	.218	✓		J. Alucia	12/02/02 1415
SAT		✓	10	3048	305	1	1343	1038	1493	1188	1426	1121	1116	.220	✓		J. Alucia	12/3/02 1700
SAT	✓		10	2716	272	1	1403	1131	1443	1171	1391	1119	1140	.227	✓		J. Alucia	12/4/02 1540
SAT		✓	10	3001	300	1	1366	1066	1418	1118	1413	1113	1099	.218	✓		J. Alucia	12-4-02 1730

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [illegible] **Date:** 1/27/03

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model 2350-1	Instrument Serial # 95340	Cal Due Date 1/22/03	Detector Model #43-106B	Detector Serial # 133988	Source Serial # FD179

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by See Note 1	
						Count Time (min)	Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Eff				
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM			Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT	✓		10	2797	280	1	1376	1096	1379	1099	1408	1128	1108	.22	✓		J.Mucia	12-5-02 1030
SAT		✓	10	3438	344	1	1386	1042	1435	1091	1411	1067	1067	.213	✓		J.Mucia	12-5-02 1500
SAT	✓		10	3084	308	1	1392	1084	1456	1147	1490	1182	1138	.227	✓		J.Mucia	12-6-02 1100
SAT		✓	10	3052	305	1	1374	1069	1465	1160	1416	1111	1113	.222	✓		J.Mucia	12-6-02 1515
SAT	✓		10	2993	299	1	1373	1074	1508	1209	1462	1163	1149	.229	✓		J.Mucia	12-7-02 1430
SAT		✓	10	3129	313	1	1388	1075	1462	1149	1443	1130	1118	.223	✓		J.Mucia	12-7-02 1530
											A							
										N								

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: LC. Finn Date: 12-19-02

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	SEG ID / Serial No.	FD176/119649
Instrument Serial No.	95340	1-22-03	817.4	1226.0	0.225	Certification Date	8-9-96
Detector Model No.	43-106B	Cal Due Date	Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft.			Nuclide	TC-99
Detector Serial No.	133988	4-9-03	☐ Cable Length ____ ft. ☐ Temperature 75 °F			Activity in dpm	4548

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data							Tolerance		Efficiency	Performed by See Note 1	
						Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR					
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
Sat	✓		10	2892	289	1247	958	1355	1066	1330	1041	1021.7	✓		0.225	LC. Finn/BC7	12-19-02 0800
Sat		✓	10	3097	310	1309	994	1261	951	1264	954	966.3	✓		0.210	LC. Finn/BC7	12-19-02 1600
* Sat	✓		10	2928	293	1261	968	1244	951	1193	900	939.7	✓		0.200	LC. Finn/BC7	12-20-02 0715
Sat	✓		10	3375	338	1346	1008	1315	977	1295	957	980.6	✓		0.216	LC. Finn/BC7	12-21-02 0730
Sat		✓	10	3625	363	1315	952	1296	933	1270	907	930.6	✓		0.205	LC. Finn/BC7	12-21-02 0930
										A							
										N							

REMARKS: *not used

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: SC. Fenn Date: 1-8-03

INSTRUMENT & DETECTOR INFORMATION			DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Instrument Model No.	2350-1	Cal Due Date	Minus 10%	Plus 10%	Net EFF	SEG ID / Serial No.	FS 438
Instrument Serial No.	95340	1-22-03	3613.5	4416.5	19.5	Certification Date	10-14-97
Detector Model No.	43-106A	Cal Due Date	Operating Conditions: ☐ Normal ☐ Abnormal ☐ Altitude ____ ft. ☐ Cable Length ____ ft. ☐ Temperature ____ °F			Nuclide	Th-230
Detector Serial No.	133988	4-9-03				Activity in dpm	20,580

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Alarm Test	Test Type		Background Data			Source Count Data							Tolerance		Efficiency	Performed by See Note 1	
						Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR					
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM		Pass	Fail	EFF	Technician (Name Printed & Initialed)	Date/ Time
SAT	✓		10	28	2.8	3969	3966.2	3911	3908.2	4174	4171.2	4015.2	✓		19.5	SC. Fenn / SC7	11-8-02 0840
SAT		✓	10	17	1.7	3654	3652.3	4064	4062.3	3973	3971.3	3995.3	✓		18.9	SC. Fenn / SC7	11-8-02 1400
* SAT	✓		10	26	2.6	3815	3812.4	4021	4018.4	3904	3901.4	3910.7	✓		19.0	SC. Fenn / SC7	11-17-02 0950
SAT	✓		10	27	2.7	3844	3841.3	4015	4012.3	3962	3959.3	3920.9	✓		.191	J. Mucia / [illegible]	12-2-02 1009
SAT		✓	10	29	2.9	3655	3653	3941	3939	4038	4036	3876	✓		.188	J. Mucia / [illegible]	12-2-02 1700
SAT	✓		10	11	1.1	3923	3922	3981	3980	4002	4001	3968	✓		.193	J. Mucia / [illegible]	12-3-02 0745
SAT		✓	10	39	3.9	3660	3656	4199	4195	3968	3964	3939	✓		.191	J. Mucia / [illegible]	12/3/02 1400
SAT	✓		10	20	2.0	3717	3715	3916	3914	4059	4057	3895	✓		.189	J. Mucia / [illegible]	12-4-02 0801

REMARKS: * Not Used - SC7

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

COUNT RATE DETECTOR RESPONSE TEST CONTINUATION FORM

SECTION 2 (To be completed by RP Technician)

Instrument Model	Instrument Serial #	Cal Due Date	Detector Model #	Detector Serial #	Source Serial #
2350-1	95340	1-22-03	43-106A	133988	FS438

Alarm Test	Test Type		Background Data			Source Count Data									Tolerance		Performed by See Note 1	
						Count Time (min)	Count 1 (SCR1)		Count 2 (SCR2)		Count 3 (SCR3)		Mean Net Source Count Rate MNSCR	Eff				
Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM		Gross Cnts	Net CPM	Gross Cnts	Net CPM	Gross Cnts	Net CPM			Pass	Fail	Technician (Name Printed & Initialed)	Date/ Time
SAT		✓	10	37	3.7	1	3941	3937	3960	3956	3940	3936	3843	.187	✓		J Nucia	12-4-02 1510
SAT	✓		10	33	3.3	1	3910	3907	3944	3941	3915	3912	3920	.190	✓		J. Nucia	12-5-02 1630
SAT		✓	10	34	3.4	1	3821	3817	3947	3944	3116	3713	3825	.186	✓		J. Nucia	12-5-02
SAT	✓		10	36	3.6	1	3801	3797	3999	3995	3951	3947	3913	.190	✓		J. Nucia	12-6-02 1545
SAT		✓	10	45	4.5	1	3823	3818	4105	4100	3853	3848	3922	.190	✓		J. Nucia	12-6-02 1720
SAT	✓		10	19	1.9	1	3800	3798	3915	3913	4065	4063	3925	.191	✓		J. Nucia	12-7-02 1100
SAT		✓	10	40	4.0	1	3786	3782	4091	4087	3911	3907	3925	.191			J. Nucia	12-7-02 1201
												A						
											N							

REMARKS:

NOTE: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [illegible] Date: 1/27/03

GAS FLOW PIPE DETECTOR RESPONSE FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: Date:

DETECTOR INFORMATION		DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Detector Model No.	43-98	Minus 10%	Plus 10%	Net EFF	SEG ID/Serial No.	A3401 (129669)
Detector Serial No.	123601	2688	3286	.045	Certification Date	6-1-95
Cal Due Date	4-15-03				Nuclide	TC-99
Operating Conditions:	☐ Normal ☐ Abnormal ☐ Altitude ____ ft ☐ Cable Length ____ ft ☐ Temperature ____ °F				Activity in dpm (S_{DPM})	67,066

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Instrument Information	Alarm Test	Test Type		Background Data			Source Count Data		Tolerance		Eff	Performed By See Note 1	
M2350 Serial No./Cal Due	Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Counts	Net CPM	Pass	Fail		Technician (Name Printed & Initialed)	Date/ Time
* 95340 1-22-03	SAT	✓		10 ~~2006~~ 19	2006	201 ~~200.6~~ 19	3188	2987	✓		.045	R.C. Finn	

Remarks: not used

Note: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

GAS FLOW PIPE DETECTOR RESPONSE FORM

SECTION 1 (To be completed at Initial Receipt Response Test) Technician Signature: RC. Finn Date: 12-20-02

DETECTOR INFORMATION		DETECTOR TOLERANCE VALUES		EFF	SOURCE INFORMATION	
Detector Model No.	43-94	Minus 10%	Plus 10%	Net EFF	SEG ID/Serial No.	A3402/129668
Detector Serial No.	124115	1139.4	1392.6	0.019	Certification Date	6-1-95
Cal Due Date	6-16-03				Nuclide	TC-99
Operating Conditions: ☒ Normal ☐ Abnormal ☐ Altitude ____ ft ☐ Cable Length ____ ft ☐ Temperature ____ °F					Activity in dpm (S_{DPM})	66,977

SECTION 1 Reviewed By: [signature] Date: 1/27/03

SECTION 2 (To be completed by RP Technician) Prior to beginning, verify the Instrument SNs listed above. IF the information above is incorrect, DO NOT CONTINUE.

Instrument Information	Alarm Test	Test Type		Background Data			Source Count Data		Tolerance		Eff	Performed By See Note 1	
M2350 Serial No./Cal Due	Sat/ Unsat	Pre	Post	Count Time (min)	Gross BKG Counts	BKG CPM	Gross Counts	Net CPM	Pass	Fail		Technician (Name Printed & Initialed)	Date/ Time
95340 / 1-22-03	Sat.	✓		10	1004	100	1366	1266	✓		0.019	RC. Finn/RCF	12-20-02
95340 / 1-22-03	Sat		✓	10	1028	103	1360	1257	✓		0.019	RC. Finn/RCF	12-20-02 1400

Remarks:

Note: 1. By initialing this block, the technician indicates that the instrument parameters have been checked and are verified to be correct.

SECTION 2 Reviewed By: [signature] Date: 1/27/03

ATTACHMENT 6.2
EXAMPLE DENVER INSTRUMENT MODEL XE 3000 RANGE CHECK

Model XE3000	S/N 3049	Cal Due Date: 11/24/03
Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	N A
10 g	9.9 - 10.1	
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	*
100 g	99.9 - 100.1	100.0
200 g	199.9 - 200.1	200.2
500 g	499.7 - 500.3	500.2
1 kg	999.5 - 1000.5	1000.4
1.5 kg	1499.2 - 1500.8	1500.6
2 kg	1999.0 - 2001.0	2001.0
2.5 kg	2498.7 - 2501.3	2501.2
3 kg	2998.5 - 3001.5	3001.1
Weight Set SN, calibration date, and calibration due date: 28629, 10/09/02, & 10/09/03		
Performed By: LC. Finn		Date: 12/2/02

ATTACHMENT 6.2
EXAMPLE DENVER INSTRUMENT MODEL XE 3000 RANGE CHECK

Model XE3000	S/N 3049	Cal Due Date: 11/24/03
Weight	Acceptance Range	Reading (grams)
1 g	0.9 - 1.1	
2 g	1.9 - 2.1	
5 g	4.9 - 5.1	N/A
10 g	9.9 - 10.1	
20 g	19.9 - 20.1	
50 g	49.9 - 50.1	*
100 g	99.9 - 100.1	100.0
200 g	199.9 - 200.1	200.1
500 g	499.7 - 500.3	500.3
1 kg	999.5 - 1000.5	1000.5
1.5 kg	1499.2 - 1500.8	1500.8
2 kg	1999.0 - 2001.0	2001.0
2.5 kg	2498.7 - 2501.3	2501.3
3 kg	2998.5 - 3001.5	3001.9
Weight Set SN, calibration date, and calibration due date: ~~A623646~~ 28629 ~~7/23/03~~ 10/09/02 10/09/03 10/09/03		
Performed By: [signature]		Date: 11/24/02

* check of 100g – 3Kg only. Limited-use of scale within range of 100grams to 3Kg.

ATTACHMENT 6.1
EXAMPLE DENVER INSTRUMENT BALANCE WEIGHING LOG

Date/Time	Sample Number/Description	Weight	Tech
11-24-02 / 1050	100 g Test Wgt.	100.0	PA
↓	500 g Test Wgt.	500.3	PA
11-25-02 / 0800	100 g Test Wgt.	100.1	RCF
↓	500 g Test Wgt.	500.4	RCF
12-2-02 / 0800	100 g Test Wgt	100.1	RCF
↓	500 g Test Wgt.	500.4	RCF
12-4-02 / 0730	100 g Test Wgt	100.0	RCF
↓	500 g Test Wgt	500.2	RCF
12-5-02 / 0900	100 g Test Wgt	100.1	RCF
↓	500 g Test Wgt	500.3	RCF
12-6-02 / 0610	100 g Test Wgt	100.0	RCF
↓	500 g Test Wgt	500.2	RCF
12-7-02 / 0635	100 g Test Wgt	100.0	RCF
↓	500 g Test Wgt	500.2	RCF
	A		
	N		

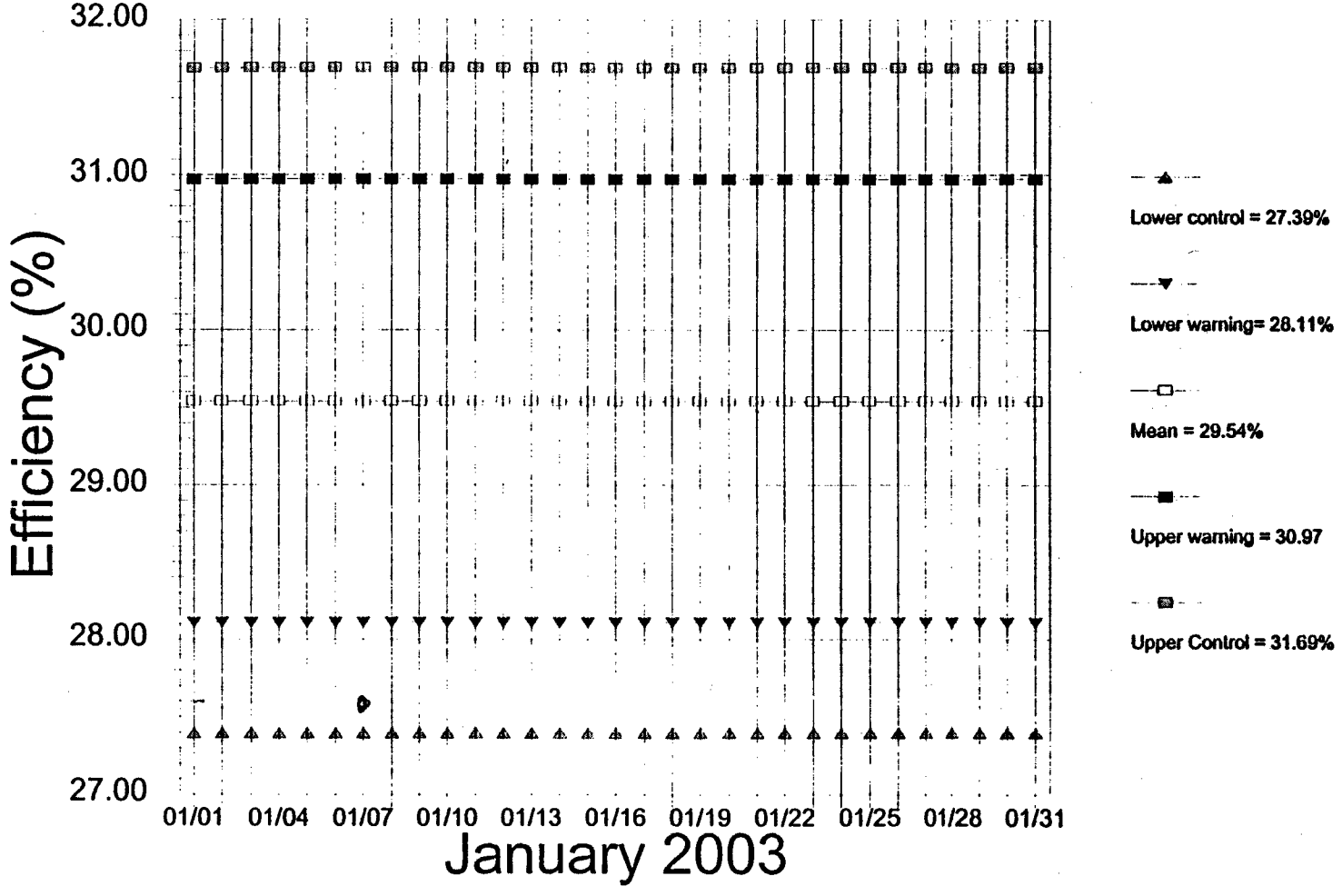
Tennelec Sample Log
Omaha VA Smear Analysis

Date/Time Counted	Sample ID	Quantity	Batch Key	Analyzed by
12/3/02 1058	B0001 03 W01	24	6471	DPS
12/3/02 1108	B0001 03 W02	7	6472	DPS
12/3/02 1122	B0001 03 W03	10	6473	DPS
12/3/02 1131	B0001 03 W04	6	6474	DPS
12/3/02 1148	B0001 03 F01	12	6475	DPS
12/3/02 1239	B0001 03 S01	13	6478	DPS
12/3/02 1334	A0003 02 W01	10	6489	DPS
12/3/02 1400	A0003 02 W02	7	6494	DPS
12/3/02 1410	A0003 02 W03	7	6495	DPS
12/3/02 1423	A0003 02 W04	9	6496	DPS
12/3/02 1457	A0003 02 F01	24	6497	DPS
12/3/02 1504	A0003 02 S01	5	6505	DPS
12/3/02 1511	A0003 02 S02	5	6506	DPS
12/3/02 1526	A0003 01 W01	8	6507	DPS
12/3/02 1532	A0003 01 W02	4	6508	DPS
12/3/02 1543	A0003 01 W03	8	6509	DPS
12/3/02 1549	A0003 01 W01	4	6510	DPS
12/3/02 1600	A0003 01 F01	8	6511	DPS
12/3/02 1620	B0001 01 F01	12	6513	DPS
12/3/02 1700	B0001 01 F01	26	6515	DPS
12/3/02 1720	B0001 01 W01	14	6516	DPS
12/3/02 1725	B0001 01 W02	4	6517	DPS
12/3/02 1808	B0001 01 W03	30	6518	DPS
12/3/02 1833	B0001 01 W04	18	6519	DPS
12/4/02 0913	A0001 01 F01	34	6527	DPS
12/4/02 0935	A0001 01 W01	15	6535	DPS
12/4/02 0955	A0001 01 W02	14	6536	DPS
12/4/02 1009	A0001 01 W03	10	6538	DPS
12/4/02 1036	A0001 01 W04	19	6540	DPS
12/4/02 1043	A0001 01 S01	5	6541	DPS
12/4/02 1057	A0001 01 S02	10	6542	DPS
12/4/02 1104	A0001 01 S03	5	6543	DPS
12/4/02 1147	N0001 01 FE1	30	6537	DPS
12/4/02 1230	N0001 01 WE1	30	6539	DPS
12/4/02 1233	B0001 03 S01	2	6547	DPS
12/4/02 1256	B0001 02 F01	16	6544	DPS

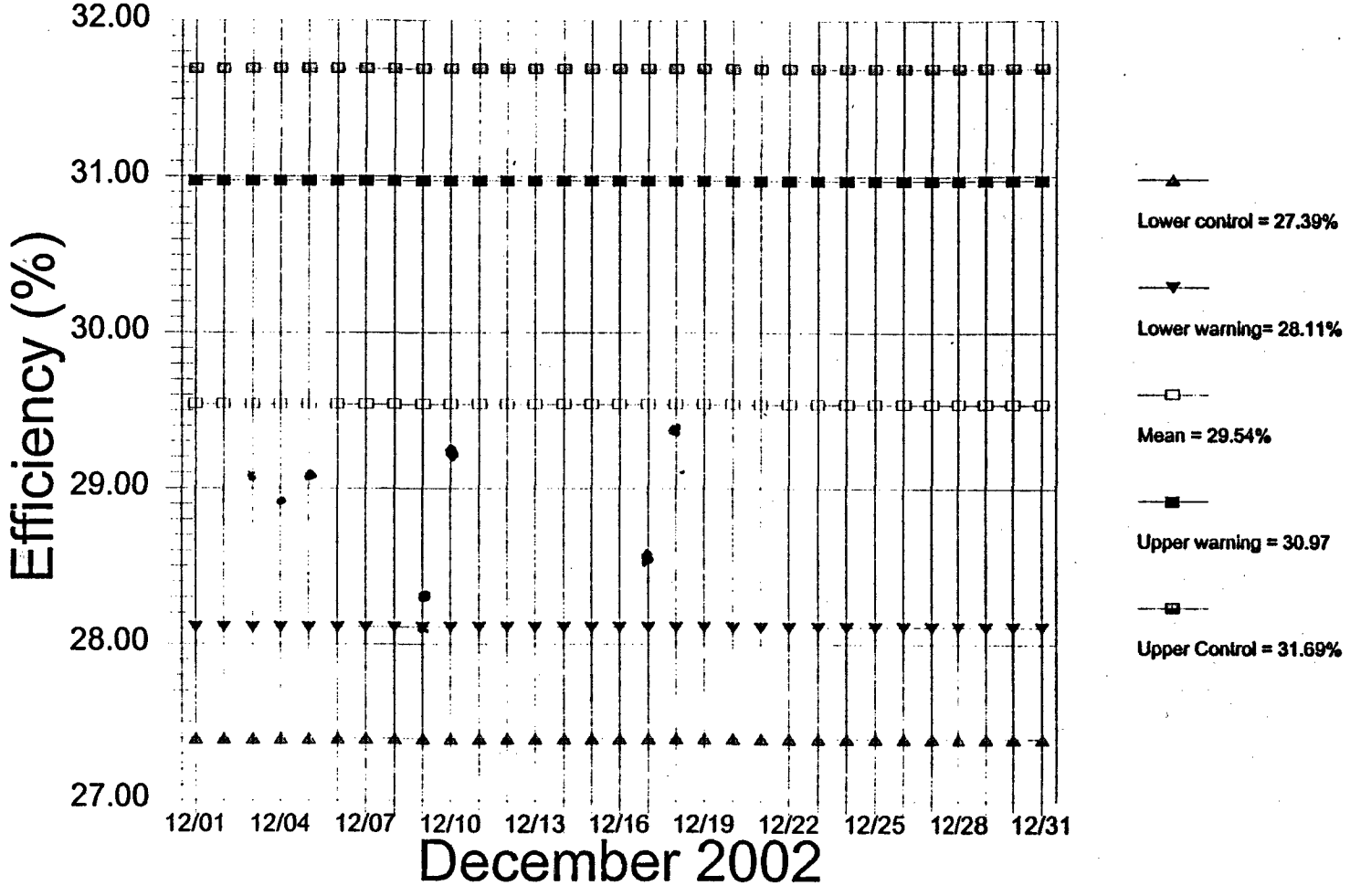
Tennelec Sample Log
Omaha VA Smear Analysis

Date/Time Counted	Sample ID	Quantity	Batch Key	Analyzed by
12/4/02 1310	B0001 02 W01	10	6545	DCS
12/4/02 1341	B0001 02 W01	22	6546	DCS
12/4/02 1551	A0002 01 F01	91	6548	DCS
12/4/02 1615	A0002 01 W01	17	6549	DCS
12/4/02 1649	A0002 01 W02	24	6550	DCS
12/4/02 1720	A0002 01 W03	22	6551	DCS
12/4/02 1757	A0002 01 W04	26	6552	DCS
12/4/02 1804	A0002 01 S01	5	6553	DCS
12/4/02 1812	A0002 01 S02	5	6554	DCS
12/4/02 1826	A0002 01 S03	10	6555	DCS
12/9/02 1107	A0004 02 F01	13	6571	DCS
12/9/02 1121	A0004 02 W01	10	6572	DCS
12/9/02 1130	A0004 02 W02	6	6573	DCS
12/9/02 1144	A0004 02 W03	10	6574	DCS
12/9/02 1150	A0004 02 W04	4	6575	DCS
12/9/02 1157	A0004 02 S01	5	6576	DCS
12/9/02 1204	A0004 02 S02	5	6577	DCS
12/9/02 1218	A0004 02 S03	10	6578	DCS
12/9/02 1236	A0004 01 F01	12	6579	DCS
12/9/02 1247	A0004 01 W01	8	6580	DCS
12/9/02 1256	A0004 01 W02	6	6581	DCS
12/9/02 1304	A0004 01 W03	6	6582	DCS
12/9/02 1307	A0004 01 W04	2	6583	DCS
12/9/02 1351	A0002 01 S04	31	6584	DCS
12/9/02 1428	AUN0002 01 FE2	15	6585	DCS
12/9/02 1439	A0005 01 V01	8	6566	DCS
12/9/02 1451	A0005 01 V02	8	6587	DCS
12/9/02 1505	A0002 01 T01	10	6588	DCS
12/10/02 0900	A0002 01 T02	10	6594	DCS
12/10/02 1015	C0001 01 OH1	36	6595	DCS
12/10/02 1029	D0001 01 P01	10	6596	DCS
12/10/02 1100	D0001 01 D01	10	6598	DCS
12/17/02 1155	B0001 01 F01	12	6617	DCS
12/18/02	B0001 01 F01	12	6638	DCS

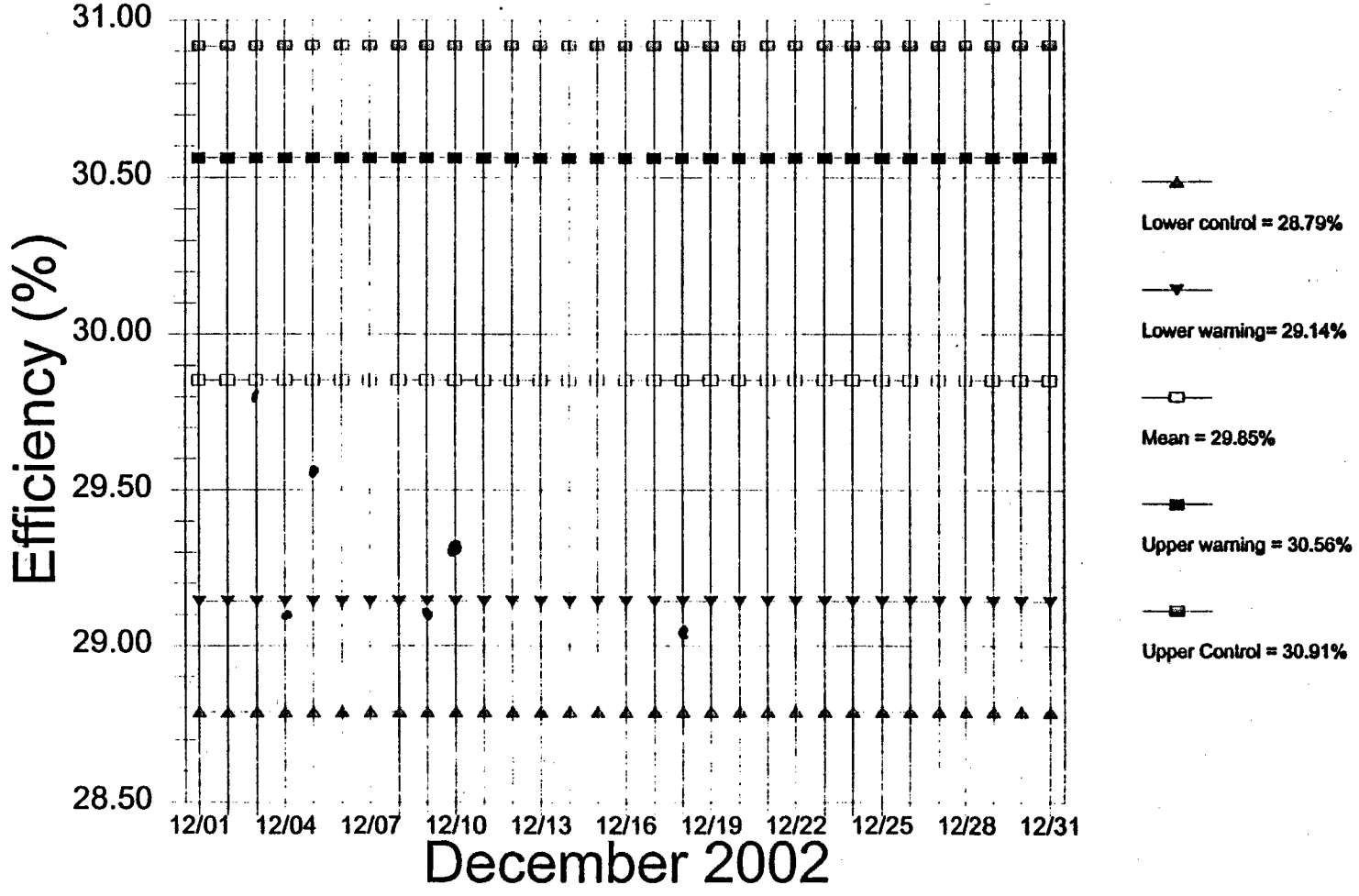
Tennelec (15632) Control Chart
Th-230 SN 119739



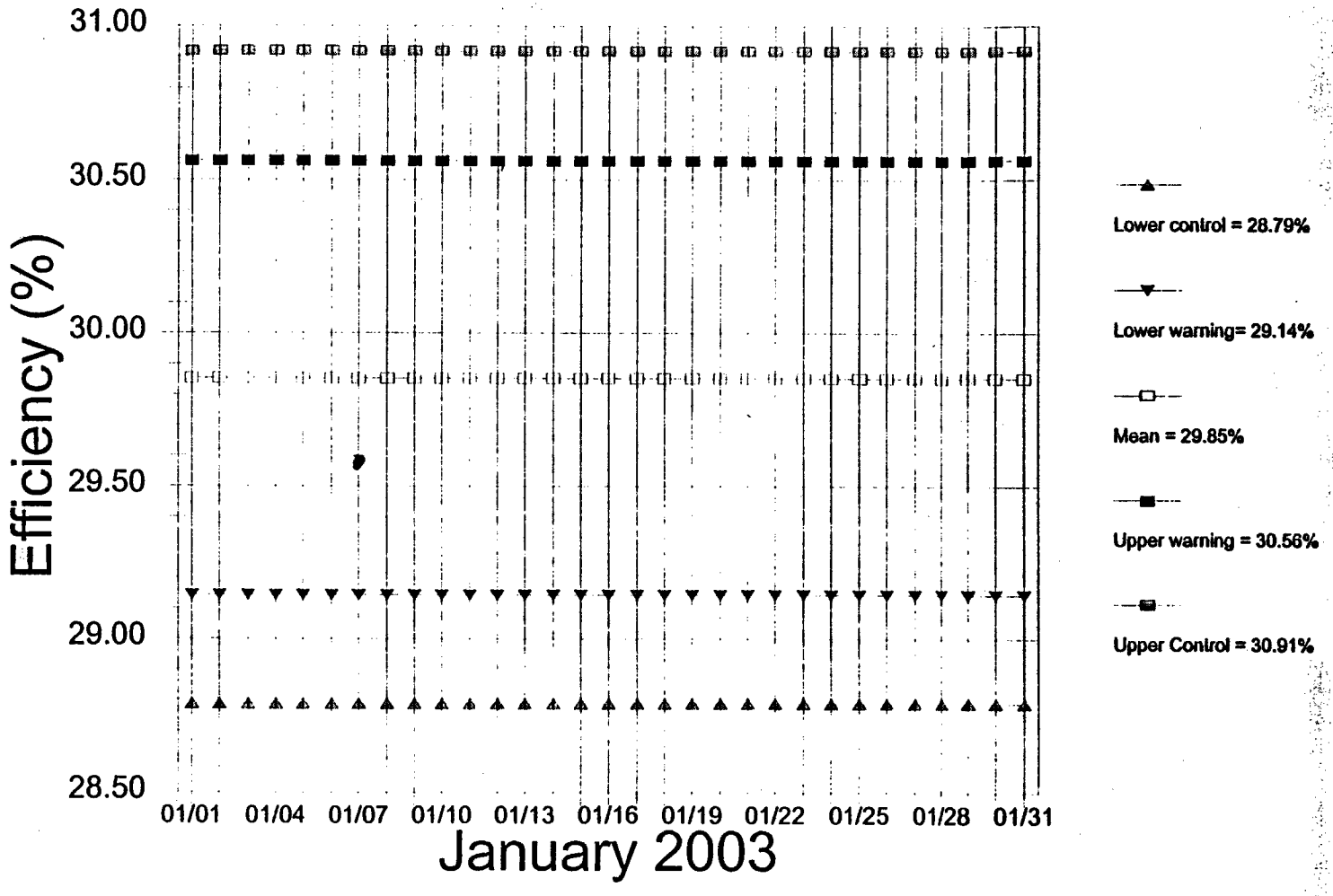
Tennelec (15632) Control Chart
Th-230 SN 119739



Tennelec (15632) Control Chart
Tc-99 SN 119715



Tennelec (15632) Control Chart
Tc-99 SN 119715



Packard Tri-Carb 2550

SN 401663

Duratek, Maxey Flats Disposal Site

Type of Count: Tritium (3ml / 12ml geometry)

Source Control SEG # 029709.01 Month of December 2002

DAY OF MONTH	H3 CPM	H3 EFF	BKG CPM	INITIALS	FILE NAME SDATA1.xxx	COMMENTS
3	12519.40	0.422	18.85	TP	0.134	
4	12646.50	0.427	16.49	TP/KS	0.135	
5	12457.90	0.420	17.26	KS	0.136	
6	12451.70	0.420	17.01	TP	0.137	
7	12541.80	0.423	16.97	KS	0.138	
8	12513.40	0.423	16.72	KS	0.139	
9	12380.80	0.418	18.18	KS	0.140	
10	12398.90	0.419	17.03	KS	0.141	
11	12351.50	0.417	17.31	KS	0.142	
12	12308.00	0.416	16.08	KS	0.143	
13	12316.20	0.416	17.09	KS	0.144	
16	12605.20	0.426	17.81	TP	0.145	
17	12542.60	0.424	16.65	KS	0.146	
18	12591.40	0.426	15.95	KS	0.147	
19	12592.00	0.426	16.70	KS	0.148	
20	12582.70	0.426	17.1.	KS	0.149	
21	12535.40	0.424	15.98	KS	0.15	
22	12430.00	0.421	17.07	KS	0.152	
23	12427.10	0.421	16.82	KS	0.153	
27	12351.20	0.418	16.66	TP/KS	0.154	
28	12363.50	0.419	16.76	TP	0.155	
29	12390.20	0.42	16.94	KS	0.156	
30	12345.50	0.418	16.75	KS	0.157	
			N/A			

Comments:

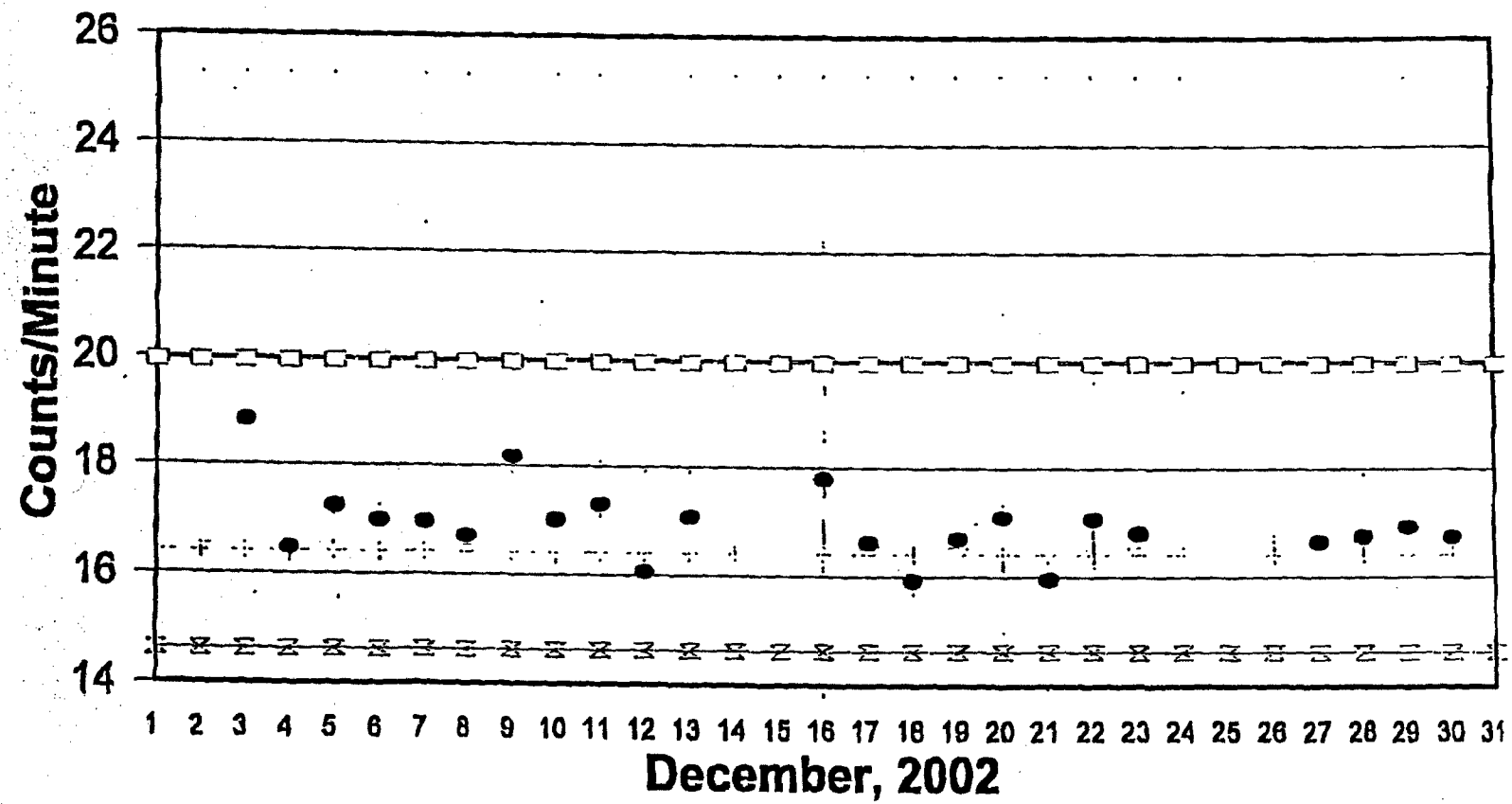
Reviewed by Tracy Proctor Date 1-2-03

1-3-03

K.6.3

TRI-CARB 2550 #401663 BACKGROUND

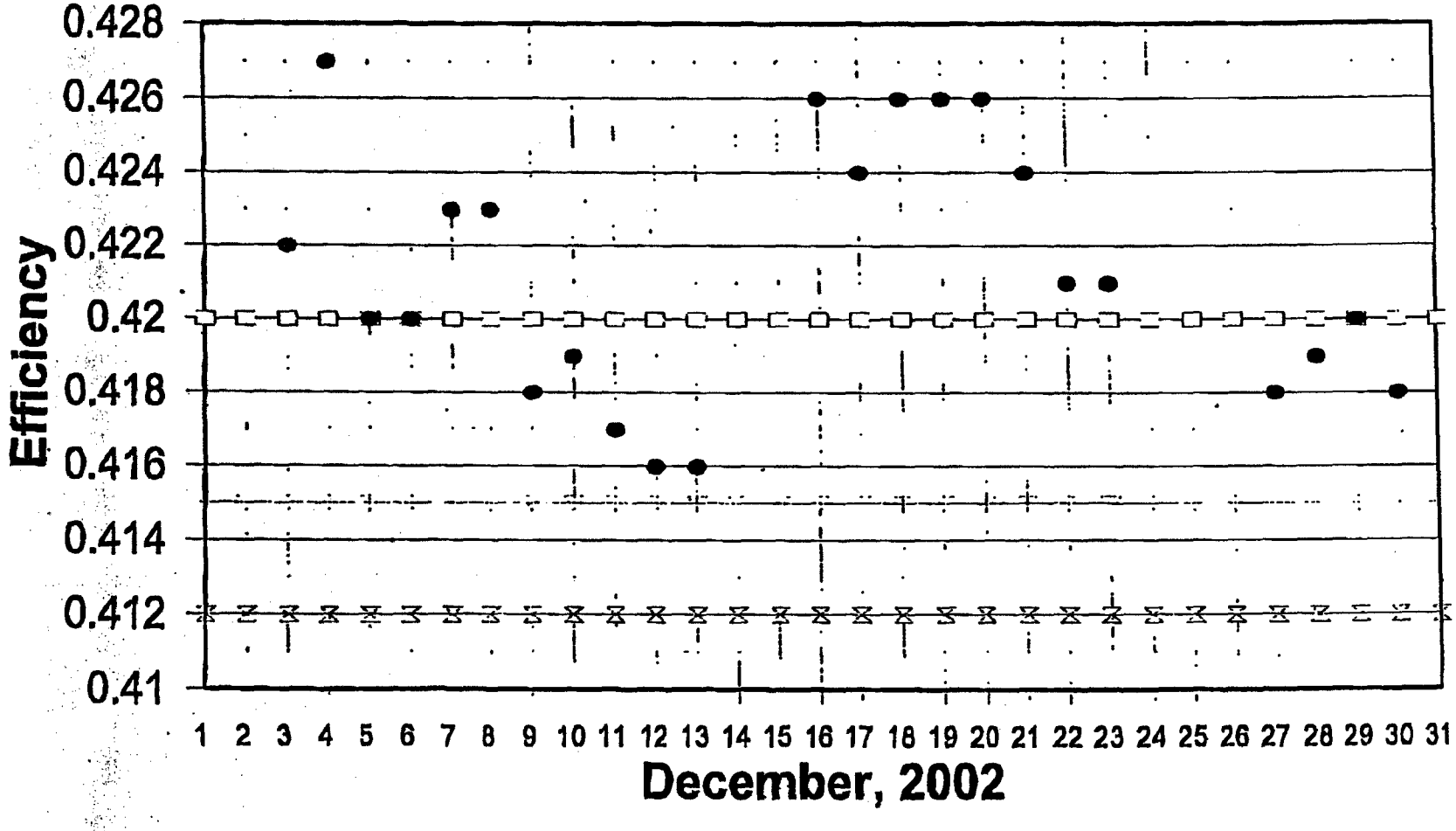
3 ml Water to 12 ml Ultima Gold LLT



-3 Sigma (14.63) | -2 Sigma (16.41) | Mean (19.96) | +2 Sigma (23.52) | +3 Sigma (25.29)

TRI-CARB 2550 #401663 H3 EFFICIENCY

3 ml Water to 12 ml Ultima Gold LLT



-3 Sigma (0.412) -2 Sigma (0.415) Mean (0.420) +2 Sigma (0.424) +3 Sigma (0.427)

ATTACHMENT 6.3
RESPONSE TEST FORM
(example)

Instrument	Instrument ID	Pass	Fail	Performed by	Date
Lud 177	26337	✓	—	RSzaro	11-6-02
Lud 177	26337	✓		RSz	11-7-02
Lud 177	26337	✓		RSzaro	11-8-02
Lud 177	26337	✓		RSza	11-11-02
Lud 177	26337	✓		RSz	11-12-02
Lud 177	26337	✓		RSzaro (RD)	11-13-02
Lud 177	26337	✓		RSzaro (RD)	11-14-02/0655
Lud 177	26337	✓		RSzaro (RD)	11-15-02/0740
Lud 177	26337	✓		RSzaro (RD)	11-17-02/0800
Lud 177	26337	✓		RSzaro (RD)	11-18-02/0700
Lud 177	26337	✓		RSzaro (RD)	11-19-02/0719
Lud 177	26337	✓		RSzaro (RD)	11-20-02/0700
Lud 177	26337	✓		RSzaro (RD)	11-22-02/0700
Lud 177	26337	✓		SC. Finn	11-23-02/0700
Lud 177	26337	✓		SC. Finn	11-24-02/0700
Lud 177	26337	✓		SC. Finn	11-25-02/0700
Lud 177	26337	✓		SC. Finn	11/26-02/0700
Lud 177	26337	✓		SC. Finn	12/2/02-0700
Lud 177	26337 SC7 12/3/02	✓		SC. Finn	12/3/02-0700
Lud 177	26337	✓		SC. Finn	12/4/02-0700
Lud 177	26337	✓		SC. Finn	12/5/02-0700
Lud 177	26337	✓		SC. Finn	12/6/02-0600
Lud 177	26337	✓		SC. Finn	12/7/02 @ 0630

[signature] , 1/27/03
Reviewed by Date

ATTACHMENT 6.4
INITIAL REFERENCE RESPONSE TEST FORM
(example)

Instrument Model Number: Model 177 Instrument ID: S/N 26337

Scale or Decade	Reference Reading	±20% Value of Reference Reading	Jig and Source ID Number	Geometry	Remarks
x1	> 500 cpm	N/A	Source Id- 119650	@Contact	BKG @ 30 to 70cpm
x10	900 cpm	720cpm / 1080cpm	↓ ↓	@Contact	Alarm Set Pt. @ ≈170 cpm

Performed by/Date _____ / _____ Reviewed by/Date _____ / 1/27/03

Duratek

CALIBRATION CERTIFICATE

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 177	Serial Number: 26337
Contact Name: Thomas Scott		Probe: 44-9	Serial Number: 016220
Customer Purchase Order Number: N/A	Work Order Number: 2002-00893	Calibration Method: Electronic and Source	

INSTRUMENT CALIBRATION INFORMATION

Instrument Range	Calibration Standard Value	Instrument Response		Comments	
		Before Calibration	After Calibration	Calibrated in accordance with RP-INS-I-235	
X 1	100	100	100	Pulser: 120935	Cal Due: 03/18/03
X 1	250	250	250	D-814: 2551	Cal Due: 09/12/02
X 1	400	400	400	Psychron: 7480	Cal Due: 05/17/03
X 10	1,000	1,000	1,000		
X 10	2,500	2,500	2,500		
X 10	4,000	4,000	4,000	Temp: 21.4°C	
X 100	10,000	10,000	10,000	Pressure: 745mmHg	
X 100	25,000	25,000	25,000	Humidity: 56%	
X 100	40,000	40,000	40,000	Background: 60cpm	
X 1000	100,000	100,000	100,000	Threshold: 37mV	
X 1000	250,000	250,000	250,000	HV (As found = 903V) (As left = 903V)	
X 1000	400,000	400,000	400,000	BAT: SAT	Volume: SAT
Efficiency Information				Audio: SAT	Geotropism: SAT
X 1 EFF	Tc-99#119720	2,562dpm	11.7%	F/S Resp: SAT	Alarm: SAT
X 10 EFF	Tc-99#119718	20,520dpm	11.5%	HV Test: SAT	
X 100 EFF	Tc-99#099606	177,000dpm	11.3%	Limited Use: X1K scale for information only. Use with 44-9 probe.	
AVG EFF	N/A	N/A	11.5%		

STATEMENT OF CERTIFICATION

We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).

Instrument Calibrated By: Anthony Lyons	Reviewed By: Thomas G. Scott	Date: 7-29-02
Calibration Date: 07/24/02	Calibration Due: 01/24/03	

Chain of Custody Record

№ 1379

Eberline Services
601 Scarboro Road
Oak Ridge, TN 37830
(865) 481-0683 Phone • (865) 483-4621 Fax

EBERLINE SERVICES

Project Name: Veterans Affairs Med Center	Project Number: 106760.0030
Send Report To: Paul Jones	Sampler (Print Name): Paul Jones
Address: 628 Gallaher Rd.	Sampler (Print Name):
Kingston, TN 37763	Shipment Method: Fed Ex
	Airbill Number: 83754 7956730
Phone: (865) 376-8276	Laboratory Receiving: Eberline Oak Ridge
Fax: (865) 376-6247	

Page 1 of 1

Purchase Order #: 15255

Analysis Requested: 10CFR61 per quote #2002

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
VA-02-0176	11-25-02	1200	Resin	1	14 day turnaround.	

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Paul A. Jones			
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level	Turnaround	Sample Receipt	
		Total # Containers Received?	
Level I ☐	Routine ☐	COC Seals Present?	
Level II ☐	24 Hour ☐	COC Seals Intact?	
Level III ☐	1 Week ☐	Received Containers Intact?	
Other ☐	Other _____	Temperature?	

11/26/02 TUE 10:37 FAX 423 483 4621 TNS LAB OAK RIDGE 002

C.O.C. # VA-001

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn **for:** Duratek (Omaha VA)

Site Contact:	Address:
Phone:	

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-34	A000101F01	11-18-02	1400	Bag #1
35-49	A000101W01	11-18-02	1400	Bag #2
50-63	A000101W02	11-18-02	1400	
64-73	A000101W03	11-18-02	1400	
74-92	A000101W04	11-18-02	1400	
1-~~20~~ 5 807 11/25/02	A000101S01	11-18-02	1400	Bag #3
6-15	A000101S02	11-18-02	1400	
16-20	A000101S03	11-18-02	1400	

A
N

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by Linda C. Finn	11-18-02/1400	Relinquished by Jec. Finn	11-26-02/1100
Accepted by E. Langille	11/27/02/10:00	Relinquished by E. Langille	11-27-02 10:30
Accepted by D. Schumann	11-27-02 10:30	Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

A
N
A

C.O.C. # YA-002

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn for: Duratek (Omaha - YA)

Site Contact:	Address:
Phone:	

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-91	A000201F01	11-21-02	1400	Bag #1
1-17	A000201W01	11-21-02	1500	Bag #2
18-41	A000201W02	11-21-02	1500	
42-63	A000201W03	11-21-02	1500	
64-89	A000201W04	11-21-02	1500	
1-5	A000201S01	11-21-02	1530	Bag #3
6-10	A000201S02	11-21-02	1530	
11-20	A000201S03	11-21-02	1530	
		A		
		N		

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by L. Finn	11-21-02/1530	Relinquished by L. Finn	11-26-02/1100
Accepted by E. Hanzlik	11/27/02 1010	Relinquished by E. Hanzlik	11-27-02 10:20
Accepted by D. Schumacher	11/27/02 1020	Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

C.O.C. #VA003

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: P.SZARO for: Duratek (Omaha Va)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-30	N0002,01FE1	11-21-02	1630	Bag #1
1-30	N0002,01WE1	11-21-02	1630	Bag #2

N A

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by P.SZARO	11-21-02/1630	Relinquished by [illegible]	11-26-02/1100
Accepted by E. Langitt	11-27-02/16:00	Relinquished by E. Langitt	11-27-02 1000
Accepted by D. Schweiser	11/27/02 1020	Relinquished by	
Accepted by N A		Relinquished by N A	
Accepted by N		Relinquished by	

C.O.C. # YA-004

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: P. SZARO for: Duratek (Omaha Va)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-38	B000101F01	11-25-02	0807	Bag #1
1-14	B000101W01	11-25-02	0830	Bag #2
15-18	B000101W02	11-25-02	0830	
19-48	B000101W03	11-25-02	0830	
49-66	B000101W04	11-25-02	0830	

A
N

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by P. SZARO	11-25-02/0830	Relinquished by LC. Fenn	11-26-02/1100
Accepted by E. Langille	11-27-02 10:00	Relinquished by E. Langille	11-27-02 10:20
Accepted by D. Schumacher	11/27/02 1020	Relinquished by	
Accepted by A		Relinquished by B	
Accepted by N		Relinquished by	

C.O.C. # YA-005

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: P. SZARO for: Duratek (Omaha VA.)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-16	B000102 F01	11-25-02	0840	Bag. 1
17-26	B000102 W01	11-25-02	0847	Bag. 2
27-48	B000102 W01	11-25-02	0847	〃
		A		
		N		

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by P. SZARO	11-25-02/0847	Relinquished by R. Fenn	11-26-02/1100
Accepted by E. Langille	11-27-02 10:00	Relinquished by E. Langille	11-27-02 10:20
Accepted by D. Schumacher	11/27/02 1020	Relinquished by	
Accepted by N/A		Relinquished by N/A	
Accepted by		Relinquished by	

C.O.C. #VA-006

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: J.L. MUCIA for: DURATEK (OMAHA VA)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-24	B000103 W01	11-26-02	0900	Bag #1
25-31	B000103 W02	11-26-02	0900	
32-41	B000103 W03	11-26-02	0900	
42-47	B000103 W04	11-26-02	0900	
48-59	B000103 F01	11-26-02	0900	Bag #2
60-74	B000103 S01	11-26-02	0900	Bag #3

A
N

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by [signature]	11/26/02 0900	Relinquished by [signature]	11/26/02 1100
Accepted by [signature]	11/27/02 10:00	Relinquished by [signature]	11-27-02-10.30
Accepted by [signature]	11-27-02 10:30	Relinquished by	EAK 11/27
Accepted by [signature]	11/22/02 1020	Relinquished by	
Accepted by	N/A	Relinquished by N/A	

C.O.C. # VA-007

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: J.L. Mucia for: Duratek (Omaha - V.A.)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-10	A0003 02 W01	11-26-02	1000	Bag #1
11-17	A0003 02 W02	11-26-02	1000	
18-24	A0003 02 W03	11-26-02	1000	
25-33	A0003 02 W04	11-26-02	1000	
34-57	A0003 02 F01	11-26-02	1000	Bag #2
58-62	A0003 02 S01	11-26-02	1000	Bag #3
63-67	A0003 02 S02	11-26-02	1000	

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by: [signature]	11/26/02 1000	Relinquished by: [signature]	11/26/02 1120
Accepted by: E. Langille	11/27/02 10:00	Relinquished by: E. Langille	11/27/02 10:30
Accepted by: D. Schomke	11/27/02 1020	Relinquished by:	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

C.O.C. VA-008

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: J.L. Mucia for: Duratek (Omaha V.A.)

Site Contact:

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-8	A0003 01W01	11-26-02	1030	Bag#1 of 1
9-12	A0003 01W02	11-26-02	1030	
13-20	A0003 01W03	11-26-02	1030	
21-24	A0003 01W04	11-26-02	1030	
25-32	A0003 01F01	11-26-02	1030	

A
N

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by J.L. Mucia	11/26/02 1030	Relinquished by J.L. Mucia	11/26/02 1120
Accepted by E. Langello	11/27/02 10:00	Relinquished by E. Langello	11/27/02 10:30
Accepted by D. Schumacher	11/27/02 1020	Relinquished by	
Accepted by		Relinquished by N/A	
Accepted by N/A		Relinquished by	

C.O.C # VA-009

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda Finn for: Duratech - Omaha VA

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-15	N0002 01FE2	12-3-02	1545	Bag #1

N/A

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by LC. Finn	12-3-02/1545	Relinquished by LC. Finn	12-06-02/1600
Accepted by D. Schumacher	12/4/02 1000	Relinquished by	
Accepted by		Relinquished by	
Accepted by N/A		Relinquished by N/A	
Accepted by		Relinquished by	

C.O.C. #-YA-015

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Lindalini for: Omaha, VA.

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-64	A000401P01-01P64	12-21-02	1000	

A
N

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by RC. Lini	12-21-02/1400	Relinquished by RC. Lini	12-21-02/1500
Accepted by [illegible]	12/6/02 0800	Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

A
N
K
N

C.O.C. # YA-010

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn **for:** Omaha, YA. (QUATEK)

Site Contact: Paul Jones

Address: ~~Omaha, YA.~~ 12-6-02

Phone:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-3	A000101F01	12-3-02	1600	
4-5	W01			
6-7	W02			
8-	W03			
9-10	W04			
11	S01			
12	S02			
13	S03			

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by B.C. Finn	12-3 / 1600	Relinquished by B.C. Finn	12-5 / 1600
Accepted by [illegible]	12/7 1530	Relinquished by [illegible]	12/11 0730
Accepted by Tracy Proctor	12/10 0740	Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

C.O.C. # YA-011

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn for: Omaha, YA. DuraTek

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-9	A000201F01	12-3-02	1500	
10-11	W01			
12-13	W02			
14-15	W03			
16-18	W04			
19	S01			
20	S02			
21	S03			
22-23	T01			
24-25	T02			
1-3	A000201S04	12-3-02	1500	

N A

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by LC. Finn	12-3 / 1500	Relinquished by LC. Finn	12-5 / 1600
Accepted by [illegible]	12/7 1530	Relinquished by [illegible]	12/10 0730
Accepted by Stacy Proctor	12/10 0740	Relinquished by	
Accepted by		Relinquished by	
Accepted by		Relinquished by	

N A

C.O.C. # VA-012

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn for: Omaha - VA (Duratek)

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-4	B000101F01	12-5-02	1600	
5-6	01W01			
7-10	01W03			
11	01W04			
12-13	B000102F01			
14-16	02W01			
17	B000103F01			
18	03W01			
19-20	03W02			
21	03W03			
22	03W04			
		A		
		N	E	

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by LC Finn	12-5/1600	Relinquished by LC Finn	12-5/1630
Accepted by Rick Shuma	12/7 1530	Relinquished by Rick Shuma	12/10 0730
Accepted by Tracy Proctor	12/10 0740	Relinquished by	
Accepted by A		Relinquished by A	
Accepted by N		Relinquished by N	

C.O.C.# VA-013

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Linda C. Finn for: Omaha - VA. (Duratek)

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-	A0003 01F01	12-5-02	1300	
2	W01			
3	W02			
4	W03			
5	W04			
6-8	A0003 02F01			
9-	02W01			
10	02W02			
11	02W03			
12	02W04			
13	02S01			
14	02S02			
15	02S03			
16	02S04			
17	02S05			

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by L.C. Finn	12-5 / 1300	Relinquished by L.C. Finn	12-5 / 1600
Accepted by [illegible]	12/7 1530	Relinquished by [illegible]	12/10 0730
Accepted by Tracy Proctor	12/10 0740	Relinquished by	
Accepted by N/A		Relinquished by N/A	
Accepted by		Relinquished by	

C.O.C. # VA-014

ATTACHMENT 6.1
CHAIN OF CUSTODY RECORD
(example)

Collected by: Lynda C. Finn for: Omaha - VA (Derutek)

Site Contact: Paul Jones

Phone:

Address:

Sample Number	Sample Location	Collection Date	Collection Time	Remarks
1-2	A0004 02F01	12-6-02	1430	
3	02W01			
4	02W02			
5	02W03			
6	02W04			
7	02S01			
8	02S02			
9	02S03			
1-2	A0004 01F01			
3	01W01			
4	01W02			
5	01W03			
6	01-W04			
1-6	C0001 010H01			
		N/A		

CUSTODY LOG

Name	Date/Time	Name	Date/Time
Collected by LC Finn	12-6/1430	Relinquished by LC Finn	12-6/1500
Accepted by [illegible]	12/6 1530	Relinquished by [illegible]	12/10 0730
Accepted by Tracy Proctor	12/10 0740	Relinquished by	
Accepted by N/A		Relinquished by N/A	
Accepted by N/A		Relinquished by	