NES Document No. 82A8373 Rev. 0

RADIOLOGICAL SUBSURFACE SAMPLING

REPORT FOR

CABOT PERFORMANCE MATERIALS

REVERE, PENNSYLVANIA

August 1994

K. Craig

Prepared and Submitted by:
Integrated Environmental Services
a Division of NES, Inc.
44 Shelter Rock Road
Danbury, CT 06810

B11

Table of Contents

1.0 Executive Summary 1

2.0 Description of Facility 1

3.0 Release Criteria 3

4.0 Characterization Survey Techniques 3
- 4.1 Survey Instrumentation 4
- 4.2 Background 4
- 4.3 MDAs 5

5.0 Survey Results 5
- 5.1 Container Storage Area 5
- 5.2 Parking Area 6
- 5.3 Building 4&5 Area 7
- 5.4 Warehouse/Loading Dock Area 8
- 5.5 Old Pit Area 9
- 5.6 Slag Tests 10

6.0 References 11

Appendix A Cabot Site Maps . . . . . A

Appendix B Calibration Sheets . . . . . B

Appendix C MDA Calculations C

Appendix D Survey Data . . . . . D

List of Figures

Figure 1 Cabot Performance Materials, Revere, PA 2
Figure 2 Container Storage Area A-1
Figure 3 Parking Area A-2
Figure 4 Building 4 & 5 Area A-3
Figure 5 Warehouse/Loading Dock Area A-4
Figure 6 Old Pit Area A-5

1.0 Executive Summary

NES, Inc./Integrated Environmental Services (NES/IES) performed subsurface soil sampling at the Cabot Performance Materials Plant in Revere, PA from July 25 through August 5, 1994. The survey was performed to confirm Ensearch Environmental's findings from their November/December 1993 characterization and to determine the extent of the contamination below the surface. Through trench and pit diggings and sampling it has been determined that there is a significant amount of slag remaining on site, individual pieces of which, are above the NRC release criteria. It has been determined that the radioactivity is limited to the slag and that no detectable contamination has leached into the soil or the surrounding water flowing through the Revere site.

2.0 Description of Facility

Cabot Corporation's Revere Plant used a thermite reduction process with powdered aluminum which produced a final product of columbium-tantalum alloy containing less than 0.01% of uranium and thorium, and a waste slag containing 0.14% of the source materials. The slag was stored on-site in the Old Pit and Drum Storage Areas and later transferred to the company's site in Boyertown, Pennsylvania, for longer-term storage. Apart from the storage areas, the slag was handled at other specific locations on the Revere site. It was in these following areas that subsurface sampling was performed:

- Container Storage Area
- Sand Blast Building's former Parking Area
- Warehouse/Loading Dock Area
- Building 4 & 5 Storage Area
- Old Pit Area

Figure 1 shows the above five areas and their location at the Revere site.

The Cabot Corporation's Revere Plant is located in Revere, PA, 3 ½ miles south of the Delaware River. The site is located in the Newark Basin which is a lowland extending from New Jersey southwest into Pennsylvania with Triassic-age sedimentary rocks forming the majority of the sequence. Elevations range from 420-520 feet above sea level. The Delaware River is the only major surficial water body near the site, although Lake Warren is located 2 miles due north. The Rapp Creek which flows south through the site originates from Lake Warren. The property slopes gently to moderately in a northwesterly direction toward Rapp Creek.

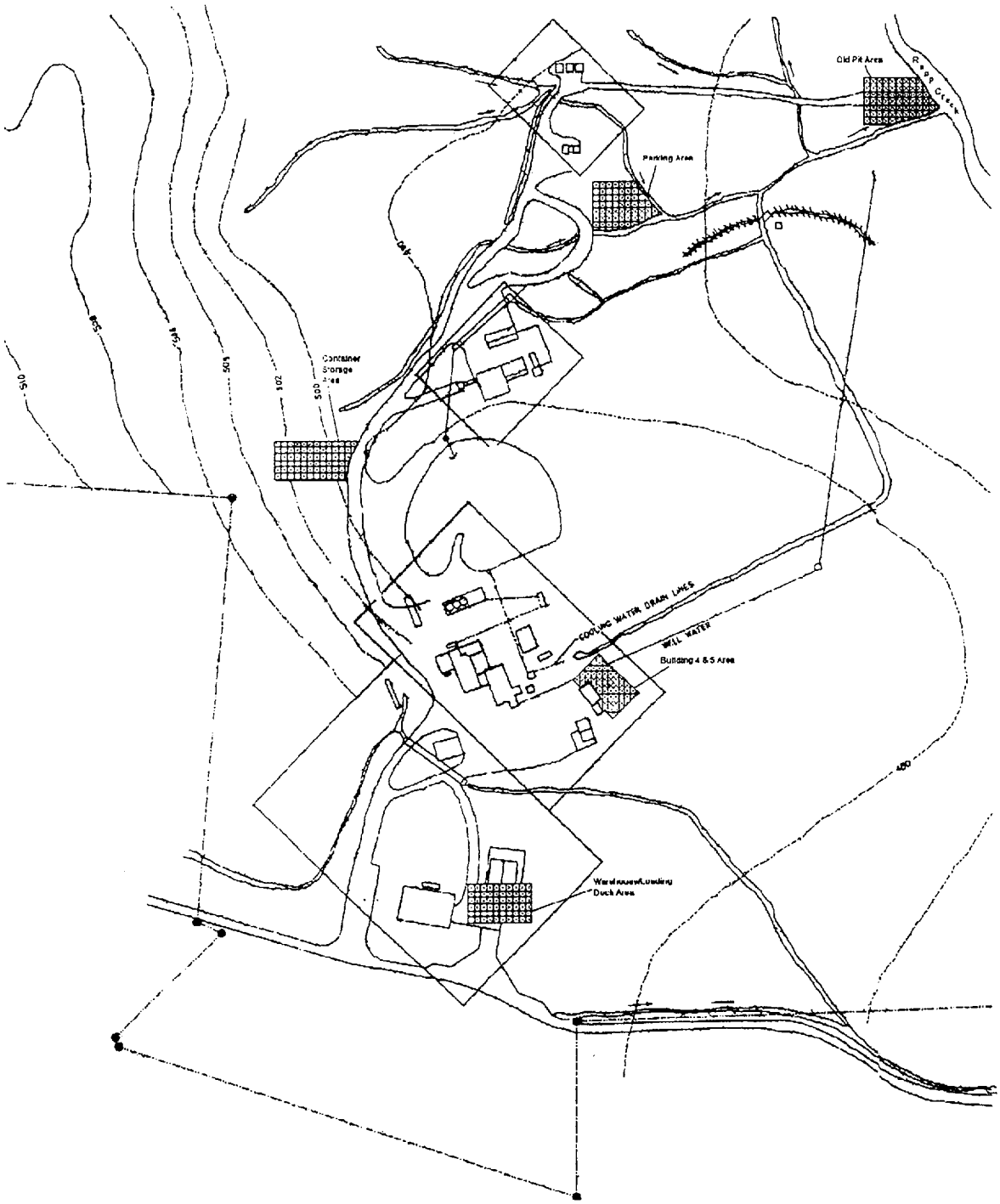

Figure 1 Cabot Performance Materials, Revere, PA

3.0 Release Criteria

Cabot initiated decontamination activities at this site in 1988. The final release survey reported levels below the Nuclear Regulatory Commission (NRC) unrestricted release guidelines. Oak Ridge Institute for Science and Education (ORISE) performed a confirmatory survey and found that although average surface activity soil concentrations and ambient radiation levels satisfy the NRC guidelines, discrete pieces of slag remaining above and below the soil surface were above soil guideline values for uranium and thorium.

The NRC has set the following concentrations for unrestricted release of soil contamination:

Kind of Material	**Concentration (pCi/g)**
Natural thorium (Th-232 plus Th-228) if all daughters are present and in equilibrium	10
Depleted uranium	35
Enriched uranium	30
Natural uranium ores (U-238 plus U-234) if all daughters are present and in equilibrium	10

4.0 Characterization Survey Techniques

Ensearch Environmental then performed a characterization of the Revere facility in the fall of 1994. The Ensearch characterization only consisted of a gamma scan and did not fully characterize the areas where radioactive material was disposed. Therefore, NES/IES performed subsurface surveys at Cabot. This consisted of digging trenches and pits to determine the depth and extent of the slag deposits. Analysis was done by direct measurements within the pits and trenches and by gamma spectroscopy on soil samples taken from within the pits and trenches.

4.1 Survey Instrumentation

The following table lists the instrumentation used during the subsurface sampling at Cabot Performance Materials. Calibration data sheets are included in Appendix B.

INSTRUMENT	USE	CALIBRATION DATE	CALIBRATION DUE DATE	SERIAL NO. Meter/Probe
Ludlum 2221 ratemeter/scaler w/ 44-9 probe	Beta-Gamma direct measurements and scan surveys	6-16-94	6-16-95	68795/066762
Ludlum 2220 ratemeter/scaler w/ AC-3 probe	Alpha direct measurements and scan surveys	2-3-94	2-3-95	50061/407582
Bicron MicroRem	Exposure rate surveys	10-12-93	10-12-94	B172G
Canberra Series 20 MCA	Gamma Spectroscopy	At Use	At Use	989997

4.2 Background

A background measurement was taken in each area prior to sampling procedures. The following table gives the results of the background measurements:

Area	MicroRem (μrem/hr)	Beta/Gamma (cpm)	Alpha (cpm)
Container Storage Area	12	45	0.2
Sand Blast Parking Area	8	48	0.5
Building 4&5 Area	8	47	1.2
Warehouse/Loading Dock Area	10	46	0
Old Pit Area	9	84	1.6

Three soil samples were taken from outside the contaminated areas to give a background for the nuclide concentration of soil in the area.

4.3 MDAs

Minimal detectable activities (MDAs) were calculated for the survey instrumentation. Calculation of the MDAs determines the instrument detection sensitivity which gives the statistically determined quantity of radiation that can be detected at a preselected confidence level. The MDA is a deductive estimate of the minimum activity level which is practically measurable with a specific instrument. The MDA was found by the following equation:

$$MDA = \frac{\frac{2.71}{T_s} + 3.29\sqrt{\frac{R_b}{T_b} + \frac{R_b}{T_s}}}{(efficiency)\left(\frac{probe\ area}{100\ cm^2}\right)},$$

where,

R_b = background counting rate
T_b = background counting time
T_s = sample count time

All MDA calculations are in units of dpm/100 cm^2. The probe sizes of the 44-9 and AC-3 are 15 cm^2 and 59 cm^2, respectively, which were entered into the equation.

5.0 Survey Results

The survey results presented here are a summary of the actual survey data sheets included in Appendix D. The following sections provide a summary of the survey data from the radiological survey for direct contamination and from the gamma spectroscopy of the soil.

5.1 Container Storage Area

The Container Storage Area subsurface sampling consisted of one trench the width of the unremediated area and three pits as seen in Figure 2, Appendix A. The area measures approximately 19,900 ft^2 and consists of a mixture of soil and slag to a depth of 4 feet.

Eleven samples were counted using gamma spectroscopy from this area. These samples consisted of slag, soil and water which flows through the area. A summary of the gamma spectroscopy results in pCi/g can be found below. The water sample and soil samples not containing slag were within the release criteria. The samples which consisted of a mixture of soil and slag were also below the release criteria but did show some evidence of elevated contamination. Individual slag pieces which were crushed and counted were above the release criteria. Direct readings within the trench and pits were within background levels which supports the fact that the contamination is isolated solely within the slag.

	pCi/g						
	Thorium			Uranium			Potassium
Sample Description	Ac-228	Pb-212	Tl-208	Pb-214	Bi-214	U-235	K-40
Trench Soil and Slag	1.15	1.46	<1.09	9.22	8.52	<.69	15.7
Random Slag	10.8	18.7	14.5	121	119	16.5	<12.7
Trench Soil and Slag	<1.72	1.53	<1.03	9.33	9.25	<.72	6.84
Trench Soil and Slag	2.24	1.17	<1.32	<.97	<.90	<.43	19.6
Trench Soil	<1.54	0.93	1.01	1.41	<.93	<.35	21.6
Clean Pile Slag	0.97	~~<~~.84	<.92	1.66	<.97	<.27	19.8
Pit #1 Soil	<.58	<.29	<.40	<.36	<.37	<.19	<.58
Pit #2 Soil	0.90	0.60	<.64	1.12	<.63	<.25	6.39
Pit #3 Soil	<1.51	1.33	~~<~~.98	<.68	<.83	<.38	17.7
Water	<.23	<.19	<.43	<.37	<.25	<.18	<2.84
Leach Test of Slag from Area	<.47	<.28	<.54	<.26	<.37	<.18	<3.07

5.2 Parking Area

The Parking Area subsurface sampling consisted of one trench the width of the area and four pits as seen in Figure 3, Appendix A. The area measures approximately 35,500 ft^2 and consists of a large amount of building rubble mixed with slag and soil to a depth of 6 feet.

Ten samples were counted from this area using gamma spectroscopy. A summary of the sample results in pCi/g can be found in the table below. Direct readings within the trench and pits were within background levels except for a red clay which was found beneath the slag. From gamma spectroscopy it was found that this clay contains naturally occurring isotopes which contribute to the elevated readings.

	pCi/g						
	Thorium			Uranium			Potassium
Sample Description	Ac-228	Pb-212	Tl-208	Pb-214	Bi-214	U-235	K-40
Pit #1 Soil	1.50	0.95	<.97	<.68	<.79	<.30	15.3
Pit #2 Soil	<.75	0.49	<.67	0.61	<.54	<.22	5.56
Pit #3 Soil	0.84	1.41	<.80	<.52	<.77	<.29	21.3
Pit #3, Red Clay	1.44	1.39	1.17	<.68	<.64	<.35	27.00
Rear Pile of Slag, Random	<.86	0.74	<.70	1.03	<.67	<.26	6.68
Pit #4 Soil	<1.06	0.94	0.81	<.60	<.61	<.33	7.24
Trench Soil and Slag	<.80	0.74	<.64	0.32	<.52	<.26	4.33
Trench Soil and Slag	1.02	0.93	<.93	1.12	<.72	<.37	<3.20
Trench Soil and Slag	1.05	0.90	0.82	0.83	<.60	<.32	14.2

5.3 Building 4&5 Area

The Building 4&5 Area subsurface sampling consisted of one trench the length of the area and one pit as seen in Figure 4, Appendix A. The area measures approximately 16,000 ft^2 and consists of slag and rock mixed with soil to a depth of 2 feet.

Six samples were counted from this area using gamma spectroscopy. A summary of the results in pCi/g can be found in the table below. Direct readings revealed areas of contamination of twice background values. This is due to the large amount of slag deposited in the area.

	pCi/g						
	Thorium			Uranium			Potassium
Sample Description	Ac-228	Pb-212	Tl-208	Pb-214	Bi-214	U-235	K-40
Trench Soil	<1.01	0.83	<.75	<.59	<.68	<.38	10.4
Pit Soil and Slag	1.35	1.5	1.05	1.5	<.85	<.43	20.4
Trench Soil and Slag	0.93	1.14	<.71	<.61	<.71	<.41	16.2
Trench Soil and Slag	<1.28	1.19	<.87	0.94	<.62	<.36	19.1
Trench Soil	<.81	0.50	<.59	0.40	<.50	<.26	5.7
Surface Soil	<.58	0.18	<.43	<.35	<.48	<.26	<1.91

5.4 Warehouse/Loading Dock Area

The Warehouse/Loading Dock Area subsurface sampling consisted of two pits in the non-paved grassy area to the west of the Warehouse as seen in Figure 5, Appendix A. The subsurface sampling in this area was restricted due to the presence of underground piping, the warehouse and an asphalt driveway which covered a majority of the area. The warehouse covered approximately 3,100 ft^2 of area with the grassy area measuring approximately 4,300 ft^2. The two pits which were dug on the west side of the warehouse did not reveal any slag.

Three samples were counted from this area using gamma spectroscopy, one soil sample from each pit and one surface sample from the gravel area to the east of the warehouse. The following table contains a summary of the data in pCi/g. Although no slag pieces were found in this area direct readings of two to three times background were found.

	pCi/g						
	Thorium			Uranium			Potassium
Sample Description	Ac-228	Pb-212	Tl-208	Pb-214	Bi-214	U-235	K-40
Pit #1 Soil	1.78	1.45	<.89	0.94	<.73	<.36	17.8
Pit #2 Soil	1.31	0.94	<.79	<.58	<.65	<.36	14.1
Gravel, East Side of Warehouse	<1.38	1.7	<.93	1.06	<.89	<.44	29.3

5.5 Old Pit Area

The Old Pit Area subsurface sampling consisted of one trench the width of the unremediated area and 4 pits as seen in Figure 6, Appendix A. The area measures approximately 54,900 ft^2 and consists of a large amount of building rubble mixed with slag and soil to a depth of 9 feet.

Fifteen samples from this area were counted using gamma spectroscopy. A summary of the data in pCi/g can be found in the following table. The pile of rubble and slag to the rear of the area was found to contain pieces of slag of a considerable size which were above the release criteria. Direct readings from within the pits and trench were only elevated when taken in contact with pieces of slag.

	pCi/g						
	Thorium			Uranium			Potassium
Sample Description	Ac-228	Pb-212	Tl-208	Pb-214	Bi-214	U-235	K-40
Sediment from Creek	<1.00	0.69	0.69	<.56	0.52	<.33	13.2
Water from Creek	<.22	<.27	<.27	<.26	<.34	<.23	<.81
Random Slag	<7.31	14.2	<4.61	147	139	<3.67	<22.2
Pit #1 Soil	1.13	1.2	1.11	<.61	<.74	<.36	17.5
Pit #2 Soil	<1.34	1.22	1.43	<.68	<.70	<.40	25
Pit #3 Soil	0.83	1.06	1.05	<.55	<.72	<.34	17.3
Pit #4 Soil	<.91	0.85	0.94	0.92	0.73	<.34	13.1
Trench Soil	0.71	0.72	<.60	<.48	<.56	<.27	10.7
Trench Soil	<.68	0.44	<.48	0.5	<.41	<.26	4.76
Trench Soil	<1.63	1.08	0.95	<.75	<.84	<.38	17.00
Trench Soil and Slag	1.17	1.19	<.69	0.88	<.64	<.33	25.3
Trench Soil and Slag	1.31	1.29	1.46	0.64	0.70	<.36	25.7
Trench Soil and Slag	0.76	1.29	1.11	0.64	<.66	<.36	20.3
Trench Soil and Slag	<1.12	1.35	0.9	<.69	<.76	<.38	20.6
Trench Soil and Slag	1.09	1.11	0.84	<.56	<.63	<.38	19.7

5.6 Slag Tests

Tests were performed on individual pieces of slag from throughout the Revere site. A leach test was performed on the slag which revealed that no contamination was leaching into the test solution. Water from the area was used as the base solution and a piece of contaminated slag was soaked in it for 24 hours. Another leach test was performed using a contaminated piece of slag soaked in water from Rapp Creek with an addition of salt to speed up the leaching process. This sample was soaked for four days. Both leach tests showed no signs of contamination. The gamma spectroscopy performed on the individual pieces of slag revealed levels

of U-238 over 145 pCi/g, Th-232 over 10 pCi/g and Th-228 around 20 pCi/g. Other pieces of slag that were tested did not reveal any contamination above release criteria. This reinforces the fact that the contamination is isolated to select pieces of slag, not the entire quantity of slag.

6.0 References

1. "Work Plan for Subsurface Sampling at Cabot Corporation, Revere, PA;" July, 1994.

2. NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination;" 1992.

3. NES Procedure 82A8006, "Radiation Worker Handbook and Training Manual."

4. Ensearch Environmental Corporation, "Radiological Characterization Survey Report for the Cabot Performance Materials Revere Plant;" April 1994.

Appendix A Cabot Site Maps

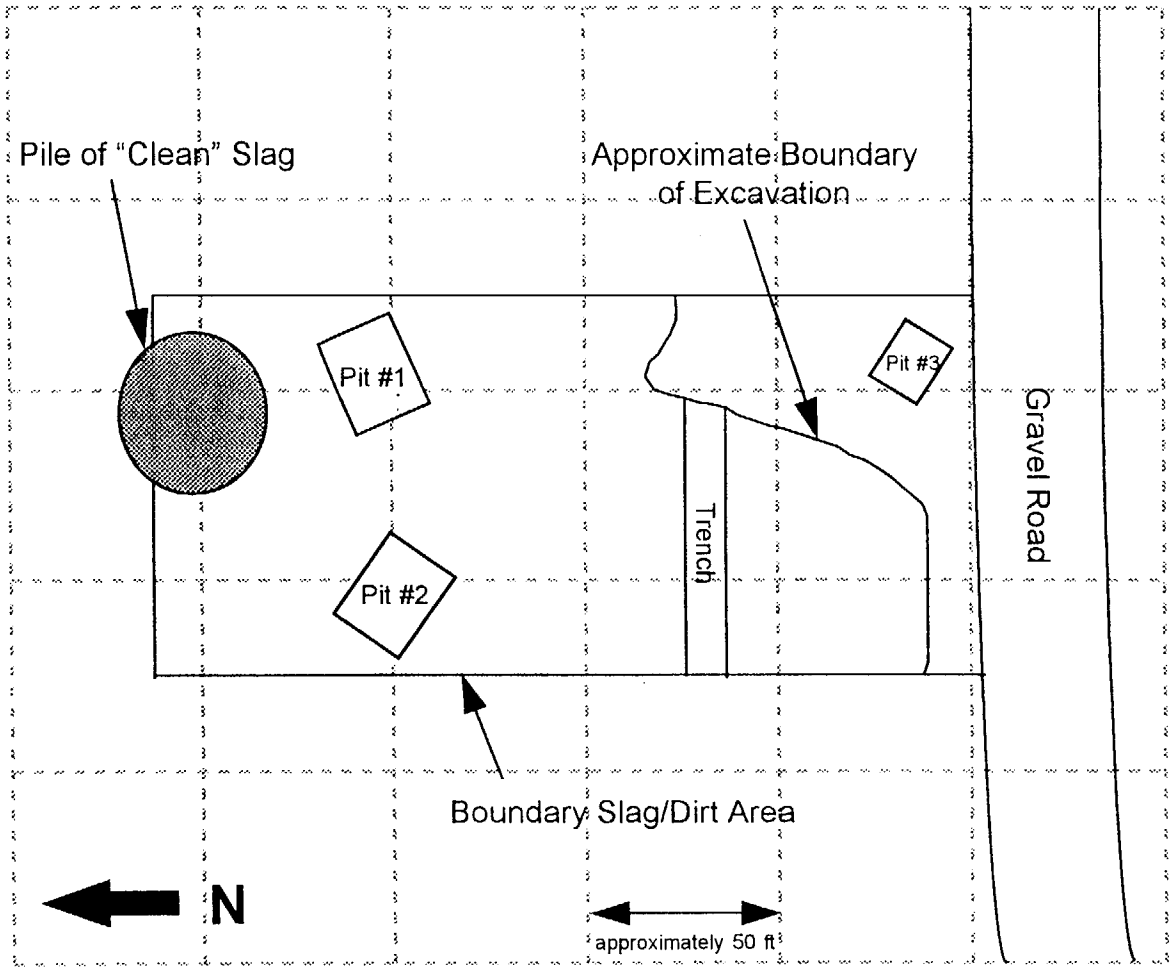

Figure 2 Container Storage Area

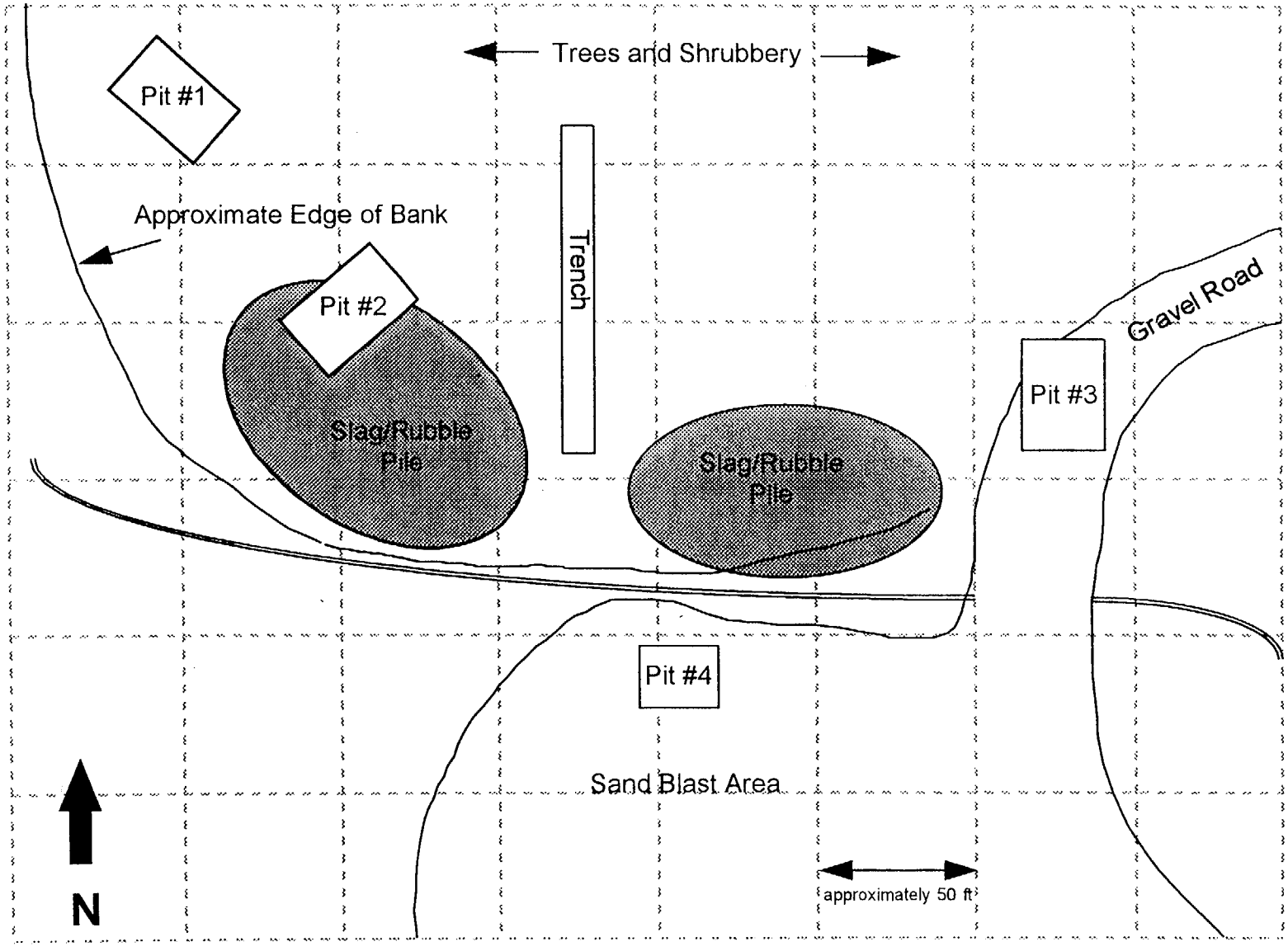

Figure 3 Parking Area

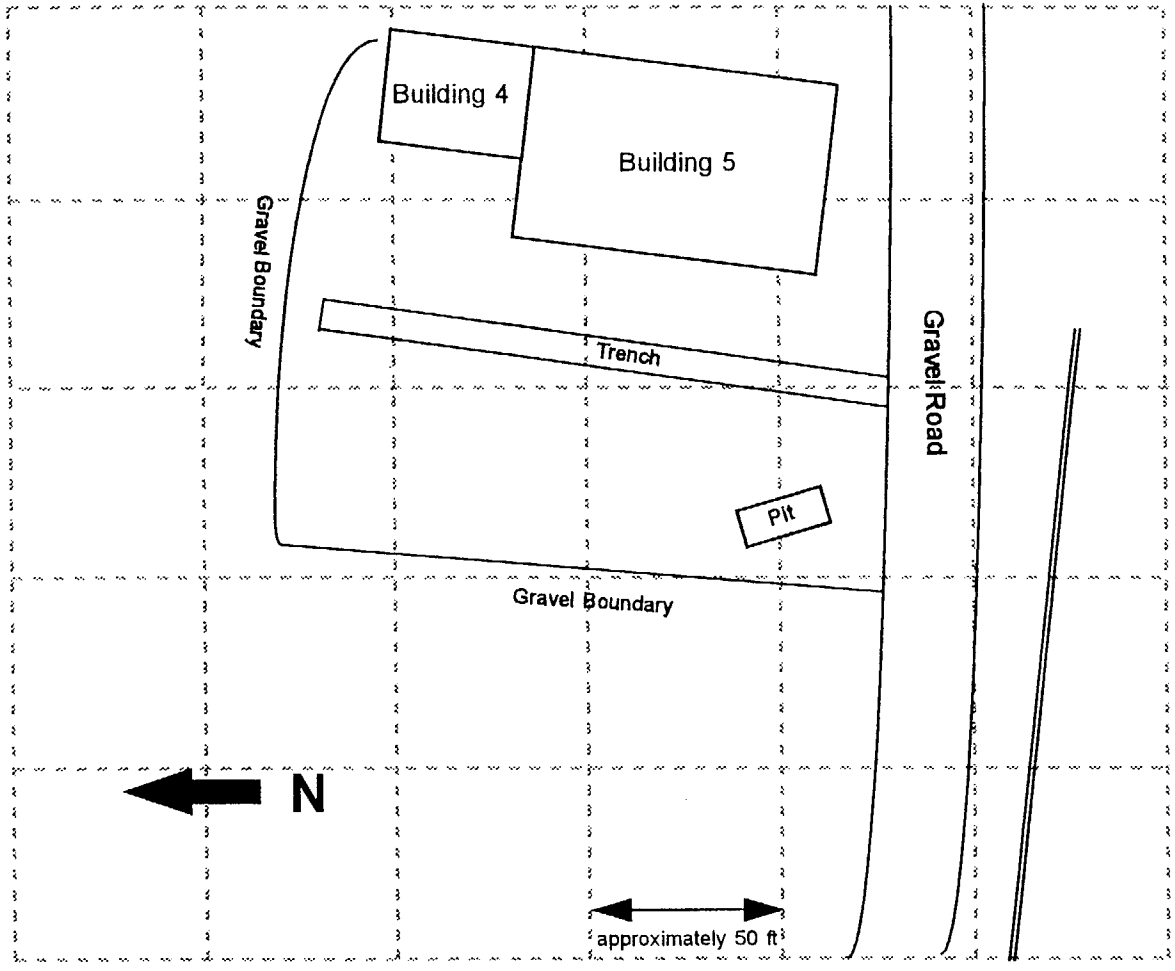

Figure 4 Building 4 & 5 Area

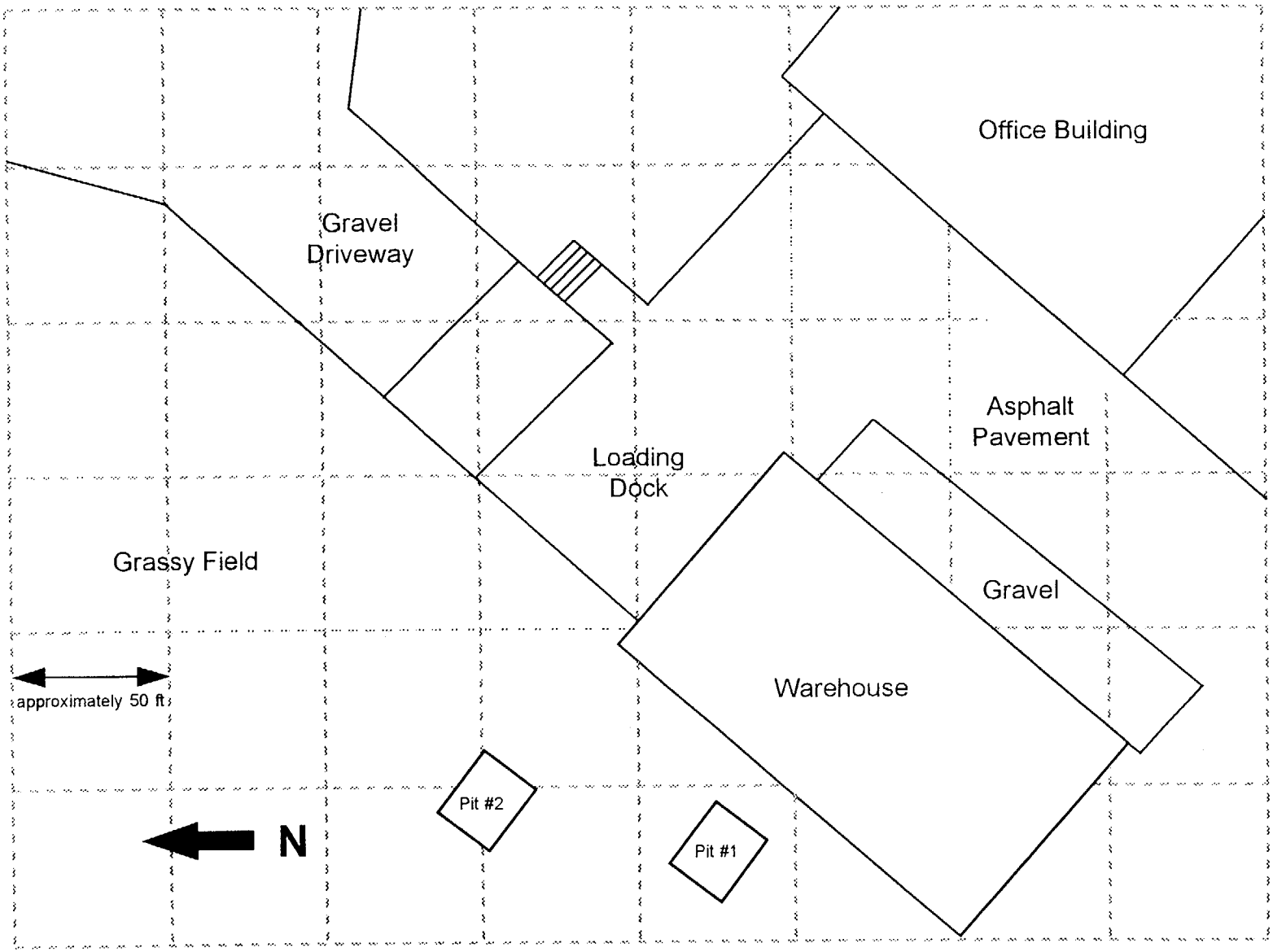

Figure 5 Warehouse/Loading Dock Area

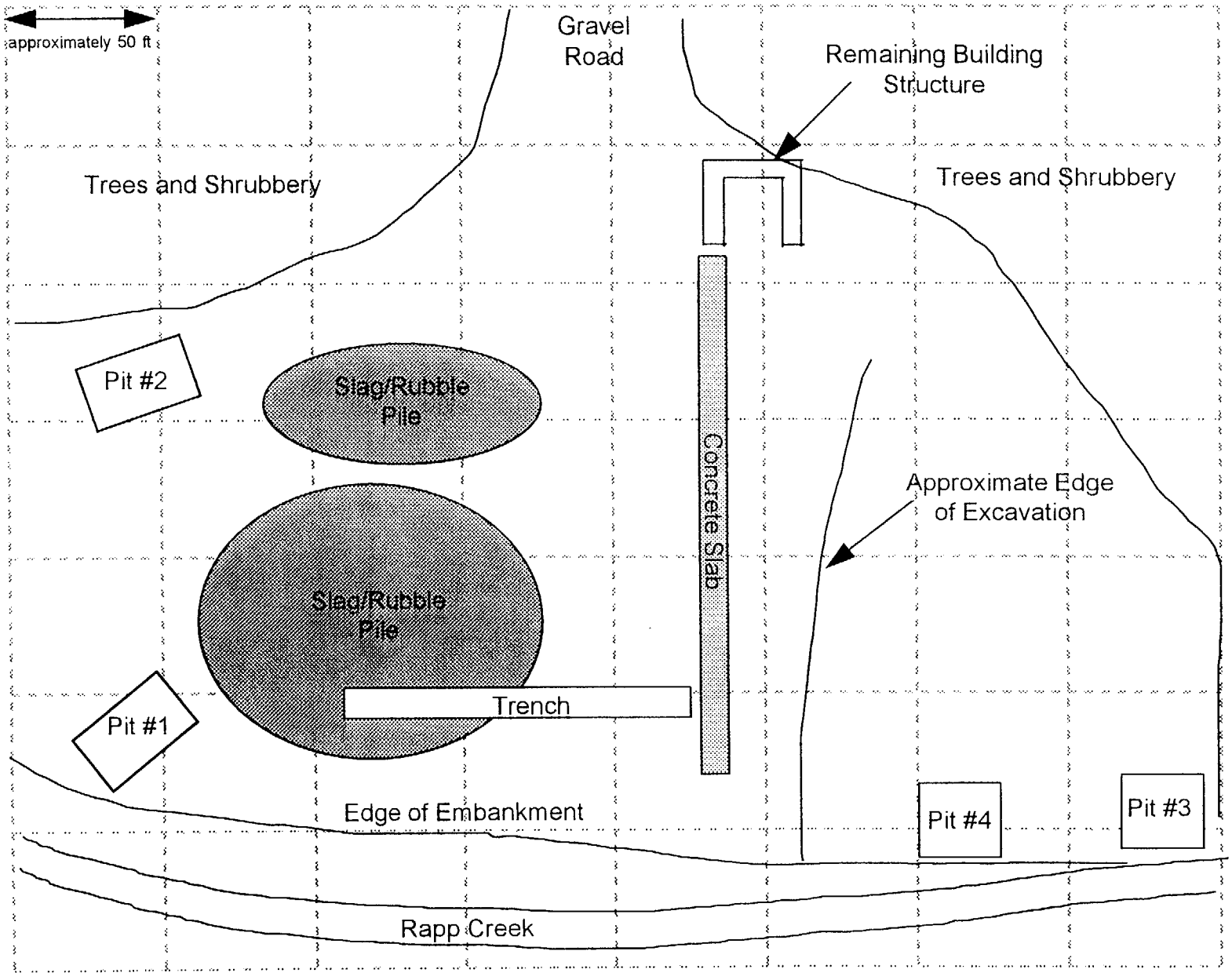

Figure 6 Old Pit Area

Appendix B Calibration Sheets

HARSHAW BICRON RADIATION MEASUREMENT PRODUCTS

BICRON • 6801 Cochran Road • Solon, Ohio 44139

Phone: (216) 248-7400 • Fax: (216) 349-6581

CERTIFICATE OF INSTRUMENT CALIBRATION

CUSTOMER: NUCLEAR ENERGY SYSTEMS Q# 57338

INSTRUMENT MODEL: micro rem SERIAL # B172G

CALIBRATION DATA

RANGE	EXPOSURE RATE	INST. READING	EXPOSURE RATE	INST. READING
X1000	**160 mR/h**	160	**40 mR/h**	41
X100	**16 mR/h**	16	**4 mR/h**	4.1
X10	**1.6 mR/h**	1.6	**400 uR/h**	400
X1	**160 uR/h**	160	**40 uR/h**	40
X0.1	**16 uR/h**	16		

THE Cs-137 1 Ci SOURCE USED FOR THIS CALIBRATION HAS A CERTIFICATE STATING ITS TRACEABILITY TO N.B.S. (N.I.S.T.) STANDARDS.

* INSTRUMENT CALIBRATED WITH A CS-137 GAMMA SOURCE USING A CONVERSION FACTOR OF $\frac{1 \text{ urem/h}}{1 \text{ uR/h}}$

* CALIBRATOR : J.L.SHEPHERD / MODEL: 28-6A S.N.:10081

CALIBRATED BY: Thomas C. Bogna DATE: 10-12-93

Saint-Gobain/Norton Industrial Ceramics Corporation

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER NES ORDER NO. 206556

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 162160

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. SR061489

Cal. Date 6-7-94 Cal Due Date 6-8-95 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 60 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

Instrument Volt Set 775 V = 3.16 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 498 / 500 V Ref./Inst. 1984 / 2000 V

COMMENTS:

Alpha eff. for U 238 = 55.5% (2π) 27.75% (4π)

Beta eff. for Cs 137 = 46.2% (2π) 23.1% (4π)

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Alpha Channel Digital Readout	400K cpm	399906	399906
	40K cpm	40002	40002
	4K cpm	4000	4000
	400 cpm	400	400
	40 cpm	40	40

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Beta/Gamma Channel Digital Readout	400K cpm	399907	399907
	40K cpm	40000	40000
	4K cpm	4000	4000
	400 cpm	400	400
	40 cpm	40	40

*Uncertainty within ± 10% C.F. within ± 20%

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu239 #8743 ☑ Beta S/N C14 (.159 μci) Tc99 (1670 cpm) ☐ Other

m 500 S/N 54680 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: [signature] Date 6-8-94

Reviewed By: Jimmie Fleming Date 6-8-94

FORM C25 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. 7R061489 Order #. 206556

Customer NES Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 69660 Beta Input Sensitivity 4 mV

Count Time 1 Minute Beta Window 50 mV

Other Distance Source to Detector tray

High Voltage	Background Alpha	Background Beta	Isotope Pu 239 Size 12.8Kcpm Alpha	Isotope Pu 239 Size 12.8Kcpm Beta	Isotope Tc99 Size 1670cpm Alpha	Isotope Tc99 Size 1670cpm Beta	Isotope C14 Size .159uCi Alpha	Isotope C14 Size .159uCi Beta
700	0	36	9995	203	0	288	0	1292
725	0	50	10070	218	1	381	0	4850
750	0	51	10092	197	2	549	1	12613
775	0	77	10333	273	1	693	0	22295
800	0	76	10248	1532	2	821	0	31011

Signature Sharon T. Murphy Date 6-8-94

FORM C48 02/23/94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER NUCLEAR ENERGY SERVICES ORDER NO. 206556

Mfg. Ludlum Measurements, Inc. Model 2220 Serial No. 48409

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR066761

Cal. Date 06/08/94 Cal Due Date 06/08/95 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 60 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 496 / 500 V Ref./Inst. 2015 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT RECEIVED "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 K CPM	400	N/A
X 1000	100 K CPM	100	
X 100	40 K CPM	40	
X 100	10 K CPM	100	
X 10	4 K CPM	400	
X 10	1 K CPM	100	
X 1	400 CPM	400	
X 1	100 CPM	100	

*Uncertainty within ± 10% C.F. within ± 20% ALL **Range(s) Calibrated Electronically**

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K CPM	399972	399972	Log Scale	500 K CPM	500K	500K
	40 K CPM	39999	39999		50 K CPM	50K	50K
	4 K CPM	4000	4000		5 K CPM	5K	5K
	400 CPM	400	400		500 CPM	500	500

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☐ m 500 S/N 54680 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: Thomas R. Murph Date 6-8-94

Reviewed By: Jimmie Fleming Date 6-8-94

FORM C22A 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Functional Check

Customer NUCLEAR ENERGY SERVICES Order #. 206556

This Certifies that Ludlum Model 44-9 Serial No. PR0160761 has been functionally checked.
Refer to applicable instrument manuals for specific operating instructions.

eff. for Cs_{137} = 48% (2π) 24% (4π)

This Detector operates at 900 Volts, 35 mV Sensitivity.

Check performed by [signature] Date 6-8-94

Reviewed by Jimmie Fleming Date 6-8-94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

JSTOMER NES INC ORDER NO. 206624

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 68795

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR066762

Cal. Date 06/16/94 Cal Due Date 06/16/95 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 48 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC

Instrument Volt Set 900 V Input Sens. 35 mV Det. Oper. 900 V at 35 mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 504 / 500 V Ref./Inst. 1993 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1K	400 K cpm	400	400
X 1K	100 K cpm	100	100
X 100	40 K cpm	400	400
X 100	10 K cpm	100	400
X 10	4 K cpm	400	100
X 10	1 K cpm	100	400
X 1	400 cpm	400	100
X 1	100 cpm	100	400

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 K cpm	400824	400824	Log Scale	500 K cpm	500k	500k
	40 K cpm	40025	40025		50 K cpm	50k	50k
	4 K cpm	4003	4003		5 K cpm	5k	5k
	400 cpm	400	400		500 cpm	500	500 cpm
	40 cpm	40	40		50 cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☑ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 63893 ☐ Oscilloscope S/N ☑ Multimeter S/N 57770262

Calibrated By: Michael Moore Date 6-16-94

Reviewed By: Jimmie Fleming Date 6-20-94

FORM C22A 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer NES INC Date 06/16/94 Order #. 206624

Model 2221 Serial No. 68795 Detector Model 44-9 Serial No. PR 066762

Source Cs-137 194.6 mCi High Voltage 900 V

Reference Point	"As Found" Readings: Meter Reading	"As Found" Readings: Range/Scale	After Adjustment Readings: Meter Reading	After Adjustment Readings: Range/Scale
150 mR/hr	23637	0.1 min	23637	0.1 min
50 mR/hr	11896	"	11896	"
15 mR/hr	4462	"	4462	"
5 mR/hr	1626	"	1626	"
1.5 mR/hr	509	"	509	"
1.0 mR/hr	331	"	331	"

Signature: Michael Moore Date 6-16-94

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

STOMER NUCLEAR ENERGY SERVICES ORDER NO. 206556

Mfg. Ludlum Measurements, Inc. Model 2220 Serial No. 52836

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR037505

Cal. Date 06/08/94 Cal Due Date 06/08/95 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 60 % Alt 699.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck. (Min. Volt) 4.4 VDC

Instrument Volt Set 900 V Input Sens. 10 mV Det. Oper. 900 V at 10 mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 496 / 500 V Ref./Inst. 1994 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400Kcpm	400	400
X 1000	100 "	100	100
X 100	40 "	400	400
X 100	10 "	100	100
X 10	4 "	400	400
X 10	1 "	100	100
X 1	400cpm	400	400
X 1	100 "	100	100

*Uncertainty within ± 10% C.F. within ± 20% All Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400Kcpm	399826	399826	Log Scale	500Kcpm	525K	525K
	40 "	39988	39988		50 "	50K	50K
	4 "	3999	3999		5 "	5K	5K
	400cpm	400	400		500cpm	500	500

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Pu-239, 8743; 12.8 K cpm ☐ Beta S/N ☐ Other

m 500 S/N 54680 ☐ Oscilloscope S/N ☑ Multimeter S/N 57390613

Calibrated By: Sharon L. Murphy Date 6-8-94

Reviewed By: Jimmie Fleming Date 6-8-94

FORM C22A 02/04/94

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. 915-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR037505

Customer NUCLEAR ENERGY SERVICES Order #. 206556

Counter 2220 Serial No. 52836 Counter Input Sensitivity 10 mV

Count Time 1 min. Distance Source to Detector surface

Isotope Pu-239, 8743; 12.8 K cpm Other eff. for U238 = 21% (2π) 10.5 (4π)

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
800	0	3625
850	0	3693
900	0	3771
950	1	3833
1000	3	3915

Operating Voltage Set at 900 V

Air Proportional	43-5	43-65	Background	Meter Reading	Range/Scale
	Toe	L/S*	0	3694	1 min. cnt.
	Center	Center	0	3771	
	Heel	Other**	0	3714	

☑ Uniformity (± 10%) Average Efficiency 29.1 %

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Sharon P. Murph Date 5-31-94

FORM C21 02/23/94

07

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 915-235-5494
501 OAK STREET FAX NO. (915) 235-4672
SWEETWATER, TEXAS 79556, U. S. A.

CERTIFICATE OF CALIBRATION

CUSTOMER Nuclear Energy Services ORDER NO. 204398
Mfg. Ludlum Meas. Model 2220 Serial No. 50061
Mfg. Ludlum Meas. Det. Model AC-3 Serial No. 407582
Cal. Date 2-3-94 Cal. Due Date 2-3-95 Cal. Interval 1yr METERFACE 202-159
Check mark (✓) applies to applicable instr. and/or detector IAW mfg. spec. T 75 °F RH 42 % Alt 707.8 mm Hg

☑ F/S Resp. ck ☑ Reset ck. ☑ Audio ck. ☑ Meter Zeroed ☑ Window Operation ☐ Background subtract
☐ Alarm Setting ck. ☑ Mechanical ck. ☑ Bat. ck. (Min. Volt) 4.4 VDC Det. Oper. V 1350 V at 35 MV
Instrument Volt Set 1350 V Threshold Dial 100=10mV Input Sens 35 mV. ☑ Input Sens Linearity
☐ New Instrument Instrument Received: ☑ Within Toler. + -10% ☐ 10-20% ☐ Out Toler. ☐ Requiring Repair
☑ HV Readout (2 points) Ref./Inst 488 / 500 V Ref./Inst 1988 / 2000 V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for [illegible] in which the front of probe faces source.

RANGE MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT METER READING	INSTRUMENT REC'D "AS FOUND READING"
X 1K	400kcpm	400	390
X "	100 "	100	97
X 100	40 "	400	390
X "	10 "	100	97
X 10	4 "	400	380
X "	1 "	100	95
X 1	400cpm	400	390
X "	100 "	100	97
X			
X			
X			

*Uncertainty within + -10% C. F. within + -20% All Range(s) Calibrated Electronically

	Reference Cal. Point	Instrument Meter Reading	"As Found Reading"
Digital Readout	400kcpm / 40 " / 4 " / 400cpm	399720 / 39965 / 3996 / 400	399720 / 39965 / 3996 / 400
Log Scale	500kcpm / 50 " / 5 " / 5000cpm	500K / 45K / 4.5K / 500	500K / 45K / 4.5K / 500

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL- STD-45662A and ANSI N323-1978

☐ Cs137 Gamma s/n 1162, G112, M565,5105, 5604, T879 ☐ Neutron Am-241 Be s/n T-304 State of Texas Calibration License No. LO-1963

☑ Alpha s/n Pu 239, 12.8kcpm (#8743) ☐ Beta s/n ☐ Other

☑ M-500 s/n 54680 ☐ Oscilloscope s/n ☑ Multimeter s/n 57390613

Calibrated By: Shannon R. Murphy Date 2-3-94

Reviewed By: Jimmie Fleming Date 2-4-94

Form 22 — 12-92

LUDLUM MEASUREMENTS, INC.
501 OAK ST./PO BOX 810
SWEETWATER, TEXAS 79556
Phone: 915/235-5494 800/622-0828(USA)
Fax: 915/235-4672

DESIGNER AND MANUFACTURER OF *Scientific and Industrial Instruments*

BENCH TEST DATA FOR DETECTOR AC-3 S/N 107582

CUSTOMER: Nuclear Energy Services Order No. 204398

Counter 2220 S/N 50061 Distance-Source to Detector Surface

Count Time 1 min. Counter Input Sensitivity 35 mV

Other

High Volt	Background	Isotope Pu 239 Size 13.8 Kcpm	Isotope Size	Isotope Size
1100	0	1557		
1150	0	1959		
1200	0	2143		
1250	0	2407		
1300	1	2490		
1350	1	2576		
1400	2	2616		
1450	8	2727		

Date 2-3-94 Signature Shawn P. Murphy

Form 4

Q4

Appendix C MDA Calculations

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 43 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{43}{10} + \frac{43}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

βγ

MDA = 677 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 52 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{52}{10} + \frac{52}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

βγ

MDA = 681 dpm/100cm²

METER L2220 SERIAL #: ~~48409~~ 52836 PD.

TS: 1 TB: 10 RB: 0.3 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.3}{10} + \frac{0.3}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 78 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.6 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.6}{10} + \frac{0.6}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 91 dpm/100cm²

Technician: Karen Cray Date: 7-25-94

Reviewed by: P. Dey Date: 7-25-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 45 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{45}{10} + \frac{45}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 690 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 51 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{51}{10} + \frac{51}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 675 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.2 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.2}{10} + \frac{0.2}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 72 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.4 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.4}{10} + \frac{0.4}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 83 dpm/100cm²

Technician: Karen Craig Date: 7-26-94

Reviewed by: P. Dey Date: 7-26-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 48 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{48}{10} + \frac{48}{1}\right)^{1/2}}{.25 \quad (15cm^2/100\ cm2)}$$

βγ

MDA = 710 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 54 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{54}{10} + \frac{54}{1}\right)^{1/2}}{.27 \quad (15cm^2/100\ cm2)}$$

βγ

MDA = 693 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.1 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.1}{10} + \frac{0.1}{1}\right)^{1/2}}{.10 \quad (59cm^2/100\ cm2)}$$

α

MDA = 64 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: _____ EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.5}{10} + \frac{0.5}{1}\right)^{1/2}}{.10 \quad (59cm^2/100\ cm2)}$$

α

MDA = 87 dpm/100cm²

Technician: Karen Craig Date: 7-27-94

Reviewed by: P. Dergt Date: 7-27-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 50 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{50}{10} + \frac{50}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 723 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 56 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{56}{10} + \frac{56}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 704 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.5 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.5}{10} + \frac{0.5}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 87 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.6 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.6}{10} + \frac{0.6}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 91 dpm/100cm²

Technician: Karen Craig Date: 7-28-94

Reviewed by: P. Deyo Date: 7-28-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 68 EFF: .25 PROBE SIZE: 15 cm²

$$\text{MDA} = \frac{\frac{2.71}{1} + 3.29\left(\frac{68}{10} + \frac{68}{1}\right)^{1/2}}{.25 \quad (15\text{cm}^2 / 100\text{ cm}^2)}$$

βγ

MDA = 831 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 80 EFF: .27 PROBE SIZE: 15cm²

$$\text{MDA} = \frac{\frac{2.71}{1} + 3.29\left(\frac{80}{10} + \frac{80}{1}\right)^{1/2}}{.27 \quad (15\text{cm}^2 / 100\text{ cm}^2)}$$

βγ

MDA = 829dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.9 EFF: .10 PROBE SIZE: 59cm²

$$\text{MDA} = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.9}{10} + \frac{0.9}{1}\right)^{1/2}}{.10 \quad (59\text{cm}^2 / 100\text{ cm}^2)}$$

α

MDA = 101dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 1.4 EFF: .10 PROBE SIZE: 59cm²

$$\text{MDA} = \frac{\frac{2.71}{1} + 3.29\left(\frac{1.4}{10} + \frac{1.4}{1}\right)^{1/2}}{.10 \quad (59\text{cm}^2 / 100\text{ cm}^2)}$$

α

MDA = 115dpm/100cm²

Technician: Karen Gray Date: 7-29-94

Reviewed by: P. Deyo Date: 7-29-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 43 EFF: .25 PROBE SIZE: 15 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{43}{10} + \frac{43}{1}\right)^{1/2}}{.25 \quad (15\,cm^2 / 100\ cm2)}$$

βγ

MDA = 676 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 47 EFF: .27 PROBE SIZE: 15 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{47}{10} + \frac{47}{1}\right)^{1/2}}{.27 \quad (15\,cm^2 / 100\ cm2)}$$

βγ

MDA = 651 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 1.2 EFF: .10 PROBE SIZE: 59 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{1.2}{10} + \frac{1.2}{1}\right)^{1/2}}{.10 \quad (59\,cm^2 / 100\ cm2)}$$

α

MDA = 110 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 1.0 EFF: .10 PROBE SIZE: 59 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{1.0}{10} + \frac{1.0}{1}\right)^{1/2}}{.10 \quad (59\,cm^2 / 100\ cm2)}$$

α

MDA = 104 ~~104~~ dpm/100cm²

Technician: Karen Craig Date: 7-30-94

Reviewed by: P. Dwyer Date: 7-30-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 68 EFF: .25 PROBE SIZE: 15 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{68}{10} + \frac{68}{1}\right)^{1/2}}{.25 \quad (15\,cm^2 / 100\ cm2)}$$

βγ

MDA = 831 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 84 EFF: .27 PROBE SIZE: 15 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{84}{10} + \frac{84}{1}\right)^{1/2}}{.27 \quad (15\,cm^2 / 100\ cm2)}$$

βγ

MDA = 848 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 1.6 EFF: .10 PROBE SIZE: 59 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{1.6}{10} + \frac{1.6}{1}\right)^{1/2}}{.10 \quad (59\,cm^2 / 100\ cm2)}$$

α

MDA = 120 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 1.1 EFF: .10 PROBE SIZE: 59 cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{1.1}{10} + \frac{1.1}{1}\right)^{1/2}}{.10 \quad (59\,cm^2 / 100\ cm2)}$$

α

MDA = 107 dpm/100cm²

Technician: Karen Gray Date: 8-1-94

Reviewed by: P. Tuyr Date: 8-1-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 50 EFF: .25 PROBE SIZE: 15cm²

Bγ

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{50}{10} + \frac{50}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

MDA = 723 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 58 EFF: .27 PROBE SIZE: 15cm²

Bγ

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{58}{10} + \frac{58}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

MDA = 716 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.8 EFF: .10 PROBE SIZE: 59cm²

α

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.8}{10} + \frac{0.8}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

MDA = 98 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.5 EFF: .10 PROBE SIZE: 59cm²

α

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.5}{10} + \frac{0.5}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

MDA = 87 dpm/100cm²

Technician: Karen Crain Date: 8-2-94

Reviewed by: P. Dugr Date: 8-2-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 40 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{40}{10} + \frac{40}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 654 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 47 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{47}{10} + \frac{47}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

Bγ

MDA = 651 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.2 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.2}{10} + \frac{0.2}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 72 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.5 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.5}{10} + \frac{0.5}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 87 dpm/100cm²

Technician: Karen Cray Date: 8-3-94

Reviewed by: P. Dey Date: 8-3-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

TS: 1 TB: 10 RB: 37 EFF: .25 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{37}{10} + \frac{37}{1}\right)^{1/2}}{.25 \quad (15cm^2 / 100\ cm2)}$$

βγ

MDA = 632 dpm/100cm²

METER L2220 SERIAL #: 48409

TS: 1 TB: 10 RB: 50 EFF: .27 PROBE SIZE: 15cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{50}{10} + \frac{50}{1}\right)^{1/2}}{.27 \quad (15cm^2 / 100\ cm2)}$$

βγ

MDA = 669 dpm/100cm²

METER L2220 SERIAL #: 52836

TS: 1 TB: 10 RB: 0.1 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.1}{10} + \frac{0.1}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 64 dpm/100cm²

METER L2220 SERIAL #: 50061

TS: 1 TB: 10 RB: 0.4 EFF: .10 PROBE SIZE: 59cm²

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.4}{10} + \frac{0.4}{1}\right)^{1/2}}{.10 \quad (59cm^2 / 100\ cm2)}$$

α

MDA = 83 dpm/100cm²

Technician: Karen Cray Date: 8-4-94

Reviewed by: P. Dey Date: 8-4-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 0.4 EFF: .40 PROBE SIZE: N/A

α

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.4}{10} + \frac{0.4}{1}\right)^{1/2}}{.40 \quad (N/A \ / 100\ cm2)}$$

MDA = 12 dpm / 100 cm²

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 60 EFF: .22 PROBE SIZE: N/A

βγ

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{60}{10} + \frac{60}{1}\right)^{1/2}}{.22 \quad (N/A \ / 100\ cm2)}$$

MDA = 134 dpm / 100 cm²

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100\ cm2)}$$

MDA = N A

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100\ cm2)}$$

MDA = _____

Technician: Karen Cray Date: 7-25-94

Reviewed by: P. Deep Date: 7-25-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 0 EFF: .40 PROBE SIZE: N/A

$$MDA = \frac{2.71/1 + 3.29(0/10 + 0/1)^{1/2}}{.40 \ (N/A \ / \ 100 \ cm2)}$$

α

MDA = 7 dpm/100 cm²

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 60 EFF: .22 PROBE SIZE: N/A

$$MDA = \frac{2.71/1 + 3.29(60/10 + 60/1)^{1/2}}{.22 \ (N/A \ / \ 100 \ cm2)}$$

βγ

MDA = 134 dpm/100 cm²

METER _____ SERIAL #: _____

TS: _____ TB: _____ RB: _____ EFF: _____ PROBE SIZE: _____

$$MDA = \frac{2.71 + 3.29(___ + ___)^{1/2}}{(\quad / \ 100 \ cm2)}$$

MDA = N/A

METER _____ SERIAL #: _____

TS: _____ TB: _____ RB: _____ EFF: _____ PROBE SIZE: _____

$$MDA = \frac{2.71 + 3.29(___ + ___)^{1/2}}{(\quad / \ 100 \ cm2)}$$

MDA = _____

Technician: Karen Cray Date: 7-26-94

Reviewed by: P. Deyo Date: 7-26-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 0.7 EFF: .40 PROBE SIZE: N/A

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.7}{10} + \frac{0.7}{1}\right)^{1/2}}{.40 \ (N/A \ / \ 100 \ cm2)}$$

α

MDA = 14 dpm/100cm²

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 60 EFF: .22 PROBE SIZE: N/A

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{60}{10} + \frac{60}{1}\right)^{1/2}}{.22 \ (N/A \ / \ 100 \ cm2)}$$

βγ

MDA = 134 dpm/100cm²

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100 \ cm2)}$$

MDA = N A

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100 \ cm2)}$$

MDA = _____

Technician: Karen Craig Date: 7-27-94

Reviewed by: P. Deyo Date: 7-27-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 0.6 EFF: .40 PROBE SIZE: N/A

$$MDA = \frac{2.71}{1} + 3.29\left(\frac{0.6}{10} + \frac{0.6}{1}\right)^{1/2}$$

.40 ~~.40~~ JC (N/A / 100 cm2)

MDA = 13 dpm/100cm²

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 63 EFF: .22 PROBE SIZE: N/A

$$MDA = \frac{2.71}{1} + 3.29\left(\frac{63}{10} + \frac{63}{1}\right)^{1/2}$$

.22 (N/A / 100 cm2)

MDA = 137 dpm/100cm²

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

MDA = 2.71 + 3.29(____ + ____)½

(/ 100 cm2)

MDA = N A

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

MDA = 2.71 + 3.29(____ + ____)½

(/ 100 cm2)

MDA = _____

Technician: Karen Gray Date: 7-28-94

Reviewed by: P. Dey Date: 7-28-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 0.5 EFF: .40 PROBE SIZE: N/A

α

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{0.5}{10} + \frac{0.5}{1}\right)^{1/2}}{.40 \ (N/A \ / \ 100 \ cm2)}$$

MDA = 13 dpm/100cm²

METER L2929 SERIAL #: 69660

TS: 1 TB: 10 RB: 54 EFF: .22 PROBE SIZE: N/A

βγ

$$MDA = \frac{\frac{2.71}{1} + 3.29\left(\frac{54}{10} + \frac{54}{1}\right)^{1/2}}{.22 \ (N/A \ / \ 100 \ cm2)}$$

MDA = 128 dpm/100cm²

METER_____ SERIAL #:_____

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100 \ cm2)}$$

MDA = N _____

METER_____ SERIAL #:_____ A

TS:_____ TB:_____ RB:_____ EFF:_____ PROBE SIZE:_____

$$MDA = \frac{2.71 + 3.29(____ + ____)^{1/2}}{(\quad / 100 \ cm2)}$$

MDA = _____

Technician: Karen Cray Date: 7/29/94

Reviewed by: P. Deep Date: 7-29-94

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

CANBERRA SPECTRAN-AT V4.2a

Nuclet Corporation, Devore, PA 18-AUG-94 09:49:53

A N A L Y S I S P A R A M E T E R S

ADC Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0103
Measured by: kc

Sample Description: C.S.A Trench
Geometry Description: 500 ML MARINELLI
Sample Size: 7.4430E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 04-AUG-94 at 10:04:43

COLLECT Live Time: 600. seconds
Real Time: 601. seconds
Dead Time: 0.17 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 04-AUG-94
Efficiency Calibration performed 02-JUN-94

[illegible] Consortium, Revere, PA 18-AUG-94 09:49:53

PEAK ANALYSIS

Peak	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	372.05	186.30	1.2	188.	154.	16.5	U-235,RA-226
2	477.93	238.94	1.5	129.	140.	11.6	PB-212
3	493.91	242.02	1.5	110.	163.	11.0	PB-214
4	590.77	295.77	1.4	76.	248.	8.3	PB-214
5	704.01	351.99	1.2	73.	479.	5.4	BI-211,PB-214
6	1165.64	582.85	1.4	9.	39.	19.6	TL-208
7	1218.68	608.85	1.3	36.	323.	6.3	XE-135,BI-214
8	1537.24	767.97	1.1	10.	41.	19.3	BI-214
9	1972.39	985.78	2.0	4.	9.	48.7	
10	2240.60	1119.44	2.4	4.	66.	13.3	BI-214
11	2476.98	1237.62	2.5	7.	18.	32.4	BI-214,CO-56
12	2922.59	1460.47	2.3	6.	32.	22.7	K-40
13	3529.68	1764.23	1.7	5.	31.	22.0	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

0 - Multiplet Analysis converged normally

[illegible] Sample
[illegible] collected on [illegible]-AUG-94 at 10:04:43
[illegible] 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram Measured	Error	Decay corrected	Error
[illegible]-241	LLD<6.08E-01		LLD<6.08E-01	
[illegible]-234	LLD<6.19E+00		LLD<6.19E+00	
[illegible]-230	LLD<7.11E+01		LLD<7.11E+01	
[illegible]-133	LLD<9.64E-01		LLD<9.64E-01	
[illegible]-109	LLD<8.14E+00		LLD<8.14E+00	
[illegible]-57	LLD<3.74E-01		LLD<3.74E-01	
[illegible]-234	LLD<1.61E+00		LLD<1.61E+00	
CE-144	LLD<2.97E+00		LLD<2.97E+00	
TC-99M	LLD<4.08E-01		LLD<4.08E-01	
CE-141	LLD<6.98E-01		LLD<6.98E-01	
KR-85M	LLD<5.09E-01		LLD<5.09E-01	
XE-131M	LLD<1.87E+01		LLD<1.87E+01	
BA-139	LLD<2.21E+00		LLD<2.21E+00	
CE-139	LLD<4.49E-01		LLD<4.49E-01	
U-235	LLD<7.22E-01		LLD<7.22E-01	
RA-226	1.98E+01	+- 3.27E+00	1.98E+01	+- 3.27E+00
BA-141	LLD<9.08E-01		LLD<9.08E-01	
KR-89	LLD<3.83E+00		LLD<3.83E+00	
T[illegible]-32	LLD<4.18E-01		LLD<4.18E-01	
XE-133M	LLD<3.47E+00		LLD<3.47E+00	
PB-212	1.53E+00	+- 1.78E-01	1.53E+00	+- 1.78E-01
RA-224	LLD<8.41E+00		LLD<8.41E+00	
XE-135	LLD<3.56E-01		LLD<3.56E-01	
XE-138	LLD<1.14E+00		LLD<1.14E+00	
SE-75	LLD<4.58E-01		LLD<4.58E-01	
NP-239	LLD<2.28E+00		LLD<2.28E+00	
HG-203	LLD<3.70E-01		LLD<3.70E-01	
IR-192	LLD<3.45E-01		LLD<3.45E-01	
CR-51	LLD<2.90E+00		LLD<2.90E+00	
PI-211	7.99E+01	+- 4.34E+00	7.99E+01	+- 4.34E+00
PB-214	9.33E+00	+- 5.07E-01	9.33E+00	+- 5.07E-01
SA-133	LLD<1.09E+00		LLD<1.09E+00	
I-131	LLD<3.31E-01		LLD<3.31E-01	
SN-113	LLD<4.41E-01		LLD<4.41E-01	
SR-97	LLD<6.69E-01		LLD<6.69E-01	
PB-211	LLD<1.12E+01		LLD<1.12E+01	
AU-198	LLD<3.05E-01		LLD<3.05E-01	
SB-125	LLD<1.04E+00		LLD<1.04E+00	
BI-212	LLD<9.09E+01		LLD<9.09E+01	
BE-7	LLD<2.53E+00		LLD<2.53E+00	
HF-181	LLD<3.35E-01		LLD<3.35E-01	
RU-103	LLD<2.79E-01		LLD<2.79E-01	
KR-85	LLD<7.05E+01		LLD<7.05E+01	
[illegible]-95	LLD<3.08E-01		LLD<3.08E-01	
[illegible]-[illegible]3	LLD<3.34E-01		LLD<3.34E-01	
BA-140	LLD<1.16E+00		LLD<1.16E+00	

[illegible]	LLD<3.[illegible]E-01		LLD<3.[illegible]E-01	
[illegible]	LLD<1.[illegible]E-00		LLD<1.[illegible]E-00	
[illegible]	LLD<3.[illegible]E-01		LLD<3.49E-01	
[illegible]	LLD<1.[illegible]E+00		LLD<1.25E+00	
[illegible]-214	9.25E+00	+- 5.91E-01	9.25E+00	+- 5.91E-01
[illegible]06	LLD<2.73E+00		LLD<2.73E+00	
[illegible]12	LLD<5.88E-01		LLD<5.88E-01	
AE-110M	LLD<2.89E-01		LLD<2.89E-01	
N9-97	LLD<3.04E-01		LLD<3.04E-01	
[illegible]B-137	LLD<3.38E-01		LLD<3.38E-01	
[illegible]-72	LLD<3.72E-01		LLD<3.72E-01	
[illegible]-137	LLD<1.09E+00		LLD<1.09E+00	
[illegible]R-97	LLD<3.59E-01		LLD<3.59E-01	
[illegible]-95	LLD<6.33E-01		LLD<6.33E-01	
[illegible]-88	LLD<4.54E-01		LLD<4.54E-01	
[illegible]-210	LLD<1.77E+00		LLD<1.77E+00	
[illegible]-98	LLD<3.57E-01		LLD<3.57E-01	
CS-136	LLD<3.43E-01		LLD<3.43E-01	
MN-54	LLD<4.12E-01		LLD<4.12E-01	
[illegible]-56	LLD<3.27E-01		LLD<3.27E-01	
I-134	LLD<3.43E-01		LLD<3.43E-01	
TL-207	LLD<2.49E+02		LLD<2.49E+02	
Y-88	LLD<3.47E-01		LLD<3.47E-01	
AC-228	LLD<1.72E+00		LLD<1.72E+00	
EU-152	LLD<3.13E+00		LLD<3.13E+00	
PA-234M	LLD<3.42E+00		LLD<3.42E+00	
SR-91	LLD<1.25E+00		LLD<1.25E+00	
RB-89	LLD<7.05E-01		LLD<7.05E-01	
FE-59	LLD<6.02E-01		LLD<6.02E-01	
ZN-65	LLD<2.09E+00		LLD<2.09E+00	
SC-46	LLD<6.29E-01		LLD<6.29E-01	
[illegible]82	LLD<1.74E+00		LLD<1.74E+00	
I-135	LLD<1.38E+00		LLD<1.38E+00	
CL-39	LLD<1.14E+00		LLD<1.14E+00	
NA-22	LLD<4.01E-01		LLD<4.01E-01	
AR-41	LLD<5.05E-01		LLD<5.05E-01	
CO-60	LLD<3.96E-01		LLD<3.96E-01	
NA-24	LLD<3.40E-01		LLD<3.40E-01	
SR-92	LLD<4.99E-01		LLD<4.99E-01	
CS-138	LLD<5.78E-01		LLD<5.78E-01	
K-40	6.84E+00	+- 1.55E+00	6.84E+00	+- 1.55E+00
KR-88	LLD<3.49E+00		LLD<3.49E+00	
TL-209	LLD<9.39E-01		LLD<9.39E-01	
LA-140	LLD<4.29E-01		LLD<4.29E-01	
NA-26	LLD<2.81E-01		LLD<2.81E-01	
MN-56	LLD<2.72E-01		LLD<2.72E-01	
RB-88	LLD<2.73E+00		LLD<2.73E+00	
Total	1.27E+02	+- 5.70E+00	1.27E+02	+- 5.70E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS [illegible] IN ANA. FILE

Channel error	Energy keV	Net Area counts	Error %	Gamma/sec
[illegible]27.91	342.02	163	11.0	2.21E+01
[illegible]4.44	582.35	39.	19.6	1.16E+01
[illegible]37.26	767.97	41.	19.3	1.56E+01
1972.39	985.38	9.	48.7	4.19E+00
2476.99	1277.60	19.	32.4	1.02E+01

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

TENNELEC SPECTRAN-AT V4.2a

[illegible] Corporation, Severna, MD 24-AUG-94 19:26:26

A N A L Y S I S P A R A M E T E R S

ADC Unit Number: 1 / ADC Unit Number: 1.0
Geometry Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First Channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0104
Measured by: KC

Sample Description: C.S.A CLEAN SOIL FRD
Geometry Description: 500 ML MARINELLI
Sample Size: 4.9580E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 26-JUL-94 at 12:25:00

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

[illegible] Germanium Series PA 24-AUG-94 19:26:26

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

	Centroid channel	Energy kev	FWHM kev	Backgrd counts	Net Area counts	Error %	Nuclides
1	417.74	207.08	0.8	17.	20.	37.2	
2	472.09	236.20	1.2	48.	72.	19.2	
3	574.17	297.11	0.7	6.	13.	38.5	GA-73
4	668.37	334.13	2.1	7.	21.	28.8	NP-239
5*	696.71	348.29	0.9	6.	46.	18.3	
6	1154.50	576.78	2.2	7.	27.	24.2	
7	1803.01	900.64	1.6	0.	26.	19.6	
8	1917.34	957.76	1.2	3.	16.	30.3	
9	2890.66	1444.26	2.5	0.	61.	12.8	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

* - Multiplet Analysis Terminated because of no CHI-SQ improvement

Detect Corporation, Revere, PA 24-AUG-94 19:26:06

Sample: U.S.A CLEAN SOIL PRO
[illegible] collected on 24-JUL-94 at 12:25:00
[illegible]ved to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
[illegible]M-241	LLD<3.53E-01		LLD<3.53E-01	
[illegible]-234	LLD<4.05E+00		LLD<4.05E+00	
[illegible]-230	LLD<4.45E+01		LLD<4.45E+01	
[illegible]E-133	LLD<6.53E-01		LLD<6.53E-01	
CD-109	LLD<6.30E+00		LLD<6.30E+00	
CO-57	LLD<2.08E-01		LLD<2.08E-01	
PA-234	LLD<1.02E+00		LLD<1.02E+00	
CE-144	LLD<2.11E+00		LLD<2.11E+00	
TC-99M	LLD<2.36E-01		LLD<2.36E-01	
CE-141	LLD<4.25E-01		LLD<4.25E-01	
KR-85M	LLD<2.98E-01		LLD<2.98E-01	
XE-131M	LLD<1.04E+01		LLD<1.04E+01	
BA-139	LLD<1.20E+00		LLD<1.20E+00	
CE-139	LLD<2.44E-01		LLD<2.44E-01	
U-235	LLD<4.26E-01		LLD<4.26E-01	
RA-226	LLD<7.19E+00		LLD<7.19E+00	
[illegible]41	LLD<5.78E-01		LLD<5.78E-01	
[illegible]89	LLD<2.13E+00		LLD<2.13E+00	
TE-132	LLD<1.93E-01		LLD<1.93E-01	
XE-133M	LLD<4.17E+00		LLD<4.17E+00	
PB-212	1.17E+00	+- 2.25E-01	1.17E+00	+- 2.25E-01
TH-227	LLD<2.31E+00		LLD<2.31E+00	
RA-224	LLD<1.12E+01		LLD<1.12E+01	
XE-135	LLD<2.31E-01		LLD<2.31E-01	
XE-138	LLD<8.44E-01		LLD<8.44E-01	
SE-75	LLD<4.04E-01		LLD<4.04E-01	
NP-239	LLD<1.33E+00		LLD<1.33E+00	
HG-203	LLD<2.57E-01		LLD<2.57E-01	
IR-192	LLD<2.68E-01		LLD<2.68E-01	
CR-51	LLD<1.98E+00		LLD<1.98E+00	
SI-211	LLD<8.15E+00		LLD<8.15E+00	
PB-214	LLD<9.65E-01		LLD<9.65E-01	
BA-133	LLD<3.36E-01		LLD<3.36E-01	
I-131	LLD<2.60E-01		LLD<2.60E-01	
SN-113	LLD<3.32E-01		LLD<3.32E-01	
KR-87	LLD<5.22E-01		LLD<5.22E-01	
PB-211	LLD<9.45E+00		LLD<9.45E+00	
AU-198	LLD<2.18E-01		LLD<2.18E-01	
SB-125	LLD<7.65E-01		LLD<7.65E-01	
BI-212	LLD<5.54E+01		LLD<5.54E+01	
BE-7	LLD<2.14E+00		LLD<2.14E+00	
HF-181	LLD<2.76E-01		LLD<2.76E-01	
[illegible]03	LLD<2.91E-01		LLD<2.91E-01	
KR-85	LLD<5.30E+01		LLD<5.30E+01	
SR-85	LLD<2.32E-01		LLD<2.32E-01	
I-133	LLD<2.78E-01		LLD<2.78E-01	

[illegible]-14[illegible]	LLD<[illegible].17E-[illegible]		LLD<[illegible].17E-01	
[illegible]-[illegible]M	LLD<2.77E-01		LLD<2.73E-01	
[illegible]-[illegible]7	LLD<3.1[illegible]E-01		LLD<3.13E-01	
[illegible]-[illegible]08	LLD<1.[illegible]E+00		LLD<1.32E+00	
[illegible]-214	LLD<9.00E-01		LLD<9.00E-01	
[illegible]-[illegible]24	LLD<3.60E-01		LLD<3.60E-01	
[illegible]-[illegible]34	LLD<3.51E-01		LLD<3.51E-01	
[illegible]U-106	LLD<3.06E+00		LLD<3.06E+00	
[illegible]-142	LLD<6.09E-01		LLD<6.09E-01	
[illegible]-110M	LLD<3.36E-01		LLD<3.36E-01	
[illegible]B-97	LLD<3.03E-01		LLD<3.03E-01	
[illegible]-177	LLD<3.32E-01		LLD<3.32E-01	
[illegible]-[illegible]7E	LLD<3.11E-01		LLD<3.11E-01	
[illegible]-187	LLD<1.07E+00		LLD<1.07E+00	
[illegible]-97	LLD<3.02E-01		LLD<3.02E-01	
[illegible]R-95	LLD<4.45E-01		LLD<4.45E-01	
[illegible]-95	LLD<3.14E-01		LLD<3.14E-01	
[illegible]L-210	LLD<2.08E+00		LLD<2.08E+00	
[illegible]-58	LLD<3.08E-01		LLD<3.08E-01	
[illegible]8-136	LLD<2.65E-01		LLD<2.65E-01	
[illegible]N-54	LLD<2.82E-01		LLD<2.82E-01	
[illegible]O-56	LLD<2.95E-01		LLD<2.95E-01	
[illegible]-134	LLD<3.47E-01		LLD<3.47E-01	
[illegible]L-207	LLD<4.58E+02		LLD<4.58E+02	
[illegible]-98	LLD<6.21E-01		LLD<6.21E-01	
[illegible]AC-228	2.24E+00	+- 4.39E-01	2.24E+00	+- 4.39E-01
[illegible]U-152	LLD<3.38E+00		LLD<3.38E+00	
[illegible]A-234M	LLD<4.47E+00		LLD<4.47E+00	
[illegible]R-91	LLD<1.03E+00		LLD<1.03E+00	
[illegible]B-89	LLD<9.07E-01		LLD<9.07E-01	
[illegible]E-59	LLD<5.67E-01		LLD<5.67E-01	
[illegible] 5	LLD<8.14E-01		LLD<8.14E-01	
[illegible]O-46	LLD<3.65E-01		LLD<3.65E-01	
[illegible]A-182	LLD<9.27E-01		LLD<9.27E-01	
[illegible]-135	LLD<1.48E+00		LLD<1.48E+00	
[illegible]L-39	LLD<7.57E-01		LLD<7.57E-01	
[illegible]A-22	LLD<4.28E-01		LLD<4.28E-01	
[illegible]R-41	LLD<5.24E-01		LLD<5.24E-01	
[illegible]O-60	LLD<3.01E-01		LLD<3.01E-01	
[illegible]A-24	LLD<4.50E-01		LLD<4.50E-01	
[illegible]R-92	LLD<2.27E-01		LLD<2.27E-01	
[illegible]S-138	LLD<4.83E-01		LLD<4.83E-01	
[illegible]-40	1.96E+01	+- 2.52E+00	1.96E+01	+- 2.52E+00
[illegible]R-88	LLD<4.21E+00		LLD<4.21E+00	
[illegible]L-209	LLD<7.20E-01		LLD<7.20E-01	
[illegible]A-140	LLD<2.84E-01		LLD<2.84E-01	
[illegible]L-26	LLD<1.09E-01		LLD<1.09E-01	
[illegible]N-56	LLD<4.08E-01		LLD<4.08E-01	
[illegible]B-98	LLD<1.37E+00		LLD<1.37E+00	
Total	2.30E+01	+- 2.57E+00	2.30E+01	+- 2.57E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Interpol. Channel	Energy keV	Net Area Counts	Error %	Gammas/sec
[illegible]3.74	207.08	20.	37.2	2.47E+00
394.17	397.11	17.	38.5	2.01E+00
669.37	334.17	21.	28.9	3.61E+00
696.7[illegible]	748.25	46.	18.3	8.03E+00
1134.30	874.78	27.	24.2	8.04E+00
1217.34	987.76	16.	30.3	7.36E+00

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

CANBERRA SPECTRAN-AT V4.2a

Chemet Corporation, Revere, PA 24-AUG-94 19:31:26

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Scalar Output.
Analysis of Spectrum saved in Disk File SD0105
Measured by: kc

Sample Description: Random Sample from T
Geometry Description: 500 ML MARINELLI
Sample Size: 6.9870E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 12:56:41

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

[illegible] Corporation, Revere, PA 24-AUG-94 19:31:24

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

PK	Centroid channel	Energy keV	FWHM keV	Backgrd counts	Net Area counts	Error %	Nuclides
1D	132.34	76.69	1.0	67.	43.	34.9	
2	471.01	231.06	1.7	69.	91.	19.7	
3	584.14	292.10	1.4	30.	25.	40.0	
4	676.43	348.13	1.8	12.	69.	14.2	
5	1009.65	504.46	0.6	8.	14.	42.0	
6	1154.22	576.64	1.4	7.	37.	19.7	
7C	1205.68	602.33	2.6	12.	45.	19.8	SB-124
8	2890.03	1443.94	1.2	1.	95.	10.5	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

C - Multiplet Analysis converged normally

[illegible] Corporation, Devens, MA 24-AUG-94 19:31:36

[illegible] Random Sample from T
Data collected on 23-JUL-94 at 12:56:41
[illegible]ved to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCi /gram Measured	Error	Decay corrected	Error
[illegible]-241	LLD<3.27E-01		LLD<3.27E-01	
[illegible]-234	LLD<3.70E+00		LLD<3.70E+00	
[illegible]-230	LLD<4.35E+01		LLD<4.35E+01	
[illegible]-233	LLD<6.17E-01		LLD<6.17E-01	
[illegible]-109	LLD<4.64E+00		LLD<4.64E+00	
[illegible]-97	LLD<1.82E-01		LLD<1.82E-01	
PA-234	LLD<7.63E-01		LLD<7.63E-01	
CE-144	LLD<1.60E+00		LLD<1.60E+00	
TC-99M	LLD<2.11E-01		LLD<2.11E-01	
CE-141	LLD<3.91E-01		LLD<3.91E-01	
KR-85M	LLD<2.43E-01		LLD<2.43E-01	
XE-131M	LLD<8.71E+00		LLD<8.71E+00	
CA-139	LLD<1.16E+00		LLD<1.16E+00	
CE-139	LLD<2.35E-01		LLD<2.35E-01	
U-235	LLD<3.50E-01		LLD<3.50E-01	
RA-226	LLD<5.79E+00		LLD<5.79E+00	
BA-141	LLD<4.88E-01		LLD<4.88E-01	
K-[illegible]9	LLD<2.21E+00		LLD<2.21E+00	
TE-132	LLD<2.05E-01		LLD<2.05E-01	
XE-133M	LLD<3.50E+00		LLD<3.50E+00	
PB-212	9.33E-01	+- 1.84E-01	9.33E-01	+- 1.84E-01
TH-227	LLD<1.25E+00		LLD<1.25E+00	
RA-224	LLD<9.40E+00		LLD<9.40E+00	
XE-135	LLD<2.12E-01		LLD<2.12E-01	
XE-138	LLD<7.83E-01		LLD<7.83E-01	
SE-75	LLD<3.64E-01		LLD<3.64E-01	
NP-239	LLD<1.31E+00		LLD<1.31E+00	
HG-203	LLD<2.48E-01		LLD<2.48E-01	
IR-192	LLD<1.91E-01		LLD<1.91E-01	
CR-51	LLD<1.64E+00		LLD<1.64E+00	
[illegible]-211	LLD<6.79E+00		LLD<6.79E+00	
PB-214	1.41E+00	+- 2.00E-01	1.41E+00	+- 2.00E-01
BA-133	LLD<3.16E-01		LLD<3.16E-01	
I-131	LLD<2.42E-01		LLD<2.42E-01	
IN-113	LLD<2.92E-01		LLD<2.92E-01	
KR-87	LLD<4.67E-01		LLD<4.67E-01	
PB-21[illegible]	LLD<7.71E+00		LLD<7.71E+00	
AU-198	LLD<2.12E-01		LLD<2.12E-01	
SB-125	LLD<5.55E-01		LLD<5.55E-01	
TI-212	LLD<5.98E+01		LLD<5.98E+01	
BE-7	LLD<1.84E+00		LLD<1.84E+00	
HF-181	LLD<2.37E-01		LLD<2.37E-01	
R[illegible]03	LLD<1.79E-01		LLD<1.79E-01	
[illegible]5	LLD<5.33E+01		LLD<5.33E+01	
[illegible]R-85	LLD<2.33E-01		LLD<2.33E-01	
I-133	LLD<2.21E-01		LLD<2.21E-01	

[illegible]-91M	LLD<2.81E-01			LLD<7.44E-01	
[illegible]-207	LLD<[illegible].98E-01			LLD<2.50E-01	
[illegible]-133	LLD<1.01E+00			LLD<7.08E-01	
[illegible]-214	LLD<9.28E-01			LLD<1.01E+00	
[illegible]-24	LLD<3.71E-01			LLD<9.28E-01	
[illegible]-134	LLD<3.77E-01			LLD<3.71E-01	
RU-106	LLD<2.21E+00			LLD<3.77E-01	
LA-142	LLD<4.29E-01			LLD<2.21E+00	
AG-110M	LLD<2.95E-01			LLD<4.29E-01	
SB-77	LLD<3.00E-01			LLD<2.95E-01	
CS-137	LLD<2.91E-01			LLD<3.00E-01	
I-132	LLD<2.41E-01			LLD<2.91E-01	
W-187	LLD<7.14E-01			LLD<2.41E-01	
IR-97	LLD<3.03E-01			LLD<7.14E-01	
ZR-95	LLD<4.49E-01			LLD<3.03E-01	
NB-95	LLD<2.68E-01			LLD<4.49E-01	
TL-210	LLD<1.35E+00			LLD<2.68E-01	
CO-58	LLD<2.54E-01			LLD<1.35E+00	
CS-136	LLD<3.01E-01			LLD<2.54E-01	
MN-54	LLD<3.00E-01			LLD<3.01E-01	
CO-56	LLD<2.98E-01			LLD<3.00E-01	
I-134	LLD<3.33E-01			LLD<2.98E-01	
TL-207	LLD<4.18E+02			LLD<3.33E-01	
Y-88	LLD<5.66E-01			LLD<4.18E+02	
AC-228	LLD<1.54E+00			LLD<5.66E-01	
EU-152	LLD<2.63E+00			LLD<1.54E+00	
PA-234M	LLD<3.86E+00			LLD<2.63E+00	
SR-91	LLD<9.21E-01			LLD<3.86E+00	
RB-89	LLD<9.03E-01			LLD<9.21E-01	
FE-59	LLD<4.80E-01			LLD<9.03E-01	
Z[illegible]-5	LLD<6.91E-01			LLD<4.80E-01	
SC-46	LLD<3.16E-01			LLD<6.91E-01	
TA-182	LLD<9.28E-01			LLD<3.16E-01	
I-135	LLD<1.30E+00			LLD<9.28E-01	
CL-39	LLD<8.71E-01			LLD<1.30E+00	
NA-22	LLD<3.72E-01			LLD<8.71E-01	
AR-41	LLD<2.81E-01			LLD<3.72E-01	
CO-60	LLD<2.48E-01			LLD<2.81E-01	
NA-24	LLD<2.36E-01			LLD<2.48E-01	
SR-92	LLD<2.98E-01			LLD<2.36E-01	
CS-138	LLD<4.64E-01			LLD<2.98E-01	
K-40	2.16E+01	+- 2.27E+00		LLD<4.64E-01	
KR-88	LLD<6.43E-01			2.16E+01	+- 2.27E+00
TL-209	LLD<8.58E-01			LLD<6.43E-01	
LA-140	LLD<2.95E-01			LLD<8.58E-01	
AL-26	LLD<1.71E-01			LLD<2.95E-01	
MN-56	LLD<6.41E-01			LLD<1.71E-01	
RB-88	LLD<9.71E-01			LLD<6.41E-01	
				LLD<9.71E-01	
Total	2.40E+01	+- 2.29E+00		2.40E+01	+- 2.29E+00

Error Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Channel	Energy keV	Net Area counts	Error %	Gammas/sec
[illegible]	7[illegible].69	43.	74.9	2.33E+00
1109.65	504.45	14.	42.0	3.72E+00
1154.22	576.64	37.	19.7	1.02E+01
1205.68	602.33	43.	19.8	1.36E+01

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

CANBERRA SPECTRAN-AT V4.2a

Nuclear Corporation Revere, PA 24-AUG-94 19:36:47

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0106
Measured by: kc

Sample Description: "Clean Pile" Random
Geometry Description: 500 ML MARINELLI
Sample Size: 7.6660E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 13:16:22

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.04	236.17	1.4	65.	80.	18.5	
2	583.92	291.99	2.2	23.	62.	17.6	
3	696.13	348.01	1.6	10.	89.	11.8	
4	1153.76	576.41	0.9	10.	41.	19.8	
5C	1204.12	601.55	0.9	5.	23.	29.6	
6C	1206.59	602.78	0.9	5.	47.	20.1	SB-124
7	1802.91	900.59	1.4	5.	17.	31.6	
8	2890.91	1444.38	2.5	0.	95.	10.3	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

C - Multiplet Analysis converged normally

Tacit Decontamination, Severn, PA 24-AUG-94 19:36:47

Sample: 'Clean Pile' Random
Data collected on 29-JUL-94 at 13:16:22
Given to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram Measured	Error	Decay corrected	Error
[illegible]-241	LLD<3.43E-01		LLD<3.43E-01	
TH-234	LLD<3.49E+00		LLD<3.49E+00	
[illegible]-230	LLD<3.94E+01		LLD<3.94E+01	
XE-133	LLD<4.94E-01		LLD<4.94E-01	
PD-109	LLD<4.67E+00		LLD<4.67E+00	
CO-57	LLD<1.94E-01		LLD<1.94E-01	
PA-234	LLD<7.87E-01		LLD<7.87E-01	
CE-144	LLD<1.86E+00		LLD<1.86E+00	
TC-99M	LLD<2.12E-01		LLD<2.12E-01	
CE-141	LLD<3.63E-01		LLD<3.63E-01	
KR-85M	LLD<2.39E-01		LLD<2.39E-01	
XE-131M	LLD<9.60E+00		LLD<9.60E+00	
BA-139	LLD<1.25E+00		LLD<1.25E+00	
CE-139	LLD<2.53E-01		LLD<2.53E-01	
U-235	LLD<2.72E-01		LLD<2.72E-01	
RA-226	LLD<5.76E+00		LLD<5.76E+00	
PR-141	LLD<4.64E-01		LLD<4.64E-01	
[illegible]-89	LLD<2.09E+00		LLD<2.09E+00	
TE-132	LLD<2.24E-01		LLD<2.24E-01	
XE-133M	LLD<3.38E+00		LLD<3.38E+00	
PB-212	8.38E-01	+- 1.55E-01	8.38E-01	+- 1.55E-01
TH-227	LLD<1.35E+00		LLD<1.35E+00	
RA-224	LLD<8.85E+00		LLD<8.85E+00	
XE-135	LLD<1.92E-01		LLD<1.92E-01	
XE-138	LLD<6.28E-01		LLD<6.28E-01	
SE-75	LLD<3.07E-01		LLD<3.07E-01	
NP-239	LLD<1.37E+00		LLD<1.37E+00	
HG-203	LLD<2.66E-01		LLD<2.66E-01	
IR-192	LLD<2.00E-01		LLD<2.00E-01	
CR-51	LLD<1.63E+00		LLD<1.63E+00	
BI-211	LLD<6.43E+00		LLD<6.43E+00	
PB-214	1.66E+00	+- 1.96E-01	1.66E+00	+- 1.96E-01
BA-133	LLD<2.53E-01		LLD<2.53E-01	
I-131	LLD<2.18E-01		LLD<2.18E-01	
SN-113	LLD<2.47E-01		LLD<2.47E-01	
KR-87	LLD<4.04E-01		LLD<4.04E-01	
PB-211	LLD<6.77E+00		LLD<6.77E+00	
AU-198	LLD<2.11E-01		LLD<2.11E-01	
SB-125	LLD<6.92E-01		LLD<6.92E-01	
BI-212	LLD<6.30E+01		LLD<6.30E+01	
BE-7	LLD<1.61E+00		LLD<1.61E+00	
HF-181	LLD<2.16E-01		LLD<2.16E-01	
[illegible]-103	LLD<2.14E-01		LLD<2.14E-01	
[illegible]-85	LLD<3.79E+01		LLD<3.79E+01	
SR-85	LLD<1.66E-01		LLD<1.66E-01	
[illegible]-133	LLD<2.75E-01		LLD<2.75E-01	

[illegible]	[illegible]		[illegible]	
[illegible]	LLD<2.48E-01		LLD<2.48E-01	
[illegible]	[illegible]		LLD<2.12E-01	
[illegible]	[illegible]		LLD<9.17E-01	
[illegible]-214	LLD<9.67E-01		LLD<9.67E-01	
[illegible]34	LLD<3.87E-01		LLD<3.87E-01	
[illegible]34	LLD<4.14E-01		LLD<4.14E-01	
RU-106	LLD<2.55E+00		LLD<2.55E+00	
LA-142	LLD<4.22E-01		LLD<4.22E-01	
AG-110M	LLD<3.02E-01		LLD<3.02E-01	
NB-97	LLD<2.94E-01		LLD<2.94E-01	
CS-137	LLD<2.63E-01		LLD<2.63E-01	
I-132	LLD<2.52E-01		LLD<2.52E-01	
[illegible]-187	LLD<7.84E-01		LLD<7.84E-01	
[illegible]R-97	LLD<2.69E-01		LLD<2.69E-01	
[illegible]R-95	LLD<5.61E-01		LLD<5.61E-01	
[illegible]-95	LLD<2.40E-01		LLD<2.40E-01	
TL-210	LLD<1.52E+00		LLD<1.52E+00	
[illegible]-58	LLD<2.42E-01		LLD<2.42E-01	
CS-136	LLD<2.88E-01		LLD<2.88E-01	
MN-54	LLD<3.09E-01		LLD<3.09E-01	
CO-56	LLD<2.39E-01		LLD<2.39E-01	
I-134	LLD<2.81E-01		LLD<2.81E-01	
TL-207	LLD<3.31E+02		LLD<3.31E+02	
Y-88	LLD<4.49E-01		LLD<4.49E-01	
AC-228	9.73E-01	+- 3.07E-01	9.73E-01	+- 3.07E-01
EU-152	LLD<2.18E+00		LLD<2.18E+00	
PA-234M	LLD<2.43E+00		LLD<2.43E+00	
SR-91	LLD<9.43E-01		LLD<9.43E-01	
RB-89	LLD<7.35E-01		LLD<7.35E-01	
FE-59	LLD<6.48E-01		LLD<6.48E-01	
ZN-65	LLD<6.16E-01		LLD<6.16E-01	
SC-46	LLD<2.92E-01		LLD<2.92E-01	
TA-182	LLD<8.87E-01		LLD<8.87E-01	
I-135	LLD<1.66E+00		LLD<1.66E+00	
CL-39	LLD<8.36E-01		LLD<8.36E-01	
NA-22	LLD<4.06E-01		LLD<4.06E-01	
AR-41	LLD<3.01E-01		LLD<3.01E-01	
CO-60	LLD<2.64E-01		LLD<2.64E-01	
NA-24	LLD<2.30E-01		LLD<2.30E-01	
SR-92	LLD<6.62E-02		LLD<6.62E-02	
CS-138	LLD<4.23E-01		LLD<4.23E-01	
K-40	1.98E+01	+- 2.04E+00	1.98E+01	+- 2.04E+00
KR-88	LLD<5.86E-01		LLD<5.86E-01	
[illegible]-209	LLD<8.36E-01		LLD<8.36E-01	
LA-140	LLD<2.51E-01		LLD<2.51E-01	
NB-96	LLD<2.61E-01		LLD<2.61E-01	
MN-56	LLD<7.17E-01		LLD<7.17E-01	
KR-88	LLD<3.99E-01		LLD<3.99E-01	
Total	2.33E+01	+- 2.08E+00	2.33E+01	+- 2.08E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Interpolated channel	Energy keV	Net Area counts	Error %	Gamma/sec
75.74	874.41	41	19.9	1.20E+01
1204.12	601.85	31.	39.6	7.13E+00
1206.85	602.73	47.	29.1	1.42E+01

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

CANBERRA SPECTRAN-AT V4.2a

Cabot Corporation, Revere, PA 28-JUL-94 13:49:35

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0107
Measured by: KC

Sample Description: C.S.A. PIT 1, 2FT DO
Geometry Description: 500 ML MARINELLI
Sample Size: 7.5310E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANLOQQ

COLLECT started on 28-JUL-94 at 13:35:47

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

Dacon Corporation, Revere, PA 28-JUL-94 13:49:35

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

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	147.27	74.16	0.8	10.	12.	47.1	PB-214
2	236.01	118.42	1.2	12.	13.	50.4	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Cabot Corporation, Revere, PA 28-JUL-94 13:49:35

Sample: C.O.A. PIT 1, 2FT DC
Data collected on 28-JUL-94 at 13:35:47
Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
AM-241	LLD<1.61E-01		LLD<1.61E-01	
TH-234	LLD<1.51E+00		LLD<1.51E+00	
TH-230	LLD<1.70E+01		LLD<1.70E+01	
XE-133	LLD<2.01E-01		LLD<2.01E-01	
CD-109	LLD<2.43E+00		LLD<2.43E+00	
CO-57	LLD<1.06E-01		LLD<1.06E-01	
PA-234	LLD<3.94E-01		LLD<3.94E-01	
CE-144	LLD<7.85E-01		LLD<7.85E-01	
TC-99M	LLD<9.78E-02		LLD<9.78E-02	
CE-141	LLD<1.98E-01		LLD<1.98E-01	
KR-85M	LLD<1.20E-01		LLD<1.20E-01	
XE-131M	LLD<5.16E+00		LLD<5.16E+00	
BA-139	LLD<6.20E-01		LLD<6.20E-01	
CE-139	LLD<1.26E-01		LLD<1.26E-01	
U-235	LLD<1.92E-01		LLD<1.92E-01	
RA-226	LLD<3.26E+00		LLD<3.26E+00	
BA-141	LLD<2.51E-01		LLD<2.51E-01	
KR-89	LLD<9.95E-01		LLD<9.95E-01	
TE-132	LLD<6.14E-02		LLD<6.14E-02	
XE-133M	LLD<1.38E+00		LLD<1.38E+00	
PB-212	LLD<2.92E-01		LLD<2.92E-01	
RA-224	LLD<4.38E+00		LLD<4.38E+00	
XE-135	LLD<9.27E-02		LLD<9.27E-02	
XE-138	LLD<3.34E-01		LLD<3.34E-01	
SE-75	LLD<1.47E-01		LLD<1.47E-01	
NP-239	LLD<8.04E-01		LLD<8.04E-01	
HG-203	LLD<1.40E-01		LLD<1.40E-01	
IR-192	LLD<9.17E-02		LLD<9.17E-02	
CR-51	LLD<8.02E-01		LLD<8.02E-01	
BI-211	LLD<2.96E+00		LLD<2.96E+00	
PB-214	LLD<3.61E-01		LLD<3.61E-01	
BA-133	LLD<1.29E-01		LLD<1.29E-01	
I-131	LLD<9.81E-02		LLD<9.81E-02	
SN-113	LLD<1.25E-01		LLD<1.25E-01	
KR-87	LLD<2.48E-01		LLD<2.48E-01	
PB-211	LLD<4.02E+00		LLD<4.02E+00	
AU-198	LLD<1.17E-01		LLD<1.17E-01	
SB-125	LLD<3.07E-01		LLD<3.07E-01	
BI-212	LLD<3.72E+01		LLD<3.72E+01	
BE-7	LLD<1.08E+00		LLD<1.08E+00	
HF-181	LLD<9.15E-02		LLD<9.15E-02	
RU-103	LLD<1.19E-01		LLD<1.19E-01	
KR-85	LLD<2.40E+01		LLD<2.40E+01	
SR-85	LLD<1.05E-01		LLD<1.05E-01	
I-133	LLD<1.46E-01		LLD<1.46E-01	
BA-140	LLD<5.32E-01		LLD<5.32E-01	

BI-207	LLD<1.33E-01	LLD<1.33E-01
TL-208	LLD<4.00E-01	LLD<4.00E-01
SB-124	LLD<1.87E-01	LLD<1.87E-01
CS-134	LLD<1.83E-01	LLD<1.83E-01
BI-214	LLD<3.73E-01	LLD<3.73E-01
RU-106	LLD<1.32E+00	LLD<1.32E+00
LA-142	LLD<2.35E-01	LLD<2.35E-01
AG-110M	LLD<1.17E-01	LLD<1.17E-01
NB-97	LLD<1.18E-01	LLD<1.18E-01
CS-137	LLD<1.45E-01	LLD<1.45E-01
I-132	LLD<1.16E-01	LLD<1.16E-01
W-187	LLD<4.45E-01	LLD<4.45E-01
ZR-97	LLD<1.43E-01	LLD<1.43E-01
ZR-95	LLD<2.05E-01	LLD<2.05E-01
NB-95	LLD<3.69E-02	LLD<3.69E-02
TL-210	LLD<8.78E-01	LLD<8.78E-01
CO-58	LLD<1.21E-01	LLD<1.21E-01
CS-136	LLD<1.07E-01	LLD<1.07E-01
MN-54	LLD<1.59E-01	LLD<1.59E-01
CO-56	LLD<4.03E-02	LLD<4.03E-02
I-134	LLD<4.50E-02	LLD<4.50E-02
TL-207	LLD<1.63E+02	LLD<1.63E+02
Y-88	LLD<2.21E-01	LLD<2.21E-01
AC-228	LLD<5.78E-01	LLD<5.78E-01
EU-152	LLD<1.39E+00	LLD<1.39E+00
PA-234M	LLD<1.03E+00	LLD<1.03E+00
SR-91	LLD<1.45E-01	LLD<1.45E-01
RB-89	LLD<2.25E-01	LLD<2.25E-01
FE-59	LLD<3.03E-01	LLD<3.03E-01
ZN-65	LLD<2.20E-01	LLD<2.20E-01
SC-46	LLD<1.12E-01	LLD<1.12E-01
TA-182	LLD<3.21E-01	LLD<3.21E-01
I-135	LLD<6.94E-01	LLD<6.94E-01
CL-39	LLD<4.40E-01	LLD<4.40E-01
NA-22	LLD<1.74E-01	LLD<1.74E-01
AR-41	LLD<5.88E-02	LLD<5.88E-02
CO-60	LLD<5.77E-02	LLD<5.77E-02
NA-24	LLD<2.02E-01	LLD<2.02E-01
SR-92	LLD<6.74E-02	LLD<6.74E-02
CS-138	LLD<3.75E-01	LLD<3.75E-01
K-40	LLD<5.78E-01	LLD<5.78E-01
KR-88	LLD<5.97E-01	LLD<5.97E-01
TL-209	LLD<2.14E-01	LLD<2.14E-01
LA-140	LLD<6.87E-02	LLD<6.87E-02
AL-26	LLD<1.58E-01	LLD<1.58E-01
MN-56	LLD<5.95E-01	LLD<5.95E-01
RB-88	LLD<4.06E-01	LLD<4.06E-01
Total	0.00E-01 +- 0.00E-01	0.00E-01 +- 0.00E-01

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

Results saved in File SD0107

PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
147.27	74.16	12.	47.1	9.30E-01
236.01	118.42	13.	50.4	1.20E+00

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

CANBERRA SPECTRAN-AT V4.2a

Cantt Corporation, Revere, PA 24-AUG-94 19:42:24

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Tabular Output.
Analysis of Spectrum saved in Disk File SD0108
Measured by: KC

Sample Description: C.S.A. PIT 2, 2 FT D
Geometry Description: 500 ML MARINELLI
Sample Size: 7.7470E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 13:53:43

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

[illegible] Laboratories, Tavares, PA 24-AUG-94 19:42:24

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1D	472.22	276.26	1.2	20.	58.	20.0	
2	583.70	291.39	1.6	3.	34.	19.0	
3	694.67	348.06	1.7	2.	60.	13.4	
4	1174.93	574.74	1.5	3.	20.	25.6	
5	1204.98	601.93	1.1	1.	32.	19.5	
6	1990.99	1444.42	2.2	0.	31.	18.0	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

D -- Multiplet Analysis converged normally

[illegible] Terminal, [illegible], PA 24-AUG-94 19:42:24

Sample: 0.5 A, RIT 2, 2 FT D
[illegible] collected on 08-JUL-94 at 13:53:43
Delayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM			
	Measured	Error	Decay corrected	Error
AM-241	LLD<2.21E-01		LLD<2.21E-01	
TH-234	LLD<2.24E+00		LLD<2.24E+00	
TH-230	LLD<2.89E+01		LLD<2.89E+01	
XE-133	LLD<3.60E-01		LLD<3.60E-01	
ID-109	LLD<3.02E+00		LLD<3.02E+00	
CO-57	LLD<1.21E-01		LLD<1.21E-01	
PA-234	LLD<5.42E-01		LLD<5.42E-01	
CE-144	LLD<1.05E+00		LLD<1.05E+00	
TC-99M	LLD<1.34E-01		LLD<1.34E-01	
CE-141	LLD<2.87E-01		LLD<2.87E-01	
KR-85M	LLD<1.72E-01		LLD<1.72E-01	
XE-131M	LLD<5.91E+00		LLD<5.91E+00	
BA-139	LLD<7.62E-01		LLD<7.62E-01	
CE-139	LLD<1.55E-01		LLD<1.55E-01	
U-235	LLD<2.47E-01		LLD<2.47E-01	
RA-226	LLD<3.96E+00		LLD<3.96E+00	
[illegible].41	LLD<3.17E-01		LLD<3.17E-01	
KR-89	LLD<1.69E+00		LLD<1.69E+00	
TE-132	LLD<1.70E-01		LLD<1.70E-01	
XE-133M	LLD<2.57E+00		LLD<2.57E+00	
PB-212	6.02E-01	+- 1.21E-01	6.02E-01	+- 1.21E-01
TH-227	LLD<1.33E+00		LLD<1.33E+00	
RA-224	LLD<6.43E+00		LLD<6.43E+00	
XE-135	LLD<1.12E-01		LLD<1.12E-01	
XE-138	LLD<4.95E-01		LLD<4.95E-01	
SE-75	LLD<2.25E-01		LLD<2.25E-01	
NP-239	LLD<8.02E-01		LLD<8.02E-01	
HG-203	LLD<1.59E-01		LLD<1.59E-01	
IR-192	LLD<1.37E-01		LLD<1.37E-01	
CR-51	LLD<1.25E+00		LLD<1.25E+00	
DI-211	LLD<5.20E+00		LLD<5.20E+00	
PB-214	1.12E+00	+- 1.50E-01	1.12E+00	+- 1.50E-01
BA-133	LLD<1.70E-01		LLD<1.70E-01	
I-131	LLD<1.71E-01		LLD<1.71E-01	
SN-113	LLD<2.21E-01		LLD<2.21E-01	
KR-87	LLD<3.42E-01		LLD<3.42E-01	
PB-211	LLD<5.22E+00		LLD<5.22E+00	
AU-198	LLD<1.30E-01		LLD<1.30E-01	
SB-125	LLD<4.95E-01		LLD<4.95E-01	
PI-212	LLD<3.35E+01		LLD<3.35E+01	
BE-7	LLD<1.15E+00		LLD<1.15E+00	
HF-181	LLD<1.48E-01		LLD<1.48E-01	
R[illegible]-103	LLD<1.50E-01		LLD<1.50E-01	
KR-85	LLD<4.35E+01		LLD<4.35E+01	
SR-85	LLD<1.90E-01		LLD<1.90E-01	
I-133	LLD<1.63E-01		LLD<1.63E-01	

[illegible]	LLD<5.53E-01		LLD<5.53E-01		
[illegible]	LLD<1.62E-01		LLD<1.62E-01		
[illegible]	LLD<1.67E-01		LLD<1.67E-01		
[illegible]-109	LLD<6.44E-01		LLD<6.44E-01		
[illegible]214	LLD<6.02E-01		LLD<6.02E-01		
[illegible]125	LLD<2.49E-01		LLD<2.49E-01		
[illegible]-134	LLD<2.70E-01		LLD<2.70E-01		
RU-106	LLD<1.91E+00		LLD<1.91E+00		
LA-142	LLD<3.27E-01		LLD<3.27E-01		
AG-110M	LLD<1.40E-01		LLD<1.40E-01		
NB-97	LLD<1.41E-01		LLD<1.41E-01		
CS-137	LLD<2.02E-01		LLD<2.02E-01		
I-132	LLD<1.31E-01		LLD<1.31E-01		
[illegible]-187	LLD<6.33E-01		LLD<6.33E-01		
SR-87	LLD<2.05E-01		LLD<2.05E-01		
ZR-95	LLD<3.25E-01		LLD<3.25E-01		
NB-95	LLD<1.97E-01		LLD<1.97E-01		
TL-210	LLD<1.31E+00		LLD<1.31E+00		
CE-139	LLD<1.30E-01		LLD<1.30E-01		
CS-136	LLD<1.93E-01		LLD<1.93E-01		
MN-54	LLD<1.33E-01		LLD<1.33E-01		
CO-56	LLD<2.27E-01		LLD<2.27E-01		
I-134	LLD<2.65E-01		LLD<2.65E-01		
TL-207	LLD<2.28E+02		LLD<2.28E+02		
Y-88	LLD<3.08E-01		LLD<3.08E-01		
AC-228	LLD<8.98E-01		LLD<8.98E-01		
EU-152	LLD<1.69E+00		LLD<1.69E+00		
PA-234M	LLD<2.76E+00		LLD<2.76E+00		
SR-91	LLD<7.88E-01		LLD<7.88E-01		
RB-89	LLD<4.39E-01		LLD<4.39E-01		
F[illegible]59	LLD<4.64E-01		LLD<4.64E-01		
[illegible]65	LLD<3.73E-01		LLD<3.73E-01		
SC-46	LLD<1.76E-01		LLD<1.76E-01		
TA-182	LLD<5.04E-01		LLD<5.04E-01		
I-135	LLD<8.37E-01		LLD<8.37E-01		
CL-39	LLD<5.10E-01		LLD<5.10E-01		
NA-22	LLD<2.53E-01		LLD<2.53E-01		
AR-41	LLD<2.27E-01		LLD<2.27E-01		
CO-60	LLD<2.16E-01		LLD<2.16E-01		
NA-24	LLD<2.66E-01		LLD<2.66E-01		
SR-92	LLD<2.69E-01		LLD<2.69E-01		
CS-138	LLD<1.91E-01		LLD<1.91E-01		
K-40	6.39E+00	+- 1.15E+00	6.39E+00	+- 1.15E+00	
KR-88	LLD<5.80E-01		LLD<5.80E-01		
TL-209	LLD<2.08E-01		LLD<2.08E-01		
LA-140	LLD<1.48E-01		LLD<1.48E-01		
AL-26	LLD<1.54E-01		LLD<1.54E-01		
MN-56	LLD<5.78E-01		LLD<5.78E-01		
RB-88	LLD<3.95E-01		LLD<3.95E-01		
Total	8.11E+00	+- 1.17E+00	8.11E+00	+- 1.17E+00	

Error Quotation at 1.00 Sigma
Confidence Level at 95.0%

PEAKS USED IN ANALYSIS

Peak-Chan Channel	Energy keV	Net Area Counts	Error %	Gammas/sec
754.43	576.74	30.	25.6	5.92E+00
1204.39	801.97	32.	18.5	9.90E+00

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

CANBERRA SPECTRAN-AT V4.2a

Gaart Corporation, Revere, PA 24-AUG-94 19:54:10

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0109
Measured by: KC

Sample Description: C.S.A. PIT 3 1 FT DO
Geometry Description: 500 ML MARINELLI
Sample Size: 5.6750E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 14:21:13

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

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

	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	471.95	236.13	0.7	46.	93.	15.5	PB-212
2	649.33	324.64	1.3	3.	17.	29.3	
3N	669.30	334.85	0.6	13.	20.	35.4	
4	696.14	347.99	2.0	6.	26.	23.6	PB-214
5	926.07	462.75	0.6	2.	7.	44.8	CS-138
6	1010.06	504.67	1.2	8.	17.	36.0	TL-208
7	1153.87	576.46	2.0	6.	23.	27.1	
8	1205.00	601.99	2.0	1.	29.	19.2	BI-214
9	1437.68	718.17	2.6	2.	12.	34.1	
10	2890.43	1444.14	2.3	0.	63.	12.6	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

N - Multiplet Analysis did NOT converge

Test Corporation, Ravena, NY 24-AUG-94 19:54:10

Sample S.S.A. FIT 3 & FT DO
Data collected on 08-JUL-94 at 14:21:13
Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
AM-241	LLD<3.31E-01		LLD<3.31E-01	
TH-234	LLD<3.70E+00		LLD<3.70E+00	
TH-230	LLD<4.04E+01		LLD<4.04E+01	
GE-133	LLD<6.24E-01		LLD<6.24E-01	
CD-109	LLD<4.97E+00		LLD<4.97E+00	
CO-57	LLD<2.07E-01		LLD<2.07E-01	
PA-234	LLD<9.19E-01		LLD<9.19E-01	
CE-144	LLD<1.87E+00		LLD<1.87E+00	
TC-99M	LLD<2.21E-01		LLD<2.21E-01	
CE-141	LLD<4.24E-01		LLD<4.24E-01	
KR-85M	LLD<2.51E-01		LLD<2.51E-01	
XE-131M	LLD<9.54E+00		LLD<9.54E+00	
BA-139	LLD<1.26E+00		LLD<1.26E+00	
CE-139	LLD<2.56E-01		LLD<2.56E-01	
U-235	LLD<3.82E-01		LLD<3.82E-01	
RA-226	LLD<6.59E+00		LLD<6.59E+00	
BA-141	LLD<4.62E-01		LLD<4.62E-01	
KR-89	LLD<2.42E+00		LLD<2.42E+00	
I-132	LLD<2.17E-01		LLD<2.17E-01	
XE-133M	LLD<4.33E+00		LLD<4.33E+00	
PB-212	1.33E+00	+- 2.06E-01	1.33E+00	+- 2.06E-01
TH-227	LLD<1.51E+00		LLD<1.51E+00	
RA-224	LLD<1.12E+01		LLD<1.12E+01	
XE-135	LLD<2.08E-01		LLD<2.08E-01	
XE-138	LLD<7.21E-01		LLD<7.21E-01	
SE-75	LLD<3.45E-01		LLD<3.45E-01	
NP-239	LLD<1.36E+00		LLD<1.36E+00	
HG-203	LLD<2.62E-01		LLD<2.62E-01	
IR-192	LLD<2.29E-01		LLD<2.29E-01	
CR-51	LLD<1.78E+00		LLD<1.78E+00	
BI-211	LLD<6.37E+00		LLD<6.37E+00	
PB-214	LLD<6.84E-01		LLD<6.84E-01	
BA-133	LLD<2.78E-01		LLD<2.78E-01	
I-131	LLD<2.12E-01		LLD<2.12E-01	
SN-113	LLD<2.88E-01		LLD<2.88E-01	
KR-87	LLD<4.41E-01		LLD<4.41E-01	
PB-211	LLD<8.13E+00		LLD<8.13E+00	
AU-198	LLD<2.07E-01		LLD<2.07E-01	
SB-125	LLD<6.80E-01		LLD<6.80E-01	
BI-212	LLD<6.06E+01		LLD<6.06E+01	
BE-7	LLD<1.86E+00		LLD<1.86E+00	
HF-181	LLD<2.29E-01		LLD<2.29E-01	
RU-103	LLD<2.58E-01		LLD<2.58E-01	
KR-85	LLD<6.05E+01		LLD<6.05E+01	
S-35	LLD<2.64E-01		LLD<2.64E-01	
I-133	LLD<2.79E-01		LLD<2.79E-01	

[illegible]	LLD<[illegible]		LLD<[illegible]	
[illegible]	LLD<[illegible]		LLD<[illegible]	
[illegible]	[illegible]	+- 2.67E-01	[illegible]	+- 2.67E-01
[illegible]	LLD<[illegible]		LLD<[illegible]	
[illegible]	LLD<[illegible]		LLD<3.30E-01	
[illegible]	LLD<3.41E-01		LLD<3.41E-01	
[illegible]	LLD<2.94E+00		LLD<2.94E+00	
LA-142	LLD<6.12E-01		LLD<6.12E-01	
AG-110M	LLD<3.44E-01		LLD<3.44E-01	
NB-97	LLD<3.33E-01		LLD<3.33E-01	
CS-137	LLD<3.49E-01		LLD<3.49E-01	
I-132	LLD<2.72E-01		LLD<2.72E-01	
W-187	LLD<7.89E-01		LLD<7.89E-01	
CR-97	LLD<3.17E-01		LLD<3.17E-01	
ZR-95	LLD<7.31E-01		LLD<7.31E-01	
NP-95	LLD<1.95E-01		LLD<1.95E-01	
TL-210	LLD<1.34E+00		LLD<1.34E+00	
CD-68	LLD<3.53E-01		LLD<3.53E-01	
CS-136	LLD<3.07E-01		LLD<3.07E-01	
MN-54	LLD<3.27E-01		LLD<3.27E-01	
CO-56	LLD<3.38E-01		LLD<3.38E-01	
I-134	LLD<3.95E-01		LLD<3.95E-01	
TL-207	LLD<4.13E+02		LLD<4.13E+02	
Y-88	LLD<5.59E-01		LLD<5.59E-01	
AC-228	LLD<1.51E+00		LLD<1.51E+00	
EU-152	LLD<3.24E+00		LLD<3.24E+00	
PA-234M	LLD<3.49E+00		LLD<3.49E+00	
SR-91	LLD<9.73E-01		LLD<9.73E-01	
RB-89	LLD<6.57E-01		LLD<6.57E-01	
FE-59	LLD<8.05E-01		LLD<8.05E-01	
ZN-65	LLD<6.14E-01		LLD<6.14E-01	
[illegible]	LLD<4.29E-01		LLD<4.29E-01	
TA-182	LLD<1.11E+00		LLD<1.11E+00	
I-135	LLD<1.47E+00		LLD<1.47E+00	
CL-39	LLD<7.90E-01		LLD<7.90E-01	
NA-22	LLD<4.30E-01		LLD<4.30E-01	
AR-41	LLD<3.29E-01		LLD<3.29E-01	
CO-60	LLD<2.08E-01		LLD<2.08E-01	
NA-24	LLD<3.47E-01		LLD<3.47E-01	
SR-92	LLD<2.93E-01		LLD<2.93E-01	
CS-138	LLD<4.04E-01		LLD<4.04E-01	
K-40	1.77E+01	+- 2.24E+00	1.77E+01	+- 2.24E+00
KR-88	LLD<1.75E+00		LLD<1.75E+00	
TL-209	LLD<1.13E+00		LLD<1.13E+00	
LA-140	LLD<2.83E-01		LLD<2.83E-01	
AL-26	LLD<3.26E-01		LLD<3.26E-01	
MN-56	LLD<1.22E+00		LLD<1.22E+00	
RB-88	LLD<1.20E+00		LLD<1.20E+00	
Total	2.00E+01	+- 2.26E+00	2.00E+01	+- 2.26E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

[illegible] [illegible]

Terrestrial [illegible]	Energy keV	Net Area Counts	Error %	Gammas/sec
[illegible]29.34	324.64	17.	29.3	2.72E+00
[illegible]9.30	374.85	20.	35.4	3.36E+00
596.14	347.99	26.	23.6	4.49E+00
926.07	442.75	7.	44.8	1.70E+00
1205.00	601.39	29.	19.2	8.83E+00
1437.68	719.17	12.	34.1	4.48E+00

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

CANBERRA SPECTRAN-AT V4.2a

Cabot Corporation, Revere, PA 18-AUG-94 10:27:46

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0110
Measured by: KC

Sample Description: C.S.A. WATER SAMPLE
Geometry Description: 500 ML MARINELLI
Sample Size: 5.0290E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 14:46:52

COLLECT Live Time: 600. seconds
        Real Time: 600. seconds
        Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides

o significant peak detected --

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: C.3.A. WATER SAMPLE
[illegible] collected on 28-JUL-94 at 14:46:52
[illegible]ved to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
[illegible]M-241	LLD<1.83E-01		LLD<1.83E-01	
[illegible]-234	LLD<1.63E+00		LLD<1.63E+00	
[illegible]-230	LLD<1.83E+01		LLD<1.83E+01	
[illegible]E-133	LLD<2.02E-01		LLD<2.02E-01	
[illegible]D-109	LLD<2.42E+00		LLD<2.42E+00	
[illegible]O-57	LLD<1.06E-01		LLD<1.06E-01	
[illegible]A-234	LLD<4.40E-01		LLD<4.40E-01	
[illegible]E-144	LLD<9.89E-01		LLD<9.89E-01	
[illegible]C-99M	LLD<1.00E-01		LLD<1.00E-01	
[illegible]E-141	LLD<1.89E-01		LLD<1.89E-01	
[illegible]R-85M	LLD<1.23E-01		LLD<1.23E-01	
[illegible]E-131M	LLD<3.95E+00		LLD<3.95E+00	
[illegible]A-139	LLD<5.67E-01		LLD<5.67E-01	
[illegible]E-139	LLD<1.15E-01		LLD<1.15E-01	
[illegible]-235	LLD<1.82E-01		LLD<1.82E-01	
[illegible]A-226	LLD<3.00E+00		LLD<3.00E+00	
[illegible]41	LLD<2.55E-01		LLD<2.55E-01	
[illegible]89	LLD<1.76E+00		LLD<1.76E+00	
[illegible]E-132	LLD<1.61E-01		LLD<1.61E-01	
[illegible]E-133M	LLD<1.01E+00		LLD<1.01E+00	
[illegible]B-212	LLD<1.86E-01		LLD<1.86E-01	
[illegible]A-224	LLD<2.49E+00		LLD<2.49E+00	
[illegible]E-135	LLD<1.19E-01		LLD<1.19E-01	
[illegible]E-138	LLD<4.10E-01		LLD<4.10E-01	
[illegible]E-75	LLD<1.78E-01		LLD<1.78E-01	
[illegible]P-239	LLD<6.84E-01		LLD<6.84E-01	
[illegible]G-203	LLD<1.44E-01		LLD<1.44E-01	
[illegible]R-192	LLD<1.07E-01		LLD<1.07E-01	
[illegible]R-51	LLD<8.44E-01		LLD<8.44E-01	
[illegible]I-211	LLD<3.47E+00		LLD<3.47E+00	
[illegible]B-214	LLD<3.74E-01		LLD<3.74E-01	
[illegible]A-133	LLD<1.87E-01		LLD<1.87E-01	
[illegible]-131	LLD<1.24E-01		LLD<1.24E-01	
[illegible]N-113	LLD<2.10E-01		LLD<2.10E-01	
[illegible]R-87	LLD<1.94E-01		LLD<1.94E-01	
[illegible]B-211	LLD<4.34E+00		LLD<4.34E+00	
[illegible]U-198	LLD<1.01E-01		LLD<1.01E-01	
[illegible]B-125	LLD<2.92E-01		LLD<2.92E-01	
[illegible]I-212	LLD<2.25E+01		LLD<2.25E+01	
[illegible]E-7	LLD<1.05E+00		LLD<1.05E+00	
[illegible]F-181	LLD<1.54E-01		LLD<1.54E-01	
[illegible]U-103	LLD<1.17E-01		LLD<1.17E-01	
[illegible]5	LLD<3.13E+01		LLD<3.13E+01	
[illegible]R-85	LLD<1.37E-01		LLD<1.37E-01	
[illegible]-133	LLD<1.00E-01		LLD<1.00E-01	
[illegible]A-140	LLD<4.72E-01		LLD<4.72E-01	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	LLD<9.52E-02
[illegible]	[illegible]	LLD<4.29E-01
[illegible]	[illegible]	LLD<1.41E-01
[illegible]	LLD<1.64E-01	LLD<1.64E-01
[illegible]	[illegible]	LLD<2.54E-01
[illegible]	[illegible]	LLD<4.65E-01
LA-142	[illegible]	LLD<2.06E-01
AG-110M	[illegible]	LLD<1.91E-01
NB-97	[illegible]	LLD<1.86E-01
CS-137	[illegible]	LLD<1.95E-01
[illegible]	[illegible]	LLD<2.02E-01
[illegible]	[illegible]	LLD<6.50E-01
ZR-97	LLD<2.08E-01	LLD<2.08E-01
ZR-95	LLD<9.88E-02	LLD<9.88E-02
NB-95	LLD<5.53E-02	LLD<5.53E-02
TL-210	LLD<1.07E+00	LLD<1.07E+00
CO-58	LLD<5.84E-02	LLD<5.84E-02
SB-136	LLD<5.87E-02	LLD<5.87E-02
MN-54	LLD<1.86E-01	LLD<1.86E-01
CO-56	LLD<1.79E-01	LLD<1.79E-01
I-134	LLD<2.11E-01	LLD<2.11E-01
TL-207	LLD<1.57E+02	LLD<1.57E+02
Y-88	LLD<2.12E-01	LLD<2.12E-01
AC-228	LLD<2.32E-01	LLD<2.32E-01
EU-152	LLD<1.61E+00	LLD<1.61E+00
PA-234M	LLD<1.90E+00	LLD<1.90E+00
SR-91	LLD<2.17E-01	LLD<2.17E-01
RB-89	LLD<1.52E-01	LLD<1.52E-01
FE-59	LLD<1.32E-01	LLD<1.32E-01
ZN-65	LLD<4.05E-01	LLD<4.05E-01
SC-46	LLD<2.49E-01	LLD<2.49E-01
TA-182	LLD<7.11E-01	LLD<7.11E-01
I-135	LLD<6.43E-01	LLD<6.43E-01
CL-39	LLD<7.86E-01	LLD<7.86E-01
NA-22	LLD<1.85E-01	LLD<1.85E-01
AR-41	LLD<1.95E-01	LLD<1.95E-01
CO-60	LLD<8.65E-02	LLD<8.65E-02
NA-24	LLD<1.95E-01	LLD<1.95E-01
SR-92	LLD<2.24E-01	LLD<2.24E-01
CS-138	LLD<3.62E-01	LLD<3.62E-01
K-40	LLD<2.84E+00	LLD<2.84E+00
KR-88	LLD<8.93E-01	LLD<8.93E-01
TL-209	LLD<3.20E-01	LLD<3.20E-01
LA-140	LLD<1.03E-01	LLD<1.03E-01
AL-26	LLD<1.07E-01	LLD<1.07E-01
MN-56	LLD<4.02E-01	LLD<4.02E-01
RB-88	LLD<6.09E-01	LLD<6.09E-01
Total	0.00E-01 +- 0.00E-01	0.00E-01 +- 0.00E-01

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

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

CANBERRA SPECTRAN-AT V4.2e

Teledyne Corporation, Devere, PA 18-AUG-94 10:32:02

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0111
Measured by: kc

Sample Description: C.S.A. Leach Test
Geometry Description: 500 ML MARINELLI
Sample Size: 5.4670E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 18:38:09

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides

No significant peak detected --

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Laboratory Corporation, Revere, PA 18-AUG-94 10:32:02

Sample: C.S.A. Leach Test
Date collected on 29-JUL-94 at 18:38:09
Delayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram			
	Measured	Error	Decay corrected	Error
AM-241	LLD<1.37E-01		LLD<1.37E-01	
TH-234	LLD<1.32E+00		LLD<1.32E+00	
TH-230	LLD<1.80E+01		LLD<1.80E+01	
XE-133	LLD<2.28E-01		LLD<2.28E-01	
CD-109	LLD<2.11E+00		LLD<2.11E+00	
CO-57	LLD<7.75E-02		LLD<7.75E-02	
PA-234	LLD<4.71E-01		LLD<4.71E-01	
CE-144	LLD<1.12E+00		LLD<1.12E+00	
TC-99M	LLD<1.03E-01		LLD<1.03E-01	
CE-141	LLD<2.23E-01		LLD<2.23E-01	
KR-85M	LLD<1.52E-01		LLD<1.52E-01	
XE-131M	LLD<4.98E+00		LLD<4.98E+00	
BA-139	LLD<5.60E-01		LLD<5.60E-01	
CE-139	LLD<1.14E-01		LLD<1.14E-01	
U-235	LLD<1.84E-01		LLD<1.84E-01	
RA-226	LLD<2.69E+00		LLD<2.69E+00	
B[illegible]41	LLD<3.10E-01		LLD<3.10E-01	
KR-89	LLD<1.62E+00		LLD<1.62E+00	
TE-132	LLD<1.47E-01		LLD<1.47E-01	
XE-133M	LLD<8.97E-01		LLD<8.97E-01	
PB-212	LLD<2.81E-01		LLD<2.81E-01	
RA-224	LLD<2.84E+00		LLD<2.84E+00	
XE-135	LLD<1.04E-01		LLD<1.04E-01	
XE-138	LLD<2.81E-01		LLD<2.81E-01	
SE-75	LLD<1.19E-01		LLD<1.19E-01	
NP-239	LLD<4.81E-01		LLD<4.81E-01	
HG-203	LLD<1.24E-01		LLD<1.24E-01	
IR-192	LLD<1.14E-01		LLD<1.14E-01	
CR-51	LLD<1.03E+00		LLD<1.03E+00	
RI-211	LLD<2.52E+00		LLD<2.52E+00	
PB-214	LLD<2.60E-01		LLD<2.60E-01	
BA-133	LLD<1.44E-01		LLD<1.44E-01	
I-131	LLD<1.14E-01		LLD<1.14E-01	
SN-113	LLD<9.02E-02		LLD<9.02E-02	
KR-87	LLD<2.08E-01		LLD<2.08E-01	
PB-211	LLD<3.22E+00		LLD<3.22E+00	
AU-198	LLD<1.32E-01		LLD<1.32E-01	
SB-125	LLD<4.05E-01		LLD<4.05E-01	
BI-212	LLD<4.40E+01		LLD<4.40E+01	
BE-7	LLD<6.90E-01		LLD<6.90E-01	
HF-181	LLD<1.26E-01		LLD<1.26E-01	
RU-103	LLD<1.21E-01		LLD<1.21E-01	
K[illegible]5	LLD<3.70E+01		LLD<3.70E+01	
SR-85	LLD<1.62E-01		LLD<1.62E-01	
I-133	LLD<1.33E-01		LLD<1.33E-01	
BA-140	LLD<4.12E-01		LLD<4.12E-01	

Y-91Y	LLD<1.62E-01	LLD<1.62E-01
SC-47	LLD<1.54E-01	LLD<1.54E-01
[illegible]-208	LLD<5.75E-01	LLD<5.75E-01
BE-7	LLD<9.03E-02	LLD<9.03E-02
[illegible]34	LLD<1.33E-01	LLD<1.33E-01
[illegible]214	LLD<3.70E-01	LLD<3.70E-01
RU-106	LLD<4.28E-01	LLD<4.28E-01
LA-140	LLD<3.06E-01	LLD<3.06E-01
AG-110M	LLD<1.46E-01	LLD<1.46E-01
NB-97	LLD<1.84E-01	LLD<1.84E-01
CD-177	LLD<2.27E-01	LLD<2.27E-01
[illegible]72	LLD<1.63E-01	LLD<1.63E-01
W-187	LLD<3.49E-01	LLD<3.49E-01
TE-87	LLD<1.37E-01	LLD<1.37E-01
ZR-95	LLD<4.02E-01	LLD<4.02E-01
NB-95	LLD<2.39E-01	LLD<2.39E-01
TL-210	LLD<7.77E-01	LLD<7.77E-01
CO-58	LLD<5.37E-02	LLD<5.37E-02
CS-136	LLD<1.20E-01	LLD<1.20E-01
MN-54	LLD<1.21E-01	LLD<1.21E-01
CO-56	LLD<5.55E-02	LLD<5.55E-02
I-134	LLD<6.20E-02	LLD<6.20E-02
TL-207	LLD<1.02E+02	LLD<1.02E+02
Y-88	LLD<1.38E-01	LLD<1.38E-01
AC-228	LLD<4.72E-01	LLD<4.72E-01
EU-152	LLD<1.43E+00	LLD<1.43E+00
PA-234M	LLD<2.01E+00	LLD<2.01E+00
SR-91	LLD<2.00E-01	LLD<2.00E-01
RB-89	LLD<1.40E-01	LLD<1.40E-01
FE-59	LLD<1.22E-01	LLD<1.22E-01
Z[illegible]5	LLD<5.49E-01	LLD<5.49E-01
SB-46	LLD<6.98E-02	LLD<6.98E-02
TA-182	LLD<1.99E-01	LLD<1.99E-01
I-135	LLD<2.67E-01	LLD<2.67E-01
CL-39	LLD<1.63E-01	LLD<1.63E-01
NA-22	LLD<7.70E-02	LLD<7.70E-02
AR-41	LLD<3.59E-01	LLD<3.59E-01
CO-60	LLD<1.76E-01	LLD<1.76E-01
NA-24	LLD<3.60E-01	LLD<3.60E-01
SR-92	LLD<9.28E-02	LLD<9.28E-02
CS-138	LLD<1.22E-01	LLD<1.22E-01
K-40	LLD<3.07E+00	LLD<3.07E+00
KR-88	LLD<2.95E+00	LLD<2.95E+00
TL-209	LLD<2.95E-01	LLD<2.95E-01
LA-140	LLD<9.47E-02	LLD<9.47E-02
AL-26	LLD<9.85E-02	LLD<9.85E-02
MN-56	LLD<3.70E-01	LLD<3.70E-01
RB-88	LLD<1.24E+00	LLD<1.24E+00
Total	0.00E-01 +- 0.00E-01	0.00E-01 +- 0.00E-01

Error Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

GAMMA SPECTRUM ANALYSIS

SPECTRAN-AT V4.2a

Atom Corporation, Revere, PA 24-AUG-94 20:38:05

ANALYSIS PARAMETERS

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 2
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0112
Measured by: KC

Sample Description: PARKING AREA, PIT 1,
Geometry Description: 500 ML MARINELLI
Sample Size: 7.1420E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 15:04:08

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00%

Decayed to [illegible] 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

Cabot Corporation, Revere, PA 24-AUG-94 20:38:05

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

Pk	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.29	236.30	1.6	40.	84.	15.2	PB-212
2	668.54	334.22	0.9	16.	13.	51.6	NP-239
3	695.89	348.22	2.1	12.	47.	18.3	PB-214
4	1154.00	576.77	1.0	3.	41.	16.7	
5	1205.74	602.37	1.3	3.	45.	16.3	BI-214,SB-124
6	1803.86	900.81	0.9	5.	25.	24.5	AC-228
7	2889.46	1443.66	2.2	1.	68.	12.4	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: PARKING AREA, PIT 1,
Data collected on 28-JUL-94 at 15:04:09
Delayed to 0. days. 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Mass Med	Error	Decay corrected	Error
AM-241	LLD<3.20E-01		LLD<3.20E-01	
TH-234	LLD<3.10E+00		LLD<3.10E+00	
TH-230	LLD<3.44E+01		LLD<3.44E+01	
XE-133	LLD<5.33E-01		LLD<5.33E-01	
CD-109	LLD<4.02E+00		LLD<4.02E+00	
CO-57	LLD<1.51E-01		LLD<1.51E-01	
PA-234	LLD<6.87E-01		LLD<6.87E-01	
CE-144	LLD<1.73E+00		LLD<1.73E+00	
TC-99M	LLD<1.95E-01		LLD<1.95E-01	
U-235	LLD<1.42E+00		LLD<1.42E+00	
CE-141	LLD<3.41E-01		LLD<3.41E-01	
KR-85M	LLD<1.97E-01		LLD<1.97E-01	
XE-131M	LLD<7.70E+00		LLD<7.70E+00	
BA-139	LLD<1.00E+00		LLD<1.00E+00	
CS-139	LLD<2.04E-01		LLD<2.04E-01	
RA-226	LLD<4.93E+00		LLD<4.93E+00	
PA-141	LLD<4.77E-01		LLD<4.77E-01	
KR-89	LLD<2.00E+00		LLD<2.00E+00	
TE-132	LLD<1.70E-01		LLD<1.70E-01	
XE-133M	LLD<3.37E+00		LLD<3.37E+00	
PB-212	9.47E-01	+- 1.45E-01	9.47E-01	+- 1.45E-01
TH-227	LLD<1.28E+00		LLD<1.28E+00	
RA-224	LLD<9.05E+00		LLD<9.05E+00	
XE-135	LLD<1.74E-01		LLD<1.74E-01	
XE-138	LLD<6.02E-01		LLD<6.02E-01	
SE-75	LLD<3.61E-01		LLD<3.61E-01	
NP-239	LLD<9.44E-01		LLD<9.44E-01	
HG-203	LLD<1.93E-01		LLD<1.93E-01	
IR-192	LLD<1.76E-01		LLD<1.76E-01	
CR-51	LLD<1.39E+00		LLD<1.39E+00	
BI-211	LLD<5.98E+00		LLD<5.98E+00	
PB-214	LLD<6.76E-01		LLD<6.76E-01	
BA-133	LLD<2.92E-01		LLD<2.92E-01	
I-131	LLD<2.34E-01		LLD<2.34E-01	
SN-113	LLD<2.53E-01		LLD<2.53E-01	
KR-87	LLD<3.84E-01		LLD<3.84E-01	
PB-211	LLD<5.97E+00		LLD<5.97E+00	
AU-198	LLD<1.57E-01		LLD<1.57E-01	
SB-125	LLD<6.90E-01		LLD<6.90E-01	
BI-212	LLD<6.08E+01		LLD<6.08E+01	
BE-7	LLD<1.60E+00		LLD<1.60E+00	
HF-181	LLD<1.96E-01		LLD<1.96E-01	
RU-103	LLD<1.79E-01		LLD<1.79E-01	
KR-85	LLD<3.77E+01		LLD<3.77E+01	
SR-85	LLD<1.65E-01		LLD<1.65E-01	
I-133	LLD<2.02E-01		LLD<2.02E-01	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	LLD<3.15E-01	LLD<3.15E-01
[illegible]	LLD<3.53E-01	LLD<3.53E-01
PB-[illegible]	LLD<2.60E+00	LLD<2.60E+00
LA-142	LLD<4.74E-01	LLD<4.74E-01
AG-110M	LLD<2.85E-01	LLD<2.85E-01
[illegible]	LLD<2.73E-01	LLD<2.73E-01
[illegible]	LLD<2.95E-01	LLD<2.95E-01
[illegible]	LLD<2.36E-01	LLD<2.36E-01
[illegible]-197	LLD<6.87E-01	LLD<6.87E-01
[illegible]	LLD<2.30E-01	LLD<2.30E-01
[illegible]	LLD<4.87E-01	LLD<4.87E-01
[illegible]	LLD<3.11E-01	LLD<3.11E-01
TL-210	LLD<1.50E+00	LLD<1.50E+00
CD-58	LLD<2.21E-01	LLD<2.21E-01
CS-136	LLD<2.95E-01	LLD<2.95E-01
MN-54	LLD<2.54E-01	LLD<2.54E-01
CO-56	LLD<2.71E-01	LLD<2.71E-01
I-134	LLD<3.20E-01	LLD<3.20E-01
TL-207	LLD<3.52E+02	LLD<3.52E+02
Y-88	LLD<4.77E-01	LLD<4.77E-01
AC-228	1.50E+00 +- 3.68E-01	1.50E+00 +- 3.68E-01
EU-152	LLD<2.30E+00	LLD<2.30E+00
PA-234M	LLD<3.91E+00	LLD<3.91E+00
SR-91	LLD<7.13E-01	LLD<7.13E-01
RB-89	LLD<4.77E-01	LLD<4.77E-01
FE-59	LLD<5.64E-01	LLD<5.64E-01
ZN-65	LLD<5.82E-01	LLD<5.82E-01
SC-46	LLD<2.97E-01	LLD<2.97E-01
TA-182	LLD<9.08E-01	LLD<9.08E-01
I-135	LLD<1.21E+00	LLD<1.21E+00
CL-39	LLD<6.71E-01	LLD<6.71E-01
NA-22	LLD<2.68E-01	LLD<2.68E-01
AR-41	LLD<3.34E-01	LLD<3.34E-01
CO-60	LLD<3.12E-01	LLD<3.12E-01
NA-24	LLD<2.76E-01	LLD<2.76E-01
SR-92	LLD<1.57E-01	LLD<1.57E-01
CS-138	LLD<2.07E-01	LLD<2.07E-01
K-40	1.53E+01 +- 1.91E+00	1.53E+01 +- 1.91E+00
KR-88	LLD<2.34E+00	LLD<2.34E+00
TL-209	LLD<7.01E-01	LLD<7.01E-01
LA-140	LLD<2.70E-01	LLD<2.70E-01
AL-26	LLD<2.59E-01	LLD<2.59E-01
MN-56	LLD<2.83E-01	LLD<2.83E-01
RB-88	LLD<4.29E-01	LLD<4.29E-01
Total	1.78E+01 +- 1.95E+00	1.78E+01 +- 1.95E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Counts/sec
668.54	334.22	13.	81.6	2.20E+00
696.59	348.22	47.	18.3	8.10E+00
1154.00	576.53	41.	16.7	1.20E-01
1205.76	602.37	45.	16.3	1.38E-01

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

CANBERRA SPECTRAN-AT V4.2a

Nuclear Corporation, Revere, PA 24-AUG-94 20:04:00

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0113
Measured by: KC

Sample Description: PARKING AREA, PIT 2,
Geometry Description: 500 ML MARINELLI
Sample Size: 7.7550E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 15:35:41

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: [illegible]

Decayed to [illegible]000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

Cabot Corporation, Revere, PA 24-AUG-94 20:04:00

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.11	236.21	0.9	33.	47.	24.2	PB-212
2	584.40	292.23	1.7	7.	29.	23.1	PB-214
3	695.95	347.90	1.0	2.	33.	18.4	PB-214
4	1153.88	576.47	0.6	7.	13.	41.3	
5	1205.70	602.34	0.6	1.	22.	22.8	BI-214,SB-124
6	2890.18	1444.02	1.0	0.	27.	19.2	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Teledyne Brown Engineering, Revere, PA 24-AUG-94 00:04:00

Sample: PARKING AREA, PIT 2,
Data collected on 28-JUL-94 at 15:35:41
Delayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
AM-241	LLD<2.02E-01		LLD<2.02E-01	
TH-234	LLD<2.15E+00		LLD<2.15E+00	
TH-230	LLD<2.69E+01		LLD<2.69E+01	
XE-133	LLD<3.77E-01		LLD<3.77E-01	
CD-109	LLD<2.84E+00		LLD<2.84E+00	
CO-57	LLD<1.18E-01		LLD<1.18E-01	
PA-234	LLD<6.16E-01		LLD<6.16E-01	
CE-144	LLD<1.02E+00		LLD<1.02E+00	
TC-99M	LLD<1.30E-01		LLD<1.30E-01	
CE-141	LLD<2.79E-01		LLD<2.79E-01	
KR-85M	LLD<1.46E-01		LLD<1.46E-01	
XE-131M	LLD<5.80E+00		LLD<5.80E+00	
BA-139	LLD<6.48E-01		LLD<6.48E-01	
CE-139	LLD<1.32E-01		LLD<1.32E-01	
U-235	LLD<2.19E-01		LLD<2.19E-01	
RA-226	LLD<3.67E+00		LLD<3.67E+00	
BA-141	LLD<2.97E-01		LLD<2.97E-01	
[illegible]39	LLD<1.19E+00		LLD<1.19E+00	
TE-132	LLD<1.19E-01		LLD<1.19E-01	
XE-133M	LLD<2.36E+00		LLD<2.36E+00	
PB-212	4.88E-01	+- 1.18E-01	4.88E-01	+- 1.18E-01
TH-227	LLD<1.26E+00		LLD<1.26E+00	
RA-224	LLD<5.88E+00		LLD<5.88E+00	
XE-135	LLD<1.28E-01		LLD<1.28E-01	
XE-138	LLD<4.58E-01		LLD<4.58E-01	
SE-75	LLD<1.90E-01		LLD<1.90E-01	
NP-239	LLD<8.26E-01		LLD<8.26E-01	
HG-203	LLD<1.61E-01		LLD<1.61E-01	
IR-192	LLD<1.16E-01		LLD<1.16E-01	
CR-51	LLD<1.20E+00		LLD<1.20E+00	
BI-211	LLD<3.87E+00		LLD<3.87E+00	
PB-214	6.09E-01	+- 1.12E-01	6.09E-01	+- 1.12E-01
BA-133	LLD<1.34E-01		LLD<1.34E-01	
I-131	LLD<1.31E-01		LLD<1.31E-01	
SN-113	LLD<1.79E-01		LLD<1.79E-01	
KR-87	LLD<3.03E-01		LLD<3.03E-01	
PB-211	LLD<4.42E+00		LLD<4.42E+00	
AU-198	LLD<1.11E-01		LLD<1.11E-01	
SB-125	LLD<3.82E-01		LLD<3.82E-01	
BI-212	LLD<3.86E+01		LLD<3.86E+01	
RE-7	LLD<1.22E+00		LLD<1.22E+00	
HF-181	LLD<1.11E-01		LLD<1.11E-01	
[illegible]03	LLD<1.47E-01		LLD<1.47E-01	
[illegible]85	LLD<2.69E+01		LLD<2.69E+01	
SR-85	LLD<1.18E-01		LLD<1.18E-01	
I-133	LLD<1.86E-01		LLD<1.86E-01	

[illegible]	[illegible]		[illegible]		
[illegible]	LLD<1.33E-01		LLD<1.80E-01		
[illegible]	[illegible]		LLD<1.80E-01		
[illegible]	[illegible]		LLD<6.72E-01		
[illegible]	LLD<5.35E-01		LLD<5.35E-01		
[illegible]24	LLD<2.14E-01		LLD<2.14E-01		
[illegible]34	LLD<2.28E-01		LLD<2.28E-01		
PU-106	LLD<1.63E+00		LLD<1.63E+00		
LA-142	LLD<2.34E-01		LLD<2.34E-01		
AG-110M	LLD<2.24E-01		LLD<2.24E-01		
[illegible]B-87	LLD<2.21E-01		LLD<2.21E-01		
[illegible]-137	LLD<1.16E-01		LLD<1.16E-01		
[illegible]-132	LLD<1.89E-01		LLD<1.89E-01		
[illegible]-87	LLD<5.65E-01		LLD<5.65E-01		
[illegible]-97	LLD<1.55E-01		LLD<1.55E-01		
[illegible]-95	LLD<3.46E-01		LLD<3.46E-01		
[illegible]-95	LLD<1.61E-01		LLD<1.61E-01		
TL-210	LLD<9.78E-01		LLD<9.78E-01		
[illegible]-88	LLD<1.03E-01		LLD<1.03E-01		
CS-136	LLD<1.04E-01		LLD<1.04E-01		
MN-54	LLD<2.22E-01		LLD<2.22E-01		
CO-56	LLD<1.92E-01		LLD<1.92E-01		
I-134	LLD<2.29E-01		LLD<2.29E-01		
TL-207	LLD<2.23E+02		LLD<2.23E+02		
Y-88	LLD<3.03E-01		LLD<3.03E-01		
AC-228	LLD<7.50E-01		LLD<7.50E-01		
EU-152	LLD<1.53E+00		LLD<1.53E+00		
PA-234M	LLD<2.06E+00		LLD<2.06E+00		
SR-91	LLD<4.38E-01		LLD<4.38E-01		
RB-89	LLD<3.94E-01		LLD<3.94E-01		
FE-59	LLD<3.44E-01		LLD<3.44E-01		
Z[illegible]5	LLD<4.68E-01		LLD<4.68E-01		
SB-46	LLD<2.13E-01		LLD<2.13E-01		
TA-182	LLD<6.09E-01		LLD<6.09E-01		
I-135	LLD<7.25E-01		LLD<7.25E-01		
CL-39	LLD<3.57E-01		LLD<3.57E-01		
NA-22	LLD<1.95E-01		LLD<1.95E-01		
AR-41	LLD<1.77E-01		LLD<1.77E-01		
CO-60	LLD<1.24E-01		LLD<1.24E-01		
NA-24	LLD<1.55E-01		LLD<1.55E-01		
SR-92	LLD<2.34E-01		LLD<2.34E-01		
CS-138	LLD<2.34E-01		LLD<2.34E-01		
K-40	5.56E+00	+- 1.07E+00	5.56E+00	+-	1.07E+00
KR-88	LLD<1.58E+00		LLD<1.58E+00		
TL-209	LLD<5.65E-01		LLD<5.65E-01		
LA-140	LLD<2.48E-01		LLD<2.48E-01		
AL-26	LLD<6.94E-02		LLD<6.94E-02		
MN-56	LLD<2.61E-01		LLD<2.61E-01		
RB-88	LLD<3.95E-01		LLD<3.95E-01		
Total	6.65E+00	+- 1.08E+00	6.65E+00	+-	1.08E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS LIST USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
[illegible]3.88	576.47	13.	41.3	3.83E+00
1205.70	602.34	22.	22.9	4.86E+00

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

CANBERRA SPECTRAN-AT V4.2a

Canberra Corporation, Reviere, PA 24-AUG-94 20:11:31

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 0.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0114
Measured by: KC

Sample Description: PARKING AREA, PIT 3,
Geometry Description: 500 ML MARINELLI
Sample Size: 8.4070E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 28-JUL-94 at 15:59:28

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 20-JUL-94
Efficiency Calibration performed 02-JUN-94

Cabot Corporation, Revere, PA 24-AUG-94 20:11:31

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.14	236.22	1.5	62.	147.	11.7	PB-212
2	669.46	334.69	0.9	13.	28.	26.2	NP-239
3	695.79	347.82	1.1	15.	34.	24.9	PB-214
4	916.47	437.96	1.2	9.	20.	31.8	
5	1153.99	576.52	1.4	3.	52.	14.8	
6	1300.29	649.57	0.9	4.	8.	49.5	
7	1802.27	900.27	1.3	1.	17.	26.8	AC-228
8$	1915.82	957.00	3.2	7.	15.	39.3	
9	2890.39	1444.12	2.5	0.	112.	9.4	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

[illegible] - Terminal [illegible], Revere, PA [illegible]-AUG-94 [illegible]

[illegible]le: PARKING AREA, PIT 3,
[illegible] collected on 28-JUL-94 at 15:59:28
[illegible]ayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

[illegible]	Activity Concentration in PCI /GRAM			
	Measured	Error	Decay corrected	Error
[illegible]-241	LLD<2.92E-01		LLD<2.92E-01	
[illegible]-234	LLD<3.10E+00		LLD<3.10E+00	
[illegible]-230	LLD<3.04E+01		LLD<3.04E+01	
XE-133	LLD<4.62E-01		LLD<4.62E-01	
CD-109	LLD<4.13E+00		LLD<4.13E+00	
CO-57	LLD<1.75E-01		LLD<1.75E-01	
PA-234	LLD<6.81E-01		LLD<6.81E-01	
CE-144	LLD<1.46E+00		LLD<1.46E+00	
TC-99M	LLD<1.80E-01		LLD<1.80E-01	
CE-141	LLD<3.53E-01		LLD<3.53E-01	
KR-85M	LLD<2.00E-01		LLD<2.00E-01	
XE-131M	LLD<7.95E+00		LLD<7.95E+00	
BA-139	LLD<1.07E+00		LLD<1.07E+00	
CE-139	LLD<2.17E-01		LLD<2.17E-01	
U-235	LLD<2.94E-01		LLD<2.94E-01	
P[illegible]-226	LLD<4.39E+00		LLD<4.39E+00	
[illegible]-141	LLD<4.36E-01		LLD<4.36E-01	
KR-89	LLD<2.10E+00		LLD<2.10E+00	
TE-132	LLD<1.92E-01		LLD<1.92E-01	
XE-133M	LLD<3.67E+00		LLD<3.67E+00	
PB-212	1.41E+00	+- 1.65E-01	1.41E+00	+- 1.65E-01
TH-227	LLD<1.28E+00		LLD<1.28E+00	
RA-224	LLD<9.61E+00		LLD<9.61E+00	
XE-135	LLD<1.99E-01		LLD<1.99E-01	
XE-138	LLD<6.83E-01		LLD<6.83E-01	
SE-75	LLD<2.98E-01		LLD<2.98E-01	
NP-239	LLD<1.06E+00		LLD<1.06E+00	
HG-203	LLD<2.02E-01		LLD<2.02E-01	
IR-192	LLD<1.74E-01		LLD<1.74E-01	
CR-51	LLD<1.59E+00		LLD<1.59E+00	
BI-211	LLD<4.48E+00		LLD<4.48E+00	
PB-214	LLD<5.20E-01		LLD<5.20E-01	
BA-133	LLD<2.44E-01		LLD<2.44E-01	
I-131	LLD<1.66E-01		LLD<1.66E-01	
SN-113	LLD<1.87E-01		LLD<1.87E-01	
KR-87	LLD<3.93E-01		LLD<3.93E-01	
PB-211	LLD<6.14E+00		LLD<6.14E+00	
AU-198	LLD<1.61E-01		LLD<1.61E-01	
SB-125	LLD<6.44E-01		LLD<6.44E-01	
BI-212	LLD<4.99E+01		LLD<4.99E+01	
BE-7	LLD<1.65E+00		LLD<1.65E+00	
[illegible]81	LLD<1.82E-01		LLD<1.82E-01	
R[illegible]-103	LLD<2.07E-01		LLD<2.07E-01	
KR-85	LLD<3.59E+01		LLD<3.59E+01	
SR-85	LLD<1.57E-01		LLD<1.57E-01	
I-133	LLD<2.02E-01		LLD<2.02E-01	

[illegible]	LLD<7.69E-01		LLD<7.69E-01		
[illegible]	LLD<1.91E-01		LLD<1.91E-01		
[illegible]-207	LLD<1.99E-01		LLD<1.99E-01		
[illegible]-108	LLD<8.04E-01		LLD<8.04E-01		
[illegible]14	LLD<7.69E-01		LLD<7.69E-01		
[illegible]24	LLD<3.07E-01		LLD<3.07E-01		
[illegible]8-134	LLD<2.98E-01		LLD<2.98E-01		
[illegible]-106	LLD<1.84E+00		LLD<1.84E+00		
[illegible]-140	LLD<3.36E-01		LLD<3.36E-01		
[illegible]	LLD<2.64E-01		LLD<2.64E-01		
[illegible]	LLD<2.69E-01		LLD<2.69E-01		
[illegible]-137	LLD<2.55E-01		LLD<2.55E-01		
[illegible]-132	LLD<2.71E-01		LLD<2.71E-01		
[illegible]-107	LLD<8.84E-01		LLD<8.84E-01		
[illegible]-97	LLD<2.51E-01		LLD<2.51E-01		
[illegible]-95	LLD<4.13E-01		LLD<4.13E-01		
[illegible]-95	LLD<2.55E-01		LLD<2.55E-01		
[illegible]	LLD<1.15E+00		LLD<1.15E+00		
[illegible]	LLD<2.18E-01		LLD<2.18E-01		
CS-136	LLD<2.17E-01		LLD<2.17E-01		
MN-54	LLD<3.19E-01		LLD<3.19E-01		
CO-56	LLD<2.77E-01		LLD<2.77E-01		
I-134	LLD<3.37E-01		LLD<3.37E-01		
TL-207	LLD<2.70E+02		LLD<2.70E+02		
Y-88	LLD<3.66E-01		LLD<3.66E-01		
AC-228	8.43E-01	+- 2.26E-01	8.43E-01	+- 2.26E-01	
EU-152	LLD<1.65E+00		LLD<1.65E+00		
PA-234M	LLD<3.11E+00		LLD<3.11E+00		
BR-91	LLD<7.45E-01		LLD<7.45E-01		
RB-89	LLD<6.36E-01		LLD<6.36E-01		
[illegible]39	LLD<3.52E-01		LLD<3.52E-01		
ZN-65	LLD<6.31E-01		LLD<6.31E-01		
SC-46	LLD<3.53E-01		LLD<3.53E-01		
TA-182	LLD<9.26E-01		LLD<9.26E-01		
I-135	LLD<9.64E-01		LLD<9.64E-01		
CL-39	LLD<6.82E-01		LLD<6.82E-01		
NA-22	LLD<1.93E-01		LLD<1.93E-01		
AR-41	LLD<3.60E-01		LLD<3.60E-01		
CO-60	LLD<2.65E-01		LLD<2.65E-01		
NA-24	LLD<2.56E-01		LLD<2.56E-01		
SR-92	LLD<2.61E-01		LLD<2.61E-01		
CS-138	LLD<2.16E-01		LLD<2.16E-01		
K-40	2.13E+01	+- 2.02E+00	2.13E+01	+- 2.02E+00	
XR-88	LLD<1.18E+00		LLD<1.18E+00		
TL-209	LLD<6.58E-01		LLD<6.58E-01		
LA-140	LLD<2.29E-01		LLD<2.29E-01		
AL-26	LLD<2.38E-01		LLD<2.38E-01		
MN-56	LLD<6.54E-01		LLD<6.54E-01		
RB-88	LLD<3.64E-01		LLD<3.64E-01		
Total	2.35E+01	+- 2.04E+00	2.35E+01	+- 2.04E+00	

[illegible]or Quotation at 1.00 Sigma
L[illegible] Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Channel number	Energy keV	Net Area counts	Error %	Gammas/sec
369.44	334.68	28.	24.2	4.71E+03
495.79	347.82	34.	24.9	5.90E+00
916.47	457.96	20.	31.3	4.59E+00
1157.99	576.52	52.	14.3	1.52E+01
1370.29	649.57	8.	49.5	2.70E+00
1716.82	957.00	15.	39.3	7.12E+00

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

GAMMASPEC SPECTRAN-AT V4.2a

[illegible] Aluminum Co., Rivera, PA 24-AUG-94 10:52:00

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Tabular Output.
Analysis of Spectrum saved in Disk File SD0115
Measured by: kc

Sample Description: P.A. Pit 3, Red Clay
Geometry Description: 500 ML MARINELLI
Sample Size: 8.1900E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 14:17:44

COLLECT Live Time: 600. seconds
Real Time: 601. seconds
Dead Time: [illegible]

Decayed to [illegible] 0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94

Westinghouse Corporate [illegible], Sewickley, PA 24-AUG-94 10:52:00

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

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	477.34	238.87	1.4	42.	140.	12.4	PB-212
2	703.70	351.77	1.9	13.	59.	16.3	BI-211,PB-214
3	1020.36	510.49	1.1	10.	15.	40.2	TL-208,NA-22, ANN--RD
4	1165.93	583.01	2.0	11.	40.	20.3	TL-208
5	1218.13	609.11	2.4	5.	28.	22.4	XE-135,BI-214
6	1821.55	910.89	1.3	4.	27.	22.6	AC-228
7	1937.74	969.02	0.8	7.	22.	28.5	AC-228,RU-105
8	2921.18	1461.28	1.7	2.	137.	8.7	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible] Revere, PA 24-AUG-94 [illegible]

[illegible] Pit 2, Red Clay
[illegible] collected on 29-JUL-94 at 14:17:44
[illegible] 0. days. 0.0000 hours [illegible] the start of COLLECT.

RADIONUCLIDE ANALYSIS REPORT

[illegible]	Activity Concentration in PCI /gram			
	Measured	Error	Decay corrected	Error
[illegible]-241	LLD<3.17E-01		LLD<3.17E-01	
[illegible]-234	LLD<3.46E+00		LLD<3.46E+00	
[illegible]-232	LLD<4.12E+01		LLD<4.12E+01	
XE-133	LLD<5.70E-01		LLD<5.70E-01	
[illegible]-109	LLD<4.91E+00		LLD<4.91E+00	
[illegible]-57	LLD<2.43E-01		LLD<2.43E-01	
[illegible]A-234	LLD<9.74E-01		LLD<9.74E-01	
CE-144	LLD<1.80E+00		LLD<1.80E+00	
TC-99M	LLD<2.10E-01		LLD<2.10E-01	
CE-141	LLD<4.03E-01		LLD<4.03E-01	
KR-85M	LLD<3.04E-01		LLD<3.04E-01	
XE-131M	LLD<9.69E+00		LLD<9.69E+00	
BA-139	LLD<1.39E+00		LLD<1.39E+00	
CE-139	LLD<2.83E-01		LLD<2.83E-01	
U-235	LLD<3.47E-01		LLD<3.47E-01	
RA-226	LLD<6.27E+00		LLD<6.27E+00	
[illegible]-141	LLD<5.37E-01		LLD<5.37E-01	
[illegible]-89	LLD<2.46E+00		LLD<2.46E+00	
TE-132	LLD<2.21E-01		LLD<2.21E-01	
XE-133M	LLD<1.97E+00		LLD<1.97E+00	
TH-227	LLD<2.23E+00		LLD<2.23E+00	
PB-212	1.39E+00	+- 1.73E-01	1.39E+00	+- 1.73E-01
RA-224	LLD<4.44E+00		LLD<4.44E+00	
XE-135	LLD<1.85E-01		LLD<1.85E-01	
XE-138	LLD<7.10E-01		LLD<7.10E-01	
SE-75	LLD<3.33E-01		LLD<3.33E-01	
NP-239	LLD<1.39E+00		LLD<1.39E+00	
HG-203	LLD<2.36E-01		LLD<2.36E-01	
IR-192	LLD<2.01E-01		LLD<2.01E-01	
CR-51	LLD<1.69E+00		LLD<1.69E+00	
BI-211	8.94E[illegible]	+- 1.[illegible]+00	8.94E+00	+- 1.46E+00
PB-214	LLD<6.79E[illegible]		LLD<6.79E-01	
BA-133	LLD<4.92E[illegible]		LLD<4.92E-01	
I-131	LLD<2.05E-01		LLD<2.05E-01	
SN-113	LLD<2.72E-01		LLD<2.72E-01	
KR-87	LLD<4.26E-01		LLD<4.26E-01	
PB-211	LLD<7.69E+00		LLD<7.69E+00	
AU-198	LLD<1.93E-01		LLD<1.93E-01	
SB-125	LLD<6.05E-01		LLD<6.05E-01	
BI-212	LLD<5.92E+01		LLD<5.92E+01	
BE-7	LLD<1.50E+00		LLD<1.50E+00	
HF-181	LLD<2.21E-01		LLD<2.21E-01	
[illegible]-103	LLD<2.09E-01		LLD<2.09E-01	
KR-85	LLD<5.43E+01		LLD<5.43E+01	
SR-85	LLD<2.37E-01		LLD<2.37E-01	
I-133	LLD<1.93E-01		LLD<1.93E-01	

[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]-208	1.17E+00	+- 2.37E-01	1.17E+00	+- 2.37E-01
[illegible]-124	LLD<1.60E-01		[illegible]	
[illegible]-74	LLD<2.88E-01		[illegible]	
[illegible]-214	LLD<6.40E-01		[illegible]	
[illegible]-134	LLD<1.92E+00		[illegible]	
[illegible]-140	LLD<4.60E-01		[illegible]	
[illegible]	LLD<2.51E-01		[illegible]	
[illegible]	LLD<2.53E-01		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]-97	[illegible]		[illegible]	
[illegible]-97	LLD<2.17E-01		LLD<2.17E-01	
[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]-210	[illegible]		[illegible]	
[illegible]-48	[illegible]		LLD<2.42E-01	
[illegible]-136	[illegible]		LLD<2.16E-01	
[illegible]N-54	LLD<2.28E-01		LLD<2.28E-01	
[illegible]-56	LLD<2.12E-01		LLD<2.12E-01	
I-134	LLD<2.29E-01		LLD<2.29E-01	
TL-207	LLD<2.15E+02		LLD<2.15E+02	
Y-88	LLD<2.87E-01		LLD<2.87E-01	
AC-228	1.44E+00	+- 3.27E-01	1.44E+00	+- 3.27E-01
EU-152	LLD<2.59E+00		LLD<2.59E+00	
PA-234M	LLD<2.64E+00		LLD<2.64E+00	
SR-91	LLD<8.07E-01		LLD<8.07E-01	
RB-89	LLD<6.30E-01		LLD<6.30E-01	
[illegible]-59	LLD<6.35E-01		LLD<6.35E-01	
[illegible]-45	LLD<8.26E-01		LLD<8.26E-01	
SC-46	LLD<4.41E-01		LLD<4.41E-01	
TA-182	LLD<1.26E+00		LLD<1.26E+00	
[illegible]-135	LLD<1.25E+00		LLD<1.25E+00	
CL-39	LLD<8.52E-01		LLD<8.52E-01	
NA-22	LLD<3.70E-01		LLD<3.70E-01	
AR-41	LLD<2.82E-01		LLD<2.82E-01	
CO-60	LLD<2.36E-01		LLD<2.36E-01	
NA-24	LLD<1.47E-01		LLD<1.47E-01	
SR-92	LLD<3.12E-01		LLD<3.12E-01	
CS-138	LLD<2.80E-01		LLD<2.80E-01	
K-40	2.70E+01	+- 2.36E+00	2.70E+01	+- 2.36E+00
KR-88	LLD<2.25E+00		LLD<2.25E+00	
TL-209	LLD<9.96E-01		LLD<9.96E-01	
LA-140	LLD<2.67E-01		LLD<2.67E-01	
AL-26	LLD<2.04E-01		LLD<2.04E-01	
MN-56	LLD<1.08E+00		LLD<1.08E+00	
RB-88	LLD<1.98E+00		LLD<1.98E+00	
Total	3.99E+01	+- 2.81E+00	3.99E+01	+- 2.81E+00

Error Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
[illegible]	609.11	28.	22.4	3.42E+00
1877.7[illegible]	969.02	22.	28.5	1.04E+01

SD0116 p.1

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

CANBERRA SPECTRAN-AT V4.0a

Data Corporation, Revere, PA 29-JUL-94 15:34:1

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels from MCA Region FULL
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Spectral data read directly from Multichannel Analyzer ANO
Analyzed by: kc

Sample Description: P.A Rear Pile Random
Geometry Description: 500 ML MARINELLI
Sample Size: 8.8840E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 15:14:59

COLLECT Live Time: 600. seconds
[illegible] 600. seconds
[illegible] 00.00 %

Decayed to [illegible] days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94

Gaeco Corporation, Revere, PA 29-JUL-94 15:34:17

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

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	476.98	238.69	1.9	45.	81.	17.2	PB-212
2	550.31	295.31	1.3	12.	36.	21.3	PB-214
3	703.81	352.03	1.5	4.	43.	13.6	BI-211,PB-214
4	714.17	357.22	0.6	3.	5.	43.5	TC-104
5	1021.61	510.87	1.4	1.	26.	20.8	TL-208,NA-22, ANN-RD
6	1165.14	582.62	1.4	3.	36.	18.3	TL-208
7	1218.54	609.31	1.9	1.	52.	14.3	BI-214
8	2920.48	1460.93	3.0	2.	37.	17.9	K-40
9	3526.67	1764.59	0.7	0.	6.	40.8	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Data Correlation, Revere P4 29-JUL-94 15:34:17

Sample: P.A Rear Pile Random
Data collected on 29-JUL-94 at 15:14:59
Decayed to 0. days. 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCi /GRAM Measured	Error	Decay Corrected	Error
AM-241	LLD<3.44E-01		LLD<3.44E-01	
PA-234	LLD<2.87E+00		LLD<2.87E+00	
TH-230	LLD<2.97E+01		LLD<2.97E+01	
XE-133	LLD<4.30E-01		LLD<4.30E-01	
CD-109	LLD<3.54E+00		LLD<3.54E+00	
CO-57	LLD<1.33E-01		LLD<1.33E-01	
PA-234	LLD<5.89E-01		LLD<5.89E-01	
CE-144	LLD<1.10E+00		LLD<1.10E+00	
TC-99M	LLD<1.72E-01		LLD<1.72E-01	
CE-141	LLD<3.25E-01		LLD<3.25E-01	
KR-85M	LLD<2.03E-01		LLD<2.03E-01	
XE-131M	LLD<7.09E+00		LLD<7.09E+00	
BA-139	LLD<9.02E-01		LLD<9.02E-01	
CE-139	LLD<1.83E-01		LLD<1.83E-01	
U-235	LLD<2.61E-01		LLD<2.61E-01	
RA-226	LLD<4.13E+00		LLD<4.13E+00	
BA-141	LLD<3.68E-01		LLD<3.68E-01	
KR-89	LLD<1.96E+00		LLD<1.96E+00	
TE-132	LLD<1.67E-01		LLD<1.67E-01	
XE-133M	LLD<1.59E+00		LLD<1.59E+00	
PB-212	7.39E-01	+- 1.27E-01	7.39E-01	+- 1.27E-01
RA-224	LLD<3.71E+00		LLD<3.71E+00	
XE-135	LLD<1.67E-01		LLD<1.67E-01	
XE-138	LLD<5.65E-01		LLD<5.65E-01	
SE-75	LLD<2.66E-01		LLD<2.66E-01	
NP-239	LLD<8.89E-01		LLD<8.89E-01	
HG-203	LLD<1.76E-01		LLD<1.76E-01	
IR-192	LLD<1.55E-01		LLD<1.55E-01	
CR-51	LLD<1.38E+00		LLD<1.38E+00	
BI-211	8.77E+00	+- 1.19E+00	8.77E+00	+- 1.19E+00
PB-214	[illegible]	+- 1.39E-01	1.03E+00	+- 1.39E-01
BA-133	[illegible]		LLD<3.92E-01	
I-131	[illegible]		LLD<1.38E-01	
SN-113	[illegible]		LLD<1.88E-01	
KR-87	[illegible]		LLD<2.69E-01	
PB-211	LLD<5.28E+00		LLD<5.28E+00	
AU-198	LLD<1.76E-01		LLD<1.76E-01	
SB-125	LLD<5.05E-01		LLD<5.05E-01	
BI-212	LLD<4.22E+01		LLD<4.22E+01	
BE-7	LLD<1.37E+00		LLD<1.37E+00	
HF-181	LLD<1.85E-01		LLD<1.85E-01	
RU-103	LLD<1.61E-01		LLD<1.61E-01	
KR-85	LLD<4.51E+01		LLD<4.51E+01	
SR-85	LLD<1.97E-01		LLD<1.97E-01	
I-133	LLD<1.78E-01		LLD<1.78E-01	
BA-140	LLD<6.05E-01		LLD<6.05E-01	

[illegible]M	LLD<1.41E-01		LLD<1.41E-01		
BI-207	LLD<1.38E-01		LLD<1.38E-01		
TL-208	LLD<6.99E-01		LLD<6.99E-01		
SB-124	LLD<1.32E-01		LLD<1.32E-01		
CS-134	LLD<3.66E-01		LLD<3.66E-01		
BI-214	LLD<6.74E-01		LLD<6.74E-01		
RU-106	LLD<1.31E+00		LLD<1.31E+00		
LA-142	LLD<3.32E-01		LLD<3.32E-01		
AG-110M	LLD<1.93E-01		LLD<1.93E-01		
NB-97	LLD<1.94E-01		LLD<1.94E-01		
BA-137	LLD<2.23E-01		LLD<2.23E-01		
I-132	LLD<1.68E-01		LLD<1.68E-01		
W-187	LLD<3.40E-01		LLD<3.40E-01		
ZR-97	LLD<1.33E-01		LLD<1.33E-01		
ZR-95	LLD<4.02E-01		LLD<4.02E-01		
NB-95	LLD<1.93E-01		LLD<1.93E-01		
TL-210	LLD<8.82E-01		LLD<8.82E-01		
CO-58	LLD<1.61E-01		LLD<1.61E-01		
CS-136	LLD<1.14E-01		LLD<1.14E-01		
MN-54	LLD<1.65E-01		LLD<1.65E-01		
CO-56	LLD<1.96E-01		LLD<1.96E-01		
I-134	LLD<2.09E-01		LLD<2.09E-01		
TL-207	LLD<1.44E+02		LLD<1.44E+02		
Y-88	LLD<1.85E-01		LLD<1.85E-01		
AC-228	LLD<8.55E-01		LLD<8.55E-01		
EU-152	LLD<1.73E+00		LLD<1.73E+00		
PA-234M	LLD<2.04E+00		LLD<2.04E+00		
SR-91	LLD<6.44E-01		LLD<6.44E-01		
RB-89	LLD<3.44E-01		LLD<3.44E-01		
FE-59	LLD<2.57E-01		LLD<2.57E-01		
ZN-65	LLD<5.77E-01		LLD<5.77E-01		
SC-46	LLD<2.58E-01		LLD<2.58E-01		
TA-182	LLD<7.22E-01		LLD<7.22E-01		
I-135	LLD<1.18E+00		LLD<1.18E+00		
CL-39	LLD<3.86E-01		LLD<3.86E-01		
NA-22	LLD<3.18E-01		LLD<3.18E-01		
AR-41	LLD<1.36E-01		LLD<1.36E-01		
CO-60	LLD<2.55E-01		LLD<2.55E-01		
NA-24	LLD<2.51E-01		LLD<2.51E-01		
SR-92	LLD<1.27E-01		LLD<1.27E-01		
CS-138	LLD<3.65E-01		LLD<3.65E-01		
K-40	6.68E+00	+- 1.20E+00	6.68E+00	+- 1.20E+00	
KR-88	LLD<1.57E+00		LLD<1.57E+00		
TL-209	LLD<4.02E-01		LLD<4.02E-01		
LA-140	[illegible]		LLD<1.81E-01		
AL-26	[illegible]		LLD<3.73E-01		
MN-56	[illegible]		LLD<7.07E-01		
RB-88	[illegible]		LLD<3.45E-01		
Total	1.72E+01	+- 1.70E+00	1.72E+01	+- 1.70E+00	

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Left Sig channel	Energy keV	Net Area counts	Error %	Gammas/sec
714.19	357.22	8.	43.5	1.50E+00
1021.61	510.87	26.	20.8	6.88E+00
1165.14	582.62	36.	18.3	1.06E+01
1218.54	609.31	52.	14.3	1.59E+01
3526.67	1764.59	1.	40.8	4.34E+00

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

CANBERRA SPECTRAN-AT V4.2a

[illegible] Revere, MA                                  24-AUG-94  10:56:59

                    A N A L Y S I S   P A R A M E T E R S

MCA Unit Number:     1      /      ADC Unit Number:  1.0
Detector Number:     1      /      Geometry Number:     1
Resolution Size:    4096 channels.
First channel for Search:     0
Order of Smoothing Function:  5
Number of Background Channels:  4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity:   3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0117
Measured by:          kc

Sample Description: P.A. Fit 4
Geometry Description:  500 ML MARINELLI
Sample Size:   7.1690E+02 gram      / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 15:47:00

COLLECT Live Time:      600. seconds
        Real Time:      600. seconds
        Dead Time:      00.00 %

 Decayed to      0. Days,  0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94
```

Tabb's Creek at [illegible], Devers, PA 28-AUG-94 10:36:59

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	[illegible]	238.57	1.3	34.	93.	15.6	PB-212
2	[illegible]	[illegible]	1.1	12.	34	29.6	BI-211,PB-214
3	1021.47	510.80	0.8	3.	20.	26.2	TL-208,NA-22, ANN-RD
4	1166.01	583.08	1.5	1.	24.	21.0	TL-208
5	2900.53	1461.15	1.1	2.	32.	19.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible] Harrisburg, Pa. 24-AUG-94 [illegible]

[illegible]
[illegible] on 29-JUL-94 at [illegible]
[illegible] 0. days, 0.0000 hours [illegible] the start of COLLECT.

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

Nuclide	Activity Concentration in PCI/Gram Measured	Error	Decay Corrected	Error
[illegible]	LLD<[illegible]		LLD<2.95E-01	
[illegible]	LLD<[illegible]		LLD<2.63E+00	
[illegible]	LLD<[illegible]		LLD<3.92E-01	
[illegible]	LLD<[illegible]		LLD<4.58E-01	
[illegible]	LLD<4.19E+00		LLD<4.19E+00	
CO-57	LLD<1.72E-01		LLD<1.72E-01	
PA-234	LLD<6.73E-01		LLD<6.73E-01	
CE-144	LLD<1.69E+00		LLD<1.69E+00	
[illegible]	LLD<1.67E-01		LLD<1.67E-01	
CE-141	LLD<3.68E-01		LLD<3.68E-01	
KR-85M	LLD<2.06E-01		LLD<2.06E-01	
XE-131M	LLD<7.56E+00		LLD<7.56E+00	
BA-137	LLD<9.94E-01		LLD<9.94E-01	
CE-139	LLD<2.02E-01		LLD<2.02E-01	
U-235	LLD<3.29E-01		LLD<3.29E-01	
RA-226	LLD<4.89E+00		LLD<4.89E+00	
[illegible]-141	LLD<4.38E-01		LLD<4.38E-01	
[illegible]-89	LLD<1.92E+00		LLD<1.92E+00	
TE-132	LLD<2.01E-01		LLD<2.01E-01	
XE-133M	LLD<2.01E+00		LLD<2.01E+00	
TH-227	LLD<1.54E+00		LLD<1.54E+00	
PB-212	9.44E-01	+- 1.48E-01	9.44E-01	+- 1.48E-01
RA-224	LLD<5.97E+00		LLD<5.97E+00	
XE-135	LLD<1.59E-01		LLD<1.59E-01	
XE-138	LLD<5.91E-01		LLD<5.91E-01	
SE-75	LLD<2.83E-01		LLD<2.83E-01	
NP-239	LLD<1.14E+00		LLD<1.14E+00	
HG-203	LLD<1.89E-01		LLD<1.89E-01	
IR-192	LLD<2.01E-01		LLD<2.01E-01	
CR-51	LLD<1.21E+00		LLD<1.21E+00	
I-211	4.24E+00	+- [illegible]E+00	4.24E+00	+- 1.25E+00
PB-214	LLD<6.03E[illegible]		LLD<6.03E-01	
BA-133	LLD<3.57E[illegible]		LLD<3.57E-01	
I-131	LLD<1.80E-01		LLD<1.80E-01	
SN-113	LLD<2.08E-01		LLD<2.08E-01	
KR-87	LLD<3.10E-01		LLD<3.10E-01	
PB-211	LLD<6.35E+00		LLD<6.35E+00	
AU-198	LLD<1.61E-01		LLD<1.61E-01	
SB-125	LLD<6.79E-01		LLD<6.79E-01	
BI-212	LLD<4.28E+01		LLD<4.28E+01	
BE-7	LLD<1.50E+00		LLD<1.50E+00	
HF-181	LLD<1.91E-01		LLD<1.91E-01	
[illegible]-103	LLD<1.48E-01		LLD<1.48E-01	
KR-85	LLD<4.80E+01		LLD<4.80E+01	
SR-85	LLD<2.10E-01		LLD<2.10E-01	
I-133	LLD<1.59E-01		LLD<1.59E-01	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	8.[illegible]E-01 +- 1.70E-01	8.03E-01 +- 1.70E-01
[illegible]	LLD<2.48E-01	LLD<2.48E-01
[illegible]	LLD<3.11E-01	LLD<3.11E-01
[illegible]	LLD<6.11E-01	LLD<6.11E-01
RU-106	LLD<1.55E+00	LLD<1.55E+00
[illegible]	LLD<3.42E-01	LLD<3.42E-01
[illegible]	LLD<2.06E-01	LLD<2.06E-01
[illegible]	LLD<2.05E-01	LLD<2.08E-01
[illegible]	LLD<2.55E-01	LLD<2.55E-01
[illegible]	LLD<2.41E-01	LLD<2.41E-01
[illegible]	LLD<5.46E-01	LLD<5.46E-01
[illegible]	LLD<2.19E-01	LLD<2.19E-01
[illegible]	LLD<2.15E-01	LLD<2.15E-01
[illegible]	LLD<1.06E-01	LLD<1.06E-01
[illegible]	LLD<1.16E+00	LLD<1.16E+00
[illegible]	LLD<1.11E-01	LLD<1.11E-01
[illegible]	LLD<1.74E-01	LLD<1.74E-01
MN-54	LLD<1.30E-01	LLD<1.30E-01
[illegible]	LLD<2.06E-01	LLD<2.06E-01
[illegible]	LLD<2.13E-01	LLD<2.13E-01
TL-207	LLD<1.71E+02	LLD<1.71E+02
Y-88	LLD<1.97E-01	LLD<1.97E-01
AC-228	LLD<1.06E+00	LLD<1.06E+00
EU-152	LLD<1.78E+00	LLD<1.78E+00
PA-234M	LLD<1.09E+00	LLD<1.09E+00
SR-91	LLD<4.77E-01	LLD<4.77E-01
RB-89	LLD<5.59E-01	LLD<5.59E-01
[illegible]	LLD<3.46E-01	LLD<3.46E-01
[illegible]	LLD<5.26E-01	LLD<5.26E-01
SC-46	LLD<2.12E-01	LLD<2.12E-01
TA-182	LLD<6.05E-01	LLD<6.05E-01
[illegible]	LLD<8.35E-01	LLD<8.35E-01
[illegible]	LLD<3.38E-01	LLD<3.38E-01
NA-22	LLD<2.85E-01	LLD<2.85E-01
[illegible]	LLD<3.22E-01	LLD<3.22E-01
[illegible]	LLD<3.65E-01	LLD<3.65E-01
NA-24	LLD<1.37E-01	LLD<1.37E-01
[illegible]	LLD<1.92E-01	LLD<1.92E-01
[illegible]	LLD<4.33E-01	LLD<4.33E-01
[illegible]-40	7.24E+00 +- 1.37E+00	7.24E+00 +- 1.37E+00
KR-88	LLD<2.25E+00	LLD<2.25E+00
[illegible]-209	LLD<2.25E-01	LLD<2.25E-01
[illegible]-140	LLD<3.06E-01	LLD<3.06E-01
[illegible]-26	LLD<1.66E-01	LLD<1.66E-01
MN-56	LLD<6.25E-01	LLD<6.25E-01
[illegible]-88	LLD<1.72E+00	LLD<1.72E+00
Total	1.32E+01 +- 1.87E+00	1.32E+01 +- 1.87E+00

Error Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

ALL PEAKS USED IN ANALYSIS

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

Program: SPECTRAN-AT V4.2a

Performed: Ohio Valley, PA                    24-AUG-94  11:01:30

                    A N A L Y S I S   P A R A M E T E R S

Multiplet Number:     1      /     ADC Unit Number:  1.0
Detector Number:      1      /     Geometry Number:    1
Spectrum Size:   4096 channels.
First channel for Search:     0
Order of Smoothing Function:  5
Number of Background Channels:  4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity:   3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0118
Measured by:        KC

Sample Description: P.A. TRENCH
Geometry Description:  500 ML MARINELLI
Sample Size:   7.9310E+02 GRAM      / Conversion Factor: 1.0000E+00
Standard Size: 3.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 16:18:20

COLLECT Live Time:      600. seconds
        Real Time:      600. seconds
        Dead Time:   0.00000%

 Decayed to      0. days,  0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94
```

Teledyne Corporation, Severn, PA 24-AUG-94 11:01:30

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1$	477.20	238.80	1.2	38.	72.	20.9	PB-212
2	540.38	295.33	1.4	4.	14.	36.4	PB-214
3C	704.31	352.13	0.9	5.	17.	38.4	BI-211,PB-214
4	1164.10	583.10	0.7	3.	23.	24.6	TL-208

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

C - Multiplet Analysis converged normally
$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

[illegible]

[illegible]

Sample: [illegible]
Date initiated on 29-JUL-94 at 16:[illegible]
Delayed by 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /GRAM Measured	Error	Decay corrected	Error
[illegible]	LLD<[illegible]		LLD<3.13E-01	
[illegible]-234	LLD<2.62E+00		LLD<2.62E+00	
[illegible]-[illegible]	LLD<2.95E+01		LLD<2.95E+01	
[illegible]-133	LLD<4.10E-01		LLD<4.10E-01	
[illegible]-109	LLD<3.97E+00		LLD<3.97E+00	
[illegible]-57	LLD<1.78E-01		LLD<1.78E-01	
[illegible]-234	LLD<6.60E-01		LLD<6.60E-01	
CE-144	LLD<1.39E+00		LLD<1.39E+00	
TC-99M	LLD<1.47E-01		LLD<1.47E-01	
CE-141	LLD<3.23E-01		LLD<3.23E-01	
KR-85M	LLD<1.79E-01		LLD<1.79E-01	
XE-131M	LLD<7.66E+00		LLD<7.66E+00	
BA-139	LLD<8.43E-01		LLD<8.43E-01	
CE-139	LLD<1.71E-01		LLD<1.71E-01	
U-235	LLD<2.62E-01		LLD<2.62E-01	
RA-226	LLD<4.36E+00		LLD<4.36E+00	
[illegible]-141	LLD<4.20E-01		LLD<4.20E-01	
[illegible]-89	LLD<1.68E+00		LLD<1.68E+00	
TE-132	LLD<1.81E-01		LLD<1.81E-01	
XE-133M	LLD<1.65E+00		LLD<1.65E+00	
TH-227	LLD<1.56E+00		LLD<1.56E+00	
PB-212	7.35E-01	+- 1.53E-01	7.35E-01	+- 1.53E-01
RA-224	LLD<5.53E+00		LLD<5.53E+00	
XE-135	LLD<1.51E-01		LLD<1.51E-01	
XE-138	LLD<4.89E-01		LLD<4.89E-01	
SE-75	LLD<1.99E-01		LLD<1.99E-01	
NP-239	LLD<9.87E-01		LLD<9.87E-01	
HG-203	LLD<1.85E-01		LLD<1.85E-01	
IR-192	LLD<1.36E-01		LLD<1.36E-01	
CR-51	LLD<1.16E+00		LLD<1.16E+00	
BI-211	2.70E+00	+- 1.04E+00	2.70E+00	+- 1.04E+00
PB-214	3.16E-01	+- 1.21E-01	3.16E-01	+- 1.21E-01
BA-133	LLD<2.69E-01		LLD<2.69E-01	
I-131	LLD<1.25E-01		LLD<1.25E-01	
SN-113	LLD<1.88E-01		LLD<1.88E-01	
KR-87	LLD<2.58E-01		LLD<2.58E-01	
PB-211	LLD<5.81E+00		LLD<5.81E+00	
AU-198	LLD<1.39E-01		LLD<1.39E-01	
SB-125	LLD<4.86E-01		LLD<4.86E-01	
BI-212	LLD<4.13E+01		LLD<4.13E+01	
BE-7	LLD<1.31E+00		LLD<1.31E+00	
[illegible]-181	LLD<1.39E-01		LLD<1.39E-01	
[illegible]-103	LLD<1.52E-01		LLD<1.52E-01	
KR-85	LLD<4.37E+01		LLD<4.37E+01	
SR-85	LLD<1.91E-01		LLD<1.91E-01	
I-133	LLD<1.55E-01		LLD<1.55E-01	

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	LLD<6.79E-01
[illegible]	[illegible]1.13E-01	[illegible]
[illegible]	[illegible]<1.84E-01	LLD<1.84E-01
[illegible]	[illegible]<5.21E-01	[illegible]
[illegible]	[illegible]<1.47E+00	[illegible]
[illegible]	[illegible]<2.99E-01	[illegible]
[illegible]	[illegible]<1.94E-01	[illegible]
[illegible]	[illegible]1.95E-01	[illegible]
[illegible]	[illegible]	LLD<1.73E-01
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	LLD<3.46E-01
[illegible]	[illegible]	LLD<1.61E-01
[illegible]	[illegible]<2.94E-01	LLD<7.76E-01
[illegible]	[illegible]	LLD<2.02E-01
[illegible]	[illegible]<1.19E+00	LLD<1.19E+00
[illegible]	[illegible]	LLD<2.18E-01
[illegible]	LLD<1.75E-01	LLD<1.75E-01
[illegible]-54	LLD<1.25E-01	LLD<1.25E-01
[illegible]-56	LLD<2.13E-01	LLD<2.13E-01
[illegible]-134	LLD<2.41E-01	LLD<2.41E-01
TL-207	LLD<1.61E+02	LLD<1.61E+02
Y-89	LLD<2.08E-01	LLD<2.08E-01
AC-228	LLD<7.97E-01	LLD<7.97E-01
EU-152	LLD<1.77E+00	LLD<1.77E+00
PA-234M	LLD<2.09E+00	LLD<2.09E+00
ER-91	LLD<6.98E-01	LLD<6.98E-01
SR-89	LLD<5.69E-01	LLD<5.69E-01
[illegible]-59	LLD<3.55E-01	LLD<3.55E-01
[illegible]-65	LLD<5.47E-01	LLD<5.47E-01
SC-46	LLD<2.19E-01	LLD<2.19E-01
TA-182	LLD<6.12E-01	LLD<6.12E-01
[illegible]-175	LLD<6.59E-01	LLD<6.59E-01
CL-39	LLD<4.99E-01	LLD<4.99E-01
NA-22	LLD<1.18E-01	LLD<1.18E-01
AR-41	LLD<2.48E-01	LLD<2.48E-01
CO-60	LLD<2.66E-01	LLD<2.66E-01
NA-24	LLD<2.08E-01	LLD<2.08E-01
SR-92	LLD<2.54E-01	LLD<2.54E-01
CS-138	LLD<8.43E-02	LLD<8.43E-02
[illegible]-40	LLD<4.33E+00	LLD<4.33E+00
KR-88	LLD<1.26E+00	LLD<1.26E+00
TL-209	LLD<8.11E-01	LLD<8.11E-01
LA-140	LLD<1.77E-01	LLD<1.77E-01
AL-26	LLD<2.64E-01	LLD<2.64E-01
MN-56	LLD<5.65E-01	LLD<5.65E-01
RB-86	LLD<3.86E-01	LLD<3.86E-01
Total	3.75E+00 +- 1.06E+00	3.75E+00 +- 1.06E+00

Error Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Channel	Energy keV	Net Area Counts	Error %	Gammas/sec
1.15	583.10	23.	24.6	6.72E+00

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

Program: GESPECTRAN-AT V4.2a

Copyright 1990-1994 Tennelec                    24-AUG-94  11:10:19

                    A N A L Y S I S   P A R A M E T E R S

ADC Unit Number:     1      /     ADC Unit Number:  1.0
Detector Number:     1      /     Geometry Number:    1
Spectrum Size:    4096 channels.
First channel for Search:      0
Order of Smoothing Function:   5
Number of Background Channels:  4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity:   3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

MLD Calculation Performed.
Multiplet Analysis Performed.

Terminal Output.
Analysis of Spectrum saved in Disk File SD0119
Measured by:          KC

Sample Description: P.A. TRENCH
Geometry Description:  500 ML MARINELLI
Sample Size:   7.3330E+02 GRAM      / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 16:50:52

COLLECT Live Time:      600. seconds
        Real Time:      600. seconds
        Dead Time:    00.00 %

 Decayed to      0. days,  0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94
```

Vitek Demonstration, Revere, PA 24-AUG-94 11:10:12

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

PK	Centroid channel	Energy keV	FWHM keV	Backgrd counts	Net Area counts	Error %	Nuclides
1	477.37	238.39	1.6	34.	84.	14.7	PB-212
2	590.33	295.28	0.9	12.	28.	27.3	PB-214
3	655.10	328.19	1.1	9.	20.	32.6	LA-140
4	676.31	339.09	1.5	12.	24.	29.6	AC-228
5	703.88	352.06	1.1	8.	57.	15.5	BI-211,PB-214
6	1184.43	593.26	1.6	7.	35.	20.4	TL-208
7	1455.18	727.22	0.7	3.	8.	46.6	BI-212
8	1822.33	911.38	1.4	2.	17.	26.8	AC-228

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible]
[illegible] collected on 29-JUL-94 at [illegible]
[illegible] 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

[illegible] Activity Concentration in PCI /05AM

	Measured	Error	Decay corrected	Error
[illegible]-241	LLD<3.39E-01		LLD<3.49E-01	
[illegible]-234	LLD<2.57E+00		LLD<2.57E+00	
[illegible]-228	LLD<3.29E+01		LLD<3.29E+01	
[illegible]-137	LLD<4.82E-01		LLD<4.82E-01	
[illegible]-149	LLD<3.89E+00		LLD<3.89E+00	
CD-87	LLD<2.03E-01		LLD<2.03E-01	
PA-234	LLD<7.65E-01		LLD<7.65E-01	
CE-144	LLD<1.41E+00		LLD<1.41E+00	
TC-99M	LLD<1.89E-01		LLD<1.89E-01	
CE-141	LLD<3.55E-01		LLD<3.55E-01	
KR-85M	LLD<2.39E-01		LLD<2.39E-01	
XE-131M	LLD<9.31E+00		LLD<9.31E+00	
BA-139	LLD<1.23E+00		LLD<1.23E+00	
CE-139	LLD<2.51E-01		LLD<2.51E-01	
U-235	LLD<3.72E-01		LLD<3.72E-01	
RA-226	LLD<5.21E+00		LLD<5.21E+00	
[illegible] 141	LLD<4.54E-01		LLD<4.54E-01	
KR-89	LLD<2.14E+00		LLD<2.14E+00	
TE-132	LLD<2.35E-01		LLD<2.35E-01	
XE-133M	LLD<1.70E+00		LLD<1.70E+00	
TH-227	LLD<2.02E+00		LLD<2.02E+00	
PB-212	9.29E-01	+- 1.37E-01	9.29E-01	+- 1.37E-01
RA-224	LLD<6.22E+00		LLD<6.22E+00	
XE-135	LLD<1.74E-01		LLD<1.74E-01	
XE-138	LLD<5.44E-01		LLD<5.44E-01	
SE-75	LLD<2.61E-01		LLD<2.61E-01	
NP-239	LLD<1.16E+00		LLD<1.16E+00	
HG-203	LLD<1.97E-01		LLD<1.97E-01	
IR-192	LLD<2.10E-01		LLD<2.10E-01	
CR-51	LLD<1.32E+00		LLD<1.32E+00	
BI-211	9.61E+00	+- 1.50E+00	9.61E+00	+- 1.50E+00
PB-214	1.12E+00	+- 1.75E-01	1.12E+00	+- 1.75E-01
BA-133	LLD<3.94E-01		LLD<3.94E-01	
I-131	LLD<1.72E-01		LLD<1.72E-01	
SN-113	LLD<2.14E-01		LLD<2.14E-01	
KR-87	LLD<3.09E-01		LLD<3.09E-01	
PB-211	LLD<5.76E+00		LLD<5.76E+00	
AU-198	LLD<1.10E-01		LLD<1.10E-01	
CD-109	LLD<5.86E-01		LLD<5.86E-01	
BI-212	LLD<4.44E+01		LLD<4.44E+01	
BE-7	LLD<1.35E+00		LLD<1.35E+00	
[illegible]-181	LLD<1.74E-01		LLD<1.74E-01	
[illegible]-103	LLD<1.49E-01		LLD<1.49E-01	
KR-85	LLD<4.36E+01		LLD<4.36E+01	
SR-89	LLD<1.90E-01		LLD<1.90E-01	
I-133	LLD<1.61E-01		LLD<1.61E-01	

[illegible]	[illegible]		[illegible]		
[illegible]	[illegible]		LLD< 1.71E-01		
[illegible]	[illegible]		LLD<1.77E-01		
[illegible]	[illegible]		LLD<9.33E-01		
[illegible]	[illegible]		LLD<1.35E-01		
[illegible]	LLD<7.16E-01		LLD<2.16E-01		
[illegible]	LLD<7.21E-01		LLD<7.27E-01		
[illegible]	LLD<2.11E+00		LLD<2.11E+00		
[illegible]	LLD<2.63E-01		LLD<2.63E-01		
[illegible]	LLD<2.27E-01		LLD<2.27E-01		
[illegible]	LLD<2.28E-01		LLD<2.28E-01		
[illegible]	LLD<2.77E-01		LLD<2.77E-01		
[illegible]	LLD<2.32E-01		LLD<2.32E-01		
[illegible]	LLD<6.75E-0		LLD<6.75E-01		
[illegible]	LLD<2.28E-01		LLD<2.28E-01		
[illegible]	LLD<3.05E-01		LLD<3.05E-01		
[illegible]	LLD<2.30E-01		LLD<2.30E-01		
[illegible]	LLD<9.87E-01		LLD<9.87E-01		
[illegible]	LLD<2.30E-01		LLD<2.30E-01		
SB-136	LLD<2.64E-01		LLD<2.64E-01		
MN-54	LLD<1.87E-01		LLD<1.87E-01		
CO-57	LLD<2.62E-01		LLD<2.62E-01		
I-134	LLD<2.80E-01		LLD<2.80E-01		
TL-207	LLD<1.92E+02		LLD<1.92E+02		
Y-88	LLD<2.03E-01		LLD<2.03E-01		
AC-228	1.02E+00	+- 2.73E-01	1.02E+00	+-	2.73E-01
EU-152	LLD<1.57E+00		LLD<1.57E+00		
PA-234M	LLD<2.16E+00		LLD<2.16E+00		
SR-91	LLD<4.63E-01		LLD<4.63E-01		
RB-89	LLD<6.31E-01		LLD<6.31E-01		
[illegible]-59	LLD<3.62E-01		LLD<3.62E-01		
[illegible]-65	LLD<7.78E-01		LLD<7.78E-01		
SC-46	LLD<3.32E-01		LLD<3.32E-01		
TA-182	LLD<8.98E-01		LLD<8.98E-01		
I-135	LLD<8.39E-01		LLD<8.39E-01		
CL-39	LLD<3.98E-01		LLD<3.98E-01		
NA-22	LLD<2.28E-01		LLD<2.28E-01		
AR-41	LLD<2.25E-01		LLD<2.25E-01		
CO-60	LLD<2.98E-01		LLD<2.98E-01		
NA-24	LLD<2.81E-01		LLD<2.81E-01		
SR-92	LLD<3.07E-01		LLD<3.07E-01		
CS-138	LLD<4.24E-01		LLD<4.24E-01		
K-40	LLD<3.20E+00		LLD<3.20E+00		
KR-88	LLD<1.36E+00		LLD<1.36E+00		
TL-209	LLD<8.21E-01		LLD<8.21E-01		
LA-140	LLD<2.63E-01		LLD<2.63E-01		
BL-26	LLD<1.63E-01		LLD<1.63E-01		
MN-56	LLD<6.11E-01		LLD<6.11E-01		
RB-88	LLD<1.69E+00		LLD<1.69E+00		
Total	1.27E+01	+- 1.54E+00	1.27E+01	+-	1.54E+00

Error Quotation at 1.00 Sigma
Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Peak Chan	Energy keV	Net Area counts	Error %	Gammas/sec
326.10	328.19	20.	32.6	7.31E+00
674.51	338.39	24.	29.6	4.15E+00
1144.43	583.26	35.	20.4	1.04E+01
1458.15	727.63	8.	46.4	2.99E+00

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

Program: GESPECTRAN-AT V4.2a

Teledyne Brown Engineering, Knoxville, TN                 24-AUG-94  11:14:56

                    A N A L Y S I S   P A R A M E T E R S

MCA Unit Number:     1      /      ADC Unit Number:  1.0
Detector Number:     1      /      Geometry Number:    1
Spectrum Size:   4096 channels.
First channel for Search:      0
Order of Smoothing Function:   5
Number of Background Channels:  4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity:   3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0120
Measured by:          kc

Sample Description: F.A Trench Btm Soil
Geometry Description:  500 ML MARINELLI
Sample Size:   1.0823E+03 gram      / Conversion Factor: 1.0000E+00
Standard Size: 3.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 18:16:16

COLLECT Live Time:      600. seconds
        Real Time:      601. seconds
        Dead Time:      0.17 %

 Decayed to      0. days,  0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94
```

Naval Construction, Revere, PA 24-AUG-94 11:14:56

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

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	477.34	238.74	1.3	108.	119.	17.1	PB-212
2	590.49	295.20	1.5	47.	46.	28.4	PB-214
3	676.53	338.14	1.2	21.	34.	26.8	AC-228
4	704.1[illegible]	351.72	1.1	16.	42.	15.6	BI-211,PB-214
5	1019.92	509.54	1.0	12.	18.	36.9	TL-208,NA-22, ANN-RD
6	1166.47	582.71	1.3	8.	37.	20.4	TL-208
7	1218.52	608.70	2.1	9.	46.	18.0	XE-135,BI-214
8	1822.84	910.53	1.4	7.	26.	25.4	AC-228
9	2240.45	1119.21	1.6	3.	14.	33.1	BI-214,SC-46
10	2922.22	1460.07	2.0	4.	95.	10.8	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible]

[illegible] Search Drm Soil
[illegible] started on 29-JUL-94 at [illegible]
[illegible] 0. days, 0.0000 hours [illegible] the start of COLLECT.

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

Nuclide	Original Concentration in PCi /gram		Decay corrected	Error
AM-241	LLD<3.06E-01		LLD<3.06E-01	
[illegible]	LLD<3.03E+00		LLD<3.03E+00	
[illegible]-270	LLD<3.12E+01		LLD<3.12E+01	
[illegible]E-133	LLD<4.33E-01		LLD<4.33E-01	
[illegible]D-109	LLD<3.74E+00		LLD<3.74E+00	
CO-57	LLD<1.77E-01		LLD<1.77E-01	
PA-234	LLD<6.89E-01		LLD<6.89E-01	
CE-144	LLD<1.59E+00		LLD<1.59E+00	
TC-99M	LLD<1.82E-01		LLD<1.82E-01	
CE-141	LLD<3.76E-01		LLD<3.76E-01	
KR-85M	LLD<2.54E-01		LLD<2.54E-01	
XE-131M	LLD<7.94E+00		LLD<7.94E+00	
BA-139	LLD<1.06E+00		LLD<1.06E+00	
CS-139	LLD<2.14E-01		LLD<2.14E-01	
U-235	LLD<3.24E-01		LLD<3.24E-01	
[illegible]-226	LLD<5.10E+00		LLD<5.10E+00	
[illegible]-141	LLD<4.63E-01		LLD<4.63E-01	
KR-89	LLD<1.93E+00		LLD<1.93E+00	
TE-132	LLD<1.95E-01		LLD<1.95E-01	
XE-133M	LLD<1.53E+00		LLD<1.53E+00	
TH-227	LLD<1.49E+00		LLD<1.49E+00	
PB-212	8.95E-01	+- 1.53E-01	8.95E-01	+- 1.53E-01
RA-224	LLD<4.54E+00		LLD<4.54E+00	
XE-135	LLD<1.85E-01		LLD<1.85E-01	
XE-138	LLD<6.91E-01		LLD<6.91E-01	
SE-75	LLD<2.14E-01		LLD<2.14E-01	
NP-239	LLD<1.17E+00		LLD<1.17E+00	
HG-203	LLD<1.79E-01		LLD<1.79E-01	
IR-192	LLD<1.50E-01		LLD<1.50E-01	
CR-51	LLD<1.37E+00		LLD<1.37E+00	
BI-211	7.11E+00	+- 1.11E+00	7.11E+00	+- 1.11E+00
PB-214	8.31E-01	+- 1.30E-01	8.31E-01	+- 1.30E-01
BA-133	LLD<3.14E-01		LLD<3.14E-01	
I-131	LLD<1.67E-01		LLD<1.67E-01	
SN-113	LLD<1.76E-01		LLD<1.76E-01	
KR-87	LLD<2.98E-01		LLD<2.98E-01	
PO-211	LLD<4.75E+00		LLD<4.75E+00	
AU-198	LLD<1.34E-01		LLD<1.34E-01	
SB-125	LLD<4.41E-01		LLD<4.41E-01	
BI-212	LLD<4.15E+01		LLD<4.15E+01	
BE-7	LLD<1.10E+00		LLD<1.10E+00	
[illegible]-181	LLD<1.46E-01		LLD<1.46E-01	
[illegible]-103	LLD<1.62E-01		LLD<1.62E-01	
KR-85	LLD<4.55E+01		LLD<4.55E+01	
SR-85	LLD<1.99E-01		LLD<1.99E-01	
I-133	LLD<1.92E-01		LLD<1.92E-01	

[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		LLD<1.69E-01	
[illegible]	8.16E-01	+- 1.67E-01	[illegible]	+- 1.67E-01
[illegible]	LLD<1.59E-01		[illegible]	
[illegible]	LLD<3.30E-01		[illegible]	
[illegible]	LLD<5.97E-01		[illegible]	
[illegible]	LLD<1.71E+00		LLD<1.71E+00	
[illegible]	LLD<3.05E-01		LLD<3.05E-01	
[illegible]	LLD<2.10E-01		LLD<2.10E-01	
[illegible]	[illegible]		LLD<2.27E-01	
[illegible]	[illegible]		LLD<1.91E-01	
[illegible]	[illegible]		LLD<1.34E-01	
[illegible]	[illegible]		LLD<5.52E-01	
[illegible]	[illegible]		LLD<2.07E-01	
[illegible]	[illegible]		LLD<3.03E-01	
[illegible]	[illegible]		LLD<2.01E-01	
[illegible]	[illegible]		LLD<1.28E+00	
[illegible]	[illegible]		LLD<2.17E-01	
[illegible]	LLD<2.31E-01		LLD<2.31E-01	
MN-54	LLD<1.87E-01		LLD<1.87E-01	
CO-56	LLD<1.98E-01		LLD<1.98E-01	
I-134	LLD<2.17E-01		LLD<2.17E-01	
TL-207	LLD<1.30E+02		LLD<1.30E+02	
Y-88	LLD<1.57E-01		LLD<1.57E-01	
AC-228	1.05E-00	+- 2.68E-01	1.05E+00	+- 2.68E-01
EU-152	LLD<1.97E+00		LLD<1.97E+00	
PA-234M	LLD<2.19E+00		LLD<2.19E+00	
SR-91	LLD<6.79E-01		LLD<6.79E-01	
[illegible]-99	LLD<4.38E-01		LLD<4.38E-01	
[illegible] 59	LLD<5.00E-01		LLD<5.00E-01	
ZN-65	LLD<6.38E-01		LLD<6.38E-01	
SC-46	LLD<2.59E-01		LLD<2.59E-01	
TA-182	LLD<7.26E-01		LLD<7.26E-01	
I-135	LLD<9.80E-01		LLD<9.80E-01	
CL-39	LLD<7.08E-01		LLD<7.08E-01	
NA-22	LLD<3.45E-01		LLD<3.45E-01	
AR-41	LLD<2.52E-01		LLD<2.52E-01	
CO-60	LLD<2.64E-01		LLD<2.64E-01	
NA-24	LLD<1.90E-01		LLD<1.90E-01	
SR-92	LLD<2.36E-01		LLD<2.36E-01	
CS-138	LLD<3.90E-01		LLD<3.90E-01	
K-40	1.42E+01	+- 1.54E+00	1.42E+01	+- 1.54E+00
KR-88	LLD<2.09E+00		LLD<2.09E+00	
TL-209	LLD<3.30E-01		LLD<3.30E-01	
LA-140	LLD<2.23E-01		LLD<2.23E-01	
AL-26	LLD<1.10E-01		LLD<1.10E-01	
MN-56	LLD<4.14E-01		LLD<4.14E-01	
RB-88	LLD<6.27E-01		LLD<6.27E-01	
Total	2.49E+01	+- 1.93E+00	2.49E+01	+- 1.93E+00

[illegible]or Quotation at 1.00 Sigma
[illegible] Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

[illegible] Channel	Energy keV	Net Area counts	Error %	Gammas/sec
[illegible]	338.14	34.	26.8	5.71E+00
[illegible]	608.70	46.	18.0	1.42E+01
[illegible]	1119.21	14.	33.1	7.29E+00

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

DEVELCO SPECTRAN-AT V4.2a

Isotope Corporation, Devens, MA 18-AUG-94 11:05:30

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0121
Measured by: kc

Sample Description: Water Blank
Geometry Description: 500 ML MARINELLI
Sample Size: 4.8530E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 29-JUL-94 at 19:12:07

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 100.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94

Tabbt Corporation, Revere, PA 18-AUG-94 11:05:30

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	131.80	91.30	1.3	1.	11.	34.3	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible] Laboratory, Inc., PA 19-AUG-94 11:09:30

Sample: Water Blank
[illegible] collected on 29-JUL-94 at 19:12:07
Delayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram Measured	Error	Decay corrected	Error
AM-241	LLD<1.76E-01		LLD<1.76E-01	
[illegible]-234	LLD<1.64E+00		LLD<1.64E+00	
TH-230	LLD<2.04E+01		LLD<2.04E+01	
XE-133	LLD<2.38E-01		LLD<2.38E-01	
CD-109	LLD<3.00E+00		LLD<3.00E+00	
CO-57	LLD<1.32E-01		LLD<1.32E-01	
PA-234	LLD<5.10E-01		LLD<5.10E-01	
CE-144	LLD<1.15E+00		LLD<1.15E+00	
TC-99M	LLD<1.02E-01		LLD<1.02E-01	
CE-141	LLD<2.31E-01		LLD<2.31E-01	
KR-85M	LLD<1.32E-01		LLD<1.32E-01	
XE-131M	LLD<4.74E+00		LLD<4.74E+00	
BA-139	LLD<6.84E-01		LLD<6.84E-01	
CE-139	LLD<1.39E-01		LLD<1.39E-01	
U-235	LLD<2.67E-01		LLD<2.67E-01	
RA-226	LLD<4.40E+00		LLD<4.40E+00	
[illegible]-241	LLD<3.67E-01		LLD<3.67E-01	
KR-89	LLD<1.54E+00		LLD<1.54E+00	
TE-132	LLD<1.32E-01		LLD<1.32E-01	
XE-133M	LLD<1.05E+00		LLD<1.05E+00	
PB-212	LLD<3.33E-01		LLD<3.33E-01	
RA-224	LLD<4.16E+00		LLD<4.16E+00	
XE-135	LLD<1.32E-01		LLD<1.32E-01	
XE-138	LLD<4.61E-01		LLD<4.61E-01	
SE-75	LLD<2.23E-01		LLD<2.23E-01	
NP-239	LLD<7.97E-01		LLD<7.97E-01	
HG-203	LLD<1.41E-01		LLD<1.41E-01	
IR-192	LLD<1.09E-01		LLD<1.09E-01	
CR-51	LLD<1.14E+00		LLD<1.14E+00	
BI-211	LLD<3.28E+00		LLD<3.28E+00	
PB-214	LLD<3.52E-01		LLD<3.52E-01	
BA-133	LLD<1.85E-01		LLD<1.85E-01	
I-131	LLD<7.51E-02		LLD<7.51E-02	
SN-113	LLD<2.38E-01		LLD<2.38E-01	
KR-87	LLD<2.15E-01		LLD<2.15E-01	
PB-211	LLD<4.09E+00		LLD<4.09E+00	
AU-198	LLD<1.35E-01		LLD<1.35E-01	
SB-125	LLD<3.98E-01		LLD<3.98E-01	
BI-212	LLD<2.86E+01		LLD<2.86E+01	
BE-7	LLD<1.12E+00		LLD<1.12E+00	
HF-181	LLD<1.59E-01		LLD<1.59E-01	
R[illegible]03	LLD<1.37E-01		LLD<1.37E-01	
KR-85	LLD<3.43E+01		LLD<3.43E+01	
SR-85	LLD<1.50E-01		LLD<1.50E-01	
I-133	LLD<4.70E-02		LLD<4.70E-02	
BA-140	LLD<7.47E-01		LLD<7.47E-01	

[illegible]	LLD<1.74E-01	LLD<1.74E-01
[illegible]-207	LLD<1.66E-01	LLD<1.66E-01
[illegible]-208	LLD<5.08E-01	LLD<5.08E-01
[illegible]-124	LLD<1.65E-01	LLD<1.65E-01
[illegible]-134	LLD<1.91E-01	LLD<1.91E-01
[illegible]-234	LLD<4.49E-01	LLD<4.49E-01
RU-106	LLD<1.54E+00	LLD<1.54E+00
LA-140	LLD<3.70E-01	LLD<3.70E-01
AG-110M	LLD<1.17E-01	LLD<1.17E-01
NB-97	LLD<1.18E-01	LLD<1.18E-01
CS-137	LLD<5.57E-02	LLD<5.57E-02
[illegible]-132	LLD<5.25E-02	LLD<5.25E-02
[illegible]-187	LLD<1.77E-01	LLD<1.77E-01
ZR-97	LLD<1.69E-01	LLD<1.69E-01
SR-95	LLD<2.78E-01	LLD<2.78E-01
NB-95	LLD<1.71E-01	LLD<1.71E-01
PB-210	LLD<1.22E+00	LLD<1.22E+00
CO-58	LLD<1.34E-01	LLD<1.34E-01
CS-136	LLD<6.08E-02	LLD<6.08E-02
MN-54	LLD<2.76E-01	LLD<2.76E-01
CO-56	LLD<1.38E-01	LLD<1.38E-01
I-134	LLD<1.55E-01	LLD<1.55E-01
TL-207	LLD<5.19E+01	LLD<5.19E+01
Y-88	LLD<7.03E-02	LLD<7.03E-02
AC-228	LLD<5.32E-01	LLD<5.32E-01
EU-152	LLD<1.07E+00	LLD<1.07E+00
PA-234M	LLD<7.24E-01	LLD<7.24E-01
SR-91	LLD<7.04E-01	LLD<7.04E-01
RB-89	LLD<3.49E-01	LLD<3.49E-01
FE-59	LLD<4.73E-01	LLD<4.73E-01
Z[illegible]5	LLD<1.54E-01	LLD<1.54E-01
S[illegible]46	LLD<7.86E-02	LLD<7.86E-02
TA-182	LLD<2.25E-01	LLD<2.25E-01
I-135	LLD<6.66E-01	LLD<6.66E-01
CL-39	LLD<6.02E-01	LLD<6.02E-01
NA-22	LLD<8.68E-02	LLD<8.68E-02
AR-41	LLD<2.02E-01	LLD<2.02E-01
CO-60	LLD<8.96E-02	LLD<8.96E-02
NA-24	LLD<9.14E-02	LLD<9.14E-02
SR-92	LLD<1.05E-01	LLD<1.05E-01
CS-138	LLD<3.05E-01	LLD<3.05E-01
K-40	LLD<8.97E-01	LLD<8.97E-01
KR-88	LLD<9.26E-01	LLD<9.26E-01
TL-209	LLD<7.36E-01	LLD<7.36E-01
LA-140	LLD<3.98E-01	LLD<3.98E-01
AL-26	LLD<1.11E-01	LLD<1.11E-01
MN-56	LLD<4.17E-01	LLD<4.17E-01
RB-88	LLD<6.31E-01	LLD<6.31E-01
Total	0.00E-01 +- 0.00E-01	0.00E-01 +- 0.00E-01

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
181.30	91.30	11.	34.3	8.93E-01

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

CANBERRA SPECTRAN-AT V4.2a

Data: Construction, Revere, PA                    18-AUG-94  11:09:24

                    A N A L Y S I S   P A R A M E T E R S

MCA Unit Number:     1      /      ADC Unit Number:  1.0
Detector Number:     1      /      Geometry Number:    1
Spectrum Size:   4096 channels.
First channel for Search:     0
Adaptive smoothing performed.
Number of Background Channels:  4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity:   3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0122
Measured by:          kc

Sample Description: Dock Pit #2
Geometry Description:  500 ML MARINELLI
Sample Size:   7.1310E+02 gram      / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 30-JUL-94 at 04:02:08

COLLECT Live Time:      600. seconds
        Real Time:      600. seconds
        Dead Time:     00.00 %

 Decayed to       0. days,  0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94
```

Abbot Corporation, Revere, PA 18-AUG-94 11:09:24

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	477.25	238.70	1.2	38.	128.	11.3	PB-212
2	590.69	295.01	1.5	11.	46.	18.4	PB-214
3	675.97	337.92	1.5	18.	27.	30.8	AC-228
4	703.70	351.71	2.5	13.	46.	19.5	BI-211,PB-214
5	819.23	409.37	1.4	11.	10.	59.5	CS-138
6	1166.63	582.80	2.2	5.	34.	20.0	TL-208
7	1218.35	608.87	2.2	4.	29.	21.6	XE-135,BI-214
8	1323.64	661.20	0.8	7.	12.	42.1	CS-137
9	1822.24	910.24	1.8	3.	29.	21.2	AC-228
10	2921.80	1459.88	2.5	0.	79.	11.3	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: Dock Pit #2
Data collected on 30-JUL-94 at 04:02:08
Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram			
	Measured	Error	Decay corrected	Error
AM-241	LLD<3.97E-01		LLD<3.97E-01	
TH-234	LLD<3.89E+00		LLD<3.89E+00	
TH-230	LLD<4.26E+01		LLD<4.26E+01	
XE-133	LLD<5.53E-01		LLD<5.53E-01	
CD-109	LLD<4.78E+00		LLD<4.78E+00	
CO-57	LLD<2.33E-01		LLD<2.33E-01	
PA-234	LLD<1.06E+00		LLD<1.06E+00	
CE-144	LLD<1.82E+00		LLD<1.82E+00	
TC-99M	LLD<2.29E-01		LLD<2.29E-01	
CE-141	LLD<3.95E-01		LLD<3.95E-01	
KR-85M	LLD<2.81E-01		LLD<2.81E-01	
XE-131M	LLD<1.05E+01		LLD<1.05E+01	
BA-139	LLD<1.02E+00		LLD<1.02E+00	
CE-139	LLD<2.07E-01		LLD<2.07E-01	
U-235	LLD<3.61E-01		LLD<3.61E-01	
RA-226	LLD<6.44E+00		LLD<6.44E+00	
[illegible]-141	LLD<5.25E-01		LLD<5.25E-01	
KR-89	LLD<2.44E+00		LLD<2.44E+00	
TE-132	LLD<2.38E-01		LLD<2.38E-01	
XE-133M	LLD<2.17E+00		LLD<2.17E+00	
PB-212	1.45E+00	+- 1.65E-01	1.45E+00	+- 1.65E-01
RA-224	LLD<4.82E+00		LLD<4.82E+00	
XE-135	LLD<2.17E-01		LLD<2.17E-01	
XE-138	LLD<7.35E-01		LLD<7.35E-01	
SE-75	LLD<3.45E-01		LLD<3.45E-01	
NP-239	LLD<1.60E+00		LLD<1.60E+00	
HG-203	LLD<2.20E-01		LLD<2.20E-01	
IR-192	LLD<1.46E-01		LLD<1.46E-01	
CR-51	LLD<1.50E+00		LLD<1.50E+00	
BI-211	8.00E+00	+- 1.56E+00	8.00E+00	+- 1.56E+00
PB-214	9.35E-01	+- 1.82E-01	9.35E-01	+- 1.82E-01
BA-133	LLD<4.56E-01		LLD<4.56E-01	
I-131	LLD<2.34E-01		LLD<2.34E-01	
SN-113	LLD<2.88E-01		LLD<2.88E-01	
KR-87	LLD<4.76E-01		LLD<4.76E-01	
PB-211	LLD<7.98E+00		LLD<7.98E+00	
AU-198	LLD<2.16E-01		LLD<2.16E-01	
SB-125	LLD<5.41E-01		LLD<5.41E-01	
BI-212	LLD<6.31E+01		LLD<6.31E+01	
BE-7	LLD<1.86E+00		LLD<1.86E+00	
HF-181	LLD<2.28E-01		LLD<2.28E-01	
[illegible]-103	LLD<2.02E-01		LLD<2.02E-01	
[illegible]-95	LLD<6.39E+01		LLD<6.39E+01	
SR-85	LLD<2.79E-01		LLD<2.79E-01	
[illegible]-133	LLD<2.08E-01		LLD<2.08E-01	
BA-140	LLD<6.89E-01		LLD<6.89E-01	

[illegible]	LLD<[illegible]		LLD<[illegible]	
[illegible]	LLD<[illegible]		LLD<2.16E-01	
[illegible]	LLD<[illegible]		LLD<[illegible]	
[illegible]-124	LLD<2.22E-01		LLD<2.22E-01	
[illegible]-134	LLD<3.02E-01		LLD<3.02E-01	
[illegible]-14	LLD<7.27E-01		LLD<7.27E-01	
[illegible]-106	LLD<1.89E+00		LLD<1.89E+00	
LA-142	LLD<4.96E-01		LLD<4.96E-01	
[illegible]-110M	LLD<3.24E-01		LLD<3.24E-01	
[illegible]-97	LLD<3.41E-01		LLD<3.41E-01	
[illegible]-137	1.72E-01	+- 7.23E-02	1.72E-01	+- 7.23E-02
[illegible]-132	LLD<2.04E-01		LLD<2.04E-01	
[illegible]-137	LLD<8.71E-01		LLD<8.71E-01	
[illegible]-97	LLD<2.40E-01		LLD<2.40E-01	
[illegible]-95	LLD<3.28E-01		LLD<3.28E-01	
ND-95	LLD<2.59E-01		LLD<2.59E-01	
TL-210	LLD<1.36E+00		LLD<1.36E+00	
CO-58	LLD<1.88E-01		LLD<1.88E-01	
CS-136	LLD<1.95E-01		LLD<1.95E-01	
MN-54	LLD<2.93E-01		LLD<2.93E-01	
CO-56	LLD<2.19E-01		LLD<2.19E-01	
I-134	LLD<2.36E-01		LLD<2.36E-01	
TL-207	LLD<1.79E+02		LLD<1.79E+02	
Y-88	LLD<2.05E-01		LLD<2.05E-01	
AC-228	1.78E+00	+- 3.78E-01	1.78E+00	+- 3.78E-01
EU-152	LLD<3.01E+00		LLD<3.01E+00	
PA-234M	LLD<2.91E+00		LLD<2.91E+00	
SR-91	LLD<6.48E-01		LLD<6.48E-01	
RB-89	LLD<5.62E-01		LLD<5.62E-01	
FE-59	LLD<7.19E-01		LLD<7.19E-01	
[illegible]-5	LLD<8.22E-01		LLD<8.22E-01	
SC-46	LLD<3.45E-01		LLD<3.45E-01	
TA-182	LLD<9.53E-01		LLD<9.53E-01	
I-135	LLD<1.44E+00		LLD<1.44E+00	
CL-39	LLD<4.29E-01		LLD<4.29E-01	
NA-22	LLD<2.20E-01		LLD<2.20E-01	
AR-41	LLD<3.12E-01		LLD<3.12E-01	
CO-60	LLD<3.18E-01		LLD<3.18E-01	
NA-24	LLD<2.13E-01		LLD<2.13E-01	
SR-92	LLD<2.83E-01		LLD<2.83E-01	
CS-138	LLD<4.26E-01		LLD<4.26E-01	
K-40	1.78E+01	+- 2.01E+00	1.78E+01	+- 2.01E+00
SR-88	LLD<1.40E+00		LLD<1.40E+00	
TL-209	LLD<8.10E-01		LLD<8.10E-01	
LA-140	LLD<5.07E-01		LLD<5.07E-01	
AL-26	LLD<4.64E-01		LLD<4.64E-01	
MN-56	LLD<7.71E-01		LLD<7.71E-01	
RB-88	LLD<9.51E-01		LLD<9.51E-01	
Total	3.02E+01	+- 2.59E+00	3.02E+01	+- 2.59E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
919.23	409.37	10.	59.5	2.02E+00
1156.63	582.80	34.	20.0	1.02E+01
1218.85	608.87	29.	21.6	9.08E+00

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

MAXBERG SPECTRAN-4T V4.2a

Saint Gobain/St. Gobain, PA 24-AUG-94 11:19:50

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

MDA Calculation Performed.
Multiplet Analysis Performed.

Printer Output.
Analysis of Spectrum saved in Disk File SD0123
Measured by: kc

Sample Description: Dock Pit #2(actual)
Geometry Description: 500 ML MARINELLI
Sample Size: 8.6940E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 30-JUL-94 at 07:00:42

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 29-JUL-94
Efficiency Calibration performed 02-JUN-94

Heat Corporation, Revere, PA 24-AUG-94 11:19:50

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

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	477.27	238.71	1.2	54.	100.	14.8	PB-212
2	676.69	338.23	1.7	16.	30.	29.6	AC-228
3	704.07	351.89	1.8	21.	32.	29.7	BI-211,PB-214
4	1166.46	582.71	1.2	6.	42.	17.9	TL-208
5	1213.78	608.83	0.9	6.	36.	19.8	XE-135,BI-214
6C	1821.80	910.02	1.4	7.	26.	25.4	AC-228
7	2931.97	1459.96	1.6	0.	76.	11.5	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

C - Multiplet Analysis converged normally

[illegible] 21-OCT-94 [illegible]

[illegible] (Liquid)
[illegible] collected on 30-JUL-94 at [illegible]
[illegible] at [illegible] 0. days, 0.000[illegible] [illegible] before the start of COLLECT.

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

Nuclide	Activity Concentration in PCi/gmet Measured	Error	Decay Corrected	Error
[illegible]	LLD<2.67E-01		LLD<2.67E-01	
[illegible]	LLD<[illegible].13E+00		LLD<[illegible].13E+00	
[illegible]	LLD<3.09E-01		LLD<3.09E+01	
XE-133	LLD<4.54E-01		LLD<4.54E-01	
[illegible]	LLD<4.34E+00		LLD<4.34E+00	
CO-57	LLD<1.87E-01		LLD<1.87E-01	
PA-234	LLD<8.18E-01		LLD<8.18E-01	
CE-144	LLD<1.57E+00		LLD<1.57E+00	
TC-99M	LLD<1.96E-01		LLD<1.96E-01	
CE-141	LLD<3.48E-01		LLD<3.48E-01	
KR-85M	LLD<2.43E-01		LLD<2.43E-01	
XE-131M	LLD<9.22E+00		LLD<9.22E+00	
BA-139	LLD<1.14E+00		LLD<1.14E+00	
CS-139	LLD<2.30E-01		LLD<2.30E-01	
U-235	LLD<3.61E-01		LLD<3.61E-01	
RA-226	LLD<5.88E+00		LLD<5.88E+00	
[illegible]141	LLD<4.43E-01		LLD<4.43E-01	
SR-89	LLD<2.13E+00		LLD<2.13E+00	
TE-132	LLD<2.11E-01		LLD<2.11E-01	
XE-133M	LLD<1.71E+00		LLD<1.71E+00	
[illegible]-227	LLD<1.55E+00		LLD<1.55E+00	
PB-212	9.35E-01	+- 1.39E-01	9.35E-01	+- 1.39E-01
RA-224	LLD<4.11E+00		LLD<4.11E+00	
XE-135	LLD<1.95E-01		LLD<1.95E-01	
XE-138	LLD<6.56E-01		LLD<6.56E-01	
SE-75	LLD<2.50E-01		LLD<2.50E-01	
NP-239	LLD<1.19E+00		LLD<1.19E+00	
HG-203	LLD<1.92E-01		LLD<1.92E-01	
IR-192	LLD<1.89E-01		LLD<1.89E-01	
SB-51	LLD<1.59E+00		LLD<1.59E+00	
BI-211	4.56E+00	+- 1.31E+00	4.56E+00	+- 1.31E+00
PB-214	LLD<5.83E-01		LLD<5.83E-01	
BA-133	LLD<3.45E-01		LLD<3.45E-01	
I-131	LLD<1.87E-01		LLD<1.87E-01	
SN-113	LLD<2.40E-01		LLD<2.40E-01	
KR-87	LLD<3.43E-01		LLD<3.43E-01	
PB-211	LLD<6.00E+00		LLD<6.00E+00	
AU-198	LLD<1.39E-01		LLD<1.39E-01	
SB-125	LLD<4.81E-01		LLD<4.81E-01	
BI-212	LLD<4.76E+01		LLD<4.76E+01	
BE-7	LLD<1.54E+00		LLD<1.54E+00	
[illegible]131	LLD<1.93E-01		LLD<1.93E-01	
[illegible]103	LLD<1.77E-01		LLD<1.77E-01	
KR-85	LLD<5.24E+01		LLD<5.24E+01	
SR-85	LLD<2.29E-01		LLD<2.29E-01	
I-133	LLD<2.25E-01		LLD<2.25E-01	

[illegible]	[illegible]		LLD<[illegible]		
[illegible]	[illegible]		LLD<[illegible]		
[illegible]	LLD<[illegible]		LLD<[illegible]		
[illegible]	LLD<[illegible]		LLD<7.91E-01		
[illegible]	LLD<1.74E-01		LLD<1.74E-01		
[illegible]	LLD<3.70E-01		LLD<3.70E-01		
[illegible]	LLD<6.54E-01		LLD<6.54E-01		
[illegible]	LLD<1.39E+00		LLD<1.39E+00		
[illegible]	LLD<3.47E-01		LLD<3.47E-01		
[illegible]	LLD<[illegible]		LLD<[illegible]		
[illegible]	LLD<[illegible]		LLD<[illegible]		
[illegible]	LLD<[illegible]		LLD<2.24E-01		
[illegible]	LLD<[illegible]		LLD<1.49E-01		
[illegible]	LLD<[illegible]		LLD<[illegible]		
[illegible]	LLD<[illegible]		LLD<2.11E-01		
[illegible]	LLD<[illegible]		LLD<4.[illegible]E-01		
[illegible]	LLD<[illegible]		LLD<2.15E-01		
[illegible]	LLD<9.65E-01		LLD<9.65E-01		
[illegible]	LLD<2.09E-01		LLD<2.09E-01		
[illegible]	LLD<1.53E-01		LLD<1.53E-01		
MN-54	LLD<2.15E-01		LLD<2.15E-01		
CO-56	LLD<2.21E-01		LLD<2.21E-01		
[illegible]-134	LLD<2.38E-01		LLD<2.38E-01		
TL-207	LLD<1.95E+02		LLD<1.95E+02		
Y-88	LLD<2.39E-01		LLD<2.39E-01		
AC-228	1.31E+00	+- 3.33E-01	1.31E+00	+- 3.33E-01	
EU-152	LLD<1.71E+00		LLD<1.71E+00		
PA-234M	LLD<2.67E+00		LLD<2.67E+00		
SR-91	LLD<5.86E-01		LLD<5.86E-01		
RB-89	LLD<4.45E-01		LLD<4.45E-01		
F[illegible]-59	LLD<4.84E-01		LLD<4.84E-01		
Z[illegible]-65	LLD<7.02E-01		LLD<7.02E-01		
SC-46	LLD<2.71E-01		LLD<2.71E-01		
TA-182	LLD<8.25E-01		LLD<8.25E-01		
I-135	LLD<8.14E-01		LLD<8.14E-01		
CL-39	LLD<3.18E-01		LLD<3.18E-01		
NA-22	LLD<2.69E-01		LLD<2.69E-01		
AR-41	LLD<2.03E-01		LLD<2.03E-01		
[illegible]-60	LLD<3.01E-01		LLD<3.01E-01		
[illegible]-24	LLD<2.15E-01		LLD<2.15E-01		
[illegible]R-92	LLD<1.59E-01		LLD<1.59E-01		
[illegible]S-138	LLD<3.58E-01		LLD<3.58E-01		
[illegible]-40	1.41E+01	+- 1.62E+00	1.41E+01	+- 1.62E+00	
[illegible]R-88	LLD<1.41E+00		LLD<1.41E+00		
[illegible]L-209	LLD<6.64E-01		LLD<6.64E-01		
LA-140	LLD<1.62E-01		LLD<1.62E-01		
[illegible]L-26	LLD<6.19E-02		LLD<6.19E-02		
[illegible]N-56	LLD<2.32E-01		LLD<2.32E-01		
RP-88	LLD<3.52E-01		LLD<3.52E-01		
Total	2.09E+01	+- 2.12E+00	2.09E+01	+- 2.12E+00	

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
676.69	338.23	30.	28.6	5.04E+00
1166.46	582.71	42.	17.9	1.23E+01
1213.78	608.83	36.	19.8	1.11E-01

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

CANBERRA SPECTRAN-AT V4.2a

Inter Domination, Revere, PA 02-AUG-94 08:36:16

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 1 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 1
Spectrum Size: 4096 channels.
First Channel for Search: 0
Adaptive smoothing performed.
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD0124
Measured by: kc

Sample Description: 4&5 Trench
Geometry Description: 500 ML MARINELLI
Sample Size: 7.5520E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 9.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 02-AUG-94 at 08:17:20

COLLECT Live Time: 600. seconds
        Real Time: 600. seconds
        Dead Time: 00.00 %

Decayed to 0. days, 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 02-AUG-94
Efficiency Calibration performed 02-JUN-94

Nabet Corporation, Revere, PA 02-AUG-94 09:36:14

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

	Centroid channel	Energy keV	FWHM keV	Backgrd counts	Net Area counts	Error %	Nuclides
1	477.61	238.90	0.8	40.	77.	16.5	PB-212
2	590.82	295.40	1.1	13.	26.	29.8	PB-214
3	676.55	338.19	0.8	15.	21.	35.2	AC-228
4	877.50	439.50	1.5	0.	6.	40.8	
5	1166.70	582.90	1.4	3.	32.	19.6	TL-208
6	1218.81	608.92	1.4	6.	21.	28.4	XE-135,BI-214
7	1322.60	660.75	0.8	1.	12.	32.2	CS-137
8	2923.24	1460.76	1.7	0.	49.	14.3	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

[illegible] Corporation, [illegible], PA 22-AUG-94 [illegible]

[illegible] 435 Item 1
[illegible] collected on 22-AUG-94 at 08:17:00
Delayed to 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram			
	Meas rec	Error	Decay corrected	Error
AG-241	LLD<3.39E-01		LLD<3.39E-01	
TL-204	LLD<3.04E+00		LLD<3.04E+00	
TL-200	LLD<3.73E+01		LLD<3.73E+01	
XE-133	LLD<5.06E-01		LLD<5.06E-01	
CD-109	LLD<4.72E+00		LLD<4.72E+00	
CD-57	LLD<1.97E-01		LLD<1.97E-01	
PA-234	LLD<9.33E-01		LLD<9.33E-01	
CE-144	LLD<1.50E+00		LLD<1.50E+00	
TC-99M	LLD<2.12E-01		LLD<2.12E-01	
CE-141	LLD<3.69E-01		LLD<3.69E-01	
KR-85M	LLD<2.29E-01		LLD<2.29E-01	
XE-131M	LLD<8.05E+00		LLD<8.05E+00	
BA-139	LLD<1.11E+00		LLD<1.11E+00	
CE-139	LLD<2.26E-01		LLD<2.26E-01	
U-235	LLD<3.80E-01		LLD<3.80E-01	
RA-226	LLD<6.68E+00		LLD<6.68E+00	
BA-141	LLD<4.33E-01		LLD<4.33E-01	
SR-89	LLD<2.19E+00		LLD<2.19E+00	
[illegible]-132	LLD<2.16E-01		LLD<2.16E-01	
XE-133M	LLD<1.91E+00		LLD<1.91E+00	
PB-212	8.32E-01	+- 1.38E-01	8.32E-01	+- 1.38E-01
RA-224	LLD<4.36E+00		LLD<4.36E+00	
XE-135	LLD<1.96E-01		LLD<1.96E-01	
XE-138	LLD<8.41E-01		LLD<8.41E-01	
SE-75	LLD<2.78E-01		LLD<2.78E-01	
NP-239	LLD<1.28E+00		LLD<1.28E+00	
HG-203	LLD<2.19E-01		LLD<2.19E-01	
IR-192	LLD<1.40E-01		LLD<1.40E-01	
CR-51	LLD<1.29E+00		LLD<1.29E+00	
BI-211	LLD<5.43E+00		LLD<5.43E+00	
PB-214	LLD<5.93E-01		LLD<5.93E-01	
BA-133	LLD<3.82E-01		LLD<3.82E-01	
I-131	LLD<1.94E-01		LLD<1.94E-01	
SN-113	LLD<2.78E-01		LLD<2.78E-01	
KR-87	LLD<3.92E-01		LLD<3.92E-01	
PB-211	LLD<5.47E+00		LLD<5.47E+00	
AU-198	LLD<1.71E-01		LLD<1.71E-01	
SB-125	LLD<5.30E-01		LLD<5.30E-01	
BI-212	LLD<4.49E+01		LLD<4.49E+01	
BE-7	LLD<1.96E+00		LLD<1.96E+00	
HF-181	LLD<2.89E-01		LLD<2.89E-01	
RU-103	LLD<1.68E-01		LLD<1.68E-01	
KR-85	LLD<5.26E+01		LLD<5.26E+01	
S[illegible]-85	LLD<2.30E-01		LLD<2.30E-01	
I-133	LLD<2.11E-01		LLD<2.11E-01	
BA-140	LLD<6.83E-01		LLD<6.83E-01	

SI-207	LLD<[illegible]		LLD<[illegible]	
[illegible]-208	LLD<7.50E-01		LLD<7.50E-01	
PB-[illegible]	LLD<1.70E-01		LLD<1.70E-01	
TB-134	LLD<3.17E-01		LLD<3.17E-01	
[illegible]-214	LLD<6.81E-01		LLD<6.81E-01	
[illegible]06	LLD<1.60E+00		LLD<1.60E+00	
[illegible]42	LLD<4.08E-01		LLD<4.08E-01	
NB-110M	LLD<2.57E-01		LLD<2.57E-01	
NB-97	LLD<2.58E-01		LLD<2.58E-01	
TB-137	1.65E-01	+- 5.34E-02	1.65E-01	+- 5.34E-02
[illegible]-132	LLD<2.04E-01		LLD<2.04E-01	
[illegible]-107	LLD<8.10E-01		LLD<8.10E-01	
[illegible]-97	LLD<2.14E-01		LLD<2.14E-01	
ZR-95	LLD<2.87E-01		LLD<2.87E-01	
NB-95	LLD<2.35E-01		LLD<2.35E-01	
TL-210	LLD<1.15E+00		LLD<1.15E+00	
CO-58	LLD<2.15E-01		LLD<2.15E-01	
CS-136	LLD<2.53E-01		LLD<2.53E-01	
MN-54	LLD<2.15E-01		LLD<2.15E-01	
CO-56	LLD<2.02E-01		LLD<2.02E-01	
I-134	LLD<1.92E-01		LLD<1.92E-01	
TL-207	LLD<2.16E+02		LLD<2.16E+02	
Y-88	LLD<2.62E-01		LLD<2.62E-01	
AC-228	LLD<1.01E+00		LLD<1.01E+00	
EU-152	LLD<2.81E+00		LLD<2.81E+00	
PA-234M	LLD<2.03E+00		LLD<2.03E+00	
BR-91	LLD<7.04E-01		LLD<7.04E-01	
RB-89	LLD<4.73E-01		LLD<4.73E-01	
FE-59	LLD<6.68E-01		LLD<6.68E-01	
ZN-65	LLD<7.55E-01		LLD<7.55E-01	
SC-46	LLD<3.29E-01		LLD<3.29E-01	
T[illegible]82	LLD<8.71E-01		LLD<8.71E-01	
I-135	LLD<1.02E+00		LLD<1.02E+00	
CL-39	LLD<6.15E-01		LLD<6.15E-01	
NA-22	LLD<2.42E-01		LLD<2.42E-01	
AR-41	LLD<3.06E-01		LLD<3.06E-01	
CO-60	LLD<2.06E-01		LLD<2.06E-01	
NA-24	LLD<1.60E-01		LLD<1.60E-01	
SR-92	LLD<1.49E-01		LLD<1.49E-01	
CS-138	LLD<3.41E-01		LLD<3.41E-01	
K-40	1.04E+01	+- 1.50E+00	1.04E+01	+- 1.50E+00
KR-88	LLD<1.32E+00		LLD<1.32E+00	
TL-209	LLD<5.80E-01		LLD<5.80E-01	
LA-140	LLD<1.86E-01		LLD<1.86E-01	
AL-26	LLD<1.58E-01		LLD<1.58E-01	
MN-56	LLD<5.93E-01		LLD<5.93E-01	
RB-88	LLD<1.68[illegible]		LLD<1.68E+00	
Total	1.14E[illegible]	[illegible]00	1.14E+01	+- 1.50E+00

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

Results saved in File SD0124

Centroid Channel	Energy keV	Net Area Counts	Error %	Gammas/sec
790.82	295.40	26.	29.8	4.00E+00
876.55	338.19	21.	35.2	3.56E+00
979.50	439.50	6.	40.8	1.34E+00
1166.70	582.90	32.	19.6	9.45E+00
1218.81	608.92	21.	28.4	6.39E+00

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

[illegible] GAMMAVISION-AT V4.0a

[illegible] 24-AUG-94 11:30:04

A N A L Y S I S P A R A M E T E R S

[illegible] Number: [illegible] ADC Unit Number: 1.0
Detector Number: [illegible] / Geometry Number: 1
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.50 keV.
Error Quotation: 1.00 sigma uncertainty.

LLD Calculation Performed.
Multiplet Analysis Performed.

[illegible] Output.
Analysis of Spectrum saved in Disk File SD0125
Measured by: kc

Sample Description: 4&5 Pit
Geometry Description: 500 ML MARINELLI
Sample Size: 7.4940E+02 gram / Conversion Factor: 1.0000E+00
Standard Size: 8.8840E+02 GRAM
Analysis Library file: ANL000

COLLECT started on 02-AUG-94 at 08:30:00

COLLECT Live Time: 600. seconds
Real Time: 600. seconds
Dead Time: [illegible] 00.00 %

Delayed to 0. days [illegible] 0.0000 hours BEFORE the start of COLLECT

Energy Calibration performed 02-AUG-94
Efficiency Calibration performed 02-JUN-94

[illegible] Corporation, Severn, PA 24-AUG-94 11:30:04

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

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	477.54	238.87	1.1	82.	139.	13.8	PB-212
2$	590.96	295.47	1.1	20.	33.	35.0	PB-214
3	677.11	338.47	2.3	18.	33.	26.8	AC-228
4	704.54	352.17	1.8	12.	77.	13.3	BI-211,PB-214
5$	1021.77	510.93	1.0	15.	14.	51.3	TL-208,NA-22, ANN-RD
6	1164.59	582.24	2.0	3.	33.	19.3	TL-208
7	1219.03	609.04	1.6	6.	38.	18.6	XE-135,BI-214
8	1823.42	910.94	2.1	10.	23.	30.8	AC-228
9	2922.45	1460.36	2.4	0.	95.	10.3	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

[illegible]

[illegible]

[illegible] collected on 02-AUG-94 at [illegible]

[illegible] 0. days, 0.0000 hours BEFORE the start of COLLECT.

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

Nuclide	Activity Concentration in PCI /gram Measured	Error	Decay corrected	Error
[illegible]	LLD<3.62E-01		LLD<3.62E-01	
[illegible]	LLD<3.70E-00		LLD<3.70E+00	
[illegible]	LLD<4.55E-01		LLD<4.55E+01	
XE-133	LLD<5.10E-01		LLD<5.10E-01	
[illegible]-139	LLD<4.88E+00		LLD<4.88E+00	
CO-57	LLD<2.32E-01		LLD<2.32E-01	
PA-234	LLD<1.01E+00		LLD<1.01E+00	
CE-144	LLD<2.27E+00		LLD<2.27E+00	
TC-99M	LLD<2.48E-01		LLD<2.48E-01	
CE-141	LLD<3.99E-01		LLD<3.99E-01	
KR-85M	LLD<2.98E-01		LLD<2.98E-01	
XE-131M	LLD<9.50E+00		LLD<9.50E+00	
BA-139	LLD<1.17E+00		LLD<1.17E+00	
CE-139	LLD<2.39E-01		LLD<2.39E-01	
U-235	LLD<4.28E-01		LLD<4.28E-01	
RA-226	LLD<6.82E+00		LLD<6.82E+00	
[illegible]-141	LLD<5.81E-01		LLD<5.81E-01	
KR-89	LLD<2.32E+00		LLD<2.32E+00	
TE-132	LLD<2.52E-01		LLD<2.52E-01	
XE-133M	LLD<2.26E+00		LLD<2.26E+00	
TH-227	LLD<2.56E+00		LLD<2.56E+00	
PB-212	1.50E+00	+- 2.07E-01	1.50E+00	+- 2.07E-01
RA-224	LLD<4.94E+00		LLD<4.94E+00	
XE-135	LLD<2.18E-01		LLD<2.18E-01	
XE-138	LLD<8.61E-01		LLD<8.61E-01	
SE-75	LLD<3.15E-01		LLD<3.15E-01	
NP-239	LLD<1.38E+00		LLD<1.38E+00	
HG-203	LLD<2.63E-01		LLD<2.63E-01	
IR-192	LLD<2.09E-01		LLD<2.09E-01	
CR-51	LLD<1.80E+00		LLD<1.80E+00	
BI-211	1.28E+01	+- 1.70E+00	1.28E+01	+- 1.70E+00
PB-214	1.50E+00	+- 1.99E-01	1.50E+00	+- 1.99E-01
BA-133	LLD<4.65E-01		LLD<4.65E-01	
I-131	LLD<2.41E-01		LLD<2.41E-01	
SN-113	LLD<3.15E-01		LLD<3.15E-01	
KR-87	LLD<3.22E-01		LLD<3.22E-01	
TB-211	LLD<6.71E+00		LLD<6.71E+00	
AU-198	LLD<1.68E-01		LLD<1.68E-01	
SB-125	LLD<6.00E-01		LLD<6.00E-01	
BI-212	LLD<5.53E+01		LLD<5.53E+01	
BE-7	LLD<1.52E+00		LLD<1.52E+00	
[illegible]-181	LLD<2.49E-01		LLD<2.49E-01	
[illegible]-103	LLD<1.99E-01		LLD<1.99E-01	
KR-85	LLD<6.32E+01		LLD<6.32E+01	
SR-85	LLD<2.76E-01		LLD<2.76E-01	
I-133	LLD<2.42E-01		LLD<2.42E-01	

[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]	
[illegible]	1.[illegible]E-01	+- 2.02E-01	[illegible]E+00	+- 2.00E-01
[illegible]	LLD<1.99E-01		LLD<1.99E-01	
[illegible]	LLD<4.62E-01		LLD<4.62E-01	
[illegible]	LLD<8.52E-01		LLD<8.52E-01	
[illegible]	LLD<2.29E+00		LLD<2.29E+00	
[illegible]	LLD<3.64E-01		LLD<3.64E-01	
[illegible]	LLD<3.57E-01		LLD<3.57E-01	
[illegible]	LLD<3.65E-01		LLD<3.65E-01	
[illegible]	LLD<2.76E-01		LLD<2.76E-01	
[illegible]	LLD<2.42E-01		LLD<2.42E-01	
[illegible]	LLD<8.11E-01		LLD<8.11E-01	
[illegible]	LLD<2.67E-01		LLD<2.67E-01	
[illegible]	LLD<4.32E-01		LLD<4.32E-01	
[illegible]	LLD<1.80E-01		LLD<1.80E-01	
[illegible]	LLD<1.64E+00		LLD<1.64E+00	
[illegible]	LLD<1.97E-01		LLD<1.97E-01	
[illegible]	LLD<2.61E-01		LLD<2.61E-01	
MN-54	LLD<2.40E-01		LLD<2.40E-01	
CO-56	LLD<2.06E-01		LLD<2.06E-01	
I-134	LLD<2.43E-01		LLD<2.43E-01	
TL-207	LLD<1.26E+02		LLD<1.26E+02	
Y-88	LLD<1.84E-01		LLD<1.84E-01	
AC-228	1.35E+00	+- 4.16E-01	1.35E+00	+- 4.16E-01
EU-152	LLD<3.33E+00		LLD<3.33E+00	
PA-234M	LLD<2.67E+00		LLD<2.67E+00	
SR-91	LLD<7.39E-01		LLD<7.39E-01	
RB-89	LLD<4.75E-01		LLD<4.75E-01	
[illegible]39	LLD<4.80E-01		LLD<4.80E-01	
[illegible]65	LLD<7.20E-01		LLD<7.20E-01	
SC-46	LLD<2.91E-01		LLD<2.91E-01	
TA-182	LLD<7.60E-01		LLD<7.60E-01	
I-135	LLD<1.54E+00		LLD<1.54E+00	
CL-39	LLD<7.49E-01		LLD<7.49E-01	
NA-22	LLD<3.17E-01		LLD<3.17E-01	
AR-41	LLD<2.20E-01		LLD<2.20E-01	
CO-60	LLD<3.13E-01		LLD<3.13E-01	
NA-24	LLD<2.49E-01		LLD<2.49E-01	
SR-92	LLD<2.32E-01		LLD<2.32E-01	
CS-138	LLD<5.10E-01		LLD<5.10E-01	
K-40	2.04E+01	+- 2.10E+00	2.04E+01	+- 2.10E+00
KR-88	LLD<6.00E-01		LLD<6.00E-01	
TL-209	LLD<8.82E-01		LLD<8.82E-01	
LA-140	LLD<2.91E-01		LLD<2.91E-01	
AL-26	LLD<3.65E-01		LLD<3.65E-01	
MN-56	LLD<5.98E-01		LLD<5.98E-01	
TB-88	LLD<1.27E+00		LLD<1.27E+00	
Total	3.86E+01	+- 2.76E+00	3.86E+01	+- 2.76E+00

Error Quotation at 1.00 Sigma
Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
277.11	338.47	33.	26.8	5.59E+00
1219.05	609.04	38.	18.6	1.17E+01