

RADIOLOGICAL SUBSURFACE SAMPLING
REPORT FOR
CABOT PERFORMANCE MATERIALS
REVERE, PENNSYLVANIA

August 1994

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B11

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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.

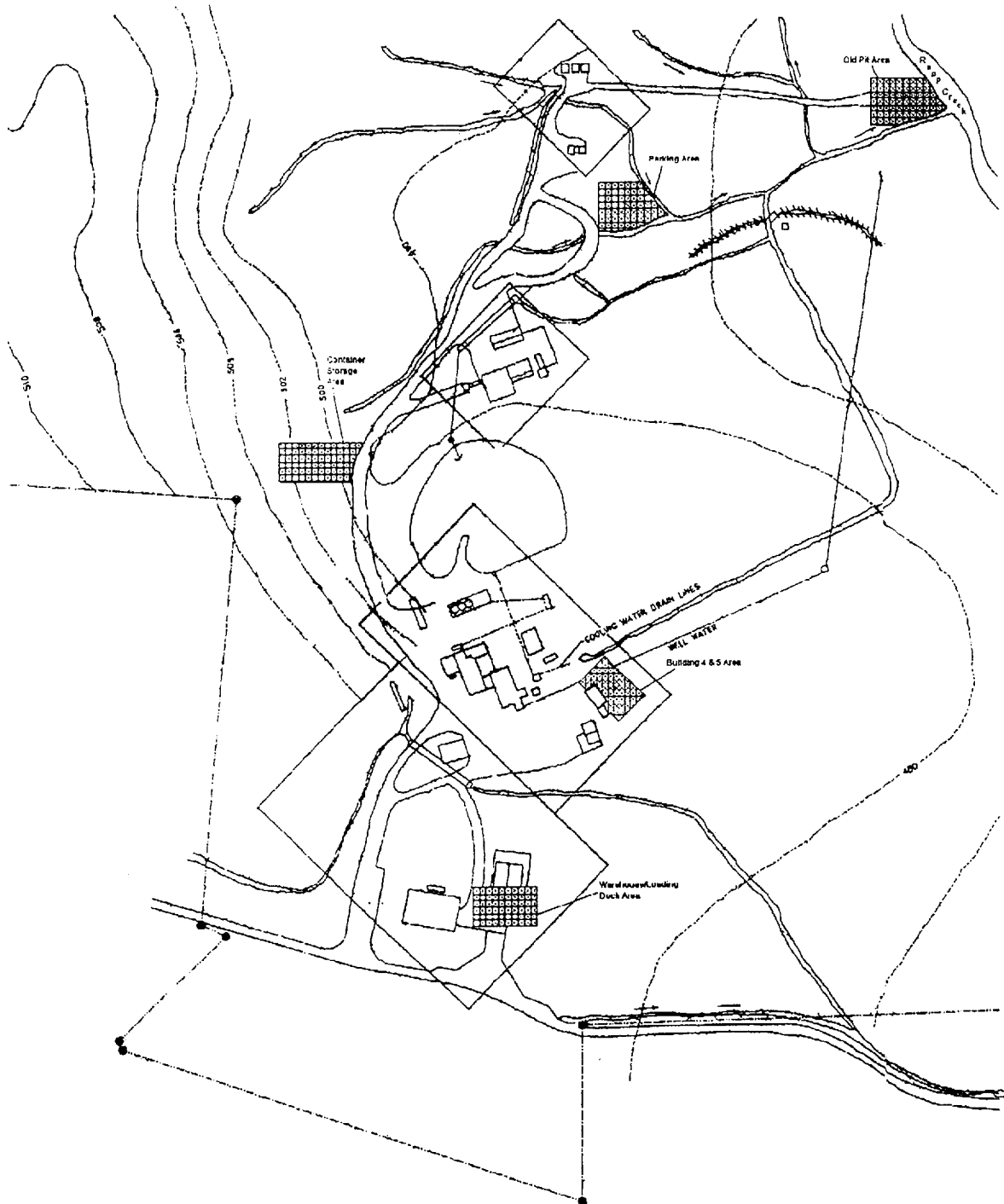


Figure 1 Cabot Performance Materials, Revere, PA

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:

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

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 cm². The probe sizes of the 44-9 and AC-3 are 15 cm² and 59 cm², 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 ft² 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.

Sample Description	pCi/g						
	Thorium			Uranium			Potassium
	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	X.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	X.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 ft² 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.

Sample Description	pCi/g						
	Thorium			Uranium			Potassium
	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 ft² 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.

Sample Description	pCi/g						
	Thorium			Uranium			Potassium
	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 ft² of area with the grassy area measuring approximately 4,300 ft². 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.

Sample Description	pCi/g						
	Thorium			Uranium			Potassium
	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 ft² 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.

Sample Description	pCi/g						
	Thorium			Uranium			Potassium
	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

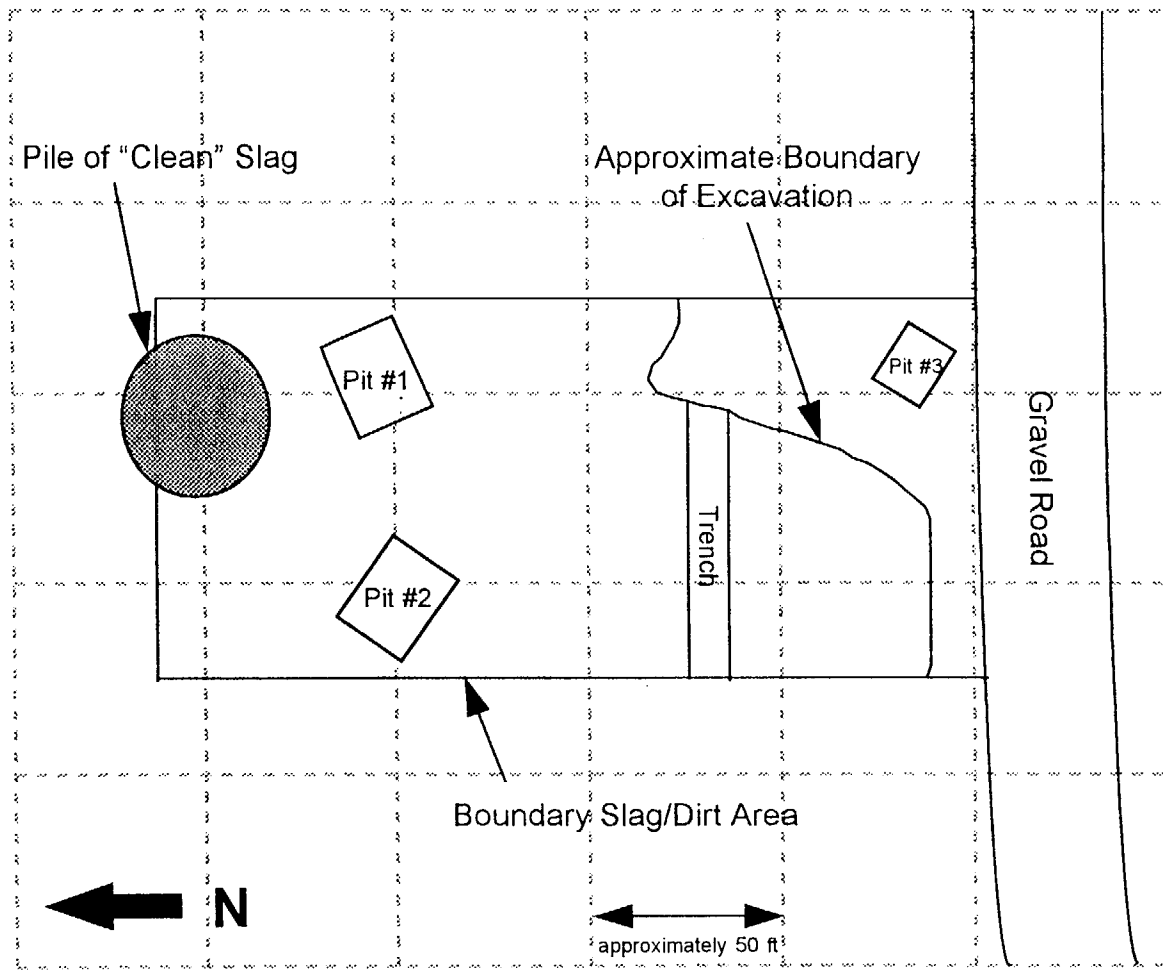


Figure 2 Container Storage Area

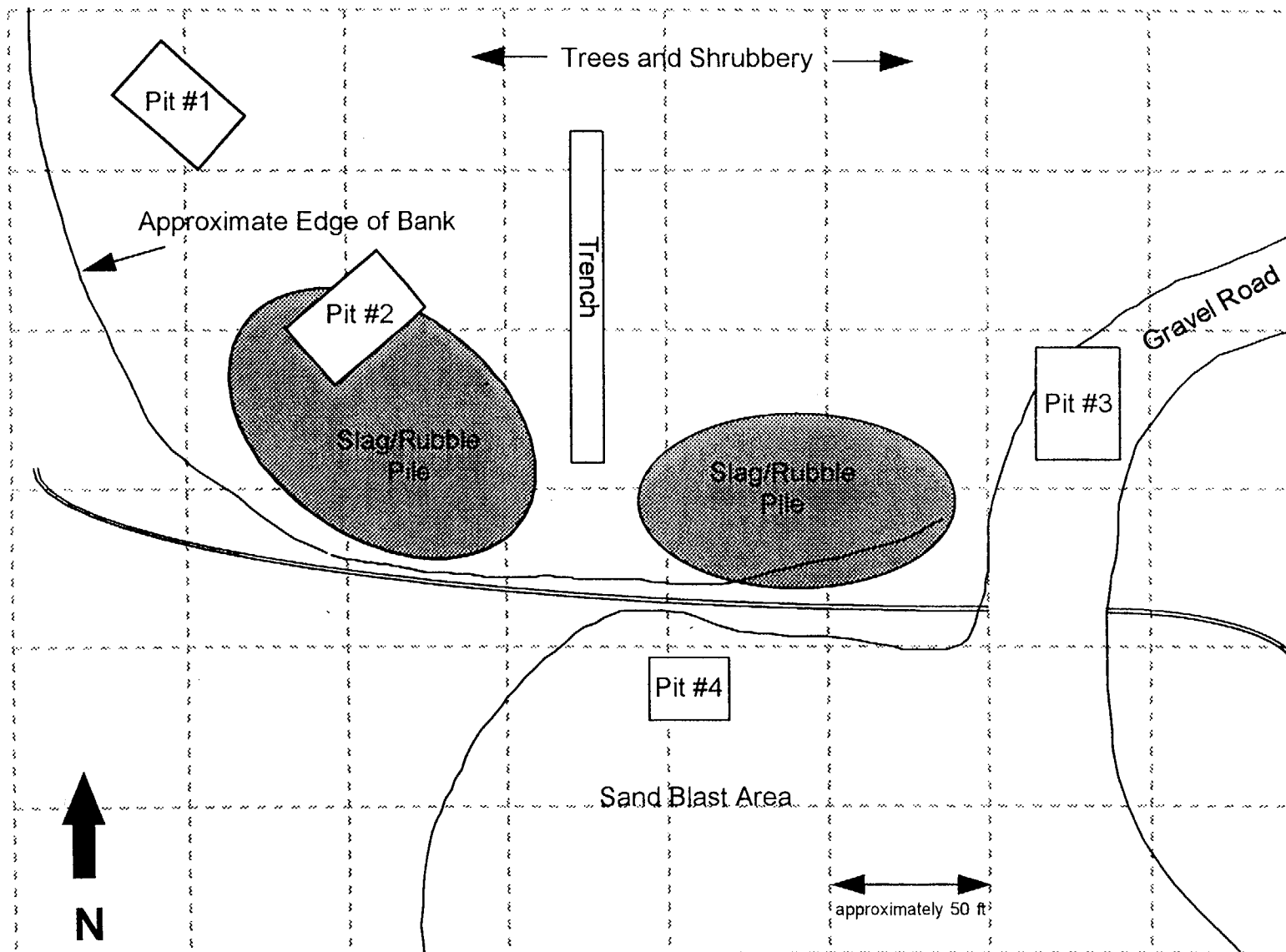


Figure 3 Parking Area

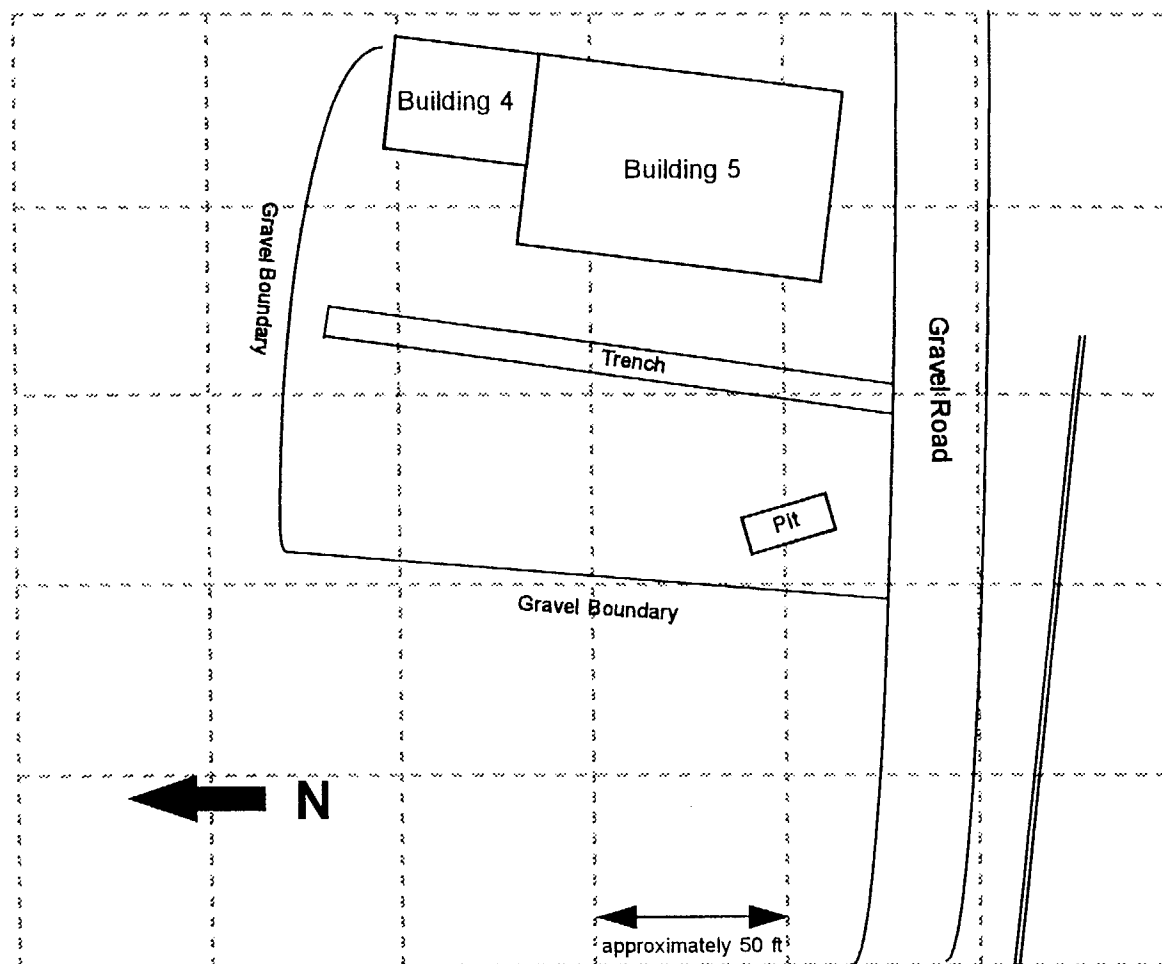
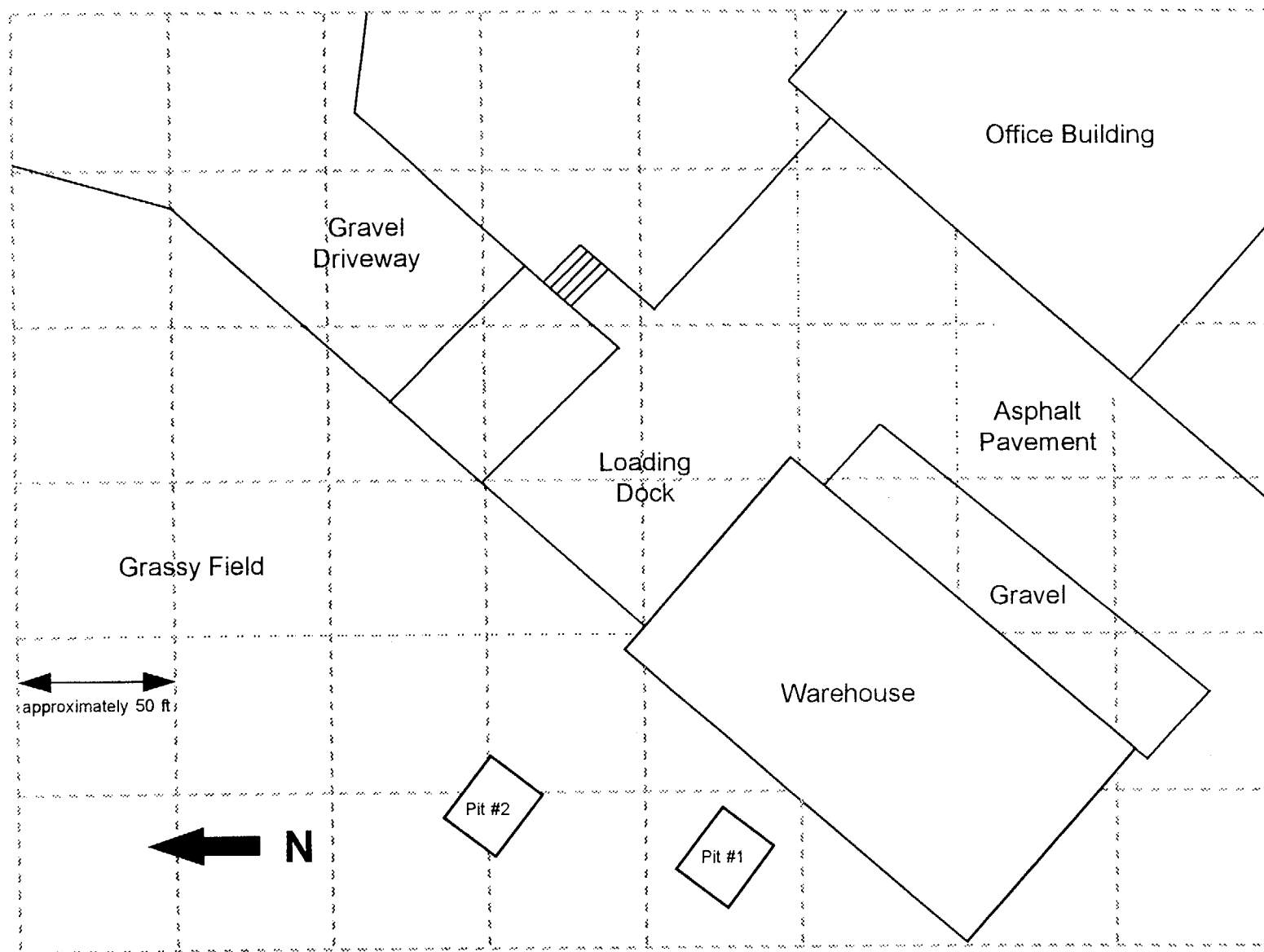


Figure 4 Building 4 & 5 Area

A-4



NES Document No. 82A8373 Rev. 0

Figure 5 Warehouse/Loading Dock Area

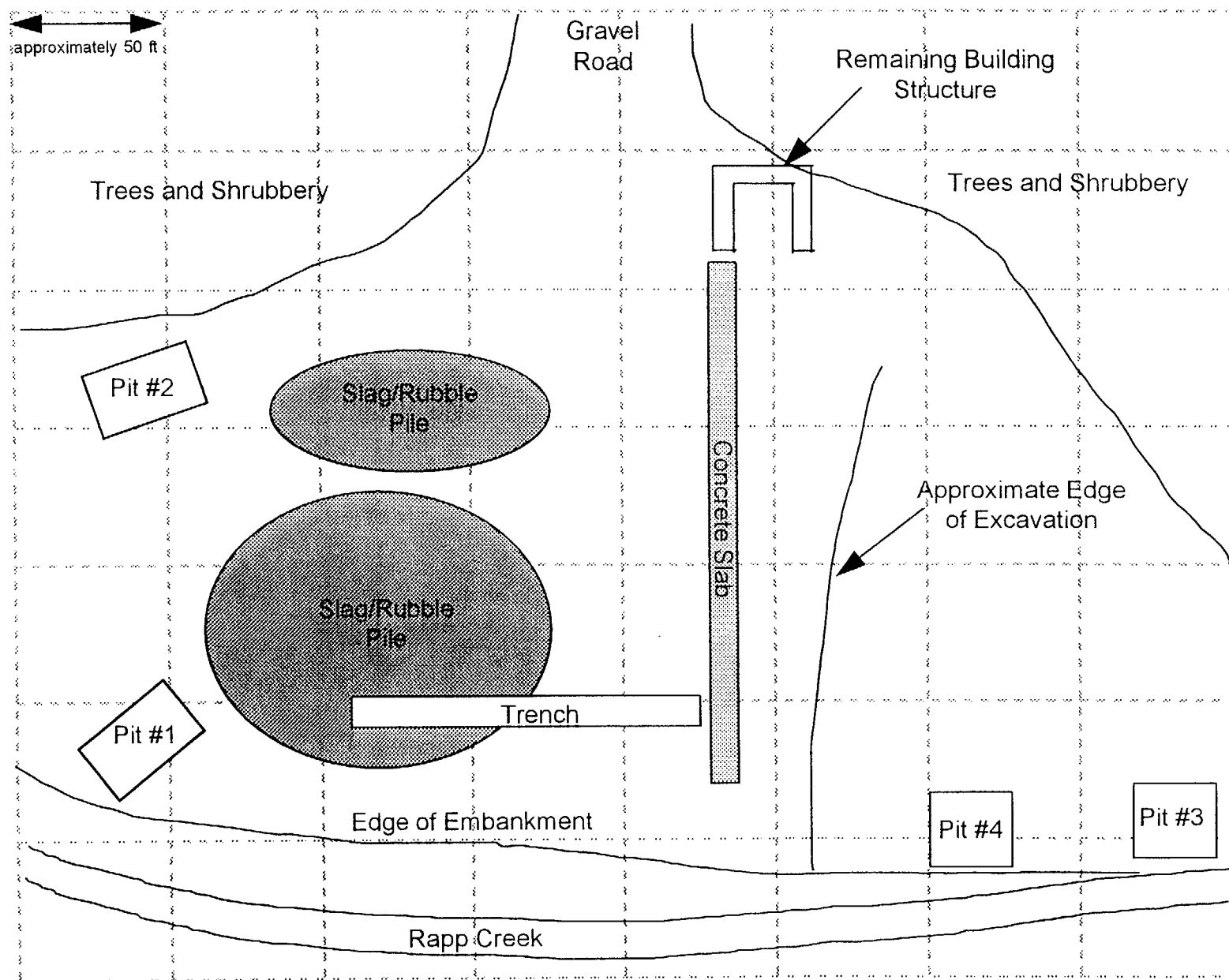


Figure 6 Old Pit Area

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 1 urem/h

1 uR/h

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

CALIBRATED BY: _____

Thomas C. Bogner
Saint-Gobain/Norton Industrial Ceramics Corporation

DATE: _____

10-12-93



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. 60166
Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. 58061489
Cal. Date 6-8-94 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. $\pm 10\%$ ☐ 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. 495 / 500 V Ref./Inst. 1984 / 2000 V

COMMENTS:

Alpha eff. for $\mu_{338} = 55.5\% (2\pi)$ 27.75% (4 π)
Beta eff. for $\mu_{137} = 46.2\% (2\pi)$ 23.1% (4 π)

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	<u>400K cpm</u>	<u>399906</u>	<u>399906</u>
	<u>40K cpm</u>	<u>40002</u>	<u>40002</u>
	<u>4K cpm</u>	<u>4000</u>	<u>4000</u>
	<u>400 cpm</u>	<u>400</u>	<u>400</u>
	<u>40 cpm</u>	<u>40</u>	<u>40</u>
Beta/Gamma Channel Digital Readout	<u>400K cpm</u>	<u>399907</u>	<u>399907</u>
	<u>40K cpm</u>	<u>40000</u>	<u>40000</u>
	<u>4K cpm</u>	<u>4000</u>	<u>4000</u>
	<u>400 cpm</u>	<u>400</u>	<u>400</u>
	<u>40 cpm</u>	<u>40</u>	<u>40</u>

*Uncertainty within $\pm 10\%$ C.F. within $\pm 20\%$

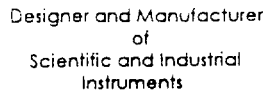
Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other international Standards Organization members, or have been derived from accepted values of natural 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 8u379 #8743 ☒ Beta S/N C4(159mc) Tc99 (1670cpm) ☐ Other _____
☐ m 500 S/N 54680 ☐ Oscilloscope S/N _____ ☒ Multimeter S/N 57390613

Calibrated By: James P. Murphy Date 6-8-94

Reviewed By: James P. Fleming Date 6-8-94



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.

Detector 43-10-1 Serial No. 2R061489 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

Signature Shawn J. Murphy 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.

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. PRO66761
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. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair
☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☒ F/S Resp. ck. ☒ Reset ck. ☒ Window Operation ☐ Batt. ck. (Min. Volt) 4.4 VDC
☒ Audio ck. ☐ Alarm Setting ck.
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 RECD "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	400	
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 $\pm 10\%$ C.F. within $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout						
400 K CPM	399972	399972		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 ☐ Multimeter S/N 57390613
☐ m 500 S/N 54680 ☐ Oscilloscope S/N ☒

Calibrated By: Shawn R. Murphy Date 6-8-94

Reviewed By: Jimmie Fleming Date 6-8-94



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. PRO66761 has been functionally checked.
Refer to applicable instrument manuals for specific operating instructions.

eff. for Cs137 = 48% (2π) 24% (4π)

This Detector operates at 900 Volts, 35 mV Sensitivity.

Check performed by Shawn Murphy

Date 6-8-94

Reviewed by Jimmie Fleming

Date 6-8-94



Designer and Manufacturer
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CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

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SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER NES INC ORDER NO. 206624

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

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR 066762

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. $\pm 10\%$ ☐ 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 $\pm 10\%$ C.F. within $\pm 20\%$

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		
400 K cpm	40024	40024	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
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:

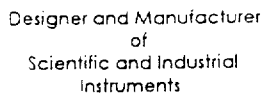
Cs-137 Gamma S/N ☐ 1162 ☒ G112 ☐ M565 ☐ S105 ☐ T1008 ☐ T879 ☐ Neutron Am-241 Be S/N T-304

☐ 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: Timothy Fleming Date 6-20-94



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CONVERSION CHART

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

Model 2221 Serial No. 68795 Detector Model 44-9 Serial No. PR066762

Source Cs-137 194.6 mCi High Voltage 900 V

[illegible]

signature: Michael Mac Date 6-16-94



Designer and Manufacturer
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CERTIFICATE OF CALIBRATION

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CUSTOMER NUCLEAR ENERGY SERVICES ORDER NO. 206556

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

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PRO37505

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. $\pm 10\%$ ☐ 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 Def. 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 $\pm 10\%$ C.F. within $\pm 20\%$

All

Range(s) Calibrated Electronically

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

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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: Shawn J. Murphy Date 6-8-94

Reviewed By: James Fleming Date 6-8-94



Designer and Manufacturer
of
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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. PRO375DS
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)


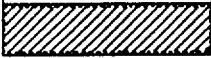
Alpha Scintillation Detector

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

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	<u>43-5</u>	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 Shawn P. Murphy

Date 5-31-94

Q7



CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810

PH. 915-235-5494

501 OAK STREET

FAX NO. (915) 235-4872

SWEETWATER, TEXAS 79558, U. S. A.

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 / at 35 MV
Instrument Volt Set 1350 V Threshold Dial 100 mV 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 44-0 in which the beam of probe faces source.

RANGE MULTIPLIER

REFERENCE
CAL. POINTINSTRUMENT
METER READINGINSTRUMENT REC'D
"AS FOUND READING"

X 1K
X "
X 100
X "
X 10
X "
X 1
X "
X
X
X

400cpm
100 "
40 "
10 "
5 "
400cpm
100 "

400
100
400
100
400
100
400
100

390
97
390
97
380
95
390
97

*Uncertainty within + -10%

C. F. within + -20%

Range(s) Calibrated Electronically

Digital
Readout

Reference Cal. Point

400cpm
40 "
4 "
400cpm

Instrument Meter Reading

399720
39965
3996
400

"As Found Reading"

399720
39965
3996
400

Log
Scale

500cpm
150 "
15 "
500cpm

500K
45K
4.5K
500

500K
45K
4.5K
500

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☐ 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: Sharon R. Murphy Date 2-3-94

Reviewed By: Gimmie Fleming Date 2-4-94

Fax: 915/235-4672



DESIGNER AND MANUFACTURER
OF
*Scientific and Industrial
Instruments*

Other _____

[illegible]

Date 2-3-94

Signature: Shawn P. Murphy

Appendix C MDA Calculations

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

Bx

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{43}{10} + \frac{43}{1} \right) \frac{1}{2} \\ &= .25 \quad (15\text{cm}^2 / 100\text{cm}^2) \\ \text{MDA} &= \underline{677 \text{ dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 48409

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

Bx

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{52}{10} + \frac{52}{1} \right) \frac{1}{2} \\ &= .27 \quad (15\text{cm}^2 / 100\text{cm}^2) \\ \text{MDA} &= \underline{681 \text{ dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 48409 52836

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

α

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{0.3}{10} + \frac{0.3}{1} \right) \frac{1}{2} \\ &= .10 \quad (59\text{cm}^2 / 100\text{cm}^2) \\ \text{MDA} &= \underline{78 \text{ dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 50061

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

α

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{0.6}{10} + \frac{0.6}{1} \right) \frac{1}{2} \\ &= .10 \quad (59\text{cm}^2 / 100\text{cm}^2) \\ \text{MDA} &= \underline{91 \text{ dpm}/100\text{cm}^2} \end{aligned}$$

Technician:

Karen Gray
P. Gray

Date:

7-25-94

Reviewed by:

Date:

7-25-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{45}{10} + \frac{45}{1} \right)^{1/2}$$

$$.25 \quad (15cm^2 / 100 cm^2)$$

$$MDA = \underline{690 dpm / 100cm^2}$$

METER L2220 SERIAL #: 48409

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{51}{10} + \frac{51}{1} \right)^{1/2}$$

$$.27 \quad (15cm^2 / 100 cm^2)$$

$$MDA = \underline{675 dpm / 100cm^2}$$

METER L2220 SERIAL #: 52836

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.2}{10} + \frac{0.2}{1} \right)^{1/2}$$

$$.10 \quad (59cm^2 / 100 cm^2)$$

$$MDA = \underline{72 dpm / 100cm^2}$$

METER L2220 SERIAL #: 50061

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.4}{10} + \frac{0.4}{1} \right)^{1/2}$$

$$.10 \quad (59cm^2 / 100 cm^2)$$

$$MDA = \underline{83 dpm / 100cm^2}$$

Technician: Loren Craig

Date: 7-26-94

Reviewed by: P. Jey

Date: 7-26-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{48}{10} + \frac{48}{1} \right)^{1/2}$$

$$.25 (15cm^2 / 100 cm^2)$$

$$MDA = \underline{710 \text{ dpm}/100cm^2}$$

METER L2220 SERIAL #: 48409

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{54}{10} + \frac{54}{1} \right)^{1/2}$$

$$.27 (15cm^2 / 100 cm^2)$$

$$MDA = \underline{693 \text{ dpm}/100cm^2}$$

METER L2220 SERIAL #: 52836

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.1}{10} + \frac{0.1}{1} \right)^{1/2}$$

$$.10 (59cm^2 / 100 cm^2)$$

$$MDA = \underline{64 \text{ dpm}/100cm^2}$$

METER L2220 SERIAL #: 50061

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.5}{10} + \frac{0.5}{1} \right)^{1/2}$$

$$.10 (59cm^2 / 100 cm^2)$$

$$MDA = \underline{87 \text{ dpm}/100cm^2}$$

Technician: Taren Craig

Date: 7-27-94

Reviewed by: P. Dwyer

Date: 7-27-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{50}{10} + \frac{50}{1} \right)^{1/2}$$

B8

$$\text{MDA} = \frac{.25}{(15\text{cm}^2 / 100\text{cm}^2)} = 723 \text{ dpm}/100\text{cm}^2$$

METER L2220 SERIAL #: 48409

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

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{56}{10} + \frac{56}{1} \right)^{1/2}$$

B8

$$\text{MDA} = \frac{.27}{(15\text{cm}^2 / 100\text{cm}^2)} = 704 \text{ dpm}/100\text{cm}^2$$

METER L2220 SERIAL #: 52836

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

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{0.5}{10} + \frac{0.5}{1} \right)^{1/2}$$

α

$$\text{MDA} = \frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)} = 87 \text{ dpm}/100\text{cm}^2$$

METER L2220 SERIAL #: 50061

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

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

α

$$\text{MDA} = \frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)} = 91 \text{ dpm}/100\text{cm}^2$$

Technician: Taren Craig Date: 7-28-94
 Reviewed by: P. J. J. Date: 7-28-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

B8

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{68}{10} + \frac{68}{1} \right) \frac{1}{2} \\ &\quad \frac{.25}{(15\text{cm}^2 / 100\text{cm}^2)} \\ \text{MDA} &= \underline{831\text{dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 48409

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

B8

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{80}{10} + \frac{80}{1} \right) \frac{1}{2} \\ &\quad \frac{.27}{(15\text{cm}^2 / 100\text{cm}^2)} \\ \text{MDA} &= \underline{829\text{dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 52836

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

2

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{0.9}{10} + \frac{0.9}{1} \right) \frac{1}{2} \\ &\quad \frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)} \\ \text{MDA} &= \underline{101\text{dpm}/100\text{cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 50061

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

2

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{1.4}{10} + \frac{1.4}{1} \right) \frac{1}{2} \\ &\quad \frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)} \\ \text{MDA} &= \underline{115\text{dpm}/100\text{cm}^2} \end{aligned}$$

Technician:

Taren Gray
P. Delp

Date:

7-29-94

Reviewed by:

Date:

7-29-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

B₈

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{43}{10} + \frac{43}{1} \right)^{1/2}$$

$$\frac{.25}{(15\text{cm}^2 / 100\text{cm}^2)}$$

$$\text{MDA} = \underline{676 \text{ dpm}/100\text{cm}^2}$$

METER L2220 SERIAL #: 48409

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

B₈

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{47}{10} + \frac{47}{1} \right)^{1/2}$$

$$\frac{.27}{(15\text{cm}^2 / 100\text{cm}^2)}$$

$$\text{MDA} = \underline{651 \text{ dpm}/100\text{cm}^2}$$

METER L2220 SERIAL #: 52836

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

α

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{1.2}{10} + \frac{1.2}{1} \right)^{1/2}$$

$$\frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)}$$

$$\text{MDA} = \underline{110 \text{ dpm}/100\text{cm}^2}$$

METER L2220 SERIAL #: 50061

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

α

$$\text{MDA} = \frac{2.71}{1} + 3.29 \left(\frac{1.0}{10} + \frac{1.0}{1} \right)^{1/2}$$

$$\frac{.10}{(59\text{cm}^2 / 100\text{cm}^2)}$$

$$\text{MDA} = 104 \underline{64 \text{ dpm}/100\text{cm}^2}$$

Technician: Loren Gray

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: 15cm²

Bx

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{68}{10} + \frac{68}{1} \right) \frac{1}{2}$$

$$MDA = \frac{.25 (15cm^2 / 100 cm^2)}{831 dpm / 100cm^2}$$

METER L2220 SERIAL #: 48409

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

Bx

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{84}{10} + \frac{84}{1} \right) \frac{1}{2}$$

$$MDA = \frac{.27 (15cm^2 / 100 cm^2)}{848 dpm / 100cm^2}$$

METER L2220 SERIAL #: 52836

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

α

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{1.6}{10} + \frac{1.6}{1} \right) \frac{1}{2}$$

$$MDA = \frac{.10 (59cm^2 / 100 cm^2)}{120 dpm / 100cm^2}$$

METER L2220 SERIAL #: 50061

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

α

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{1.1}{10} + \frac{1.1}{1} \right) \frac{1}{2}$$

$$MDA = \frac{.10 (59cm^2 / 100 cm^2)}{107 dpm / 100cm^2}$$

Technician:

Karen Gray

Date:

8-1-94

Reviewed by:

P. Lutz

Date:

8-1-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

B8

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{50}{10} + \frac{50}{1} \right)^{1/2}$$

$$MDA = \frac{.25 (15cm^2 / 100 cm^2)}{723 dpm / 100cm^2}$$

METER L2220 SERIAL #: 48409

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

B8

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{58}{10} + \frac{58}{1} \right)^{1/2}$$

$$MDA = \frac{.27 (15cm^2 / 100 cm^2)}{716 dpm / 100cm^2}$$

METER L2220 SERIAL #: 52836

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

α

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.8}{10} + \frac{0.8}{1} \right)^{1/2}$$

$$MDA = \frac{.10 (59cm^2 / 100 cm^2)}{98 dpm / 100cm^2}$$

METER L2220 SERIAL #: 50061

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

α

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.5}{10} + \frac{0.5}{1} \right)^{1/2}$$

$$MDA = \frac{.10 (59cm^2 / 100 cm^2)}{87 dpm / 100cm^2}$$

Technician: Loren Gray

Date: 8-2-94

Reviewed by: P. Dwyer

Date: 8-2-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{40}{10} + \frac{40}{1} \right)^{1/2}$$

B8

$$MDA = \frac{.25}{(15cm^2 / 100 cm^2)} = 654 dpm / 100cm^2$$

METER L2220 SERIAL #: 48409

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{47}{10} + \frac{47}{1} \right)^{1/2}$$

B8

$$MDA = \frac{.27}{(15cm^2 / 100 cm^2)} = 651 dpm / 100cm^2$$

METER L2220 SERIAL #: 52836

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.2}{10} + \frac{0.2}{1} \right)^{1/2}$$

α

$$MDA = \frac{.10}{(59cm^2 / 100 cm^2)} = 72 dpm / 100cm^2$$

METER L2220 SERIAL #: 50061

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.5}{10} + \frac{0.5}{1} \right)^{1/2}$$

α

$$MDA = \frac{.10}{(59cm^2 / 100 cm^2)} = 87 dpm / 100cm^2$$

Technician:

Laren Craig
P. Dwyer

Date:

8-3-94

Reviewed by:

Date:

8-3-94

MDA CALCULATION SHEET

METER L2221 SERIAL #: 68795

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

BY

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{37}{10} + \frac{37}{1} \right) \frac{1}{2} \\ &= .25 \quad (15\text{cm}^2 / 100 \text{ cm}^2) \\ \text{MDA} &= \underline{632 \text{ dpm} / 100 \text{ cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 48409

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

BY

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{50}{10} + \frac{50}{1} \right) \frac{1}{2} \\ &= .27 \quad (15\text{cm}^2 / 100 \text{ cm}^2) \\ \text{MDA} &= \underline{669 \text{ dpm} / 100 \text{ cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 52836

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

α

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{0.1}{10} + \frac{0.1}{1} \right) \frac{1}{2} \\ &= .10 \quad (59\text{cm}^2 / 100 \text{ cm}^2) \\ \text{MDA} &= \underline{64 \text{ dpm} / 100 \text{ cm}^2} \end{aligned}$$

METER L2220 SERIAL #: 50061

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

α

$$\begin{aligned} \text{MDA} &= \frac{2.71}{1} + 3.29 \left(\frac{0.4}{10} + \frac{0.4}{1} \right) \frac{1}{2} \\ &= .10 \quad (59\text{cm}^2 / 100 \text{ cm}^2) \\ \text{MDA} &= \underline{83 \text{ dpm} / 100 \text{ cm}^2} \end{aligned}$$

Technician:

Karen Gray
P. Dwyer

Date: 8-4-94

Reviewed by:

Date: 8-4-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.4}{10} + \frac{0.4}{1} \right)^{1/2}$$

.40 (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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{60}{10} + \frac{60}{1} \right)^{1/2}$$

.22 (N/A / 100 cm²)

MDA = 134 dpm / 100 cm²

METER _____ SERIAL #: _____

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

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

(/ 100 cm²)

MDA = N/A

METER _____ SERIAL #: _____

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

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

(/ 100 cm²)

MDA = _____

Technician: Faren Craig

Date: 7-25-94

Reviewed by: P. Depp

Date: 7-25-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0}{10} + \frac{0}{1} \right)^{1/2}$$

$$.40 \quad (N/A / 100 \text{ cm}^2)$$

$$MDA = \underline{7 \text{ dpm} / 100 \text{ cm}^2}$$

METER L2929 SERIAL #: 69660

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{60}{10} + \frac{60}{1} \right)^{1/2}$$

$$.22 \quad (N/A / 100 \text{ cm}^2)$$

$$MDA = \underline{134 \text{ dpm} / 100 \text{ cm}^2}$$

METER _____ SERIAL #: _____

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

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

$$\quad (\quad / 100 \text{ cm}^2)$$

$$MDA = \underline{N/A}$$

METER _____ SERIAL #: _____

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

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

$$\quad (\quad / 100 \text{ cm}^2)$$

$$MDA = \underline{\quad}$$

Technician: Loren Craig

Date: 7-26-94

Reviewed by: P. Deep

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 = $\frac{2.71}{1} + 3.29(\frac{0.7}{10} + \frac{0.7}{1})^{1/2}$

.40 (N/A / 100 cm²)

MDA = 14 dpm/100cm²

METER L2929 SERIAL #: 69660

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

MDA = $\frac{2.71}{1} + 3.29(\frac{60}{10} + \frac{60}{1})^{1/2}$

.22 (N/A / 100 cm²)

MDA = 134 dpm/100cm²

METER _____ SERIAL #: _____

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

MDA = $\frac{2.71}{1} + 3.29(\text{ } + \text{ })^{1/2}$

(/ 100 cm²)

MDA = N

METER _____ SERIAL #: _____

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

MDA = $\frac{2.71}{1} + 3.29(\text{ } + \text{ })^{1/2}$

(/ 100 cm²)

MDA = _____

Technician: Tammy Craig Date: 7-27-94

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

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

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

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

$$.40 = \frac{40}{100} \text{ (N/A / 100 cm}^2\text{)}$$

$$MDA = \underline{13 \text{ dpm / 100 cm}^2}$$

METER L2929 SERIAL #: 69660

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

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

$$.22 \text{ (N/A / 100 cm}^2\text{)}$$

$$MDA = \underline{137 \text{ dpm / 100 cm}^2}$$

METER _____ SERIAL #: _____

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

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

$$\text{(/ 100 cm}^2\text{)}$$

$$MDA = \underline{N}$$

METER _____ SERIAL #: _____

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

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

$$\text{(/ 100 cm}^2\text{)}$$

$$MDA = \underline{\quad}$$

Technician: Karen Craig

Date: 7-28-94

Reviewed by: P. Deep

Date: 7-28-94

MDA CALCULATION SHEET

METER L2929 SERIAL #: 69660

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{0.5}{10} + \frac{0.5}{1} \right)^{1/2}$$

$$.40 \text{ (N/A / 100 cm}^2\text{)}$$

$$MDA = \underline{13 \text{ dpm/100 cm}^2}$$

METER L2929 SERIAL #: 69660

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

$$MDA = \frac{2.71}{1} + 3.29 \left(\frac{54}{10} + \frac{54}{1} \right)^{1/2}$$

$$.22 \text{ (N/A / 100 cm}^2\text{)}$$

$$MDA = \underline{128 \text{ dpm/100 cm}^2}$$

METER _____ SERIAL #: _____

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

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

$$\text{ (} \quad \text{ / 100 cm}^2\text{)}$$

$$MDA = \underline{N}$$

METER _____ SERIAL #: _____

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

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

$$\text{ (} \quad \text{ / 100 cm}^2\text{)}$$

$$MDA = \underline{\quad}$$

Technician: Loren Gray Date: 7/29/94

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

GAMMA SPECTRUM ANALYSIS

TANDEMRA SPECTRON-4T V4.2a

West Corporation, Beverly, PA

18-AUG-94 09:49:53

ANALYSIS PARAMETERS

ADC Unit Number: 1 / ADC Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 1
 Spectrum Size: 4095 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.

ULD 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

PEAK ANALYSIS

Peak	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	372.05	135.30	1.2	188.	154.	16.5	U-235,RA-226
2	477.53	173.64	1.5	129.	140.	11.6	PB-212
3	493.91	174.02	1.5	110.	163.	11.0	PB-214
4	590.73	215.73	1.4	76.	248.	8.3	PB-214
5	704.01	251.29	1.2	73.	479.	5.4	BI-211,PB-214
6	1166.64	562.85	1.4	9.	39.	19.6	TL-208
7	1219.68	608.95	1.3	35.	323.	6.3	XE-135,BI-214
8	1537.26	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.

2 - Multiplet Analysis converged normally

18-4UG-94 09:49:53

18-4UG-94 09:49:53

18-4UG-94 09:49:53

18-4UG-94 09:49:53

34-241	LLD<4.08E-01	Measured	Error	Decay	Error
34-234	LTD<6.19E+00				
34-230	LTD<7.11E+01				
34-223	LTD<8.64E-01				
34-209	LTD<8.14E+00				
34-207	LTD<3.74E-01				
34-204	LTD<1.61E+00				
34-144	LTD<2.97E+00				
34-99M	LTD<4.08E-01				
34-141	LTD<6.98E-01				
34-85M	LTD<5.09E-01				
34-131M	LTD<1.87E+01				
34-139	LTD<2.21E+00				
34-139	LTD<4.49E-01				
34-235	LTD<7.22E-01				
34-226	LTD<1.98E+01				
34-141	LTD<9.08E-01				
34-99	LTD<3.83E+00				
34-32	LTD<4.18E-01				
34-133M	LTD<3.47E+00				
34-212	LTD<1.53E+00				
34-224	LTD<8.41E+00				
34-135	LTD<3.56E-01				
34-138	LTD<1.14E+00				
34-75	LTD<4.58E-01				
34-239	LTD<2.28E+00				
34-203	LTD<3.70E-01				
34-192	LTD<3.45E-01				
34-51	LTD<2.90E+00				
34-211	LTD<7.99E+01				
34-214	LTD<9.33E+00				
34-133	LTD<1.09E+00				
34-131	LTD<3.31E-01				
34-113	LTD<4.41E-01				
34-97	LTD<6.69E-01				
34-211	LTD<1.12E+01				
34-198	LTD<3.05E-01				
34-125	LTD<1.04E+00				
34-212	LTD<9.09E+01				
34-7	LTD<2.53E+00				
34-181	LTD<3.35E-01				
34-103	LTD<2.79E-01				
34-85	LTD<7.05E+01				
34-85	LTD<3.08E-01				
34-33	LTD<3.34E-01				
34-140	LTD<1.16E+00				

1.27E+02 +- 5.70E+00	1.27E+02 +- 5.70E+00	1.27E+02 +- 5.70E+00
LLD<2.73E+00	LLD<2.73E+00	LLD<2.73E+00
LLD<2.72E-01	LLD<2.72E-01	LLD<2.72E-01
LLD<2.81E-01	LLD<2.81E-01	LLD<2.81E-01
LLD<4.29E-01	LLD<4.29E-01	LLD<4.29E-01
LLD<9.39E-01	LLD<9.39E-01	LLD<9.39E-01
LLD<3.49E+00	LLD<3.49E+00	LLD<3.49E+00
6.84E+00 +- 1.55E+00	6.84E+00 +- 1.55E+00	6.84E+00 +- 1.55E+00
LLD<5.78E-01	LLD<5.78E-01	LLD<5.78E-01
LLD<4.99E-01	LLD<4.99E-01	LLD<4.99E-01
LLD<3.40E-01	LLD<3.40E-01	LLD<3.40E-01
LLD<3.96E-01	LLD<3.96E-01	LLD<3.96E-01
LLD<5.05E-01	LLD<5.05E-01	LLD<5.05E-01
LLD<4.01E-01	LLD<4.01E-01	LLD<4.01E-01
LLD<1.14E+00	LLD<1.14E+00	LLD<1.14E+00
LLD<1.38E+00	LLD<1.38E+00	LLD<1.38E+00
LLD<1.74E+00	LLD<1.74E+00	LLD<1.74E+00
LLD<6.29E-01	LLD<6.29E-01	LLD<6.29E-01
LLD<2.09E+00	LLD<2.09E+00	LLD<2.09E+00
LLD<6.02E-01	LLD<6.02E-01	LLD<6.02E-01
LLD<7.05E-01	LLD<7.05E-01	LLD<7.05E-01
LLD<1.25E+00	LLD<1.25E+00	LLD<1.25E+00
LLD<3.42E+00	LLD<3.42E+00	LLD<3.42E+00
LLD<3.13E+00	LLD<3.13E+00	LLD<3.13E+00
LLD<1.72E+00	LLD<1.72E+00	LLD<1.72E+00
LLD<3.47E-01	LLD<3.47E-01	LLD<3.47E-01
LLD<2.49E+02	LLD<2.49E+02	LLD<2.49E+02
LLD<3.43E-01	LLD<3.43E-01	LLD<3.43E-01
LLD<3.27E-01	LLD<3.27E-01	LLD<3.27E-01
LLD<4.12E-01	LLD<4.12E-01	LLD<4.12E-01
LLD<3.43E-01	LLD<3.43E-01	LLD<3.43E-01
LLD<3.57E-01	LLD<3.57E-01	LLD<3.57E-01
LLD<1.77E+00	LLD<1.77E+00	LLD<1.77E+00
LLD<4.54E-01	LLD<4.54E-01	LLD<4.54E-01
LLD<6.33E-01	LLD<6.33E-01	LLD<6.33E-01
LLD<3.59E-01	LLD<3.59E-01	LLD<3.59E-01
LLD<1.09E+00	LLD<1.09E+00	LLD<1.09E+00
LLD<3.72E-01	LLD<3.72E-01	LLD<3.72E-01
LLD<3.38E-01	LLD<3.38E-01	LLD<3.38E-01
LLD<3.04E-01	LLD<3.04E-01	LLD<3.04E-01
LLD<2.39E-01	LLD<2.39E-01	LLD<2.39E-01
LLD<5.88E-01	LLD<5.88E-01	LLD<5.88E-01
LLD<2.73E+00	LLD<2.73E+00	LLD<2.73E+00
9.25E+00 +- 5.91E-01	9.25E+00 +- 5.91E-01	9.25E+00 +- 5.91E-01
LLD<1.25E+00	LLD<1.25E+00	LLD<1.25E+00
LLD<3.49E-01	LLD<3.49E-01	LLD<3.49E-01
LLD<1.01E+00	LLD<1.01E+00	LLD<1.01E+00
LLD<2.11E-01	LLD<2.11E-01	LLD<2.11E-01
LLD<3.14E-01	LLD<3.14E-01	LLD<3.14E-01
LLD<4.32E-01	LLD<4.32E-01	LLD<4.32E-01
LLD<6.32E-01	LLD<6.32E-01	LLD<6.32E-01
LLD<2.19E-01	LLD<2.19E-01	LLD<2.19E-01
LLD<4.34E-01	LLD<4.34E-01	LLD<4.34E-01
LLD<6.32E-01	LLD<6.32E-01	LLD<6.32E-01
LLD<3.59E-01	LLD<3.59E-01	LLD<3.59E-01
LLD<1.09E+00	LLD<1.09E+00	LLD<1.09E+00
LLD<3.72E-01	LLD<3.72E-01	LLD<3.72E-01
LLD<3.38E-01	LLD<3.38E-01	LLD<3.38E-01
LLD<3.04E-01	LLD<3.04E-01	LLD<3.04E-01
LLD<2.39E-01	LLD<2.39E-01	LLD<2.39E-01
LLD<5.88E-01	LLD<5.88E-01	LLD<5.88E-01
LLD<2.73E+00	LLD<2.73E+00	LLD<2.73E+00
9.25E+00 +- 5.91E-01	9.25E+00 +- 5.91E-01	9.25E+00 +- 5.91E-01
LLD<1.25E+00	LLD<1.25E+00	LLD<1.25E+00
LLD<3.49E-01	LLD<3.49E-01	LLD<3.49E-01
LLD<1.01E+00	LLD<1.01E+00	LLD

Energy	Net Area	Error	Count/sec
keV	counts	%	
197.91	342.02	1.55	11.0
198.44	382.35	1.79	19.6
198.72	747.97	4.1	15.3
1977.29	995.38	7.1	48.7
1976.99	1277.43	13.1	32.4
			1.02E+01
			4.18E+00
			2.56E+01
			1.16E+01
			2.21E+01

 GAMMA SPECTRUM ANALYSIS

TEMPERATURE SPECTRUM-AT V4.2a

Location: Conception, Bevers, PA

24-AUG-94 19:26:26

ANALYSIS PARAMETERS

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: ± 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

24-AUG-94 19:25:26

ANALYSIS

Channel	Energy	FWHM	Background	Net Area	Counts	Error	Nuclides
1	412.74	107.08	0.8	17.	20.	37.2	
2	472.09	236.20	1.3	48.	72.	19.2	
3	574.17	397.11	0.7	6.	13.	38.5	GA-73
4	652.37	134.12	2.1	7.	21.	28.8	NP-239
5a	596.71	248.25	0.9	6.	46.	18.3	
6	1154.50	375.78	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 Multiplier processed.

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

Sample: C.S.A. CLEAN SOIL FRO

Collected on 26-JUL-94 at 12:25:00

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

RADIOISOTOPE ANALYSIS REPORT

Isotope	Activity Concentration in PCI /GRAM	Decay corrected	Error
	Measured	Error	
AM-241	LLD<3.53E-01	LLD<3.53E-01	
TH-234	LLD<4.05E+00	LLD<4.05E+00	
PA-230	LLD<4.45E+01	LLD<4.45E+01	
XE-133	LLD<6.53E-01	LLD<6.53E-01	
CE-139	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	
PA-214	LLD<5.78E-01	LLD<5.78E-01	
PA-214	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	
HB-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	
GN-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	
NU-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	
PE-181	LLD<2.76E-01	LLD<2.76E-01	
PA-214	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	

BA-140	LLD<3.17E-01	LLD<3.17E-01
BA-141	LLD<2.77E-01	LLD<2.73E-01
BA-142	LLD<3.13E-01	LLD<3.13E-01
BA-143	LLD<1.32E+00	LLD<1.32E+00
BA-144	LLD<9.00E-01	LLD<9.00E-01
BA-145	LLD<3.60E-01	LLD<3.60E-01
BA-146	LLD<3.51E-01	LLD<3.51E-01
BA-106	LLD<3.04E+00	LLD<3.04E+00
BA-142	LLD<6.09E-01	LLD<6.09E-01
BA-110M	LLD<3.36E-01	LLD<3.36E-01
BA-97	LLD<3.03E-01	LLD<3.03E-01
BA-137	LLD<3.32E-01	LLD<3.32E-01
BA-138	LLD<3.11E-01	LLD<3.11E-01
BA-187	LLD<1.07E+00	LLD<1.07E+00
BA-97	LLD<3.02E-01	LLD<3.02E-01
BA-95	LLD<4.45E-01	LLD<4.45E-01
BA-95	LLD<3.14E-01	LLD<3.14E-01
BA-210	LLD<2.08E+00	LLD<2.08E+00
BA-58	LLD<3.08E-01	LLD<3.08E-01
BA-136	LLD<2.65E-01	LLD<2.65E-01
BA-54	LLD<2.82E-01	LLD<2.82E-01
BA-56	LLD<2.95E-01	LLD<2.95E-01
BA-134	LLD<3.47E-01	LLD<3.47E-01
BA-207	LLD<4.58E+02	LLD<4.58E+02
BA-98	LLD<6.21E-01	LLD<6.21E-01
BA-228	2.24E+00 +- 4.39E-01	2.24E+00 +- 4.39E-01
BA-152	LLD<3.38E+00	LLD<3.38E+00
BA-234M	LLD<4.47E+00	LLD<4.47E+00
BA-91	LLD<1.03E+00	LLD<1.03E+00
BA-89	LLD<9.07E-01	LLD<9.07E-01
BA-59	LLD<5.67E-01	LLD<5.67E-01
BA-5	LLD<8.14E-01	LLD<8.14E-01
BA-46	LLD<3.65E-01	LLD<3.65E-01
BA-182	LLD<9.27E-01	LLD<9.27E-01
BA-135	LLD<1.48E+00	LLD<1.48E+00
BA-39	LLD<7.57E-01	LLD<7.57E-01
BA-22	LLD<4.28E-01	LLD<4.28E-01
BA-41	LLD<5.24E-01	LLD<5.24E-01
BA-60	LLD<3.01E-01	LLD<3.01E-01
BA-24	LLD<4.50E-01	LLD<4.50E-01
BA-92	LLD<2.27E-01	LLD<2.27E-01
BA-138	LLD<4.83E-01	LLD<4.83E-01
BA-40	1.96E+01 +- 2.52E+00	1.96E+01 +- 2.52E+00
BA-88	LLD<4.21E+00	LLD<4.21E+00
BA-209	LLD<7.20E-01	LLD<7.20E-01
BA-140	LLD<2.84E-01	LLD<2.84E-01
BA-26	LLD<1.09E-01	LLD<1.09E-01
BA-56	LLD<4.08E-01	LLD<4.08E-01
BA-98	LLD<1.37E+00	LLD<1.37E+00
<hr/>		
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%

RESULTS NOT USED IN ANALYSIS

Channel	Electron Volts	Net Area Counts	Error %	Gamma/s/Sec
35.74	207.03	20.	37.2	2.47E+00
394.17	297.11	17.	38.5	5.01E+00
663.37	331.17	21.	28.9	3.61E+00
496.77	48.25	46.	18.7	8.03E+00
1116.70	376.75	27.	24.2	8.04E+00
927.74	927.74	15.	30.3	7.36E+00

 *
 * GAMMA SPECTRUM ANALYSIS *
 *

GAMPEPRA SPECTRAN-AT V4.2a

Esot 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

ACA 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 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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
10	432.34	76.69	1.0	67.	43.	34.9	
2	471.01	831.06	1.7	69.	91.	19.7	
3	534.14	892.10	1.4	30.	25.	40.0	
4	676.43	1048.13	1.8	12.	69.	14.2	
5	1009.65	1504.46	0.6	8.	14.	42.0	
6	1154.22	1766.64	1.4	7.	37.	19.7	
7C	1205.68	1802.33	2.6	12.	45.	19.8	SB-124
8	2590.03	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

Miller Random Sample from T

Data collected on 25-AUG-74 at 12:36:41

Moved 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

Radionuclide	Activity Concentration in PCI /gram	Decay
Measured	Error	corrected Error
AY-241	LLD<3.27E-01	LLD<3.27E-01
BE-234	LLD<3.70E+00	LLD<3.70E+00
BY-230	LLD<4.35E+01	LLD<4.35E+01
CE-135	LLD<6.17E-01	LLD<6.17E-01
CO-109	LLD<4.64E+00	LLD<4.64E+00
CO-57	LLD<1.82E-01	LLD<1.82E-01
PA-234	LLD<7.63E-01	LLD<7.63E-01
TE-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
KE-85M	LLD<2.43E-01	LLD<2.43E-01
KE-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
J-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-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
BB-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
BE-75	LLD<3.64E-01	LLD<3.64E-01
GP-239	LLD<1.31E+00	LLD<1.31E+00
AG-203	LLD<2.48E-01	LLD<2.48E-01
IR-192	LLD<1.91E-01	LLD<1.91E-01
OR-51	LLD<1.64E+00	LLD<1.64E+00
SI-211	LLD<6.79E+00	LLD<6.79E+00
BB-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
CR-87	LLD<4.67E-01	LLD<4.67E-01
BB-214	LLD<7.71E+00	LLD<7.71E+00
QU-198	LLD<2.12E-01	LLD<2.12E-01
BR-125	LLD<5.55E-01	LLD<5.55E-01
TI-212	LLD<5.98E+01	LLD<5.98E+01
CE-7	LLD<1.84E+00	LLD<1.84E+00
FE-191	LLD<2.37E-01	LLD<2.37E-01
RA-203	LLD<1.79E-01	LLD<1.79E-01
LA-25	LLD<5.33E+01	LLD<5.33E+01
RA-85	LLD<2.33E-01	LLD<2.33E-01
T-133	LLD<2.21E-01	LLD<2.21E-01

[illegible]

PLEASE NOT USED IN ANALYSIS

Channel	Energy keV	Net Area counts	Error %	Gamma/sec
80.34	76.69	43.	74.8	3.33E+00
1009.65	504.45	14.	42.0	3.52E+00
1154.22	576.64	37.	19.7	1.02E+01
1205.68	602.33	43.	19.8	1.36E+01

 GAMMA SPECTRUM ANALYSIS

CONSERVA SPECTRAN-AT V4.2a

Isot Corporation Revere, MA

24-AUG-94 19:36:47

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: 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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.04	234.17	1.4	65.	80.	18.5	SB-124
2	583.92	291.99	2.2	23.	62.	17.6	
3	696.13	348.01	1.6	10.	89.	11.8	
4	1133.76	576.41	0.9	10.	41.	19.8	
5C	1204.12	601.55	0.9	5.	23.	29.6	
6C	1204.59	602.78	0.9	5.	47.	20.1	
7	1802.91	900.59	1.4	5.	17.	31.6	
8	2690.91	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

Sample: 01-00-01-01 Random
 Date collected on 28-JUL-94 at 15:16:22
 0. days, 0.000 hours BEFORE the start of collect.

RADIOACTIVITY ANALYSIS REPORT

Activity Concentration in FCI /gram

Decay
 Error corrected Error

1-133	LDD<3.43E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-85	LDD<1.66E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-85	LDD<3.79E+01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-103	LDD<2.14E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
HF-181	LDD<2.16E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SE-7	LDD<1.61E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SI-212	LDD<6.30E+01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SI-125	LDD<6.92E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SI-198	LDD<2.11E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SI-211	LDD<6.77E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
KR-87	LDD<4.04E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SN-113	LDD<2.47E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
1-131	LDD<2.18E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SA-133	LDD<2.53E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SE-214	LDD<2.53E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SI-211	LDD<6.43E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-51	LDD<1.63E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
IR-192	LDD<2.00E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
IG-203	LDD<2.66E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
HP-239	LDD<1.37E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SE-75	LDD<3.07E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
XE-138	LDD<6.28E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
XE-135	LDD<1.92E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
RA-224	LDD<8.85E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
TH-227	LDD<1.35E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
PB-212	LDD<3.38E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
XE-133M	LDD<3.38E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
TE-132	LDD<2.24E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-89	LDD<2.09E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SR-141	LDD<4.64E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
RA-226	LDD<5.76E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
U-235	LDD<2.72E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
CE-139	LDD<2.53E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
SA-139	LDD<1.25E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
XE-131M	LDD<9.60E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
KR-85M	LDD<2.39E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
CE-141	LDD<3.63E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
TC-99M	LDD<2.12E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
CE-144	LDD<1.86E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
PA-234	LDD<7.87E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
DC-57	LDD<1.94E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
DO-109	LDD<4.67E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
CE-133	LDD<4.94E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
1-230	LDD<3.94E+01	1.66E+00	1.96E-01	1.66E+00	1.96E-01
TR-234	LDD<3.49E+00	1.66E+00	1.96E-01	1.66E+00	1.96E-01
1-141	LDD<3.43E-01	1.66E+00	1.96E-01	1.66E+00	1.96E-01

Item	Value	Value	Value
1-141	LLD<5.12E-01	2.33E+01	2.08E+00
1-142	LLD<2.48E-01	2.33E+01	2.08E+00
1-207	LLD<2.12E-01	2.33E+01	2.08E+00
1-208	LLD<9.17E-01	2.33E+01	2.08E+00
1-214	LLD<9.67E-01	2.33E+01	2.08E+00
81-234	LLD<3.57E-01	2.33E+01	2.08E+00
82-234	LLD<4.14E-01	2.33E+01	2.08E+00
80-106	LLD<2.55E+00	2.33E+01	2.08E+00
19-142	LLD<4.22E-01	2.33E+01	2.08E+00
65-110M	LLD<3.02E-01	2.33E+01	2.08E+00
93-97	LLD<2.94E-01	2.33E+01	2.08E+00
58-137	LLD<2.63E-01	2.33E+01	2.08E+00
1-152	LLD<2.52E-01	2.33E+01	2.08E+00
8-187	LLD<7.84E-01	2.33E+01	2.08E+00
19-97	LLD<2.67E-01	2.33E+01	2.08E+00
19-95	LLD<5.61E-01	2.33E+01	2.08E+00
19-95	LLD<2.40E-01	2.33E+01	2.08E+00
71-210	LLD<1.52E+00	2.33E+01	2.08E+00
10-68	LLD<2.42E-01	2.33E+01	2.08E+00
58-126	LLD<2.88E-01	2.33E+01	2.08E+00
4N-54	LLD<3.09E-01	2.33E+01	2.08E+00
50-56	LLD<2.39E-01	2.33E+01	2.08E+00
1-134	LLD<2.81E-01	2.33E+01	2.08E+00
71-207	LLD<3.31E+02	2.33E+01	2.08E+00
Y-88	LLD<4.49E-01	2.33E+01	2.08E+00
90-228	LLD<9.73E-01	2.33E+01	2.08E+00
EU-152	LLD<2.18E+00	2.33E+01	2.08E+00
FA-234M	LLD<2.43E+00	2.33E+01	2.08E+00
8R-91	LLD<9.43E-01	2.33E+01	2.08E+00
RB-89	LLD<7.35E-01	2.33E+01	2.08E+00
FE-59	LLD<6.48E-01	2.33E+01	2.08E+00
Z1	LLD<6.16E-01	2.33E+01	2.08E+00
50-46	LLD<2.92E-01	2.33E+01	2.08E+00
1A-182	LLD<8.87E-01	2.33E+01	2.08E+00
1-135	LLD<1.66E+00	2.33E+01	2.08E+00
DL-39	LLD<8.36E-01	2.33E+01	2.08E+00
WA-22	LLD<4.06E-01	2.33E+01	2.08E+00
9R-41	LLD<3.01E-01	2.33E+01	2.08E+00
50-60	LLD<2.64E-01	2.33E+01	2.08E+00
WA-24	LLD<2.30E-01	2.33E+01	2.08E+00
5R-92	LLD<6.62E-02	2.33E+01	2.08E+00
58-138	LLD<4.23E-01	2.33E+01	2.08E+00
1-40	1.98E+01	2.33E+01	2.08E+00
4R-88	LLD<5.86E-01	2.33E+01	2.08E+00
1-209	LLD<8.36E-01	2.33E+01	2.08E+00
19-140	LLD<2.51E-01	2.33E+01	2.08E+00
11-26	LLD<2.61E-01	2.33E+01	2.08E+00
4N-56	LLD<7.17E-01	2.33E+01	2.08E+00
19-88	LLD<3.99E-01	2.33E+01	2.08E+00

PEAKS NOT USED IN ANALYSIS

Peak No. Channel	Energy keV	Net Area counts	Error %	Gamma/sec
1203.74	674.41	41	19.9	1.20E+01
1204.12	601.53	33	29.6	7.13E+00
1206.59	603.73	47	20.1	1.42E+01

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

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CANBERRA SPECTRAN-AT V4.2a

Cabot Corporation, Revere, MA

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: ANL000..

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

Dacot Corporation, Revere, MA

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	Backgrd 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%

28-JUL-94 13:49:35

Radioactivity Concentration, Reversed, 24

Sample: C-13, P-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.

RADIOACTIVITY ANALYSIS REPORT

Activity Concentration in PCI /GRAM

Decay Error corrected Error Measured

AM-241	LDD<1.61E-01	BA-140	LDD<5.32E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.46E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.05E-01
AM-241	LDD<1.51E+00	BA-140	LDD<2.40E+01
AM-241	LDD<1.51E+00	BA-140	LDD<1.19E-01
AM-241	LDD<1.51E+00	BA-140	LDD<9.15E-02
AM-241	LDD<1.51E+00	BA-140	LDD<1.08E+00
AM-241	LDD<1.51E+00	BA-140	LDD<3.72E+01
AM-241	LDD<1.51E+00	BA-140	LDD<3.07E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.17E-01
AM-241	LDD<1.51E+00	BA-140	LDD<4.02E+00
AM-241	LDD<1.51E+00	BA-140	LDD<2.48E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.25E-01
AM-241	LDD<1.51E+00	BA-140	LDD<9.81E-02
AM-241	LDD<1.51E+00	BA-140	LDD<1.29E-01
AM-241	LDD<1.51E+00	BA-140	LDD<3.61E-01
AM-241	LDD<1.51E+00	BA-140	LDD<2.96E+00
AM-241	LDD<1.51E+00	BA-140	LDD<8.02E-01
AM-241	LDD<1.51E+00	BA-140	LDD<9.17E-02
AM-241	LDD<1.51E+00	BA-140	LDD<1.40E-01
AM-241	LDD<1.51E+00	BA-140	LDD<8.04E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.47E-01
AM-241	LDD<1.51E+00	BA-140	LDD<3.34E-01
AM-241	LDD<1.51E+00	BA-140	LDD<9.27E-02
AM-241	LDD<1.51E+00	BA-140	LDD<4.38E+00
AM-241	LDD<1.51E+00	BA-140	LDD<2.92E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.38E+00
AM-241	LDD<1.51E+00	BA-140	LDD<6.14E-02
AM-241	LDD<1.51E+00	BA-140	LDD<9.95E-01
AM-241	LDD<1.51E+00	BA-140	LDD<2.51E-01
AM-241	LDD<1.51E+00	BA-140	LDD<3.26E+00
AM-241	LDD<1.51E+00	BA-140	LDD<1.92E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.26E-01
AM-241	LDD<1.51E+00	BA-140	LDD<6.20E-01
AM-241	LDD<1.51E+00	BA-140	LDD<5.16E+00
AM-241	LDD<1.51E+00	BA-140	LDD<1.20E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.98E-01
AM-241	LDD<1.51E+00	BA-140	LDD<9.78E-02
AM-241	LDD<1.51E+00	BA-140	LDD<7.85E-01
AM-241	LDD<1.51E+00	BA-140	LDD<3.94E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.06E-01
AM-241	LDD<1.51E+00	BA-140	LDD<2.43E+00
AM-241	LDD<1.51E+00	BA-140	LDD<2.01E-01
AM-241	LDD<1.51E+00	BA-140	LDD<1.70E+01
AM-241	LDD<1.51E+00	BA-140	LDD<1.61E-01

Results saved in File SD0107

Error Quotation at 1.00 Sigma
LTD Confidence Level at 95.0%

Total		0.00E-01 + - 0.00E-01	0.00E-01 + - 0.00E-01
BI-207	LTD<1.33E-01	LTD<1.33E-01	
TL-208	LTD<4.00E-01	LTD<4.00E-01	
CB-134	LTD<1.87E-01	LTD<1.87E-01	
CB-134	LTD<1.87E-01	LTD<1.87E-01	
BI-214	LTD<2.73E-01	LTD<2.73E-01	
RU-106	LTD<1.32E+00	LTD<1.32E+00	
LA-142	LTD<2.35E-01	LTD<2.35E-01	
AB-110M	LTD<1.17E-01	LTD<1.17E-01	
NB-97	LTD<1.16E-01	LTD<1.16E-01	
CB-137	LTD<1.45E-01	LTD<1.45E-01	
I-132	LTD<1.16E-01	LTD<1.16E-01	
W-187	LTD<4.45E-01	LTD<4.45E-01	
ZR-97	LTD<1.43E-01	LTD<1.43E-01	
ZR-95	LTD<2.05E-01	LTD<2.05E-01	
NB-95	LTD<3.69E-02	LTD<3.69E-02	
TL-210	LTD<8.78E-01	LTD<8.78E-01	
CD-58	LTD<1.21E-01	LTD<1.21E-01	
CS-136	LTD<1.07E-01	LTD<1.07E-01	
MN-54	LTD<1.59E-01	LTD<1.59E-01	
CD-56	LTD<4.50E-02	LTD<4.50E-02	
I-134	LTD<4.50E-02	LTD<4.50E-02	
TL-207	LTD<1.63E+02	LTD<1.63E+02	
Y-88	LTD<2.21E-01	LTD<2.21E-01	
AC-228	LTD<5.78E-01	LTD<5.78E-01	
EU-152	LTD<1.39E+00	LTD<1.39E+00	
PA-234M	LTD<1.03E+00	LTD<1.03E+00	
SR-91	LTD<1.45E-01	LTD<1.45E-01	
RB-89	LTD<2.25E-01	LTD<2.25E-01	
FE-59	LTD<3.03E-01	LTD<3.03E-01	
ZN-65	LTD<2.20E-01	LTD<2.20E-01	
SC-46	LTD<1.12E-01	LTD<1.12E-01	
TA-182	LTD<3.21E-01	LTD<3.21E-01	
I-135	LTD<6.94E-01	LTD<6.94E-01	
CL-39	LTD<4.40E-01	LTD<4.40E-01	
NA-22	LTD<1.74E-01	LTD<1.74E-01	
AR-41	LTD<5.88E-02	LTD<5.88E-02	
CD-60	LTD<5.77E-02	LTD<5.77E-02	
NA-24	LTD<2.02E-01	LTD<2.02E-01	
SR-92	LTD<6.74E-02	LTD<6.74E-02	
CS-138	LTD<3.75E-01	LTD<3.75E-01	
K-40	LTD<5.78E-01	LTD<5.78E-01	
KR-88	LTD<5.97E-01	LTD<5.97E-01	
TL-209	LTD<2.14E-01	LTD<2.14E-01	
LA-140	LTD<6.87E-02	LTD<6.87E-02	
AL-26	LTD<1.58E-01	LTD<1.58E-01	
MN-56	LTD<5.95E-01	LTD<5.95E-01	
RB-88	LTD<4.06E-01	LTD<4.06E-01	

Centroid channel	Energy keV	Net Area counts	Error %	Sammas/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

CANESRA SPECTRAN-AT V4.2a

Carot Corporation, Severe, 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.

Regular 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: $7.7470\text{E}+02$ GRAM / Conversion Factor: $1.0000\text{E}+00$
Standard Size: $8.8840\text{E}+02$ 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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
10	472.22	276.26	1.2	20.	58.	20.0	
2	583.75	271.39	1.6	3.	34.	19.0	
3	595.57	348.06	1.7	2.	60.	13.4	
4	1154.53	671.74	1.5	3.	20.	25.6	
5	1204.58	601.93	1.1	1.	32.	19.5	
6	2990.69	1444.42	2.2	0.	31.	18.0	

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

0 -- Multiplet Analysis converged normally

Sample: C.S. A. PIT 2, 2 FT D

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 PDI /GRAM		Decay	
	Measured	Error	corrected	Error
AY-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	
IC-109	LLD<3.02E+00		LLD<3.02E+00	
CS-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	
PO-214	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	
FR-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	
FR-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	
BN-113	LLD<2.21E-01		LLD<2.21E-01	
KR-87	LLD<3.42E-01		LLD<3.42E-01	
PR-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	
HA-181	LLD<1.48E-01		LLD<1.48E-01	
PO-103	LLD<1.50E-01		LLD<1.50E-01	
KR-86	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	

Error Quotation at 1.00 Sigma
Confidence Level at 95.0%

Total		8.11E+00 +- 1.17E+00	8.11E+00 +- 1.17E+00
RB-88	LTD<3.95E-01	LTD<3.95E-01	
MN-56	LTD<5.78E-01	LTD<5.78E-01	
AL-26	LTD<1.54E-01	LTD<1.54E-01	
LA-140	LTD<1.48E-01	LTD<1.48E-01	
TL-209	LTD<2.08E-01	LTD<2.08E-01	
KR-88	LTD<5.80E-01	LTD<5.80E-01	
X-40	6.39E+00 +- 1.15E+00	6.39E+00 +- 1.15E+00	
CS-138	LTD<1.91E-01	LTD<1.91E-01	
SR-92	LTD<2.69E-01	LTD<2.69E-01	
NA-24	LTD<2.66E-01	LTD<2.66E-01	
OD-60	LTD<2.16E-01	LTD<2.16E-01	
AR-41	LTD<2.27E-01	LTD<2.27E-01	
NA-22	LTD<2.53E-01	LTD<2.53E-01	
OL-39	LTD<5.10E-01	LTD<5.10E-01	
I-135	LTD<8.37E-01	LTD<8.37E-01	
TA-182	LTD<5.04E-01	LTD<5.04E-01	
SD-46	LTD<1.76E-01	LTD<1.76E-01	
Z-55	LTD<3.73E-01	LTD<3.73E-01	
SR-59	LTD<4.64E-01	LTD<4.64E-01	
RB-89	LTD<4.39E-01	LTD<4.39E-01	
SR-91	LTD<7.88E-01	LTD<7.88E-01	
PA-234M	LTD<2.76E+00	LTD<2.76E+00	
EU-152	LTD<1.69E+00	LTD<1.69E+00	
AC-228	LTD<8.98E-01	LTD<8.98E-01	
V-88	LTD<3.08E-01	LTD<3.08E-01	
TL-207	LTD<2.28E+02	LTD<2.28E+02	
I-134	LTD<2.65E-01	LTD<2.65E-01	
OD-56	LTD<2.27E-01	LTD<2.27E-01	
MN-54	LTD<1.33E-01	LTD<1.33E-01	
OS-136	LTD<1.93E-01	LTD<1.93E-01	
OC-33	LTD<1.30E-01	LTD<1.30E-01	
TL-210	LTD<1.31E+00	LTD<1.31E+00	
VB-95	LTD<1.97E-01	LTD<1.97E-01	
ZD-95	LTD<3.25E-01	LTD<3.25E-01	
TR-57	LTD<2.05E-01	LTD<2.05E-01	
X-187	LTD<6.33E-01	LTD<6.33E-01	
I-133	LTD<1.31E-01	LTD<1.31E-01	
TS-137	LTD<2.02E-01	LTD<2.02E-01	
RB-97	LTD<1.41E-01	LTD<1.41E-01	
AG-110M	LTD<1.40E-01	LTD<1.40E-01	
LA-142	LTD<3.17E-01	LTD<3.17E-01	
OU-106	LTD<1.91E+00	LTD<1.91E+00	
TS-136	LTD<2.70E-01	LTD<2.70E-01	
TS-124	LTD<3.49E-01	LTD<3.49E-01	
TS-124	LTD<5.22E-01	LTD<5.22E-01	
TS-109	LTD<6.44E-01	LTD<6.44E-01	
TS-107	LTD<1.67E-01	LTD<1.67E-01	
TS-107	LTD<1.62E-01	LTD<1.62E-01	
TS-107	LTD<5.13E-01	LTD<5.13E-01	

DATA USED IN ANALYSIS

Channel	Energy keV	Net Area counts	Error %	Gamma/sec
1204.43	576.74	20.	25.6	5.72E+00
1204.38	601.98	32.	18.5	9.90E+00

GAMMA SPECTRUM ANALYSIS

CANBERRA SPECTRAN-AT V4.2a

Dacot Corporation, Revere, MA

24-AUG-94 19:54:10

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: 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: $5.6750\text{E}+02$ GRAM / Conversion Factor: $1.0000\text{E}+00$
Standard Size: $8.8840\text{E}+02$ 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

PEAK ANALYSIS

	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	471.95	236.13	0.7	46.	93.	15.5	PS-212
2	549.34	274.64	1.3	3.	17.	29.3	
3N	549.30	274.65	0.6	12.	20.	35.4	
4	675.14	337.59	2.0	6.	26.	23.6	PS-214
5	726.07	362.75	0.6	2.	7.	44.6	CS-138
6	1010.06	504.67	1.2	8.	17.	36.0	TL-208
7	1153.67	576.46	2.0	6.	23.	27.1	
8	1205.00	601.99	2.0	1.	29.	19.2	BI-214
9	1337.68	718.17	2.5	2.	12.	34.1	
10	2890.43	1444.14	2.3	0.	53.	12.6	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

N - Multiplet Analysis did NOT converge

Sample: 0.5.4. PIT 3.1 FT DD

Cells collected on 06-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 PDI /GRAM			
	Measured	Error	Decay corrected	Error
AN-241	LLD<3.31E-01		LLD<3.31E-01	
TA-234	LLD<3.70E+00		LLD<3.70E+00	
TA-230	LLD<4.04E+01		LLD<4.04E+01	
CE-133	LLD<6.24E-01		LLD<6.24E-01	
CE-109	LLD<4.97E+00		LLD<4.97E+00	
CE-57	LLD<2.07E-01		LLD<2.07E-01	
TA-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	
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	
SI-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	

Error Quotation at 1.00 Sigma
LTD Confidence Level at 95.0%

Total		2.00E+01 +- 2.26E+00	2.00E+01 +- 2.26E+00
RB-88	LTD<1.20E+00	LTD<1.20E+00	LTD<1.20E+00
WN-56	LTD<1.22E+00	LTD<1.22E+00	LTD<1.22E+00
AL-26	LTD<3.26E-01	LTD<3.26E-01	LTD<3.26E-01
LA-140	LTD<2.83E-01	LTD<2.83E-01	LTD<2.83E-01
TL-209	LTD<1.13E+00	LTD<1.13E+00	LTD<1.13E+00
CR-88	LTD<1.75E+00	LTD<1.75E+00	LTD<1.75E+00
4-40	1.77E+01 +- 2.24E+00	1.77E+01 +- 2.24E+00	1.77E+01 +- 2.24E+00
DS-138	LTD<4.04E-01	LTD<4.04E-01	LTD<4.04E-01
DR-92	LTD<2.93E-01	LTD<2.93E-01	LTD<2.93E-01
VA-24	LTD<3.47E-01	LTD<3.47E-01	LTD<3.47E-01
CD-60	LTD<2.08E-01	LTD<2.08E-01	LTD<2.08E-01
AR-41	LTD<3.29E-01	LTD<3.29E-01	LTD<3.29E-01
NA-22	LTD<4.30E-01	LTD<4.30E-01	LTD<4.30E-01
DL-39	LTD<7.90E-01	LTD<7.90E-01	LTD<7.90E-01
1-135	LTD<1.47E+00	LTD<1.47E+00	LTD<1.47E+00
TF-482	LTD<1.11E+00	LTD<1.11E+00	LTD<1.11E+00
3E-5	LTD<4.29E-01	LTD<4.29E-01	LTD<4.29E-01
ZN-65	LTD<6.14E-01	LTD<6.14E-01	LTD<6.14E-01
FE-59	LTD<8.05E-01	LTD<8.05E-01	LTD<8.05E-01
RB-89	LTD<6.57E-01	LTD<6.57E-01	LTD<6.57E-01
GR-91	LTD<9.73E-01	LTD<9.73E-01	LTD<9.73E-01
PA-234M	LTD<3.49E+00	LTD<3.49E+00	LTD<3.49E+00
ED-152	LTD<3.24E+00	LTD<3.24E+00	LTD<3.24E+00
AC-228	LTD<1.51E+00	LTD<1.51E+00	LTD<1.51E+00
V-88	LTD<5.59E-01	LTD<5.59E-01	LTD<5.59E-01
TL-207	LTD<4.13E+02	LTD<4.13E+02	LTD<4.13E+02
1-134	LTD<3.95E-01	LTD<3.95E-01	LTD<3.95E-01
DO-56	LTD<3.38E-01	LTD<3.38E-01	LTD<3.38E-01
IN-54	LTD<3.27E-01	LTD<3.27E-01	LTD<3.27E-01
DE-136	LTD<3.07E-01	LTD<3.07E-01	LTD<3.07E-01
DO-58	LTD<3.53E-01	LTD<3.53E-01	LTD<3.53E-01
TL-210	LTD<1.34E+00	LTD<1.34E+00	LTD<1.34E+00
VE-95	LTD<1.95E-01	LTD<1.95E-01	LTD<1.95E-01
ZR-95	LTD<7.31E-01	LTD<7.31E-01	LTD<7.31E-01
4-97	LTD<3.17E-01	LTD<3.17E-01	LTD<3.17E-01
4-197	LTD<7.89E-01	LTD<7.89E-01	LTD<7.89E-01
1-132	LTD<2.72E-01	LTD<2.72E-01	LTD<2.72E-01
DS-157	LTD<3.49E-01	LTD<3.49E-01	LTD<3.49E-01
VB-97	LTD<3.33E-01	LTD<3.33E-01	LTD<3.33E-01
AG-110M	LTD<3.44E-01	LTD<3.44E-01	LTD<3.44E-01
LA-142	LTD<6.12E-01	LTD<6.12E-01	LTD<6.12E-01
7-05	LTD<2.94E+00	LTD<2.94E+00	LTD<2.94E+00
7-134	LTD<3.41E-01	LTD<3.41E-01	LTD<3.41E-01
7-124	LTD<3.30E-01	LTD<3.30E-01	LTD<3.30E-01
7-14	LTD<8.26E-01	LTD<8.26E-01	LTD<8.26E-01
7-108	9.52E-01 +- 2.57E-01	9.52E-01 +- 2.57E-01	9.52E-01 +- 2.57E-01
7-107	LTD<2.23E-01	LTD<2.23E-01	LTD<2.23E-01
7-41M	LTD<1.12E-01	LTD<1.12E-01	LTD<1.12E-01

*
* GAMMA SPECTRUM ANALYSIS *
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DANESRA SPECTRAN-4T V4.2a

Labot Corporation, Reverse, PA

19-AUG-94 10:27:46

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
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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
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No significant peak detected --

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: C.S.A. WATER SAMPLE
collected on 28-JUL-94 at 14:46:52
Decayed to 0.0000 hours BEFORE the start of COLLECT.

RADIONUCLIDE ANALYSIS REPORT

Location: Activity Concentration in PCI /GRAM

Decay Error corrected Error

18-291	LDD<1.83E-01	LDD<1.83E+00
18-234	LDD<1.63E+00	LDD<1.83E+01
18-230	LDD<1.83E+01	LDD<2.02E-01
18-133	LDD<2.02E+00	LDD<2.42E+00
18-109	LDD<2.42E+00	LDD<1.06E-01
18-57	LDD<1.06E-01	LDD<4.40E-01
18-234	LDD<4.40E-01	LDD<9.89E-01
18-144	LDD<9.89E-01	LDD<1.00E-01
18-99M	LDD<1.00E-01	LDD<1.89E-01
18-141	LDD<1.89E-01	LDD<1.23E-01
18-85M	LDD<1.23E-01	LDD<3.95E+00
18-131M	LDD<3.95E+00	LDD<5.67E-01
18-139	LDD<5.67E-01	LDD<1.15E-01
18-235	LDD<1.82E-01	LDD<3.00E+00
18-226	LDD<3.00E+00	LDD<2.55E-01
18-41	LDD<2.55E-01	LDD<1.76E+00
18-99	LDD<1.76E+00	LDD<1.61E-01
18-132	LDD<1.61E-01	LDD<1.01E+00
18-212	LDD<1.86E-01	LDD<2.49E+00
18-224	LDD<2.49E+00	LDD<1.19E-01
18-135	LDD<1.19E-01	LDD<4.10E-01
18-138	LDD<4.10E-01	LDD<1.78E-01
18-75	LDD<1.78E-01	LDD<6.84E-01
18-239	LDD<6.84E-01	LDD<1.44E-01
18-203	LDD<1.44E-01	LDD<1.07E-01
18-192	LDD<1.07E-01	LDD<8.44E-01
18-51	LDD<8.44E-01	LDD<3.47E+00
18-214	LDD<3.47E-01	LDD<1.87E-01
18-133	LDD<1.87E-01	LDD<1.24E-01
18-131	LDD<1.24E-01	LDD<2.10E-01
18-113	LDD<2.10E-01	LDD<1.94E-01
18-87	LDD<1.94E-01	LDD<4.34E+00
18-211	LDD<4.34E+00	LDD<1.01E-01
18-198	LDD<1.01E-01	LDD<2.92E-01
18-125	LDD<2.92E-01	LDD<2.25E+01
18-212	LDD<2.25E+01	LDD<1.05E+00
18-7	LDD<1.05E+00	LDD<1.54E-01
18-181	LDD<1.54E-01	LDD<1.17E-01
18-103	LDD<1.17E-01	LDD<3.13E+01
18-85	LDD<3.13E-01	LDD<1.37E-01
18-133	LDD<1.00E-01	LDD<4.72E-01
18-140	LDD<4.72E-01	

LTD Quotation at 1.00 Sigma
LTD Confidence Level at 95.0%

Total		0.00E-01 + - 0.00E-01	0.00E-01 + - 0.00E-01
RB-88	LTD<6.09E-01	LTD<6.09E-01	LTD<6.09E-01
MN-56	LTD<4.02E-01	LTD<4.02E-01	LTD<4.02E-01
AL-26	LTD<1.07E-01	LTD<1.07E-01	LTD<1.07E-01
LA-140	LTD<1.03E-01	LTD<1.03E-01	LTD<1.03E-01
TL-209	LTD<3.20E-01	LTD<3.20E-01	LTD<3.20E-01
KR-88	LTD<8.93E-01	LTD<8.93E-01	LTD<8.93E-01
K-40	LTD<2.84E+00	LTD<2.84E+00	LTD<2.84E+00
CS-138	LTD<3.62E-01	LTD<3.62E-01	LTD<3.62E-01
SR-92	LTD<2.24E-01	LTD<2.24E-01	LTD<2.24E-01
NA-24	LTD<1.95E-01	LTD<1.95E-01	LTD<1.95E-01
CD-60	LTD<8.65E-02	LTD<8.65E-02	LTD<8.65E-02
AR-41	LTD<1.95E-01	LTD<1.95E-01	LTD<1.95E-01
NA-22	LTD<1.85E-01	LTD<1.85E-01	LTD<1.85E-01
CL-39	LTD<7.86E-01	LTD<7.86E-01	LTD<7.86E-01
I-135	LTD<6.43E-01	LTD<6.43E-01	LTD<6.43E-01
TA-182	LTD<7.11E-01	LTD<7.11E-01	LTD<7.11E-01
E-46	LTD<2.49E-01	LTD<2.49E-01	LTD<2.49E-01
Z-45	LTD<4.05E-01	LTD<4.05E-01	LTD<4.05E-01
FE-59	LTD<1.32E-01	LTD<1.32E-01	LTD<1.32E-01
RB-89	LTD<1.52E-01	LTD<1.52E-01	LTD<1.52E-01
SR-91	LTD<2.17E-01	LTD<2.17E-01	LTD<2.17E-01
PA-234M	LTD<1.90E+00	LTD<1.90E+00	LTD<1.90E+00
EU-152	LTD<1.61E+00	LTD<1.61E+00	LTD<1.61E+00
AC-228	LTD<2.32E-01	LTD<2.32E-01	LTD<2.32E-01
Y-88	LTD<2.12E-01	LTD<2.12E-01	LTD<2.12E-01
TL-207	LTD<1.57E+02	LTD<1.57E+02	LTD<1.57E+02
I-134	LTD<2.11E-01	LTD<2.11E-01	LTD<2.11E-01
CO-56	LTD<1.79E-01	LTD<1.79E-01	LTD<1.79E-01
MN-54	LTD<1.86E-01	LTD<1.86E-01	LTD<1.86E-01
CE-136	LTD<5.87E-02	LTD<5.87E-02	LTD<5.87E-02
CO-58	LTD<5.84E-02	LTD<5.84E-02	LTD<5.84E-02
TL-210	LTD<1.07E+00	LTD<1.07E+00	LTD<1.07E+00
NR-95	LTD<9.53E-02	LTD<9.53E-02	LTD<9.53E-02
TL-96	LTD<9.88E-02	LTD<9.88E-02	LTD<9.88E-02
TL-97	LTD<2.08E-01	LTD<2.08E-01	LTD<2.08E-01
E-187	LTD<6.10E-01	LTD<6.10E-01	LTD<6.10E-01
I-123	LTD<3.03E-01	LTD<3.03E-01	LTD<3.03E-01
CO-137	LTD<1.55E-01	LTD<1.55E-01	LTD<1.55E-01
NR-97	LTD<1.86E-01	LTD<1.86E-01	LTD<1.86E-01
AB-110M	LTD<1.91E-01	LTD<1.91E-01	LTD<1.91E-01
LA-142	LTD<2.06E-01	LTD<2.06E-01	LTD<2.06E-01
RI-105	LTD<4.45E-01	LTD<4.45E-01	LTD<4.45E-01
LA-105	LTD<2.54E-01	LTD<2.54E-01	LTD<2.54E-01
LA-104	LTD<1.64E-01	LTD<1.64E-01	LTD<1.64E-01
LA-119	LTD<1.41E-01	LTD<1.41E-01	LTD<1.41E-01
LA-108	LTD<1.29E-01	LTD<1.29E-01	LTD<1.29E-01
LA-107	LTD<1.32E-01	LTD<1.32E-01	LTD<1.32E-01
LA-106	LTD<1.32E-01	LTD<1.32E-01	LTD<1.32E-01

 * GAMMA SPECTRUM ANALYSIS *

CANBERRA SPECTRAN-AT V4.2a

Isot Corporation, Severe, PA

18-AUG-94 10:32:02

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
 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

iboc Corporation, Brevard, PA

18-AUG-94 10:32:02

PEAK ANALYSIS

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

NO significant peak detected ---

Error Quotation at 1.00 sigma.
Peak Confidence Level at 95.0%

18-AUG-94 10:32:02

Activity Concentration in PCI /gram

Sample: C.S.A. Leach Test
collected on 28-JUL-94 at 18:38:09
O. 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

Activity Concentration in PCI /gram

Decay
corrected Error
corrected Error

9M-241	LDD<1.37E-01	Measured	9M-241	LDD<1.37E-01	Measured
TH-234	LDD<1.32E+00		TH-234	LDD<1.32E+00	
TH-230	LDD<1.80E+01		TH-230	LDD<1.80E+01	
XE-133	LDD<2.28E-01		XE-133	LDD<2.28E-01	
TD-109	LDD<2.11E+00		TD-109	LDD<2.11E+00	
TD-57	LDD<7.75E-02		TD-57	LDD<7.75E-02	
9A-234	LDD<4.71E-01		9A-234	LDD<4.71E-01	
7E-144	LDD<1.12E+00		7E-144	LDD<1.12E+00	
TC-99M	LDD<1.03E-01		TC-99M	LDD<1.03E-01	
CE-141	LDD<2.23E-01		CE-141	LDD<2.23E-01	
KR-85M	LDD<1.52E-01		KR-85M	LDD<1.52E-01	
XE-131M	LDD<4.98E+00		XE-131M	LDD<4.98E+00	
9A-139	LDD<5.60E-01		9A-139	LDD<5.60E-01	
CE-139	LDD<1.14E-01		CE-139	LDD<1.14E-01	
J-235	LDD<1.84E-01		J-235	LDD<1.84E-01	
9A-226	LDD<2.69E+00		9A-226	LDD<2.69E+00	
3-41	LDD<3.10E-01		3-41	LDD<3.10E-01	
XR-89	LDD<1.62E+00		XR-89	LDD<1.62E+00	
TE-132	LDD<1.47E-01		TE-132	LDD<1.47E-01	
XE-133M	LDD<8.97E-01		XE-133M	LDD<8.97E-01	
9B-212	LDD<2.81E-01		9B-212	LDD<2.81E-01	
9A-224	LDD<2.84E+00		9A-224	LDD<2.84E+00	
XE-135	LDD<1.04E-01		XE-135	LDD<1.04E-01	
XE-138	LDD<2.81E-01		XE-138	LDD<2.81E-01	
3E-75	LDD<1.19E-01		3E-75	LDD<1.19E-01	
9P-239	LDD<4.81E-01		9P-239	LDD<4.81E-01	
4G-203	LDD<1.24E-01		4G-203	LDD<1.24E-01	
1R-192	LDD<1.14E-01		1R-192	LDD<1.14E-01	
2R-51	LDD<1.03E+00		2R-51	LDD<1.03E+00	
91-211	LDD<2.52E+00		91-211	LDD<2.52E+00	
9B-214	LDD<2.60E-01		9B-214	LDD<2.60E-01	
9A-133	LDD<1.44E-01		9A-133	LDD<1.44E-01	
1-131	LDD<1.14E-01		1-131	LDD<1.14E-01	
9M-113	LDD<9.02E-02		9M-113	LDD<9.02E-02	
4R-87	LDD<2.08E-01		4R-87	LDD<2.08E-01	
9B-211	LDD<3.22E+00		9B-211	LDD<3.22E+00	
9U-198	LDD<1.32E-01		9U-198	LDD<1.32E-01	
9B-125	LDD<4.05E-01		9B-125	LDD<4.05E-01	
91-212	LDD<4.40E+01		91-212	LDD<4.40E+01	
3E-7	LDD<6.90E-01		3E-7	LDD<6.90E-01	
4F-181	LDD<1.26E-01		4F-181	LDD<1.26E-01	
91-03	LDD<1.21E-01		91-03	LDD<1.21E-01	
9R-85	LDD<3.70E+01		9R-85	LDD<3.70E+01	
1-133	LDD<1.33E-01		1-133	LDD<1.33E-01	
9A-140	LDD<4.12E-01		9A-140	LDD<4.12E-01	

Y-917	LLD<1.52E-01	LLD<1.52E-01
BC-007	LLD<1.54E-01	LLD<1.54E-01
BC-008	LLD<5.35E-01	LLD<5.35E-01
BF-134	LLD<9.03E-02	LLD<9.03E-02
BC-134	LLD<1.33E-01	LLD<1.33E-01
BC-214	LLD<3.70E-01	LLD<3.70E-01
BU-106	LLD<4.28E-01	LLD<4.28E-01
LA-142	LLD<3.06E-01	LLD<3.06E-01
AB-110M	LLD<1.46E-01	LLD<1.46E-01
BR-97	LLD<1.84E-01	LLD<1.84E-01
CB-177	LLD<2.27E-01	LLD<2.27E-01
BC-172	LLD<1.63E-01	LLD<1.63E-01
W-157	LLD<3.49E-01	LLD<3.49E-01
TR-97	LLD<1.37E-01	LLD<1.37E-01
TR-95	LLD<4.02E-01	LLD<4.02E-01
NR-95	LLD<2.39E-01	LLD<2.39E-01
TL-210	LLD<7.77E-01	LLD<7.77E-01
CB-58	LLD<5.37E-02	LLD<5.37E-02
CB-136	LLD<1.20E-01	LLD<1.20E-01
MN-54	LLD<1.21E-01	LLD<1.21E-01
CD-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-28	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-05	LLD<5.49E-01	LLD<5.49E-01
SL-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
EL-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
CD-60	LLD<1.76E-01	LLD<1.76E-01
NA-24	LLD<3.60E-01	LLD<3.60E-01
GR-92	LLD<9.28E-02	LLD<9.28E-02
CB-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
<hr/>		
Total	0.00E-01	0.00E-01 +- 0.00E-01

Error Quotation at 1.00 Sigma
 Confidence Level at 95.0%

GAMMA SPECTRUM ANALYSIS

SPRINTER SPECTRAN-AT V4.2a

Lab: Corporation, Bayre, PA

24-AUG-94 20:38:05

ANALYSIS PARAMETERS

DA 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 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 0.0000 hours BEFORE the start of COLLECT

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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	172.29	236.30	1.6	40.	84.	15.2	PB-212
2	153.34	334.22	0.9	14.	13.	51.6	NP-239
3	191.55	343.22	2.1	12.	47.	18.3	PB-214
4	1154.00	576.57	1.0	3.	41.	16.7	
5	1205.74	602.37	1.3	3.	45.	16.3	BI-214.SB-124
6	1303.33	700.81	0.9	5.	25.	24.5	AC-228
7	2239.46	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,

Date collected on 28-JUL-74 at 15:04:08

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		Decay	
	measured	Error	corrected	Error
MA-241	LLD<3.20E-01		LLD<3.20E-01	
MA-234	LLD<3.10E+00		LLD<3.10E+00	
MA-230	LLD<3.14E+01		LLD<3.44E+01	
XE-133	LLD<5.33E-01		LLD<5.33E-01	
OD-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	
CE-139	LLD<2.04E-01		LLD<2.04E-01	
RA-226	LLD<4.93E+00		LLD<4.93E+00	
RA-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	
FB-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	
4G-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	
PR-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	
KE-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	

PEAKS NOT USED IN ANALYSIS

Centroid Channel	Energy keV	Net Area counts	Error %	Calculated
548.54	334.22	13.	81.6	2.23E+00
596.55	348.22	47.	18.3	8.13E+00
1154.00	576.53	41.	18.7	1.20E-01
1205.76	602.37	45.	16.3	1.38E-01

 GAMMA SPECTRUM ANALYSIS

CANBERRA SPECTRAN-AT V4.2a

Isot Corporation, Revere, PA

24-AUG-94 20:04:00

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: 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: 00.00%

Decayed to 0.0000 hours BEFORE the start of COLLECT

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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Background 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	495.95	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%

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 L Y S I S R E P O R T

Isotope	Activity Concentration in PCI /GRAM			
	Measured	Error	Decay corrected	Error
CM-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	
CO-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	
I-139	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	
MG-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	
PO-103	LLD<1.47E-01		LLD<1.47E-01	
CO-35	LLD<2.69E+01		LLD<2.69E+01	
GR-85	LLD<1.18E-01		LLD<1.18E-01	
I-133	LLD<1.86E-01		LLD<1.86E-01	

BA-127	LLD<5.11E-01	LLD<5.11E-01
CA-114	LLD<1.33E-01	LLD<1.33E-01
DA-107	LLD<1.30E-01	LLD<1.30E-01
EA-202	LLD<6.70E-01	LLD<6.70E-01
FA-114	LLD<5.35E-01	LLD<5.35E-01
GA-124	LLD<2.14E-01	LLD<2.14E-01
HA-134	LLD<2.28E-01	LLD<2.28E-01
IA-106	LLD<1.63E+00	LLD<1.63E+00
JA-142	LLD<2.34E-01	LLD<2.34E-01
KA-110M	LLD<2.24E-01	LLD<2.24E-01
LA-87	LLD<2.21E-01	LLD<2.21E-01
MA-137	LLD<1.16E-01	LLD<1.16E-01
NA-132	LLD<1.89E-01	LLD<1.89E-01
OA-87	LLD<5.65E-01	LLD<5.65E-01
PA-97	LLD<1.55E-01	LLD<1.55E-01
QA-95	LLD<3.46E-01	LLD<3.46E-01
RA-95	LLD<1.61E-01	LLD<1.61E-01
TA-210	LLD<9.78E-01	LLD<9.78E-01
UB-58	LLD<1.03E-01	LLD<1.03E-01
US-136	LLD<1.04E-01	LLD<1.04E-01
VN-54	LLD<2.22E-01	LLD<2.22E-01
WD-56	LLD<1.92E-01	LLD<1.92E-01
Y-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-5	LLD<4.68E-01	LLD<4.68E-01
SD-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
CD-60	LLD<1.24E-01	LLD<1.24E-01
NA-24	LLD<1.55E-01	LLD<1.55E-01
BR-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
 LL Confidence Level at 95.0%

RESULTS - SEC IN ANALYSIS

Channel	Energy keV	Net Area Counts	Errors %	Gammae/sec
13.98	576.47	13.	41.3	3.83E+00
1405.70	602.34	22.	22.3	4.86E+00

GAMMA SPECTRUM ANALYSIS

CANBERRA SPECTRAN-AT V4.2a

Racal Corporation, Revue, PA

24-AUG-94 20:11:31

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: 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

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

PX	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	472.14	236.22	1.5	42.	147.	11.7	PB-212
2	669.46	334.69	0.9	13.	28.	26.2	NP-239
3	495.79	347.82	1.1	15.	34.	24.9	PB-214
4	916.47	457.96	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

Sample: PARKING AREA, PIT 3,

Collected on 28-JUL-94 at 15:59:28

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

Sample	Activity Concentration in POC /GRAM			
	Measured	Error	Decay corrected	Error
BY-741	LLD<2.92E-01		LLD<2.92E-01	
TH-134	LLD<3.10E+00		LLD<3.10E+00	
BY-730	LLD<3.04E+01		LLD<3.04E+01	
YE-133	LLD<4.62E-01		LLD<4.62E-01	
CO-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	
PA-226	LLD<4.39E+00		LLD<4.39E+00	
BA-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	
PA-224	LLD<9.61E+00		LLD<9.61E+00	
YE-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	
WG-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	
91-212	LLD<4.99E+01		LLD<4.99E+01	
BE-7	LLD<1.65E+00		LLD<1.65E+00	
PO-181	LLD<1.82E-01		LLD<1.82E-01	
RS-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	

9-140	LLD<7.69E-01		LLD<7.69E-01
9-141	LLD<1.91E-01		LLD<1.91E-01
9-207	LLD<1.99E-01		LLD<1.99E-01
9-208	LLD<8.04E-01		LLD<8.04E-01
9-114	LLD<7.69E-01		LLD<7.69E-01
9-134	LLD<3.07E-01		LLD<3.07E-01
9B-134	LLD<2.98E-01		LLD<2.98E-01
9D-106	LLD<1.84E+00		LLD<1.84E+00
9-142	LLD<3.36E-01		LLD<3.36E-01
9B-104	LLD<2.64E-01		LLD<2.64E-01
9-137	LLD<2.69E-01		LLD<2.69E-01
9B-137	LLD<2.55E-01		LLD<2.55E-01
9-132	LLD<2.71E-01		LLD<2.71E-01
9-127	LLD<8.94E-01		LLD<8.94E-01
9C-97	LLD<2.51E-01		LLD<2.51E-01
9B-95	LLD<4.13E-01		LLD<4.13E-01
9B-95	LLD<2.55E-01		LLD<2.55E-01
9L-110	LLD<1.15E+00		LLD<1.15E+00
9B-134	LLD<2.18E-01		LLD<2.18E-01
9B-136	LLD<2.17E-01		LLD<2.17E-01
9B-54	LLD<3.19E-01		LLD<3.19E-01
9C-56	LLD<2.77E-01		LLD<2.77E-01
9-134	LLD<3.37E-01		LLD<3.37E-01
9L-207	LLD<2.70E+02		LLD<2.70E+02
9-28	LLD<3.66E-01		LLD<3.66E-01
9C-228	8.43E-01 +- 2.26E-01		8.43E-01 +- 2.26E-01
9U-152	LLD<1.65E+00		LLD<1.65E+00
9A-234M	LLD<3.11E+00		LLD<3.11E+00
9R-91	LLD<7.45E-01		LLD<7.45E-01
9B-89	LLD<6.36E-01		LLD<6.36E-01
9-59	LLD<3.52E-01		LLD<3.52E-01
9N-65	LLD<6.31E-01		LLD<6.31E-01
9C-46	LLD<3.53E-01		LLD<3.53E-01
9A-182	LLD<9.26E-01		LLD<9.26E-01
9-135	LLD<9.64E-01		LLD<9.64E-01
9L-39	LLD<6.82E-01		LLD<6.82E-01
9A-22	LLD<1.93E-01		LLD<1.93E-01
9R-41	LLD<3.60E-01		LLD<3.60E-01
9C-60	LLD<2.65E-01		LLD<2.65E-01
9A-24	LLD<2.56E-01		LLD<2.56E-01
9B-92	LLD<2.61E-01		LLD<2.61E-01
9B-138	LLD<2.16E-01		LLD<2.16E-01
9-40	2.13E+01 +- 2.02E+00		2.13E+01 +- 2.02E+00
9R-88	LLD<1.18E+00		LLD<1.18E+00
9L-209	LLD<6.58E-01		LLD<6.58E-01
9A-140	LLD<2.29E-01		LLD<2.29E-01
9L-26	LLD<2.38E-01		LLD<2.38E-01
9N-56	LLD<6.54E-01		LLD<6.54E-01
9B-88	LLD<3.64E-01		LLD<3.64E-01
<hr/>			
Total	2.35E+01 +- 2.04E+00		2.35E+01 +- 2.04E+00

For Quotation at 1.00 Sigma
 Confidence Level at 95.0%

PEAKS NOT USED IN ANALYSIS

Peak Label	Energy keV	Net Area counts	Error %	Counts/sec
368.44	334.68	28.	26.2	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
1370.39	649.57	8.	49.5	2.70E+00
1510.62	957.00	15.	39.3	7.12E+00

GAMMA SPECTRUM ANALYSIS

LANDFILL SPECTRAN-AT V4.2a

Sample Description: Reverse, PA

24-AUG-94 10:52:00

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: 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 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: 0.000 seconds

Decayed to 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	Background counts	Net Area counts	Error %	Nuclides
1	477.34	238.87	1.4	40.	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	1718.13	809.11	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%

Sample: P. A. Pit 3. Red Clay

Collected on 29-JUL-94 at 14:17:44

Decayed to 0. days. 0.0000 hours since start of COLLECT.

RADIOISOTOPE ANALYSIS REPORT

Activity Concentration in PDI (dpm/g)

Isotope	Measured	Decay corrected	Error
AM-241	LLD<3.17E-01	LLD<3.17E-01	
AM-241	LLD<3.46E+00	LLD<3.46E+00	
AM-241	LLD<4.12E+01	LLD<4.12E+01	
AM-241	LLD<5.70E-01	LLD<5.70E-01	
AM-241	LLD<4.91E+00	LLD<4.91E+00	
AM-241	LLD<2.43E-01	LLD<2.43E-01	
AM-241	LLD<9.74E-01	LLD<9.74E-01	
AM-241	LLD<1.80E+00	LLD<1.80E+00	
AM-241	LLD<2.10E-01	LLD<2.10E-01	
AM-241	LLD<4.03E-01	LLD<4.03E-01	
AM-241	LLD<3.04E-01	LLD<3.04E-01	
AM-241	LLD<9.69E+00	LLD<9.69E+00	
AM-241	LLD<1.39E+00	LLD<1.39E+00	
AM-241	LLD<2.83E-01	LLD<2.83E-01	
AM-241	LLD<3.47E-01	LLD<3.47E-01	
AM-241	LLD<6.27E+00	LLD<6.27E+00	
AM-241	LLD<5.37E-01	LLD<5.37E-01	
AM-241	LLD<2.46E+00	LLD<2.46E+00	
AM-241	LLD<2.21E-01	LLD<2.21E-01	
AM-241	LLD<1.97E+00	LLD<1.97E+00	
AM-241	LLD<2.23E+00	LLD<2.23E+00	
AM-241	1.39E+00 +- 1.73E-01	1.39E+00 +- 1.73E-01	
AM-241	LLD<4.44E+00	LLD<4.44E+00	
AM-241	LLD<1.85E-01	LLD<1.85E-01	
AM-241	LLD<7.10E-01	LLD<7.10E-01	
AM-241	LLD<3.33E-01	LLD<3.33E-01	
AM-241	LLD<1.39E+00	LLD<1.39E+00	
AM-241	LLD<2.36E-01	LLD<2.36E-01	
AM-241	LLD<2.01E-01	LLD<2.01E-01	
AM-241	LLD<1.69E+00	LLD<1.69E+00	
AM-241	8.94E+00 +- 1.46E+00	8.94E+00 +- 1.46E+00	
AM-241	LLD<6.79E-01	LLD<6.79E-01	
AM-241	LLD<4.92E-01	LLD<4.92E-01	
AM-241	LLD<2.05E-01	LLD<2.05E-01	
AM-241	LLD<2.72E-01	LLD<2.72E-01	
AM-241	LLD<4.26E-01	LLD<4.26E-01	
AM-241	LLD<7.69E+00	LLD<7.69E+00	
AM-241	LLD<1.93E-01	LLD<1.93E-01	
AM-241	LLD<6.05E-01	LLD<6.05E-01	
AM-241	LLD<5.92E+01	LLD<5.92E+01	
AM-241	LLD<1.50E+00	LLD<1.50E+00	
AM-241	LLD<2.21E-01	LLD<2.21E-01	
AM-241	LLD<2.09E-01	LLD<2.09E-01	
AM-241	LLD<5.43E+01	LLD<5.43E+01	
AM-241	LLD<2.37E-01	LLD<2.37E-01	
AM-241	LLD<1.93E-01	LLD<1.93E-01	

[illegible]

128.10	609.11	28.	22.4	3.62E+00
1877.79	969.02	22.	28.6	1.04E+01
1.00	1.00	%		
1.00	1.00	1.00	1.00	1.00

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*           G A M M A   S P E C T R U M   A N A L Y S I S
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CANBERRA SPECTRAN-AT V4.0a

Lab: Corvaton, Revere, PA

29-JUL-94 15:34:11

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 AND
 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
 Dead Time: 600. seconds
 D.B. Time: 00.00 %

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

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

Cobalt Corporation, Reverse, A2

29-JUL-94 15:34:17

P E A K S I G N A L V E I S

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	476.98	238.69	1.9	48.	81.	17.2	PB-212
2	550.31	295.31	1.3	17.	34.	21.5	PB-214
3	703.81	352.03	1.5	4.	40.	13.6	BI-211, PB-214
4	717.17	357.22	0.6	3.	5.	43.5	TC-104
5	1021.81	510.87	1.4	1.	25.	20.8	TL-203, NA-22, ANN-RD
6	1165.14	582.62	1.4	3.	36.	18.3	TL-203
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%

Salem Corporation, Reverse PA

19-JUL-94 15:34:17

Sampler: 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 FOI /ERAM		Decay	
	Measured	Error	corrected	Error
AM-241	LLD<3.44E-01		LLD<3.44E-01	
TH-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	
CD-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	
BE-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	1.03E+00	+- 1.39E-01	1.03E+00	+- 1.39E-01
BA-133	LLD<3.92E-01		LLD<3.92E-01	
I-131	LLD<1.38E-01		LLD<1.38E-01	
SN-113	LLD<1.88E-01		LLD<1.88E-01	
KR-87	LLD<2.69E-01		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	
GR-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	

Error Quotation at 1.00 Sigma
LLD Confidence Level at 95.0%

LA-214	LLD<1.41E-01	1.72E+01	1.70E+00	1.72E+01 +- 1.70E+00
CS-134	LLD<3.66E-01			
LA-142	LLD<3.32E-01			
LA-110M	LLD<1.93E-01			
NE-97	LLD<1.94E-01			
OS-137	LLD<2.23E-01			
1-132	LLD<1.68E-01			
W-187	LLD<3.40E-01			
ZR-97	LLD<1.33E-01			
ZR-98	LLD<4.02E-01			
NR-98	LLD<1.93E-01			
TL-210	LLD<8.82E-01			
CO-58	LLD<1.61E-01			
OS-136	LLD<1.14E-01			
MN-54	LLD<1.65E-01			
CO-56	LLD<1.96E-01			
I-134	LLD<2.09E-01			
TL-207	LLD<1.44E+02			
Y-88	LLD<1.85E-01			
AC-228	LLD<8.55E-01			
EU-152	LLD<1.73E+00			
PA-234M	LLD<2.04E+00			
SR-91	LLD<6.44E-01			
RB-89	LLD<3.44E-01			
FE-59	LLD<2.57E-01			
ZN-65	LLD<5.77E-01			
SC-46	LLD<2.58E-01			
TA-182	LLD<7.22E-01			
I-135	LLD<1.18E+00			
CL-39	LLD<3.86E-01			
NA-22	LLD<3.18E-01			
AR-41	LLD<1.36E-01			
CO-60	LLD<2.55E-01			
NA-24	LLD<2.51E-01			
SR-92	LLD<1.27E-01			
CS-138	LLD<3.65E-01			
K-40	6.68E+00 +- 1.20E+00			
KR-88	LLD<1.57E+00			
TL-209	LLD<4.02E-01			
LA-140	LLD<1.81E-01			
AL-26	LLD<3.73E-01			
MN-56	LLD<7.07E-01			
RB-88	LLD<3.45E-01			
Total	1.72E+01 +- 1.70E+00			

PEAKS NOT USED IN ANALYSIS

Cent. chn channel	Energy keV	Net Area counts	Error %	Gamma/sec
714.19	357.22	8.	43.5	1.50E+00
1021.61	510.87	25.	20.8	6.88E+00
1165.14	582.62	36.	13.3	1.06E+01
1218.54	609.31	52.	14.3	1.59E+01
3526.67	1764.59	1.	40.8	4.34E+00

GAMMA SPECTRUM ANALYSIS

TRANSFORM SPECTRAN-AT V4.2a

Input Description: Reverse, PA

24-AUG-94 10:56:59

ANALYSIS PARAMETERS

ADG Unit Number: 1 / ADG Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 1
 Sampling Rate: 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.

ULD 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: 300 ML MARINELLI
 Sample Size: $7.1690E+02$ gram / Conversion Factor: $1.0000E+00$
 Standard Size: $9.8840E+02$ 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

PK	P E A K C O U N T S					Nuclides
	Channel	Energy keV	FWHM keV	Background counts	Net Area counts	
1	173.74	232.57	1.3	74.	93.	59-212
2	174.08	235.75	1.1	12.	24.	81-211, 83-214
3	1001.07	510.90	0.8	3.	20.	TL-208, NA-22,
						ANN-PD
4	1366.01	583.05	1.5	1.	24.	TL-208
5	2000.53	1460.15	1.1	2.	32.	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Apple, A.C. Pile 1

was collected on 29-JUL-94 at 15:47:00

elapsed to 0. days, 0.0000 hours REEFEE the start of COLLECT.

RADIONUCLIDE ANALYSIS REPORT

Nucleide	Activity Concentration in PCI /gram		Decay	
	Measured	Error	corrected	Error
AC-141	LLD<2.95E-01		LLD<2.95E-01	
TH-234	LLD<2.63E+00		LLD<2.63E+00	
TH-232	LLD<3.32E+01		LLD<3.32E+01	
AS-133	LLD<4.59E-01		LLD<4.59E-01	
CS-137	LLD<4.19E+00		LLD<4.19E+00	
CO-60	LLD<1.73E-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	
TC-99M	LLD<1.67E-01		LLD<1.67E-01	
DE-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	
GE-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	
PO-141	LLD<4.38E-01		LLD<4.38E-01	
K-89	LLD<1.92E+00		LLD<1.92E+00	
TE-132	LLD<2.01E-01		LLD<2.01E-01	
XS-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	
BE-75	LLD<2.83E-01		LLD<2.83E-01	
NP-237	LLD<1.14E+00		LLD<1.14E+00	
PG-203	LLD<1.89E-01		LLD<1.89E-01	
IR-192	LLD<2.01E-01		LLD<2.01E-01	
OS-51	LLD<1.21E+00		LLD<1.21E+00	
BI-211	4.24E+00 +- 1.25E+00		4.24E+00 +- 1.25E+00	
PS-214	LLD<6.03E-01		LLD<6.03E-01	
BA-133	LLD<3.57E-01		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	
PS-211	LLD<6.35E+00		LLD<6.35E+00	
CU-109	LLD<1.61E-01		LLD<1.61E-01	
SS-125	LLD<6.79E-01		LLD<6.79E-01	
SI-212	LLD<4.28E+01		LLD<4.28E+01	
BE-7	LLD<1.50E+00		LLD<1.50E+00	
PF-131	LLD<1.91E-01		LLD<1.91E-01	
PO-103	LLD<1.48E-01		LLD<1.48E-01	
KY-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	

ALL PEAKS USED IN ANALYSIS

Error Quotation at 1.00 Sigma
Confidence Level at 95.0%

Total	1.32E+01 +- 1.87E+00	1.32E+01 +- 1.87E+00
7E-88	LTD<1.72E+00	LTD<1.72E+00
7N-56	LTD<6.25E-01	LTD<6.25E-01
7A-25	LTD<1.66E-01	LTD<1.66E-01
7A-140	LTD<3.06E-01	LTD<3.06E-01
7E-209	LTD<2.25E-01	LTD<2.25E-01
7R-88	LTD<2.25E+00	LTD<2.25E+00
<-40	7.24E+00 +- 1.37E+00	7.24E+00 +- 1.37E+00
7S-138	LTD<4.33E-01	LTD<4.33E-01
7E-92	LTD<1.92E-01	LTD<1.92E-01
7A-24	LTD<1.37E-01	LTD<1.37E-01
7C-60	LTD<3.65E-01	LTD<3.65E-01
7R-41	LTD<3.22E-01	LTD<3.22E-01
7A-22	LTD<2.85E-01	LTD<2.85E-01
7L-59	LTD<3.38E-01	LTD<3.38E-01
7-135	LTD<8.35E-01	LTD<8.35E-01
7A-182	LTD<6.05E-01	LTD<6.05E-01
5C-46	LTD<2.12E-01	LTD<2.12E-01
7-55	LTD<5.26E-01	LTD<5.26E-01
7-59	LTD<3.49E-01	LTD<3.49E-01
7B-89	LTD<5.59E-01	LTD<5.59E-01
5R-91	LTD<4.77E-01	LTD<4.77E-01
PA-234M	LTD<1.09E+00	LTD<1.09E+00
EU-152	LTD<1.78E+00	LTD<1.78E+00
AC-228	LTD<1.06E+00	LTD<1.06E+00
Y-88	LTD<1.97E-01	LTD<1.97E-01
7L-207	LTD<1.71E+02	LTD<1.71E+02
7-134	LTD<2.13E-01	LTD<2.13E-01
7C-56	LTD<2.06E-01	LTD<2.06E-01
7N-54	LTD<1.30E-01	LTD<1.30E-01
7B-126	LTD<1.74E-01	LTD<1.74E-01
7C-88	LTD<1.11E-01	LTD<1.11E-01
7L-110	LTD<1.16E+00	LTD<1.16E+00
7-107	LTD<1.06E-01	LTD<1.06E-01
7A-55	LTD<2.15E-01	LTD<2.15E-01
7-107	LTD<2.19E-01	LTD<2.19E-01
7-157	LTD<5.46E-01	LTD<5.46E-01
7-107	LTD<3.41E-01	LTD<3.41E-01
7-107	LTD<3.59E-01	LTD<3.59E-01
7-107	LTD<2.08E-01	LTD<2.08E-01
7-107	LTD<2.06E-01	LTD<2.06E-01
7-107	LTD<3.42E-01	LTD<3.42E-01
7A-106	LTD<1.55E+00	LTD<1.55E+00
7-107	LTD<6.11E-01	LTD<6.11E-01
7-107	LTD<3.11E-01	LTD<3.11E-01
7-107	LTD<2.48E-01	LTD<2.48E-01
7-107	8.09E-01 +- 1.70E-01	8.09E-01 +- 1.70E-01
7-107	LTD<1.31E-01	LTD<1.31E-01
7-107	LTD<1.94E-01	LTD<1.94E-01
7-107	LTD<4.15E-01	LTD<4.15E-01

GAMMA SPECTRUM ANALYSIS

INTERPRET SPECTRUM-AT V4.2a

File Name: TRENCH.PA

24-AUG-94 11:01:30

ANALYSIS PARAMETERS

Peak Unit Number: 1 / ADC Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 1
 Program 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: 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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1#	477.20	238.80	1.2	38.	72.	20.9	PB-212
2	500.37	295.33	1.4	4.	14.	36.4	PB-214
7C	704.01	352.13	0.9	5.	17.	38.4	BI-211, PB-214
1	1164.10	582.10	0.7	3.	23.	24.6	TL-208

Search 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

Sample: PIA-758700

Date collected on 29-JUL-74 at 15:18:12

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

RADIONUCLIDE ANALYSIS REPORT

Activity Concentration in PCI /GRAM

	Year	Error	Decay corrected	Error
AK-221	LLD<7.13E-01		LLD<7.13E-01	
TH-234	LLD<2.62E+00		LLD<2.62E+00	
TH-230	LLD<2.95E+01		LLD<2.95E+01	
XE-133	LLD<4.10E-01		LLD<4.10E-01	
DD-109	LLD<3.97E+00		LLD<3.97E+00	
DD-57	LLD<1.78E-01		LLD<1.78E-01	
PA-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	
U-141	LLD<4.20E-01		LLD<4.20E-01	
U-238	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	
PS-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	
PS-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	
BN-113	LLD<1.88E-01		LLD<1.88E-01	
KR-87	LLD<2.58E-01		LLD<2.58E-01	
PS-211	LLD<5.81E+00		LLD<5.81E+00	
QU-198	LLD<1.39E-01		LLD<1.39E-01	
EO-125	LLD<4.86E-01		LLD<4.86E-01	
BI-212	LLD<4.13E+01		LLD<4.13E+01	
SE-7	LLD<1.31E+00		LLD<1.31E+00	
SE-151	LLD<1.39E-01		LLD<1.39E-01	
U-103	LLD<1.52E-01		LLD<1.52E-01	
KR-85	LLD<4.37E+01		LLD<4.37E+01	
GR-85	LLD<1.91E-01		LLD<1.91E-01	
I-133	LLD<1.55E-01		LLD<1.55E-01	

Error Quotation at 1.00 Sigma
95.00 Confidence Level at 95.0%

RESULTS OF ANALYSIS

ANALYST	DATE	TIME	ERROR	SAMPLES/SEC
NAME	MM/DD	HH:MM	%	
10.15	583.10	23.	24.4	6.72E+00

THE UNIVERSITY OF CHICAGO

C:\P07-65\EDTRAN-AT V9.2a

^a The number of subjects who were included in each group was 10.

24-AUG-94 11:10:18

SYNOPSIS PARAMETERS

```

ADP Unit Number:      1      /      ADP Unit Number:      1.0
Collector Number:      1      /      Geometry Number:      1
Number of Channels:    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:  $\pm 1.50$  keV.
Error Quotation: 1.00 sigma uncertainty.

```

LLD Calculation Performed.
Multiplet Analysis Performed.

For Output.

Analysis of Spectrum saved in Disk File SDO119
Measured by: KR

```

Sample Description: P.A. TRENCH
Geometry Description: 500 ML MARINELLI
Sample Size: 7.3330E+02 GRAM / Conversion Factor: 1.0000E+00
Standard Size: 9.9840E+02 GRAM
Analysis Library file: ANLO00

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

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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

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Background counts	Net Area counts	Error %	Nuclides
1	177.37	238.89	1.6	34.	84.	14.7	PS-212
2	190.33	295.28	0.9	12.	28.	27.3	PE-214
3	634.10	732.19	1.1	9.	20.	32.6	LA-140
4	574.51	739.09	1.5	12.	24.	29.6	AC-228
5	703.82	852.06	1.1	8.	57.	15.5	SI-211, PE-214
6	1164.43	893.06	1.6	7.	35.	20.4	TL-208
7	1455.15	727.53	0.7	3.	8.	46.6	BI-212
8	1922.53	911.38	1.4	2.	17.	26.8	AC-228

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample ID: 1150151

Collected on 29-JUL-74 at 16:50:51

Age: 0. days, 0.0000 before BEFORE the start of COLLECT.

RADIOISOTOPE ANALYSIS REPORT

Activity Concentration in ROI /GRAM

	Measured	Error	Decay corrected	Error
CM-241	LLD<3.49E-01		LLD<3.49E-01	
CM-274	LLD<2.57E+00		LLD<2.57E+00	
CM-276	LLD<3.29E+01		LLD<3.29E+01	
CF-133	LLD<4.82E-01		LLD<4.82E-01	
CO-109	LLD<3.89E+00		LLD<3.89E+00	
CO-57	LLD<2.03E-01		LLD<2.03E-01	
FA-234	LLD<7.65E-01		LLD<7.65E-01	
GE-144	LLD<1.41E+00		LLD<1.41E+00	
TC-99M	LLD<1.89E-01		LLD<1.89E-01	
GE-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	
BA-226	LLD<5.21E+00		LLD<5.21E+00	
CM-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	
FB-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	
BE-75	LLD<2.61E-01		LLD<2.61E-01	
NP-239	LLD<1.16E+00		LLD<1.16E+00	
H3-203	LLD<1.97E-01		LLD<1.97E-01	
ER-192	LLD<2.10E-01		LLD<2.10E-01	
CR-51	LLD<1.32E+00		LLD<1.32E+00	
SI-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	
CM-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	
PE-211	LLD<5.76E+00		LLD<5.76E+00	
NU-198	LLD<1.10E-01		LLD<1.10E-01	
SD-126	LLD<3.86E-01		LLD<3.86E-01	
BI-212	LLD<4.44E+01		LLD<4.44E+01	
BE-7	LLD<1.35E+00		LLD<1.35E+00	
KR-138	LLD<1.74E-01		LLD<1.74E-01	
KR-103	LLD<1.49E-01		LLD<1.49E-01	
KR-85	LLD<4.36E+01		LLD<4.36E+01	
ER-65	LLD<1.90E-01		LLD<1.90E-01	
I-133	LLD<1.61E-01		LLD<1.61E-01	

AC-228	LLD<1.02E+00	+- 2.73E-01	1.02E+00	+- 2.73E-01
BU-152	LLD<1.57E+00		LLD<1.57E+00	
PA-234M	LLD<2.16E+00		LLD<2.16E+00	
GR-91	LLD<4.63E-01		LLD<4.63E-01	
RR-89	LLD<6.31E-01		LLD<6.31E-01	
TC-59	LLD<3.62E-01		LLD<3.62E-01	
LC-65	LLD<7.78E-01		LLD<7.78E-01	
GC-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	
VR-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	
FL-209	LLD<8.21E-01		LLD<8.21E-01	
LA-140	LLD<2.63E-01		LLD<2.63E-01	
AL-26	LLD<1.63E-01		LLD<1.63E-01	
YN-56	LLD<6.11E-01		LLD<6.11E-01	
RR-88	LLD<1.69E+00		LLD<1.69E+00	
<hr/>				
Total	1.27E+01	+- 1.54E+00	1.27E+01	+- 1.54E+00

Error Quotation at 1.00 Sigma
 Confidence Level at 95.0%

GAMMA SPECTRUM ANALYSIS

TECHNICAL SPECTRAN-AT V4.2a

Dept. Environmental Science, PA

24-AUG-94 11:14:56

ANALYSIS PARAMETERS

ADC Unit Number: 1 / ADC Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 1
 Rearr. Pile: 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

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	677.34	238.74	1.3	108.	119.	17.1	PB-212
2	590.45	223.20	1.5	47.	46.	28.4	PB-214
3	675.53	238.14	1.2	21.	34.	26.8	AC-228
4	706.14	251.72	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	1165.47	582.71	1.3	8.	37.	20.4	TL-208
7	1218.52	508.70	2.1	9.	46.	18.0	XE-135, BI-214
8	1222.84	510.53	1.4	7.	26.	25.4	AC-228
9	2240.45	1119.21	1.5	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%

SECRET - SECURITY INFORMATION

[illegible][illegible][illegible]

Confidence Level at 95.0%
or Glottation at 1.00 Sigma

Total		2.49E+01 +- 1.93E+00	2.49E+01 +- 1.93E+00
48-88	LDD<6.27E-01	LDD<6.27E-01	LDD<6.27E-01
48-88	LDD<4.14E-01	LDD<4.14E-01	LDD<4.14E-01
48-88	LDD<1.10E-01	LDD<1.10E-01	LDD<1.10E-01
48-88	LDD<2.23E-01	LDD<2.23E-01	LDD<2.23E-01
48-88	LDD<3.30E-01	LDD<3.30E-01	LDD<3.30E-01
48-88	LDD<2.09E+00	LDD<2.09E+00	LDD<2.09E+00
48-88	1.42E+01 +- 1.54E+00	1.42E+01 +- 1.54E+00	1.42E+01 +- 1.54E+00
48-88	LDD<3.90E-01	LDD<3.90E-01	LDD<3.90E-01
48-88	LDD<2.36E-01	LDD<2.36E-01	LDD<2.36E-01
48-88	LDD<1.90E-01	LDD<1.90E-01	LDD<1.90E-01
48-88	LDD<2.64E-01	LDD<2.64E-01	LDD<2.64E-01
48-88	LDD<2.52E-01	LDD<2.52E-01	LDD<2.52E-01
48-88	LDD<3.45E-01	LDD<3.45E-01	LDD<3.45E-01
48-88	LDD<7.08E-01	LDD<7.08E-01	LDD<7.08E-01
48-88	LDD<9.80E-01	LDD<9.80E-01	LDD<9.80E-01
48-88	LDD<7.26E-01	LDD<7.26E-01	LDD<7.26E-01
48-88	LDD<2.59E-01	LDD<2.59E-01	LDD<2.59E-01
48-88	LDD<6.38E-01	LDD<6.38E-01	LDD<6.38E-01
48-88	LDD<5.00E-01	LDD<5.00E-01	LDD<5.00E-01
48-88	LDD<4.38E-01	LDD<4.38E-01	LDD<4.38E-01
48-88	LDD<6.79E-01	LDD<6.79E-01	LDD<6.79E-01
48-88	LDD<2.19E+00	LDD<2.19E+00	LDD<2.19E+00
48-88	LDD<1.97E+00	LDD<1.97E+00	LDD<1.97E+00
48-88	1.05E-00 +- 2.68E-01	1.05E-00 +- 2.68E-01	1.05E-00 +- 2.68E-01
48-88	LDD<1.57E-01	LDD<1.57E-01	LDD<1.57E-01
48-88	LDD<1.30E+02	LDD<1.30E+02	LDD<1.30E+02
48-88	LDD<2.17E-01	LDD<2.17E-01	LDD<2.17E-01
48-88	LDD<1.98E-01	LDD<1.98E-01	LDD<1.98E-01
48-88	LDD<1.87E-01	LDD<1.87E-01	LDD<1.87E-01
48-88	LDD<2.31E-01	LDD<2.31E-01	LDD<2.31E-01
48-88	LDD<2.17E-01	LDD<2.17E-01	LDD<2.17E-01
48-88	LDD<1.28E+00	LDD<1.28E+00	LDD<1.28E+00
48-88	LDD<1.01E-01	LDD<1.01E-01	LDD<1.01E-01
48-88	LDD<3.03E-01	LDD<3.03E-01	LDD<3.03E-01
48-88	LDD<2.07E-01	LDD<2.07E-01	LDD<2.07E-01
48-88	LDD<5.12E-01	LDD<5.12E-01	LDD<5.12E-01
48-88	LDD<1.44E-01	LDD<1.44E-01	LDD<1.44E-01
48-88	LDD<1.91E-01	LDD<1.91E-01	LDD<1.91E-01
48-88	LDD<2.10E-01	LDD<2.10E-01	LDD<2.10E-01
48-88	LDD<1.03E-01	LDD<1.03E-01	LDD<1.03E-01
48-88	LDD<1.71E+00	LDD<1.71E+00	LDD<1.71E+00
48-88	LDD<5.97E-01	LDD<5.97E-01	LDD<5.97E-01
48-88	LDD<3.30E-01	LDD<3.30E-01	LDD<3.30E-01
48-88	LDD<1.69E-01	LDD<1.69E-01	LDD<1.69E-01
48-88	8.16E-01 +- 1.67E-01	8.16E-01 +- 1.67E-01	8.16E-01 +- 1.67E-01
48-88	LDD<1.94E-01	LDD<1.94E-01	LDD<1.94E-01
48-88	LDD<1.71E-01	LDD<1.71E-01	LDD<1.71E-01
48-88	LDD<1.11E-01	LDD<1.11E-01	LDD<1.11E-01

RESULTS NOT USED IN ANALYSIS

Channel	Energy keV	Net Area counts	Error %	Gamma/sec
576.53	338.14	34.	26.6	5.71E+00
1119.82	608.70	46.	18.0	1.42E+01
1740.48	1119.21	14.	33.1	7.29E+00

 *
 * GAMMA SPECTRUM ANALYSIS *
 *

COMBEEA SPECTRAN-AT V4.2a

Lab: Correlation, Ravens, PA

18-AUG-94 11:05:30

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
 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: 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

PEAK ANALYSIS

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%

Sample: Water Blank

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		Decay	
	Measured	Error	corrected	Error
AX-241	LLD<1.76E-01		LLD<1.76E-01	
CH-230	LLD<1.64E+00		LLD<1.64E+00	
CH-230	LLD<2.04E+01		LLD<2.04E+01	
XE-133	LLD<2.38E-01		LLD<2.38E-01	
CO-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	
BA-141	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	
AB-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	
CS-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	
AB-214	LLD<3.52E-01		LLD<3.52E-01	
PA-133	LLD<1.85E-01		LLD<1.85E-01	
I-131	LLD<7.51E-02		LLD<7.51E-02	
BN-113	LLD<2.38E-01		LLD<2.38E-01	
KR-87	LLD<2.15E-01		LLD<2.15E-01	
AB-211	LLD<4.09E+00		LLD<4.09E+00	
AU-198	LLD<1.35E-01		LLD<1.35E-01	
GB-126	LLD<3.98E-01		LLD<3.98E-01	
SI-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	
RA-203	LLD<1.37E-01		LLD<1.37E-01	
KA-35	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	
PA-140	LLD<7.47E-01		LLD<7.47E-01	

AB-104	LLD<1.74E-01	LLD<1.74E-01
BI-207	LLD<1.66E-01	LLD<1.66E-01
BI-208	LLD<5.08E-01	LLD<5.08E-01
FE-134	LLD<1.65E-01	LLD<1.65E-01
LA-134	LLD<1.81E-01	LLD<1.81E-01
LA-214	LLD<4.49E-01	LLD<4.49E-01
AL-105	LLD<1.54E+00	LLD<1.54E+00
LA-140	LLD<3.70E-01	LLD<3.70E-01
AB-1104	LLD<1.17E-01	LLD<1.17E-01
NB-97	LLD<1.18E-01	LLD<1.18E-01
OS-137	LLD<5.57E-02	LLD<5.57E-02
CI-132	LLD<5.23E-02	LLD<5.23E-02
W-187	LLD<1.77E-01	LLD<1.77E-01
ZR-97	LLD<1.69E-01	LLD<1.69E-01
IR-95	LLD<2.78E-01	LLD<2.78E-01
NB-95	LLD<1.71E-01	LLD<1.71E-01
AL-210	LLD<1.22E+00	LLD<1.22E+00
CO-58	LLD<1.34E-01	LLD<1.34E-01
OS-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-45	LLD<1.54E-01	LLD<1.54E-01
SC-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
OL-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
BR-92	LLD<1.05E-01	LLD<1.05E-01
OS-138	LLD<3.05E-01	LLD<3.05E-01
C-40	LLD<8.97E-01	LLD<8.97E-01
CR-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
<hr/>		
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
81.30	91.30	11.	34.3	8.93E-01

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-AT V4.2a

Unit: Concentration, Bq/g, PA

18-AUG-94 11:09:24

ANALYSIS PARAMETERS

KCA Unit Number: 1 / AOB 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: $7.1310\text{E}+02$ gram / Conversion Factor: $1.0000\text{E}+00$
Standard Size: $8.8840\text{E}+02$ 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

PEAK ANALYSIS

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	590.09	293.01	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	919.23	409.37	1.4	11.	10.	59.5	CS-138
6	1146.63	582.80	2.2	5.	34.	20.0	TL-208
7	1218.35	608.97	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: Deck Pit #2

Sample 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	
CO-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	
F-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	
GE-75	LLD<3.45E-01		LLD<3.45E-01	
NP-239	LLD<1.60E+00		LLD<1.60E+00	
AG-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	
BN-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	
ES-125	LLD<5.41E-01		LLD<5.41E-01	
BI-212	LLD<6.31E+01		LLD<6.31E+01	
SE-7	LLD<1.86E+00		LLD<1.86E+00	
IF-181	LLD<2.28E-01		LLD<2.28E-01	
W-103	LLD<2.02E-01		LLD<2.02E-01	
CS-135	LLD<6.39E+01		LLD<6.39E+01	
IR-85	LLD<2.79E-01		LLD<2.79E-01	
-133	LLD<2.08E-01		LLD<2.08E-01	
PA-140	LLD<6.89E-01		LLD<6.89E-01	

LA-137	LLD<2.73E-01	LLD<2.73E-01
SA-107	LLD<2.16E-01	LLD<2.16E-01
LA-102	LLD<3.34E-01	LLD<3.34E-01
SA-124	LLD<2.32E-01	LLD<2.32E-01
LA-134	LLD<3.02E-01	LLD<3.02E-01
LA-114	LLD<7.27E-01	LLD<7.27E-01
SA-106	LLD<1.89E+00	LLD<1.89E+00
LA-142	LLD<4.94E-01	LLD<4.94E-01
SA-110M	LLD<3.24E-01	LLD<3.24E-01
SA-87	LLD<3.41E-01	LLD<3.41E-01
SA-137	1.72E-01 +- 7.23E-02	1.72E-01 +- 7.23E-02
LA-132	LLD<2.04E-01	LLD<2.04E-01
SA-127	LLD<8.71E-01	LLD<8.71E-01
SA-97	LLD<2.40E-01	LLD<2.40E-01
SA-95	LLD<3.28E-01	LLD<3.28E-01
SA-95	LLD<2.59E-01	LLD<2.59E-01
LA-210	LLD<1.36E+00	LLD<1.36E+00
CD-58	LLD<1.88E-01	LLD<1.88E-01
SA-136	LLD<1.95E-01	LLD<1.95E-01
MN-54	LLD<2.93E-01	LLD<2.93E-01
CD-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-238	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
LA-5	LLD<8.22E-01	LLD<8.22E-01
SA-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
CU-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
IR-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 %	Sammas/sec
819.23	409.37	10.	59.5	2.02E+00
1156.63	582.80	34.	20.0	1.02E+01
1218.85	608.87	29.	21.5	9.08E+00

GAMMA SPECTRUM ANALYSIS

ROMBERG SPECTRAN-AT V4.2a

Geant Transport by Sovare, PA

24-AUG-94 11:19:50

ANALYSIS PARAMETERS

Fit Number: 1 / ADD 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.

ULD 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

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	477.27	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	1.3	21.	32.	29.7	BI-211, PB-214
4	1166.46	582.71	1.2	6.	42.	17.9	TL-208
5	1313.78	668.83	0.9	6.	36.	19.8	XE-135, BI-214
6	1801.90	910.02	1.4	7.	26.	25.4	AC-228
7	2921.97	1459.96	1.6	0.	76.	11.5	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

0 - Multiplet Analysis converged normally

It is collected on 30-JUL-94 at 07:00:00
 0. days, 0.0000 total, 0.0000 the +44% of COLLECT.

RADIONUCLIDE ANALYSIS REPORT

Relative Concentration in FOI, 1994

Decay Error Checked Error

14-013	LLD<2.47E-01	4.55E+00 +- 1.31E+00	LLD<1.59E+00	4.55E+00 +- 1.31E+00
15-013	LLD<3.13E+00			
16-013	LLD<3.09E-01			
17-013	LLD<4.34E+00			
18-013	LLD<4.34E+00			
19-013	LLD<8.13E-01			
20-013	LLD<4.34E+00			
21-013	LLD<4.34E+00			
22-013	LLD<4.34E+00			
23-013	LLD<4.34E+00			
24-013	LLD<4.34E+00			
25-013	LLD<4.34E+00			
26-013	LLD<4.34E+00			
27-013	LLD<4.34E+00			
28-013	LLD<4.34E+00			
29-013	LLD<4.34E+00			
30-013	LLD<4.34E+00			
31-013	LLD<4.34E+00			
32-013	LLD<4.34E+00			
33-013	LLD<4.34E+00			
34-013	LLD<4.34E+00			
35-013	LLD<4.34E+00			
36-013	LLD<4.34E+00			
37-013	LLD<4.34E+00			
38-013	LLD<4.34E+00			
39-013	LLD<4.34E+00			
40-013	LLD<4.34E+00			
41-013	LLD<4.34E+00			
42-013	LLD<4.34E+00			
43-013	LLD<4.34E+00			
44-013	LLD<4.34E+00			
45-013	LLD<4.34E+00			
46-013	LLD<4.34E+00			
47-013	LLD<4.34E+00			
48-013	LLD<4.34E+00			
49-013	LLD<4.34E+00			
50-013	LLD<4.34E+00			
51-013	LLD<4.34E+00			
52-013	LLD<4.34E+00			
53-013	LLD<4.34E+00			
54-013	LLD<4.34E+00			
55-013	LLD<4.34E+00			
56-013	LLD<4.34E+00			
57-013	LLD<4.34E+00			
58-013	LLD<4.34E+00			
59-013	LLD<4.34E+00			
60-013	LLD<4.34E+00			
61-013	LLD<4.34E+00			
62-013	LLD<4.34E+00			
63-013	LLD<4.34E+00			
64-013	LLD<4.34E+00			
65-013	LLD<4.34E+00			
66-013	LLD<4.34E+00			
67-013	LLD<4.34E+00			
68-013	LLD<4.34E+00			
69-013	LLD<4.34E+00			
70-013	LLD<4.34E+00			
71-013	LLD<4.34E+00			
72-013	LLD<4.34E+00			
73-013	LLD<4.34E+00			
74-013	LLD<4.34E+00			
75-013	LLD<4.34E+00			
76-013	LLD<4.34E+00			
77-013	LLD<4.34E+00			
78-013	LLD<4.34E+00			
79-013	LLD<4.34E+00			
80-013	LLD<4.34E+00			
81-013	LLD<4.34E+00			
82-013	LLD<4.34E+00			
83-013	LLD<4.34E+00			
84-013	LLD<4.34E+00			
85-013	LLD<4.34E+00			
86-013	LLD<4.34E+00			
87-013	LLD<4.34E+00			
88-013	LLD<4.34E+00			
89-013	LLD<4.34E+00			
90-013	LLD<4.34E+00			
91-013	LLD<4.34E+00			
92-013	LLD<4.34E+00			
93-013	LLD<4.34E+00			
94-013	LLD<4.34E+00			
95-013	LLD<4.34E+00			
96-013	LLD<4.34E+00			
97-013	LLD<4.34E+00			
98-013	LLD<4.34E+00			
99-013	LLD<4.34E+00			
100-013	LLD<4.34E+00			

CONFIDENTIAL
Confidence Level at 95.0%

Total		2.09E+01 +- 2.12E+00	2.09E+01 +- 2.12E+00
NP-88	LTD<3.52E-01	LTD<3.52E-01	LTD<3.52E-01
NP-86	LTD<2.32E-01	LTD<2.32E-01	LTD<2.32E-01
NP-26	LTD<6.19E-02	LTD<6.19E-02	LTD<6.19E-02
NP-140	LTD<1.62E-01	LTD<1.62E-01	LTD<1.62E-01
NP-209	LTD<6.64E-01	LTD<6.64E-01	LTD<6.64E-01
NP-88	LTD<1.41E+00	LTD<1.41E+00	LTD<1.41E+00
NP-40	1.41E+01 +- 1.62E+00	1.41E+01 +- 1.62E+00	1.41E+01 +- 1.62E+00
NP-128	LTD<3.58E-01	LTD<3.58E-01	LTD<3.58E-01
NP-92	LTD<1.59E-01	LTD<1.59E-01	LTD<1.59E-01
NP-24	LTD<2.15E-01	LTD<2.15E-01	LTD<2.15E-01
NP-60	LTD<3.01E-01	LTD<3.01E-01	LTD<3.01E-01
NP-41	LTD<2.03E-01	LTD<2.03E-01	LTD<2.03E-01
NP-22	LTD<2.69E-01	LTD<2.69E-01	LTD<2.69E-01
NP-39	LTD<3.18E-01	LTD<3.18E-01	LTD<3.18E-01
NP-125	LTD<8.14E-01	LTD<8.14E-01	LTD<8.14E-01
NP-182	LTD<8.25E-01	LTD<8.25E-01	LTD<8.25E-01
NP-46	LTD<2.71E-01	LTD<2.71E-01	LTD<2.71E-01
NP-65	LTD<7.02E-01	LTD<7.02E-01	LTD<7.02E-01
NP-19	LTD<4.84E-01	LTD<4.84E-01	LTD<4.84E-01
NP-89	LTD<4.45E-01	LTD<4.45E-01	LTD<4.45E-01
NP-91	LTD<5.86E-01	LTD<5.86E-01	LTD<5.86E-01
NP-234M	LTD<2.67E+00	LTD<2.67E+00	LTD<2.67E+00
NP-152	LTD<1.71E+00	LTD<1.71E+00	LTD<1.71E+00
NP-228	1.31E+00 +- 3.33E-01	1.31E+00 +- 3.33E-01	1.31E+00 +- 3.33E-01
NP-88	LTD<2.39E-01	LTD<2.39E-01	LTD<2.39E-01
NP-207	LTD<1.95E+02	LTD<1.95E+02	LTD<1.95E+02
NP-134	LTD<2.38E-01	LTD<2.38E-01	LTD<2.38E-01
NP-56	LTD<2.21E-01	LTD<2.21E-01	LTD<2.21E-01
NP-24	LTD<2.15E-01	LTD<2.15E-01	LTD<2.15E-01
NP-156	LTD<1.53E-01	LTD<1.53E-01	LTD<1.53E-01
NP-18	LTD<2.09E-01	LTD<2.09E-01	LTD<2.09E-01
NP-10	LTD<9.65E-01	LTD<9.65E-01	LTD<9.65E-01
NP-91	LTD<0.14E-01	LTD<0.14E-01	LTD<0.14E-01
NP-57	LTD<4.17E-01	LTD<4.17E-01	LTD<4.17E-01
NP-17	LTD<2.11E-01	LTD<2.11E-01	LTD<2.11E-01
NP-97	LTD<6.16E-01	LTD<6.16E-01	LTD<6.16E-01
NP-102	LTD<1.18E-01	LTD<1.18E-01	LTD<1.18E-01
NP-171	LTD<1.34E-01	LTD<1.34E-01	LTD<1.34E-01
NP-17	LTD<2.63E-01	LTD<2.63E-01	LTD<2.63E-01
NP-106	LTD<3.160E-01	LTD<3.160E-01	LTD<3.160E-01
NP-132	LTD<3.47E-01	LTD<3.47E-01	LTD<3.47E-01
NP-108	LTD<1.39E+00	LTD<1.39E+00	LTD<1.39E+00
NP-215	LTD<6.54E-01	LTD<6.54E-01	LTD<6.54E-01
NP-174	LTD<3.70E-01	LTD<3.70E-01	LTD<3.70E-01
NP-133	LTD<1.74E-01	LTD<1.74E-01	LTD<1.74E-01
NP-109	LTD<7.13E-01	LTD<7.13E-01	LTD<7.13E-01
NP-107	LTD<1.58E-01	LTD<1.58E-01	LTD<1.58E-01
NP-10	LTD<2.04E-01	LTD<2.04E-01	LTD<2.04E-01
NP-10	LTD<5.97E-01	LTD<5.97E-01	LTD<5.97E-01

PEAKS NOT USED IN ANALYSIS

Channel	Energy keV	Net Area counts	Error %	Gammas/sec
576.69	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

DANDERRA SPECTRAN-AT V4.2a

Local Description: Reverse, 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

VCA 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

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	870.50	435.50	1.5	0.	6.	40.8	
5	1166.70	582.90	1.4	3.	32.	19.6	TL-208
6	1216.81	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%

Sample 035-750-1

Sample collected on 22-AUG-94 at 08:17:00

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

RADIONUCLIDE ANALYSIS REPORT

Radionuclide	Activity Concentration in PCI /gram			
	Meas rec	Error	Decay corrected	Error
AA-241	LLD<3.37E-01		LLD<3.37E-01	
TA-234	LLD<3.04E+00		LLD<3.04E+00	
TH-230	LLD<3.73E+01		LLD<3.73E+01	
XE-133	LLD<5.06E-01		LLD<5.06E-01	
CO-139	LLD<4.72E+00		LLD<4.72E+00	
CO-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	
TO-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	
VF-89	LLD<2.19E+00		LLD<2.19E+00	
U-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	
FB-211	LLD<5.47E+00		LLD<5.47E+00	
AU-199	LLD<1.71E-01		LLD<1.71E-01	
BB-125	LLD<5.30E-01		LLD<5.30E-01	
BI-212	LLD<4.49E+01		LLD<4.49E+01	
SE-7	LLD<1.96E+00		LLD<1.96E+00	
HF-181	LLD<2.89E-01		LLD<2.89E-01	
SU-103	LLD<1.68E-01		LLD<1.68E-01	
KR-85	LLD<5.26E+01		LLD<5.26E+01	
PO-210	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	

Results saved in file SD0124
 Error Quotation at 1.00 Sigma
 LLD Confidence Level at 95.0%

Total	1.14E+01	1.14E+01 +- 1.50E+00
8B-28	LLD<1.66E-01	LLD<1.68E+00
4N-56	LLD<5.93E-01	LLD<5.93E-01
9L-26	LLD<1.58E-01	LLD<1.58E-01
LA-140	LLD<1.86E-01	LLD<1.86E-01
TL-209	LLD<5.80E-01	LLD<5.80E-01
XR-58	LLD<1.32E+00	LLD<1.32E+00
X-40	1.04E+01	1.04E+01 +- 1.50E+00
CS-138	LLD<3.41E-01	LLD<3.41E-01
GR-92	LLD<1.49E-01	LLD<1.49E-01
NA-24	LLD<1.60E-01	LLD<1.60E-01
OD-60	LLD<2.06E-01	LLD<2.06E-01
AR-41	LLD<3.06E-01	LLD<3.06E-01
NA-22	LLD<2.42E-01	LLD<2.42E-01
OL-39	LLD<6.15E-01	LLD<6.15E-01
1-135	LLD<1.02E+00	LLD<1.02E+00
1-82	LLD<8.71E-01	LLD<8.71E-01
SC-46	LLD<3.29E-01	LLD<3.29E-01
ZN-65	LLD<7.55E-01	LLD<7.55E-01
FE-59	LLD<6.68E-01	LLD<6.68E-01
RS-89	LLD<4.73E-01	LLD<4.73E-01
SR-91	LLD<7.04E-01	LLD<7.04E-01
FA-234M	LLD<2.03E+00	LLD<2.03E+00
EU-152	LLD<2.81E+00	LLD<2.81E+00
AC-228	LLD<1.01E+00	LLD<1.01E+00
Y-98	LLD<2.62E-01	LLD<2.62E-01
TL-207	LLD<2.16E+02	LLD<2.16E+02
1-134	LLD<1.92E-01	LLD<1.92E-01
OD-96	LLD<2.02E-01	LLD<2.02E-01
MN-54	LLD<2.15E-01	LLD<2.15E-01
CS-136	LLD<2.53E-01	LLD<2.53E-01
CO-58	LLD<2.15E-01	LLD<2.15E-01
TL-210	LLD<1.15E+00	LLD<1.15E+00
NS-95	LLD<2.35E-01	LLD<2.35E-01
ZR-95	LLD<2.87E-01	LLD<2.87E-01
ZR-97	LLD<2.14E-01	LLD<2.14E-01
U-107	LLD<8.10E-01	LLD<8.10E-01
U-132	LLD<2.04E-01	LLD<2.04E-01
NS-127	1.65E-01	1.65E-01 +- 5.34E-02
NS-97	LLD<2.58E-01	LLD<2.58E-01
NS-110M	LLD<2.57E-01	LLD<2.57E-01
U-142	LLD<4.08E-01	LLD<4.08E-01
ON-06	LLD<1.60E+00	LLD<1.60E+00
SI-214	LLD<6.81E-01	LLD<6.81E-01
NS-134	LLD<5.17E-01	LLD<5.17E-01
NS-134	LLD<1.70E-01	LLD<1.70E-01
U-108	LLD<7.50E-01	LLD<7.50E-01
SI-207	LLD<1.01E-01	LLD<1.01E-01

Net Area	Energy	Counts	%	Gamma/Sec
1213.81	608.92	21.	28.4	6.39E+00
1166.70	582.90	32.	19.6	9.45E+00
779.50	439.50	6.	40.8	1.34E+00
76.55	338.19	21.	35.2	3.56E+00
790.82	295.40	25.	29.8	4.00E+00

GAMMA SPECTROMETER ANALYSIS

ANALYST: J. J. TRAFLET-AT V4.2a

ANALYST: J. J. TRAFLET-AT V4.2a

24-AUG-94 11:30:04

ANALYSIS PARAMETERS

ASD Unit Number: 1.0
 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.

Output:

Analysis of Spectrum saved in Disk File SD0125
 Measured by: kt

Sample Description: 4%5 Pit
 Geometry Description: 500 ML MARINELLI
 Sample Size: 7.4940×10^2 gram / Conversion Factor: 1.0000×10^0
 Standard Size: 8.8840×10^2 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: 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

PEAK ANALYSIS

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	704.55	352.17	1.8	12.	77.	13.3	BI-211, PB-214
5	1021.77	510.53	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	1460.35	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

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The *Agrobacterium* strains were grown in YEA medium for 24 h at 28 °C. The cell concentration was adjusted to 1.0 × 10⁸ cells/ml. The cells were then mixed with the plant tissue and the transformation efficiency was determined. The results are shown as the mean ± SD of three independent experiments. The asterisk indicates a significant difference (p < 0.05) between the control and the treated groups.

[illegible]

Peak ID	Energy	Net Area	Error	Dammas/sec	%	Counts	Key
1219.05	338.47	609.04	38.	18.6	1.17E+01	5.99E+00	
1277.11	338.47	609.04	38.	18.6	1.17E+01	5.99E+00	

PEAKS NOT USED IN ANALYSIS