Westinghouse
Hanford Company

P.O. Box 1970 Richland, WA 99352

WHC-SD-WM-DP-025
Addendum 17 Rev 0

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18 of 18

222-S Analytical Laboratory

Project: 242-A EVAPORATOR FEED CHARACTERIZATION

Tank: 106AW

Customer Id. Number: 791 COMP

Report Revision: 0

Date Printed: June 4, 1992

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S I G N A T U R E P A G E

I have reviewed the Inorganic and Radiochemistry results reported in this data package (when applicable). The results meet the requirements of "242-A Evaporator Feed Characterization Project - Statement of Work" - WHC-SOW-91-0002. This data is an accurate representation of the data generated for the requested laboratory analyses performed.

J. H. Tillman
242-A Evaporator Project Manager

7/29/92
Date

I have reviewed the compiled report and certify that this data package meets the document standards of the RCRA Data Packaging Procedure LO-150-151. This data package is complete and contains the data generated from the requested laboratory analysis performed on this sample.

L. R. Webb
Records Management Specialist
Data Coordinator

11/30/92
Date

I have reviewed this report and certify that this data package meets the requirements of "Quality Assurance Project Plan for the Chemical Analysis of Highly Radioactive Samples in Support of Environmental Activities on the Hanford Site" - WHC-SD-CP-QAPP-002, unless superseded by the Statement of Work or Waste Characterization Plan. This data package is a complete and accurate representation of the data generated from the requested laboratory analyses performed on this sample based on the QA Review Process. This Data Package has been reviewed by the Laboratory QA Officer or designee.

L. P. Markel
Laboratory Q.A. Officer

9/15/92
Date

The data contained in this hardcopy data package has been approved and authorized for release by the Laboratory Manager or Manager's designee as verified by the following signature.

M. A. Bell
Manager
Processing and Analytical Laboratories

9-16-92
Date

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NARRATIVE

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242-EVAPORATOR FEED CHARACTERIZATION

INORGANIC CASE NARRATIVE

Introduction

The analysis of samples in support of the 242-A Evaporator Feed Characterization Project for Fiscal Year 1991, was performed by the 222-S Laboratory during the last quarter of 1991 and completed during the first quarter of 1992. Samples received and analyzed for the inorganic and conventional parameters were performed using methods specified in the Statement of Work (SOW), WHC-SOW-91-0002 Westinghouse Hanford Company, 242-A Evaporator Feed Characterization Project Fiscal Year 1991, September 1991.

Samples submitted to the laboratory were identified as:

1. TK-102-AW (referred to as 102AW in the remainder of this report) the feed tank prior to the evaporator.

2. TK-106-AW (referred to as 106AW in the remainder of this report) one of the candidate feed tanks into 102AW.

3. TK-103-AP (referred to as 103AP in the remainder of this report) the other candidate feed tank into 102AW.

The inorganic constituents requested for analysis on the three tanks were divided into the following categories; metals by Inductively Coupled Plasma (ICP), metals by Atomic Absorption Spectroscopy (AAS), and conventional parameters by specified methods. The results were obtained using approved methods as specified in Table I of the SOW. Quality analyses, including number and frequency, were performed in accordance to guidance found in Table 2 of the SOW. The parameters analyzed for from the three tanks are:

Metals by ICP

Silver	Ag
Aluminum	Al
Barium	Ba
Cadmium	Cd
Chromium	Cr
Iron	Fe
Magnesium	Mg
Manganese	Mn
Sodium	Na
Lead	Pb
Zinc	Zn

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Metals (AAS)

Arsenic	As
Selenium	Se
Mercury	Hg

Conventionals (IC)

Fluoride	F
Chloride	Cl
Nitrite	NO2
Nitrate	NO3
Phosphate	PO4
Sulfate	SO4

Conventional (Specified Methods)

Total Organic Carbon	TOC
Total Inorganic Carbon	TIC
Cyanide	CN
Hydroxide	OH
Ph	
Specific Gravity	SpG
Differential Scanning Calorimetry	DSC

The analysis of the samples for Cyanide, Total Ammonia, Total Inorganic Carbon (TIC), Specific Gravity, and Differential Scanning Calorimetry (DSC) were performed using methods traceable to ASTM or EPA. All other analytes were determined based on EPA SW-846 methods or current approved WHC golden rod procedures.

The Quality Objectives and requirements for this work effort were set to achieve the highest quality data. Factors relevant to sample matrix and the applicability of the methods to these complex matrices of samples from the evaporator candidate and feed tanks may have lead to biased results for some analytes of concern. The Quality Objectives were:

1. Matrix Spike and Matrix Spike Duplicate per batch or for no more than 20 samples which ever is less. The calculated Percent Recovery for these analyses to be within 75 to 125% and the Relative Percent Difference (RPD) must not exceed ± 20%.

2. One sample in twenty was to be analyzed in duplicate where specified. The duplicate results must agree with an RPD of ± 20%.

3. A blank must be run for each batch or for every 20 samples.

John H. Tillman 9/5/92

J. H. Tillman, Manager
Inorganic Chemistry PAL

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242-EVAPORATOR FEED CHARACTERIZATION

INORGANICS CASE NARRATIVE

Problems encountered:

Samples from the two candidate and one feed tank into the evaporator were received into the 222-S laboratory during the laboratory's transition period from process to environmental analysis. This transition period signaled a change in the analytical protocols required to meet different, and in some cases, more stringent conditions. Most of the problems encountered during this work effort can be attributed to the response of the laboratory to these changing requirements. Nevertheless, the data generated for these samples was obtained using the best available laboratory practice at the time of sample analysis. The following problems were observed to have occurred throughout the samples submitted from tanks 102AW, 103AP, and 106AW:

(1) In a few cases, the analytical data cards are not corrected with one line, an initial and a date. Also, due to insufficient training, the chemists signed the analytical data card in the incorrect location. Though the analytical data cards were signed by the cognizant chemists, they were often signed in the inappropriate location on the card. This indicated the need for appropriate training to address this problem. This training effort has begun.

The Extension "1621" on the data cards represent an old extension which specifically denotes "TOC" analysis.

(2) Instrument Detection Limits (IDL). Detection limits for the parameters determined were obtained using the method prescribed by the US EPA. The instrument detection limits for the metals determined by Inductively Coupled Plasma (ICP), Atomic Absorption (AA), Ion Chromatograph (IC) and classical methods are obtained from an aqueous matrix. The instrument detection limits for the analytes on actual evaporator feed or candidate tanks would probably be higher due to matrix efforts. The standards used to prepare the solutions for the detection limit determinations were obtained from bonifide and reliable sources. The procedure basically requires the analysis of seven replicates of the analyte at a concentration two times the noise level for the instrument. Following this protocol, the instrument detection limits were met or exceeded when compared to the IDC's in the Request for Special Analyses (RSA). Typical instrument detection limits obtained during this work effort are listed below:

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Analyte	Detection Limit (ppm) Required	Actual
Arsenic (As)	5	.005
Cyanide (CN)	.10	.010
Mercury (Hg)	.20	.002
Ammonia (NH4)	500	.100
Hydroxide (OH-)	1700	17.000
Selenium (Se)	1	.005
Total Inorganic Carbon (TIC)	5000	5.000
Total Organic Carbon (TOC)	500	5.500
Fluoride (F)	6000	.090
Nitrate (NO3)	5000	.240
Chloride (Cl)	4000	.040
Nitrite (NO2)	5000	.180
Phosphate (PO4)	10000	.130
Sulfate (SO4)	10000	.130
Aluminum (Al)	50	.075
Barium (Ba)	2	.003
Cadmium (Cd)	1	.004
Chromium (Cr)	5	.004
Iron (Fe)	10	.007
Lead (Pb)	5	.030
Magnesium (Mg)	1	.0001
Manganese (Mn)	2	.001
Silver (Ag)	5	.018
Sodium (Na)	60	.048
Zinc (Zn)	2	.002

Detection limits for the analytes required in the Statement of Work are listed for each set of samples. These instrument detection limits vary according to the analyte and instrument and were generated in accordance with the Request for Special Analysis (RSA), the internal memo, "Recommendations for Tank Farm Waste Analysis" by T. D. Blankenship, dated November 26, 1990, and references the document, "Detection Limit Package, Appendix B" for the 241-U-110 Single Shell Tank Waste Characterization data package, dated August 9, 1991. The detection limit study performed for Core 5 followed recommended EPA protocol.

J. H. Tillman 9/5/92

J. H. Tillman, Manager
Inorganic Chemistry PAL

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Detection Limits of Radionuclides

Listed below are the detection limits for indicated radionuclides for sample R348.

Radionuclide	DL uCi/L
C-14	1.1×10^{-2}
Pu-239	7.6×10^{-3}
Am-241	2.0×10^{-2}
Tc-99	3.0×10^{-2}
I-129	8.2×10^{-2}
Sr-90	4.4×10^{-3}
Se-79	5.6×10^{-3}
H-3	1.1×10^{-2}
Total U	1.1×10^{-4} g/L
Co-60	$5.0 \times 10^{+0}$
Cs-134	$6.0 \times 10^{+0}$
Cs-137	$9.0 \times 10^{+0}$
Ce-144	$4.5 \times 10^{+1}$
Eu-154	$1.8 \times 10^{+1}$
Eu-155	$1.1 \times 10^{+1}$
Nb-94	$5.0 \times 10^{+0}$
Ra-226*	$1.8 \times 10^{+1}$
Ru-106	$1.1 \times 10^{+2}$
Sn-113	$6.0 \times 10^{+0}$

*Based on the gamma peak of daughter Bi-204

The gamma limits are based on the background spectrum of the Ge detector which was used for counting of the above mentioned sample. The data reduction of the background gamma spectrum was done under the same parameters (sample size, sample geometry, and counting time) as used for the sample. Note that the limits will change in the sample depending on the presence of other radionuclides, their gamma-ray energies, intensities, and their levels of activity.

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242-EVAPORATOR FEED CHARACTERIZATION

INORGANICS CASE NARRATIVE

TANK: 106AW

Problems encountered:

The samples taken from the 106AW tank appeared to be aqueous with no visible organic layout. These samples also had a yellow tint. The laboratory check standards for the specific batch of samples were within the control limits for the Ion Chromatographic analytes and the conventional tests run. The Inductively Coupled Plasma (ICP) metals which rendered questionable results in the check standards were lead, magnesium and zinc. The results for these metals were outside of the control limits of 100% ± 20%:

Analyte	% Recovery	
	Initial Check Standard	Ending Check Standard
Lead (Pb)	120.0	113.6
Magnesium (Mg)	568.0	467.2
Zinc (Zn)	230.0	243.3

The spike recovery value for aluminum in sample R318 implies a chelation matrix effect that resulted in an extremely low recovery value of 26%. This effect was also observed in the case of total chromium, where the recovery value was 18.1 %. Magnesium was the worst offender with a 0% recovery value. The less than values observed throughout the metals analysis for these samples is an excellent illustration of the elevated detection limits anticipated due to matrix efforts. Though assumptions can be made from the data obtained, it must be noted that the possible effects of processes such as chelation, complexation and chemical reaction may have had a significant effect on the results of the analytes of interest.

Reference is directed to the Internal Memos dated September 9 and 10, 1991, describing "Shipping Anomalies Noted in Samples from TK-106-AW". The recommendations presented appear to have been incorporated into the system to ensure sample integrity and minimal exposure to the laboratory staff.

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Procedure LA-365-132 was used for the analysis of Se-79, a radio nuclide. Procedure LA-365-131 is the atomic absorption method for total selenium, which was not requested for this sample. No spike was run for Tc-99. The percent recovery for uranium was outside the control limits. No rerun was performed on this sample for no apparent reason.

Data Packaging did not receive a printout for Selenium 79 Analysis Sample No. R348-5789. We contacted Stan Catlow, the chemist, and were informed that the missing information is not retrievable.

Method LA-220-102 was approved according to the SOW but method LA-220-101 was used for the analysis of samples for Sr 90. Method LA-220-101 is specific to liquid samples and was applicable to the samples within this project. Method LA-220-102 is specific to Sr 90 analysis of solid samples. Both methods should have been identified and approved for use in the analysis of these samples.

John H. Tillman 9/15/92

J. H. Tillman, Manager
Inorganic Chemistry PAL

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Internal
Memo

From: Office of Sample Management 16500-90-0
Phone: 3-3869 MO-346/200W T6-08
Date: November 26, 1990
Subject: RECOMMENDATIONS FOR TANK FARM WASTE ANALYSES

To: T. D. Blankenship R1-62

cc: J. D. Briggs T6-14
J. A. Eacker R1-51
D. L. Halgren R1-51
J. H. Kessner T6-08
E. J. Kosiancic SO-61
C. R. Stroup T6-07
RLW File/LB

Reference: Internal Memo, T. D. Blankenship to E. J. Kosiancic, "Tank Farm Waste Analysis Requirements," dated September 10, 1990.

The referenced Internal Memo requests information regarding laboratory analytical capacity for a variety of analytes to support Tank Farm and Evaporator operations. Specific comments and suggestions for each have been prepared along with information on suggested minimum quantitation limits (MQLs) for the needed analyses and recommended reporting formats. With the exception of Nb^{94}, all requested analyses are currently performed on-site. Laboratory capacity exists to support these programs if sufficient prescheduling of activities is done to coordinate with times of high sample throughput in the laboratory (e.g., single shell tank sampling).

The discussions that follow are based on the assumption that the laboratory will be performing "standard" regulatory type analysis. Analysis MQLs are based on proven laboratory experience, turnaround times are based on requirements in the Tri-Party agreement, and reporting/validation formats based on WHC-CM-5-3, Section 2.0, "Data Validation for RCRA Analyses." This information is summarized in the following attached tables:

Table 1	MQLs for Inorganic Analysis
Table 2	MQLs for Radionuclide Analysis
Table 3	MQLs for Organic Analysis (these are CLP requirements but will form the basis for all organic analysis)
Table 4	Sample Turnaround Times
Table 5	Result Reporting/Validation
Table 6	Validation Criteria - Generic Data Quality Objectives (DQOs)

If specific needs different from this standard are required for a given program, these needs must be defined in the program's Waste Analysis Plan (WAP) or equivalent documentation and negotiated with the laboratory to assur

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compliance. While it is expected that in most cases specific needs will be more stringent, if less stringent requirements are appropriate, these should also be defined in the WAP. This could significantly reduce analytical costs and turnaround times.

Characterization of Waste Streams Discharged to Double Shell Tanks (DSTs):

These streams are from ongoing operations of the site and will need analysis for two requirements; verification of compliance to tank farm storage specifications (processing parameters), and determination of composition for regulatory based designation of the waste (hazardous waste designation). Processing parameter based analysis will be equivalent to current practice and should be predefined using laboratory "routine set" analysis. The analysis will be performed under the quality assurance requirements of NQA-1 with typical result turnarounds of 1 to 5 days. Results will be available via the laboratory reporting system (LCCS).

Analysis of the samples to meet the needs for hazardous waste designation will require more stringent quality assurance than for processing parameters. Those components that fall under both needs will likely be required to be analyzed by both protocols. Unfortunately, analysis turnaround times for designation will likely exceed needs for normal processing parameters. If processing parameter analysis results show a component to significantly exceed a hazardous waste designation limit (e.g., a sample is sufficiently caustic to qualify as a extremely hazardous waste based on corrosiveness) reanalysis of the sample under the more stringent protocols would not be necessary. In no case will analysis performed to processing parameter protocols be suitable for designation as an intermediate level or as nonhazardous waste.

DST Characterization Analysis:

All of these analyses will be required to be performed to hazardous waste designation protocols. Currently, no analytical capacity exists to perform Nb^{94} analysis. This long lived ($2x10^4$ y) beta emitter is not expected to be present in significant quantities and will require development efforts to analyze for. Addition of total beta (TB) analysis to the analysis request should allow for screening for significant levels of unaccounted for beta activity and assessment of the needs for additional specific beta emitting radionuclide component quantification.

Analysis for Pu^{238} at the 222-S Laboratory is complicated by the presence of this isotope in the spike (Pu^{236}) added to the analysis to allow correction for overall yield in the procedure. For most expected samples, Pu^{238} activity will be only a small fraction of the $Pu^{239/240}$ activity and may be approximated using isotopic ratios based on historical irradiated uranium processing.

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Samples having greater than normal Pu^{238} (e.g., associated with previous irradiated thorium processing) activity will be detectable using the current procedures. In these cases, Pu^{238} activity can be quantified either using a special analysis or through determination of isotopic ratios based on mass spectral analysis.

Analysis of Samples for the 242-A Evaporator:

All analyses identified in the Internal Memo appear to be for hazardous waste designation needs. It should be noted that analysis of the vent stack will require the installation of specialized gas sampling equipment.

General Comments:

Analysis of two major hazardous waste designation groups were not requested for any of the streams; semivolatile organics and Toxicity Characteristic Leaching Procedure (TCLP). If these analyses have not been assessed for inclusion in the requested analysis, it is recommended that they are reviewed for inclusion.

The current schedule for implementation of organic analysis capacity at 222-S Laboratory is for early in 1991, most probably after March 1, 1991. Until capacity becomes available at 222-S Laboratory, organic analyses (VOA and TOX) will be performed by the Pacific Northwest Laboratories (PNL). This will require transhipping of samples sent to 222-S Laboratory, but should not seriously affect result turnaround or quality.

Estimated cost information for the requested analyses is shown in Table 7. These costs are based on analysis of organic components at PNL. When organic capability is available at 222-S Laboratory, costs will be reduced slightly. Addition of semivolatile organic analysis to the lists would increase costs $2000 per analysis. Addition of TCLP to the list would increase analysis costs $1500 for those samples containing greater than 1% solids. For liquid only samples, no additional preparation is required for TCLP and the analytes of concern are already included in the analysis requests.

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16500-90-090

If you need any additional information or have any questions, please call me on 3-3869.

Richard L. Weiss

R. L. Weiss, Principal Scientist
Office of Sample Management

jmd

Attachments - 7

CONCURRENCE:

Curtis R. Stroup Date 11/28/90
C. R. Stroup, Manager
Analytical Laboratories

J. D. Briggs for Date 11/29/90
J. D. Briggs, Manager
222-S Analytical Laboratory Complex

TABLE 1
RECOMMENDED ANALYSIS MINIMUM QUANTITATION LEVELS for TANK FARM WASTE ANALYSES

Analyte	High Salt Liquid or Solid/Slurry	Low Salt Liquid	Analyte	High Salt Liquid or Solid/Slurry	Low Salt Liquid
Analyzed by Inductively Coupled Plasma Spectroscopy (ICP)					
Al	50	0.5	As	20	0.2
Ba	2	0.02	Bi	100	0.5
B	20	0.05	Cd	2	0.02
Ca	0.2	0.002	Ce	100	1
Cr	5	0.05	Co	20	0.2
Cu	20	0.2	Eu	2	0.02
Fe	10	0.01	La	20	0.2
Pb	30	0.3	Li	3	0.03
Mg	0.1	0.001	Mn	2	0.02
Hg	5	0.05	Mo	5	0.05
Nd	250	2.5	Ni	20	0.2
P	50	0.5	K	250	2.5
Sm	200	2	Se	100	1
Si	100	0.5	Ag	30	0.3
Na	60	0.6	Sr	2	0.02
S	60	0.6	Ta	50	0.5
Th	20	0.2	Sn	2	0.02
Ti	30	0.06	W	200	0.5
U	1500	15	Zn	2	0.02
Zr	80	0.1			
Analyzed by Specific Atomic Absorption Techniques					
As	5	0.05	Hg	3	0.03
Se	5	0.05			
Anion Analysis by DIONEX					
F	6000	10	Cl	4000	5
NO_3	20000	10	NO_2	20000	10
PO_4	10000	10	SO_4	10000	10
Specific Analysis					
CO_3	5000	50	TOC(carbon)	5000	50
CN	0.1	0.01	NH_4	5000	50
U	100	1	TOX(chlorine)	100	10
OH	0.2	0.002	DSC	*	*

Values for solids are as ug/g
Values for liquids are as ug/ml
*DSC will be used to screen for the presence of exothermic reactions. Specific quantitation limits are not required for this screening

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TABLE 2
RECOMMENDED ANALYSIS MINIMUM QUANTITATION LEVELS for TANK FARM WASTE ANALYSES

Analyte	Solid/Slurry	High Salt Liquid	Low Salt Liquid
Alpha Total	100	1	0.01
Beta Total	350	3.5	0.035
Radionuclides Analyzed by Gamma Energy Analysis			
Co^{60}	4	4	0.04
Cs^{137}	5	5	0.05
$RuRh^{106}$	50	50	0.5
Radionuclides Analyzed by Separation with Beta Counting			
H^{3}	75	1.5	1.5
C^{14}	50	0.5	0.25
Nb^{94}	*	*	*
Se^{79}	50	0.5	0.25
Sr^{90}	150	1.5	0.015
Tc^{99}	250	2.5	0.025
I^{129}	900	9	0.09
Radionuclides Analyzed by Separation with Alpha Counting/Alpha Energy Analysis			
Pu^{238}	200[1]	2[1]	0.02[1]
$Pu^{239/240}$	50	0.5	0.005
Am^{241}	100	1	0.01
Cm^{244}	100	1	0.01

Values for solids are as pCi/g
Values for liquids are as pCi/ml

* No current analysis capacity for Nb^{94}
[1]Potential interferrence on Pu^{238} analysis from contamination in Pu^{236} spike added to the analysis

TABLE 3

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Pesticides/Aroclors	CAS Number	Quantitation Limits* Water ug/L	Soil ug/Kg	On Column (ng)
98. alpha-BHC	319-84-6	0.05	1.7	5
99. beta-BHC	319-85-7	0.05	1.7	5
100. delta-BHC	319-86-8	0.05	1.7	5
101. gamma-BHC (Lindane)	58-89-9	0.05	1.7	5
102. Heptachlor	76-44-8	0.05	1.7	5
103. Aldrin	309-00-2	0.05	1.7	5
104. Heptachlor epoxide	1024-57-3	0.05	1.7	5
105. Endosulfan I	959-98-8	0.05	1.7	5
106. Dieldrin	60-57-1	0.10	3.3	10
107. 4,4'-DDE	72-55-9	0.10	3.3	10
108. Endrin	72-20-8	0.10	3.3	10
109. Endosulfan II	33213-65-9	0.10	3.3	10
110. 4,4'-DDD	72-54-8	0.10	3.3	10
111. Endosulfan sulfate	1031-07-8	0.10	3.3	10
112. 4,4'-DDT	50-29-3	0.10	3.3	10
113. Methoxychlor	72-43-5	0.50	17.0	50
114. Endrin ketone	53494-70-5	0.10	3.3	10
115. Endrin aldehyde	7421-36-3	0.10	3.3	10
116. alpha-Chlordane	5103-71-9	0.05	1.7	5
117. gamma-Chlordane	5103-74-2	0.05	1.7	5
118. Toxaphene	8001-35-2	5.0	170.0	500
119. Aroclor-1016	12674-11-2	1.0	33.0	100
120. Aroclor-1221	11104-28-2	1.0	33.0	100
121. Aroclor-1232	11141-16-5	2.0	67.0	200
122. Aroclor-1242	53469-21-9	1.0	33.0	100
123. Aroclor-1248	12672-29-6	1.0	33.0	100
124. Aroclor-1254	11097-69-1	1.0	33.0	100
125. Aroclor-1260	11096-82-5	1.0	33.0	100

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

There is no differentiation between the preparation of low and medium soil samples in this method for the analysis of Pesticides/Aroclors.

TABLE 3 (cont)

(continued)

Semivolatiles	CAS Number	Quantitation Limits* Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
69. Dibenzofuran	132-64-9	10	330	10000	(20)
70. 2,4-Dinitrotoluene	121-14-2	10	330	10000	(20)
71. Diethylphthalate	84-66-2	10	330	10000	(20)
72. 4-Chlorophenyl-phenyl ether	7005-72-3	10	330	10000	(20)
73. Fluorene	86-73-7	10	330	10000	(20)
74. 4-Nitroaniline	100-01-6	50	1700	50000	(100)
75. 4,6-Dinitro-2-methylphenol	534-52-1	50	1700	50000	(100)
76. N-nitrosodiphenylamine	86-30-6	10	330	10000	(20)
77. 4-Bromophenyl-phenylether	101-55-3	10	330	10000	(20)
78. Hexachlorobenzene	118-74-1	10	330	10000	(20)
79. Pentachlorophenol	87-86-5	50	1700	50000	(100)
80. Phenanthrene	85-01-8	10	330	10000	(20)
81. Anthracene	120-12-7	10	330	10000	(20)
82. Carbazole	86-74-8	10	330	10000	(20)
83. Di-n-butylphthalate	84-74-2	10	330	10000	(20)
84. Fluoranthene	206-44-0	10	330	10000	(20)
85. Pyrene	129-00-0	10	330	10000	(20)
86. Butylbenzylphthalate	85-68-7	10	330	10000	(20)
87. 3,3'-Dichlorobenzidine	91-94-1	10	330	10000	(20)
88. Benzo(a)anthracene	56-55-3	10	330	10000	(20)
89. Chrysene	218-01-9	10	330	10000	(20)
90. bis(2-Ethylhexyl)phthalate	117-81-7	10	330	10000	(20)
91. Di-n-octylphthalate	117-84-0	10	330	10000	(20)
92. Benzo(b)fluoranthene	205-99-2	10	330	10000	(20)
93. Benzo(k)fluoranthene	207-08-9	10	330	10000	(20)
94. Benzo(a)pyrene	50-32-8	10	330	10000	(20)
95. Indeno(1,2,3-cd)pyrene	193-39-5	10	330	10000	(20)
96. Dibenz(a,h)anthracene	53-70-3	10	330	10000	(20)
97. Benzo(g,h,i)perylene	191-24-2	10	330	10000	(20)

* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 3 (cont)

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)

Semivolatiles	CAS Number	Quantitation Limits* Water ug/L	Low Soil ug/Kg	Med. Soil ug/Kg	On Column (ng)
34. Phenol	108-95-2	10	330	10000	(20)
35. bis(2-Chloroethyl) ether	111-44-4	10	330	10000	(20)
36. 2-Chlorophenol	95-57-8	10	330	10000	(20)
37. 1,3-Dichlorobenzene	541-73-1	10	330	10000	(20)
38. 1,4-Dichlorobenzene	106-46-7	10	330	10000	(20)
39. 1,2-Dichlorobenzene	95-50-1	10	330	10000	(20)
40. 2-Methylphenol	95-48-7	10	330	10000	(20)
41. 2,2'-oxybis (1-Chloropropane)#	108-60-1	10	330	10000	(20)
42. 4-Methylphenol	106-44-5	10	330	10000	(20)
43. N-Nitroso-di-n-dipropylamine	621-64-7	10	330	10000	(20)
44. Hexachloroethane	67-72-1	10	330	10000	(20)
45. Nitrobenzene	98-95-3	10	330	10000	(20)
46. Isophorone	78-59-1	10	330	10000	(20)
47. 2-Nitrophenol	88-75-5	10	330	10000	(20)
48. 2,4-Dimethylphenol	105-67-9	10	330	10000	(20)
49. bis(2-Chloroethoxy) methane	111-91-1	10	330	10000	(20)
50 2,4-Dichlorophenol	120-83-2	10	330	10000	(20)
51. 1,2,4-Trichlorobenzene	120-82-1	10	330	10000	(20)
52. Naphthalene	91-20-3	10	330	10000	(20)
53. 4-Chloroaniline	106-47-8	10	330	10000	(20)
54. Hexachlorobutadiene	87-68-3	10	330	10000	(20)
55. 4-Chloro-3-methylphenol	59-50-7	10	330	10000	(20)
56. 2-Methylnaphthalene	91-57-6	10	330	10000	(20)
57. Hexachlorocyclopentadiene	77-47-4	10	330	10000	(20)
58. 2,4,6-Trichlorophenol	88-06-2	10	330	10000	(20)
59. 2,4,5-Trichlorophenol	95-95-4	50	1700	50000	(100)
60. 2-Chloronaphthalene	91-58-7	10	330	10000	(20)
61. 2-Nitroaniline	88-74-4	50	1700	50000	(100)
62. Dimethylphthalate	131-11-3	10	330	10000	(20)
63. Acenaphthylene	208-96-8	10	330	10000	(20)
64. 2,6-Dinitrotoluene	606-20-2	10	330	10000	(20)
65. 3-Nitroaniline	99-09-2	50	1700	50000	(100)
66. Acenaphthene	83-32-9	10	330	10000	(20)
67. 2,4-Dinitrophenol	51-28-5	50	1700	50000	(100)
68. 4-Nitrophenol	100-02-7	50	1700	50000	(100)

Previously known by the name bis(2-Chloroisopropyl) ether

TABLE 4
SAMPLE RESULT TURNAROUND TIMES

Laboratory analysis and quality assurance documentation, excluding validation, shall be limited to the following schedule:

Transuranic and hot cell analyses - 100 days annual average, but not to exceed 140 days

Low-level and mixed waste (up to 100 mr/hr) analyses - 75 days annual average, but not to exceed 90 days

Nonradioactive waste analyses - 50 days

Validated data packages will be issued within 21 days of receipt of the results by the Office of Sample Management.

TABLE 5
RESULT REPORTING/VALIDATION

The RCRA validation documentation package consists of the Office of Sample Management Data Validation cover sheet (different sheets for Level A, B, or C validation), supplemental Quality Control (QC) attachment pages, a copy of the Chain of Custody, and all sample data. One documentation package is completed for each sample or delivery group.

Three levels of validation are offered:

Level A The minimum requirement for all RCRA data. The primary application is for data used in waste designation/disposal. The additional QC required by SW-846 will be assessed through laboratory audits and Performance Evaluation (PE) samples.

Review Requirements:

- o Requested Versus Reported Analyses
- o Analysis Holding Times

Level B Provides a more in-depth review for programs whose data are compiled for use in later reports.

Review Requirements in Addition to Those Listed for Level A:

- o Matrix Spike/Matrix Spike Duplicate Analysis
- o Surrogate Recoveries
- o Duplicate Analysis
- o Analytical Blank Analysis

Level C Requires that the data be reported in Sample Delivery Group (SDG) data packages and is applicable to RCRA governed programs requiring Contract Laboratory Program (CLP) quality data from analytical work done in non-CLP laboratories

Review Requirements in Addition to Those Above:

- o Initial and Continuing Instrument Calibrations
- o Gas Chromatography - Mass Spectrograph (GC/MS) Tune Criteria
- o Internal Standards for Gas Chromatograph Analysis
- o Laboratory Control Samples
- o Interference Check Samples (for ICP analysis)
- o Any Other QC Checks Performed or Required by the Methods of Analysis

TABLE 6
VALIDATION CRITERIA - GENERIC DATA QUALITY OBJECTIVES

1. REQUESTED VERSUS REPORTED ANALYSES

   All requested analyses shall be reported of accounted for.

2. HOLDING TIMES

   Holding times shall be equivalent to RCRA defined times. If no RCRA holding time exists, holding times will be 6 months unless specifically defined in project specific documentation.

3. SURROGATE RECOVERY

   Sample and blank surrogate recoveries must be between 80 and 120%.

4. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

   A matrix spike or matrix spike duplicate must be analyzed with every analytical batch of every 20 samples, whichever is more frequent. Control limits will be between 75 and 125% with ±20% relative percent differences.

5. DUPLICATE ANALYSIS

   Duplicate analysis must be performed with every analytical batch or every 20 samples, whichever is more frequent. Control limits will be ±20%. If both sample and duplicate results are below the method detection limit of sample quantitation limit, then no control limit applies.

6. ANALYTICAL BLANKS

   A minimum of one analytical blank must be analyzed for every batch or every 20 samples, whichever is more frequent. No contaminants should be detected in the blanks.

7. INITIAL AND CONTINUING CALIBRATION

   Analytical instrumentation shall be calibrated in accordance with requirements specific to the instrumentation and methods of procedures employed.

8. GC/MS TUNE

   Ion abundance results and tuning frequency requirements must be as specified in the method employed for analysis.

9. INTERNAL STANDARDS

   Internal Standard area counts and retention time differences from the associated calibration standard must be within the control limits specified by the methods or procedure used.

9 3 1 2 8 3 4 9 9 6

TABLE 6 (cont)

10. LABORATORY CONTROL SAMPLE

All Laboratory Control Sample recoveries must be within 80-120% for all sample matrices.

11. INTERFERENCE CHECK SAMPLE

Frequency of analysis and all Interference Check Sample solution results must meet the requirements specified in the procedure used.

12. OTHER QUALITY CONTROL CHECKS

As specified in project specific documentation.

TABLE 7
ESTIMATED COSTS

CHARACTERIZATION OF WASTE STREAMS DICHSRGED TO DOUBLE SHELL TANKS	
Analysis for processing parameters	$500/sample
Analysis for hazwaste designation	$5000/sample
DOUBLE SHELL TANK CHARACTERIZATION	
Analysis for hazewaste designation	$10000/sample
ANALYSIS OF SAMPLES FROM 242-A EVAPORTOR	
Analysis of feed tank	$5000/sample
Analysis of Process Condensate	$2500/sample
Analysis of Slurry Product	$5000/sample
Analysis of Steam Condensate	$4000/sample
Analysis of Cooling Water	$4000/sample
Analysis of Vent Gases	$2000/sample

9 3 1 2 8 3 4 9 9 8

Westinghouse Hanford Company — **Internal Memo**

From: Office of Sample Management — 28600-91-121
Phone: 3-4369 MO-346/200W T6-08
Date: September 10, 1991
Subject: SHIPPING ANOMALIES NOTED IN SAMPLES FROM TK-106-AW

To: P. G. Haigh R1-51
D. L. Halgren R1-51

cc: J. D. Briggs T6-14
J. G. Field G2-02
V. V. Johansen T6-20
J. H. Kessner T6-08
R. J. Smith G2-02
W. A. McCormick G2-02
DYB File/LB

The 222-S Sample Custodian, V. V. Johansen, informed the Office of Sample Management that there have been two problem areas identified with samples from Double Shell Tank 241-AW-106.

The custody seals were one area. Some of the custody seals were placed across the pin on the shipping container (pig), so that the normal torque applied by the crane in lifting the container in and out of the B-Plant truck caused strain on the seals. Also, the custody seals were inscribed in pencil or ballpoint pen. This made the seals hard to read because they are silver colored and shiny. In the future, it is recommended that the seals be placed on the side of the pig, across the seam of the lid. It is also recommended that a "Sharpie" marker be used to write on the custody seals.

The second problem was liquid inside the pig or the plastic bag, outside of the bottle of liquid waste. It appeared that the sample bottles were intact, with tight lids, and that no liquid had leaked from them. There was also an instance of a sandy substance mixed in with the liquid that had smearable radioactive contamination over 10,000 disintegrations per minute. This problem poses a contamination hazard to 222-S Laboratory staff and is an As Low As Reasonably Achievable concern.

9312853499 9

The Tank Farms procedure for sampling and shipping, "Sample Non-Aging Waste Storage Tanks," (TO-080-030) and the Safety Analysis Report for Packaging, "N-55 Overpack," (WHC-SD-RE-SAP-015) were scrutinized for possible procedure violations. Though none were found, this matter needs to be addressed to prevent another occurrence.

If you have any questions or need additional information, please contact me on 3-4369.

Deborah Y. Bisenius 9/5/92
Deborah Y. Bisenius, Technical Representative
Office of Sample Management

tjn

9 3 1 2 3 3 0 1 0

Westinghouse Hanford Company | **Internal Memo**

From: Office of Sample Management
Phone: 3-4369
Date: September 9, 1991
Subject: SHIPPING ANOMALIES NOTED IN SAMPLES FROM TK-106-AW

To: P. G. Haigh R1-51
D. L. Halgren R1-51

cc: J. D. Briggs T6-14
J. G. Field G2-02
V. V. Johansen T6-20
J. H. Kessner T6-08
R. J. Smith G2-02
W. A. McCormick G2-02

The 222-S Sample Custodian, V. V. Johansen, informed the Office of Sample Management(OSM) that there have been two problem areas identified with samples from Double Shell Tank 241-AW-106.

The custody seals were one area. Some of the custody seals were placed across the pin on the shipping container (pig), so that the normal torque applied by the crane in lifting the container in and out of the B-Plant truck caused strain on the seals. Also, the custody seals were inscribed in pencil or ballpoint pen. This made the seals hard to read because they are silver colored and shiny. In future, it is recommended that the seals be placed on the side of the pig, across the seam of the lid. It is also recommended that a "Sharpie" marker be used to write on the custody seals.

The second problem was liquid inside the shipping container (pig) or the plastic bag, outside of the bottle of liquid waste. It appeared that the sample bottles were intact, with tight lids, and that no liquid had leaked from them. There was also an instance of a sandy substance mixed in with the liquid that had smearable radioactive contamination over 10,000 DPM. This problem poses a contamination hazard to 222-S Laboratory staff and is an ALARA concern.

The Tank Farms procedure for sampling and shipping, "Sample Non-Aging Waste Storage Tanks,"(TO-080-030) and the Safety Analysis Report for Packaging(SARP), "N-55 Overpack,"(WHC-SD-RE-SAP-015) were scrutinized for possible procedure violations. Though none were found, this matter needs to be addressed to prevent another occurrence.

John H. Silling for Deborah Bisenius 9/11/91

Deborah Y. Bisenius
Technical Representative
Office of Sample Management

tjn

5.22

9312863500 1

[22] From: Vida V Johansen at ~WHC32 9/4/91 8:13AM (1088 bytes: 15 ln)
To: Paul G Haigh at ~WHC216, Deborah Y Bisenius at ~WHC169
Receipt Requested
Subject: 106-AW Tank samples

---------- Message Contents ----------

Two of the 106-AW samples we received on 8/01/91 and 8/02/91 were found to have liquid in their shipping container (Pig). The second sample had moisture inside the plastic bag. There was sand(?) mixed in with the liquid and when smeared by the HPT the mixture was found to be over 10,000 DPM. The lids were on tight and the bottles were intact.

The sample numbers are: 6AW791-7A--R9765
6AW791-7B--R9766
6AW791-8A--R9767

We have discontinued removing these samples from their shipping containers until we hear from you. Please contact me at 373-2271 or 373-2435.

Thank you
Vida Johansen
Sample Custodian-222s lab.

9 3 1 2 3 3 5 0 0 2

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SINGLE SHELL TANK PROJECT
Analytical Detection Limits
October 12, 1990

The following detection limits are derived on ideal matrices. These values were derived by using either calibration standards or pure matrix standards. Detection limits on actual single shell tank samples are likely to be much higher. No information regarding procedure detection limits is available for procedures not listed in this report.

Procedure LA-355-131
Arsenic Analysis by Hydride Generation Atomic Absorption

Detection Limit = 0.005 ppm in solution
Typical sample dilution for the Fusion Dissolution was 0.0025g/mL.
Typical sample dilution for the Water Digestion was 0.010g/mL.
Typical sample dilution for the acid Digestion was 0.010g/mL.

Procedure LA-325-102
Mercury Analysis by Atomic Absorption Manual Cold Vapor Technique

Detection Limit = 0.002 ppm in solution
Typical sample dilution for the Fusion Dissolution was 0.0025g/mL.
Typical sample dilution for the Water Digestion was 0.010g/mL.
Typical sample dilution for the acid Digestion was 0.010g/mL.
Solids were analyzed directly.

Procedure LA-362-131
Selenium Analysis by Hydride Generation Atomic Absorption

Detection Limit = 0.005 ppm in solution
Typical sample dilution for the Fusion Dissolution was 0.0025g/mL.
Typical sample dilution for the Water Digestion was 0.010g/mL.
Typical sample dilution for the acid Digestion was 0.010g/mL.

9 3 1 2 8 3 5 0 0 4

Procedure LA-533-105
Anion Analysis on Dionex Model 40001

Typical sample dilution was 0.000099g/mL

Fluoride
Detection Limit in solution = 0.09 ppm.

Chloride
Detection Limit in solution = 0.04 ppm.

Nitrate
Detection Limit in solution = 0.24 ppm.

Phosphate
Detection Limit in solution = 0.13 ppm.

Sulfate
Detection Limit in solution = 0.13 ppm.

Procedure LA-622-102
Determination of Carbonate in Solutions by Coulometry

Detection Limit = 5 ppm in solution
Typical sample dilution was 0.01g/mL

Procedure LA-344-105
Total Organic Carbon
Determination of Carbon Insolation by Combustion and Coulometry

Detection Limit = 5.5 ppm in solution
Typical sample dilution was 0.01 g/mL

Procedure LA-695-101
Cyanide = 0.1 ppm CN in solution
Spectrophotometric Determination of Cyanide

Procedure LA-634-102
Ammonia = 0.1 ppm NH_4^+ in solution
Ammonia by Kjeldahl

Procedure LA-645-001
Nitrite = 0.184 ppm NO_2 in solution
Spectrophotometric Determination of Nitrite

Procedure LA-265-101
Chromium VI = 0.1004 ppm Cr^{6+} in solution
Spectrophotometric Determination of Hexavalent Chromium

9 3 1 2 8 6 3 5 0 0 5

Procedure: LA-505-151 (Nominal Detection Limits)

Inductively Coupled Plasma (ICP) Emission Spectrometer Operations and Analysis.

Typical sample dilution for the Fusion Dissolution was 0.00019 g/mL.

Typical sample dilution for the Water Digestion was 0.000476 g/mL.

Typical sample dilution for the Acid Digestion was 0.000476 g/mL

Instrument Detection Limit ppm.

Aluminum	0.0745	Antimony	0.1424
Arsenic	0.0223	Barium	0.0026
Beryllium	0.0006	Bismuth	0.0839
Boron	0.0083	Cadmium	0.0039
Calcium	0.0002	Cerium	0.1359
Chromium	0.0039	Cobalt	0.0246
Copper	0.0158	Europium	0.0024
Iron	0.0073	Lanthanum	0.0141
Lead	0.0273	Lithium	0.0032
Magnesium	0.0001	Manganese	0.0011
Mercury	0.0036	Molybdenum	0.0049
Neodymium	0.2130	Nickel	0.0147
Phosphorous	0.0308	Potassium	0.2122
Samarium	0.1525	Selenium	0.0631
Silicon	0.0314	Silver	0.0183
Sodium	0.0483	Strontium	0.0010
Sulfur	0.0163	Tantalum	0.0273
Thallium	0.0646	Thorium	0.0122
Tin	0.0144	Titanium	0.0035
Tungsten	0.0273	Uranium	1.1405
Vanadium	0.0186	Zinc	0.0017
Zirconium	0.0141		

9 3 1 2 8 3 5 0 0 6

SAMPLING AND CUSTODY DATA

9 3 1 2 3 1 2 1 0 0 7

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655		
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	B-Plant Sample Truck				
Shipped to	222-S Lab				
SAMPLING INFORMATION					
Sample Collected by	SCOTT DABLING	Date 8-21-91	8-21-91	Time	0535
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 13A, Suspension Line Length = 46 ± .5 ft				
Remarks	Seal #4236				
Ice Chest or Sample Pig No.	TF-5	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
Sample No. 6AW791-1B (Shipping No. R9590)	FD-A Pt. No. 54, Set No. 2 FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
R. Ault	Brent Myers	8-27-91 0930
B. Muers / Brent Myers	Vida Johansen	8/27/91 1055
Relinquished by:	Received by	Date/Time:
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-030	C-2	15

9 3 1 2 8 3-5 0 0 8

8

SAMPLE CHECK IN LIST

Date/Time Received 8/27/91 1055 Sample ID 6AW791-1B

Project 106AW Client 241-AW Tank farm

Shipping Container ID# TF-5 Shipping # R9590

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [X] No [ ] see attached
3. Custody Seals dated and signed? Yes [X] No [ ] see attached
4. Custody Seals ID # 4236
5. Condition of Samples: ✓ in good condition
   ____ broken
   ____ leaking
6. Samples have: ____ custody seals
   ✓ appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VIDA Johansen

Signature Vida Johansen

Date/Time 8/27/91 1500

Please send copy to Office of Sample Management Data Administrator, T6-08

9312863500 9

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	Duane Cross	Date	8-21-91	Time	0610
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 13A, Suspension Line Length = 44 ± .5 ft				
Remarks	Seal #4217				
Ice Chest or Sample Pig No.	B-23	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
Sample No. 6AW791-2B (Shipping No. R9592)	FD-A Pt. No. 54, Set No. 2 FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: [illegible]	Received by: B. A. Stoehle	Date/Time: 8-27-91 / 0530
Relinquished by: B. Stoehle	Received by: Raymond Aleite	Date/Time: 8-27-91 / 0635
Relinquished by: Raymond Aleite	Received by: Vicka Johnson for 8-27-91 / 0730	Date/Time: 8/27/91 0730
Relinquished by:	Received by:	Date/Time:

Document No.	Rev/Mod	Page
TO-080-030	C-2	15

SAMPLE CHECK IN LIST

Date/Time Received 8/27/91 0730 Sample ID 6AW791-2B

Project TANK 106 Client 241-AW Tank Farms

Shipping Container ID# B-23 Shipping # R9592

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [X] No [ ] see attached
3. Custody Seals dated and signed? Yes [✓] No [ ] see attached
4. Custody Seals ID # 4217
5. Condition of Samples: ✓ in good condition
   _____ broken
   _____ leaking
6. Samples have: _____ custody seals
   ✓ appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VIDA JOHANSEN

Signature Vida Johansen

Date/Time 8/27/91 1500

Please send copy to Office of Sample Management Data Administrator, T6-08.

9312835011

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	V. Miller	Date 8-21-91	8-21-91	Time	0630
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 13A, Suspension Line Length = 41 ± .5 ft				
Remarks	Seal #4218				
Ice Chest or Sample Pig No.	G-6	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-3A
(Shipping No. R9593)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
[illegible]	B. A. Moehle	8-27-91 / 0245
B. A. Moehle	Raymond Akita	8-27-91 / 0350
Raymond Akita	Vada Johansen	8-27-91 0730
Relinquished by:	Received by:	Date/Time:

9 3 1 2 8 3 5 0 1 2

SAMPLE CHECK IN LIST

Date/Time Received 8/22/91 0350 Sample ID 6AW791-3A

Project TANK 106-AW Client 241-AW TANK FARMS

Shipping Container ID# G-6 Shipping # R9593

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [X] No [ ] See attached
3. Custody Seals dated and signed? Yes [X] No [ ] See attached
4. Custody Seals ID # 4218
5. Condition of Samples: X in good condition
   ____ broken
   ____ leaking
6. Samples have: ____ custody seals
   X appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) Yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VICKI JOHANSEN

Signature Vicki Johansen

Date/Time 8/30/91 1150

Please send copy to Office of Sample Management Data Administrator, T6-08.

9312863501 3

From: VV JOHANSEN
Phone: 373-2271 T6-20
Date: August 29, 1991
Subject: ARRIVAL OF DST SAMPLES

To: JEANETTE DUNCAN T6-08

cc: Deborah Bisenius T6-08
James Atterberry T6-20

The following samples were received on 8/27/91:

6AW791-1A-R9589
6AW791-2A-R9591
6AW791-3A-R9593
6AW791-1B-R9590
6AW791-2B-R9592
6AW791-3B-R9594

The manner in which the custody seals were attached to the shipping containers would not insure the samples integrity.

The writing could not be seen clearly, only the indentation of what "it could be" on the seals. I would suggest a sharpie be used instead of a pen.

Paul Haigh was contacted and agreed the seals were not properly attached. He also agreed sample HR9594 should be disposed as the seal appeared to be mutilated and the integrity was questionable. The chain of custody on that particular sample did not have the sampler's name listed. Paul supplied the information for me.

The following samples were received on 8/12/91 and 8/13/91:

R9595- 6AW791-4A
R9597- 6AW791-5A
R9763- 6AW791-6A
R9596- 6AW791-4B
R9598- 6AW791-5B
R9764- 6AW791-6B

When the samples were received the seals were intact but the signature and date were not verified. The custody seal numbers are not listed on the chain of custody so the numbers were not cross checked. Although the custody seal numbers were noticed, they were not recorded because this is not in our Sample Receiving Procedure(LO-090-101).

Vida Johansen

9 3 1 2 8 3 5 0 1 4

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	JOE RODRIQUEZ (VJ)	Date 8-21-91	8-21-91	Time	0645
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 13A, Suspension Line Length = 41 ± .5 ft				
Remarks	Seal # 4220				
Ice Chest or Sample Pig No.	G - 8	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
Sample No. 6AW791-3B (Shipping No. R9594)	FD-A Pt. No. 54, Set No. 2 FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: [illegible]	Received by: B. A. Stoehle	Date/Time: 8-27-91/0245
Relinquished by: B. A. Stoehle	Received by: Raymond Akita	Date/Time: 8-27-91/0350
Relinquished by: Raymond Akita	Received by: Vada Johansen	Date/Time: 8/27/91 0830
Relinquished by:	Received by:	Date/Time:

Sample disposed of per QSM and tank farm request.

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DISPOSE

SAMPLE CHECK IN LIST

Date/Time Received 8/27/91 0350 Sample ID 6AW791-3B

Project TANK 106 AW Client 241-AW TANK FARMS

Shipping Container ID# G-8 Shipping # R9594

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [ ] No [ ] ?
3. Custody Seals dated and signed? Yes [ ] No [ ] ?
4. Custody Seals ID # 4220
5. Condition of Samples: _____ in good condition
   _____ broken
   _____ leaking
6. Samples have: _____ custody seals
   _____ appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VIDA JOHANSEN

Signature Vida Johansen

Date/Time 8/28/91 1500

Please send copy to Office of Sample Management Data Administrator, T6-08.

9 3 1 2 8 3 5 0 1 6

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	JKatsel	Date	8/12/91	Time	0605
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 1C, Suspension Line Length = 49 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	5	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-4B
(Shipping No. R9596)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: J Vill	Received by: [illegible]	Date/Time: 8-12-91/1830
Relinquished by: [illegible]	Received by: C A Clark	Date/Time: 8/12/91 / 2155 1955
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK IN LIST

Date/Time Received 8/12/91 2155 Sample ID 6AW791-4B

Project 106 AW Client 2411-AW Hank James

Shipping Container ID# 5 Shipping # R9596

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [ ] No [ ]
4. Custody Seals ID # _____
5. Condition of Samples: X in good condition
   ____ broken
   ____ leaking
6. Samples have: ____ custody seals
   X appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VIDA JOHANSEN

Signature Vida Johansen

Date/Time 8/30/91 11:50

Please send copy to Office of Sample Management Data Administrator, T6-08

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TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	[illegible]	Date	8/12/91	Time	0630
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 1C, Suspension Line Length = 46 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	G-10	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-5B
(Shipping No. R9598)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: [illegible]	Received by: [illegible]	Date/Time: 8-12-91/1830
Relinquished by: [illegible]	Received by: [illegible]	Date/Time: 8-12-91/2155
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK IN LIST

Date/Time Received 8/12/91 1155 Sample ID 6AW791-5B

Project 106 AW Client 241-AW Tank farm

Shipping Container ID# G-10 Shipping # R9598

1. Condition of Shipping container? Good
2. Custody Seals on container intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [ ] No [ ]
4. Custody Seals ID # _____
5. Condition of Samples: X in good condition
   ____ broken
   ____ leaking
6. Samples have: ____ custody seals
   X appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name Vida Johansen

Signature Vida Johansen

Date/Time 8/30/91 1145

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TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	[signature]	Date	8/12/91	Time	0645
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 1C, Suspension Line Length = 42 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	TF-10	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
Sample No. 6AW791-6B (Shipping No. R9764)	FD-A Pt. No. 54, Set No. 2 FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by:	Received by:	Date/Time:
[signature]	[signature]	8-13-91/1315
Relinquished by: [signature]	Received by: 13 [signature]	Date/Time: 8-13-91 1347
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK IN LIST

Date/Time Received 8/13/91 1347 Sample ID 6AW791-68

Project 106AW Client Tank farm 241-AW

Shipping Container ID# TF-10 Shipping # R97694

1. Condition of Shipping container? good
2. Custody Seals on container intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [ ] No [ ]
4. Custody Seals ID # _____
5. Condition of Samples: X in good condition
   ____ broken
   ____ leaking
6. Samples have: ____ custody seals
   X appropriate sample labels
7. The following paperwork should be accounted for (N/A if not applicable):
   Chain of Custody #(s) yes
   Request for Special Analysis #(s) no
8. Have any anomalies been identified? Yes [X] No [ ]
9. Memos have been initiated for all anomalies identified? Yes [X]

Printed Name VIDA JOHANSEN

Signature Vida Johansen

Date/Time 8/30/91 1145

Please send copy to Office of Sample Management Data Administrator, T6-08

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1 of 1

TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	MIKE HERMAN VS	Date	7/31/91 VS	Time	0625 VS
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 22A, Suspension Line Length = 51 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	B-25	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-7B
(Shipping No. R9766)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: [signature]	Received by: C. DeBaise	Date/Time: 8-1-91 / 0230
Relinquished by: C. DeBaise / Guy R. Samson	Received by: [signature]	Date/Time: 8-1-91 1800
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 8.1.91 1800 Client Name TANK FARMS

Project/Client # 241-AW Tank farms Batch or Case # 106 AW Rlsa 220

Cooler ID (if noted on outside of cooler) B.25

1. Condition of shipping container? Good
2. Custody Seals on cooler intact? Yes [✓] No [ ]
3. Custody Seals dated and signed? Yes [✓] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [N/A] No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [ ] NA
6. Each sample is in a plastic bag? Yes [ ] No [ ] NA
7. Number of sample containers in cooler: NA
8. Samples have:
   - ____ clips (in cans)
   - ____ custody seals
   - ____ hazard labels
   - ____ tape
   - ____ appropriate sample labels
9. Samples are:
   - NA in good condition
   - ____ broken
   - ____ other
   - NA ____ leaking
   - ____ have air bubbles
10. Samples received at NA °C. Coolant type NA
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) yes Sample # BAW791-7B Shipping # R9766
    Request for Analysis #(s) NO
    Airbill # NA Carrier hand carried - B plant truck
12. Have any anomalies been identified above? Yes [ ] No [✓]
13. Memos have been initiated for all anomalies identified above? Yes [ ]

Printed Name/Signature VIDA JOHANSEN / Vida Johansen Date/Time 8.2.91 1305

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TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	MIKE HERMAN VJ	Date	7/31/91 VJ	Time	0608 VJ
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 22A, Suspension Line Length = 48 ± .5 ft				
Remarks	SEAL # 4234				
Ice Chest or Sample Pig No.	TF-4	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number	Sample Schedule Number
Sample No. 6AW791-8B (Shipping No. R9768)	FD-A Pt. No. 54, Set No. 2 FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: R. Ardell	Received by: M.B. Hyson	Date/Time: 8-2-91/0940
Relinquished by: Matt Hyson	Received by: Vida Johansen	Date/Time: 8-2-91 1040
Relinquished by:	Received by:	Date/Time:
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 8.2.91 1040 Client Name Tank Farm

Project/Client # 241-AW tank farm Batch or Case # 106-AW RUSA 22A

Cooler ID (if noted on outside of cooler) TF-4

1. Condition of shipping container? Good
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [X] No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [ ] NA
6. Each sample is in a plastic bag? Yes [ ] No [ ] NA
7. Number of sample containers in cooler: NA
8. Samples have: ____ clips (in cans) ____ tape
   ____ custody seals ____ appropriate sample labels
   NA hazard labels NA
9. Samples are: ____ in good condition ____ leaking
   ____ broken ____ have air bubbles
   ____ other
10. Samples received at NA °C. Coolant type NA
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) Yes Sample # 6AW791-8A Shipping R9768
    Request for Analysis #(s) no
    Airbill # NA Carrier hand carried - B plant truck
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [ ]

Printed Name/Signature VIDA JOHANSEN Vida Johansen Date/Time 8/2/91 1220

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TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655
Bill of Lading No.	N/A	Offsite Property No.	N/A
Method of Shipment	B-Plant Sample Truck		
Shipped to	222-S Lab		

SAMPLING INFORMATION

Sample Collected by	MIKE HERMAN VJ	Date	7/31/91 VJ	Time	0635 VJ
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 22A, Suspension Line Length = 48 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	G-5	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-9B
(Shipping No. R9770)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: [signature]	Received by: [signature]	Date/Time: 8-2-91/0320
Relinquished by: [signature]	Received by: Raymond Aketa	Date/Time: 8-2-91/0555
Relinquished by: Raymond Aketa	Received by: Vida Johansen	Date/Time: 8-2-91 0720
Relinquished by:	Received by:	Date/Time:

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R9770

SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 8-2-91 0555 Client Name TANK FARM

Project/Client # 241-B TANK FARM Batch or Case # 16A-AW RISER 22A

Cooler ID (if noted on outside of cooler) G.5

1. Condition of shipping container? Good
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes [N/A] No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [ ] NA
6. Each sample is in a plastic bag? Yes [ ] No [ ] NA
7. Number of sample containers in cooler: NA
8. Samples have:
   - ____ clips (in cans)
   - ____ custody seals
   - NA hazard labels
   - ____ tape
   - ____ appropriate sample labels NA
9. Samples are:
   - ____ in good condition
   - ____ broken
   - ____ other
   - ____ leaking
   - ____ have air bubbles
10. Samples received at NA °C. Coolant type NA
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) Yes Sample # 16AW791-98 Shipping # R9770
    Request for Analysis #(s) NO
    Airbill # NA Carrier hand carried - B plant truck
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [ ]

Printed Name/Signature VIDA JOHANSEN / Vida Johansen Date/Time 8/2/91 1220

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TANK FARM PLANT OPERATING PROCEDURE

CHAIN OF CUSTODY

Company Contact	Paul Haigh	Telephone	373-4655		
Bill of Lading No.	N/A	Offsite Property No.	N/A		
Method of Shipment	B-Plant Sample Truck				
Shipped to	222-S Lab				
SAMPLING INFORMATION					
Sample Collected by	MIKE HERMAN JS	Date	7/31/91 JS	Time	0641 JS
Sample Locations	241-AW Tank Farm, Tank 106-AW, Riser # 22A, Suspension Line Length = 41 ± .5 ft				
Remarks					
Ice Chest or Sample Pig No.	G-1	Field Logbook and Page No.	N/A		

SAMPLE IDENTIFICATION

Sample Number
Sample No. 6AW791-10B
(Shipping No. R9772)

Sample Schedule Number
FD-A Pt. No. 54, Set No. 2
FSS-T-630-00001 (Draft)

CHAIN OF POSSESSION

Relinquished by: a Will	Received by: John J Thomas	Date/Time: 8-2-91 / 0115
Relinquished by: John J Thomas	Received by: Raymond Akita	Date/Time: 8-2-91 / 0235
Relinquished by: Raymond Akita	Received by: Vicki Hansen	Date/Time: 8.2.91 0720
Relinquished by:	Received by:	Date/Time:

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SAMPLE CHECK-IN LIST

(1 Per Shipping Container)

Date/Time Received 8-2-91 - 0235 Client Name TANK FARM

Project/Client # 241 TANK FARMS Batch or Case # 106-AW RISER 22A

Cooler ID (if noted on outside of cooler) G-1

1. Condition of shipping container? Good
2. Custody Seals on cooler intact? Yes [X] No [ ]
3. Custody Seals dated and signed? Yes [X] No [ ]
4. Chain of Custody record is taped on inside of cooler lid? Yes NA No [ ]
5. Vermiculite/packing material is: Wet [ ] Dry [ ] NA
6. Each sample is in a plastic bag? Yes [ ] No [ ] NA
7. Number of sample containers in cooler: _____
8. Samples have: ____ clips (in cans) ____ tape
   ____ custody seals ____ appropriate sample labels
   NA hazard labels NA
9. Samples are: NA in good condition ____ leaking
   ____ broken ____ have air bubbles
   ____ other
10. Samples received at NA °C. Coolant type NA
11. The following paperwork should be accounted for (N/A if not applicable):
    Chain of Custody #(s) yes Sample # GAW-791-10A Shipping # R9772
    Request for Analysis #(s) NO
    Airbill # NO Carrier hand carried - 8 plant hours
12. Have any anomalies been identified above? Yes [ ] No [X]
13. Memos have been initiated for all anomalies identified above? Yes [ ]

Printed Name/Signature Vicki Johansen / Vicki Johansen Date/Time 8-2-91 1800

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REQUEST FOR SPECIAL ANALYSIS (RSA)

Sample Point	(2) Date/Time Issued	(3) Date/Time Required	(4) Charge Code
TD-A 54 Set No. 2	9/11/91 0900	11/20/91	(5) Work Package: IWIT6CØE

(6) Number of Samples	Dose Rate mRad/Hr	(7) Customer I.D.	(8) Laboratory I.D.	(9) Requester Name/Phone
10		6AW791-1A, 6AW791-2A, 6AW791-3A, 6AW791-4A, 6AW791-5A, 6AW791-6A, 6AW791-7A, 6AW791-8A, 6AW791-9A, 6AW791-10A, 7-31-92	Radio R346 STD 347 (Rad B) 348 R361 STD	P.G. Haigh 3-4655

(10) Release: RPT

(11) Volume of Sample: 100mL

(12) Determination	(13) Expected Range	(14) Minimum Detection Level	(15) Method
Cyanide (CN^-)		0.01 mg/L	
Selenium (Se)		1 mg/L	
Mercury (Hg)		0.2 mg/L	
Differential Scanning Calorimetry (DSC)		Exotherm	
Specific Gravity		0.1 pH units	
Tritium (H-3)		1.5 pCi/mL	
Total Uranium		100 mg/L	
Sr-90		1.5 pCi/mL	
Am-241		1 pCi/mL	
Pu-239/240		0.5 pCi/mL	
I-129		9 pCi/mL	
Cs-134/137		5 pCi/mL	

(16) Matrix (Other Metals or Anions Present) Liquid mixed waste. Radioactive contamination: natural, activation products and reactor fission products. Possible detectable halogenated and non-halogenated organic compounds. Hydroxide - pH = 12.5 or greater. Anions - sodium salts of nitrate, nitrite, phosphate, carbonate and sulfate. Metals - calcium and potassium salts, lead, chromium, cadmium.

(17) Radioactivity Level (Actual ☐ Estimated ☐)

Total Alpha _____ µ Ci/L

Total Beta _____ µ Ci/L

Total Gamma _____ µ Ci/L

(18) Additional Information (Measurement Uncertainty or Other Pertinent Information) ± 25% Accuracy and precision

Radiochemical Analyses to be performed on a composite from 10 samples.

(19) Estimated Cost

(20) Samples Received: By | From | Date | Time

Laboratory Manager

(21) Distribution of Final Results/Sample Disposal Instructions
Minimum storage time - until April, 1992
Customer will direct OSM re: sample disposal

REQUEST FOR SPECIAL ANALYSIS (RSA)

(1) Sample Point	(2) Date/Time Issued	(3) Date/Time Required	(4) Charge Code
FD-A 54 Set No. 2	9/11/91 0900	11/20/91	(5) Work Package: 1WIT6CØE

(6) Number of Samples	Dose Rate mRad/Hr	(7) Customer I.D.	(8) Laboratory I.D.	(9) Requester Name/Phone
10		6AW791-1A, 6AW791-8A, 6AW791-2A, 6AW791-9A, 6AW791-3A, 6AW791-10A, 6AW791-4A, 6AW791-5A, 6AW791-6A, 6AW791-7A		P.G. Haigh 3-4655

(10) Release: _____ RPT

(11) Volume of Sample: 100 mL

(12) Determination	(13) Expected Range	(14) Minimum Detection Level	(15) Method
Eu-154/155		32 pCi/sample	
Sn-113		15 pCi/sample	
Ru-106		11 pCi/sample	
C-14		260,000 pCi/mL	
Co-60		1,200,000 pCi/mL	
Se-79		78,000 pCi/mL	
Nb-94		98,000 pCi/mL	
Tc-99		2,000,000 pCi/mL	
Ce-144		850,000 pCi/mL	
Cm-243/244		13,000 pCi/mL	
Ra-226		33,000 pCi/mL	

(16) Matrix (Other Metals or Anions Present)
Liquid mixed waste. Radioactive contamination: natural, activation products and reactor fission products. Possible detectable halogenated and non-halogenated organic compounds. Hydroxide - pH = 12.5 or greater. Anions - sodium salts of nitrate, nitrite, phosphate, carbonate and sulfate. Metals - calcium and potassium salts, lead, chromium, cadmium.

(17) Radioactivity Level (Actual ☐ Estimated ☐)

Total Alpha _____ µ Ci/L

Total Beta _____ µ Ci/L

Total Gamma _____ µ Ci/L

(18) Additional Information (Measurement Uncertainty or Other Pertinent Information) ± 25% Accuracy and precision
Radiochemical analyses to be performed on a composite from 10 samples.

(19) Estimated Cost

(20) Samples Received

By	From	Date	Time
			32

Laboratory Manager

(21) Distribution of Final Results/Sample Disposal Instructions
Minimum storage time - until April, 1992
Customer will direct OSM re-sample

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SAMPLE DATA SUMMARY

SUMMARY DATA REPORT

Project: 242-A EVAPORATOR FEED CHARACTERIZATION
Tank: 106AW
Customer ID: 791 Composite

Undigested Sample Analysis Results

	Sample R348		Sample Duplicate R348	
Am 241	2.27E-2	uCi/L	2.02E-2	uCi/L
C 14	7.40E-2	uCi/L	7.54E-2	uCi/L
GEA				
Cs 137	5.07E+4	uCi/L	5.06E+4	uCi/L
Cs 134	4.01E+2	uCi/L	3.93E+2	uCi/L
Eu 154	1.93E+1	uCi/L	<1.28E+1	uCi/L
Eu 155	<6.84E+1	uCi/L	<6.87E+1	uCi/L
Co 60	<4.71E+0	uCi/L	<8.03E+0	uCi/L
Sn 113	<4.98E+1	uCi/L	<5.05E+1	uCi/L
RuRh 106	<4.97E+2	uCi/L	<4.81E+2	uCi/L
Nb 94	<7.93E+0	uCi/L	7.38E+0	uCi/L
CePr 144	<2.72E+2	uCi/L	<2.71E+2	uCi/L
Ra 226	<7.75E+1	uCi/L	<7.76E+1	uCi/L
I 129	<4.75E-2	uCi/L	<3.73E-2	uCi/L
Pu 239/240	9.98E-2	uCi/L	9.79E-2	uCi/L
Se 79	3.30E-2	uCi/L	4.66E-2	uCi/L
Sr 90	2.94E+1	uCi/L	2.95E+1	uCi/L
Tc 99	1.88E+1	uCi/L	1.48E+1	uCi/L
H3	1.19E+1	uCi/L	1.21E+1	uCi/L
U	9.40E-3	g/L	9.54E-3	g/L
U 234	1.49E-6	g/L	NA	
U 235	4.26E-4	g/L	NA	
U 238	8.97E-3	g/L	NA	

UNDIGESTED SAMPLE ANALYSIS RESULTS

UNDIGESTED SAMPLE RESULTS

Tank: 106AW
Sample No.: R348
Customer ID: 791 COMPOSITE

	Check Standard		Blank		Sample		Duplicate Sample		Spike of Sample		Check Standard	
Lab ID:	R346		R347		R348		R348		R348		R361	
Americium 241 (10-18-91)	103.5	%	1.51E-1	uCi/L	R348-5782 2.27E-2	uCi/L	R348-5882 2.02E-2	uCi/L	NA		110.8	%
Carbon 14 (10-25-91)	101.3	%	<1.13E-2	uCi/L	R348-5788 7.40E-2	uCi/L	R348-5888 7.54E-2	uCi/L	R348-5988 119.5	%	90.5	%
GEA (09-23-91)					R348-5730		R348-5830		R348-5930			
Cesium 137	94.3	%	<2.06E-3	uCi/L	5.07E+4	uCi/L	5.06E+4	uCi/L	124.5	%	97.5	%
Cesium 134	NA		<1.51E-3	uCi/L	4.01E+2	uCi/L	3.93E+2	uCi/L	NA		NA	
Europium 154	NA		<4.14E-3	uCi/L	<1.93E+1	uCi/L	<1.28E+1	uCi/L	NA		NA	
Europium 155	NA		<2.35E-3	uCi/L	<6.84E+1	uCi/L	<6.87E+1	uCi/L	NA		NA	
Cobalt 60	102.2	%	<1.17E-3	uCi/L	<4.71E+0	uCi/L	<8.03E+0	uCi/L	105.7	%	103	%
Tin 113	NA		<1.44E-3	uCi/L	<4.98E+1	uCi/L	<5.05E+1	uCi/L	NA		NA	
Ruthenium-Rhodium 106	NA		<2.22E-2	uCi/L	<4.97E+2	uCi/L	<4.81E+2	uCi/L	NA		NA	
Niobium 94	NA		<8.41E-4	uCi/L	<7.93E+0	uCi/L	<7.38E+0	uCi/L	NA		NA	
Cerium-Praseodymium 144	NA		<1.01E-2	uCi/L	<2.72E+2	uCi/L	<2.71E+2	uCi/L	NA		NA	
Radium 226	NA		<1.89E-2	uCi/L	<7.75E+1	uCi/L	<7.76E+1	uCi/L	NA		NA	
Iodine 129 (09-25-91)	102.4	%	<8.18E-2	uCi/L	R348-5785 <4.75E-2	uCi/L	R348-5885 <3.73E-2	uCi/L	NA		100.3	%
Plutonium 239/240 (10-18-91)	112.1	%	<7.62E-3	uCi/L	R348-5781 9.98E-2	uCi/L	R348-5881 9.79E-2	uCi/L	NA		110.5	%
Selenium 79 (09-25-91)	*		<5.63E-3	uCi/L	R348-5789 3.30E-2**	uCi/L	R348-5889 4.66E-2**	uCi/L	*		*	
Strontium 90 (10-03-91)	102.3	%	<4.42E-3	uCi/L	R348-5786 2.94E+1	uCi/L	R348-5886 2.95E+1	uCi/L	N/A		93.3	%
Technetium 99 (09-25-91)	92	%	<3.03E-2	uCi/L	R348-5784 1.88E+1	uCi/L	R348-5884 1.48E+1	uCi/L	N/A		92.5	%
Tritium (10-07-91)	98.6	%	<1.13E-2	uCi/L	R348-5787 1.19E+1	uCi/L	R348-5887 1.21E+1	uCi/L	R348-5987 92.1	%	100.5	%
Uranium (10-23-91)	91.4	%	<5.32E-7	g/L	R348-5740 9.40E-3	g/L	R348-5840 9.54E-3	g/L	R348-5940 42.4***	%	90.7	%
Uranium 234 (10-23-92)	NA		NA		1.49E-6	g/L	NA		NA		NA	
Uranium 235 (10-23-92)	NA		NA		4.26E-4	g/L	NA		NA		NA	
Uranium 238 (10-23-92)	NA		NA		8.97E-3	g/L	NA		NA		NA	

*No Standard Available For This Procedure. **Flag: Sample Duplicate >20% Difference. ***Matrix Interference.

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: CARBON 14	Sample Prep: UNDIGESTED

Instrument: WB27818, WC16085	Procedure/Rev: LA-348-104/B-0
Technologist: J. KUNKEL	Date: 10-25-91
Starting Time: 16:00	Temperature: 23degC
Ending Time: 20:15	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5588	11		
2	REAGENT BLANK	R347-5688	12		
3	SAMPLE 791 COMP	R348-5788	13		
4	SAM DUP 791 COMP	R348-5888	14		
5	SPIKE OF 791 COMP	R348-5988	15		
6	FINAL LMCS CHECK STD	R361-5588	16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	6B49/1.0 mL			N/A
SPIKE	6B49/1.0 mL			N/A
SAMPLES RERUN.				

A-6000-881 (03/92)

9 3 1 2 8 5 3 5 0 3 7

CARBON 14 ANALYSIS - UNDIGESTED SAMPLE

1

Serial No.	Sample Point	Date	Time Issued	Priority
R 346.-5588	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	% RECOVERY	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: STD

Remarks, Calculations, Results:
EDP R909 C14EDTA
STD# 6B49 RESULT 2.425 mCi/l
STD VAL 2.394 %REC 101.3%

$$\frac{(5383.23)(1000)}{(2.22e^6)(1)}$$

Analyst 1: 80518

Date: 10-25-91

2

Serial No.	Sample Point	Date	Time Issued	Priority
R 347.-5680	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	uCI/L	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: REG BL

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L

$$\frac{(<25)(1000)}{(2.22e^6)(1)} = <1.13e^{-2}\ \text{mCi/l}$$

Analyst 1: 80518

Date: 10-25-91

3

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5788	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	uCI/L	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L

$$\frac{(164.38)(1000)}{(2.22e^6)(1)} = 7.40e^{-2}\ \text{mCi/l}$$

Analyst 1: 80518

Date: 10-25-91

4

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5888	106AW R	9-	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	uCI/L	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L

$$\frac{(167.44)(1000)}{(2.22e^6)(1)} = 7.54e^{-2}\ \text{mCi/l}$$

Analyst 1: 80518

Date: 10-25-91

5

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5988	106AW R		11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	% RECOVERY	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
SAMPLE SPIKED ID
SPIKE ID 6B49 119.5%
SPIKE VOLUME 1ml
COUNT AS uCI/L

$$\frac{(3238.18-167.4)(1000)(2)}{(2.22e^6)(1)} = 2.86/2.394$$

Analyst 1: 80518

Date: 10-25-91

6

Serial No.	Sample Point	Date	Time Issued	Priority
R 361.-5586	106AW R	9-	43	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
C14	LA-348-104	% RECOVERY	W1TE2	1

RERUN

Sample Size: ? /ml
Customer ID: STD

Remarks, Calculations, Results:
EDP R909 C14EDTA
STD# 6B49 RESULT 2.166
STD VAL 2.394 %REC 90.5%

$$\frac{(4809.441)(1000)}{(2.22e^6)(1)}$$

Analyst 1: 80518

Date: 10-25-91

9 3 1 2 8 6 3 5 0 3 9

BACKGROUND CLEAN CURVE CORRELATION TABLE

50 10/31/92

POWERFAIL RECOVERY MON 28 OCT 1991 14:27 PAGE:

```
3 **- 5  1      191.20  4.57  10.00    46.50 147.0          0.17 **
    ISO1 %EFF CH1:89.98                              ISO1 DPM  :164.3778

4 **- 6  1      194.10  4.54  10.00    57.22 146.0          0.14 **
    ISO1 %EFF CH1:90.06                              ISO1 DPM  :167.4349

5 **- 7  1     3043.90  1.15  10.00    67.94 148.0          0.01 **
    ISO1 %EFF CH1:89.89                              ISO1 DPM  :3338.188

6 **- 8  P     4405.40  0.95  10.00    78.68 139.0          0.01 **
    ISO1 %EFF CH1:90.70                              ISO1 DPM  :4809.441
```

BEST AVAILABLE COPY

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: GAMMA ENERGY	Sample Prep: UNDIGESTED

Instrument: WB57237, WB57265	Procedure/Rev: LA-548-121/D-0
Technologist: L. TEMPLE	Date: 09-23-91
Starting Time: 13:30	Temperature: N/A
Ending Time: 14:08	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5530	11		
2	REAGENT BLANK	R347-5630	12		
3	SAMPLE 791 COMP	R348-5730	13		
4	SAM DUP 791 COMP	R348-5830	14		
5	SPIKE OF 791 COMP	R348-5930	15		
6	FINAL LMCS CHECK STD	R361-5530	16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	32B49/0.5 mL			N/A
SPIKE	32B49/0.5 mL			N/A

A-6000-881 (03/92)

GAMMA ENERGY ANALYSIS - UNDIGESTED SAMPLE

1147

Serial No	Sample Point	Date	Time Issued	Priority
R 348. 5530	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA 540-121	% RECOVERY	W1TE2	0

Sample Size	Customer ID
.50aml	STD

Remarks, Calculations, Results — Long Form please

COLX STDH 32649
R901 STD VAL 1.2723E'
RESULT 1.20E' % REC 94.39%
R905 STD VAL 1.0775E'
RESULT 1.08E' % REC 102.2%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	DHMilian			

Date 9-23-91

1148

Serial No	Sample Point	Date	Time Issued	Priority
R 347.-5630	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA-540-121	uCI/L	W1TE2	0

Sample Size	Customer ID
? 22ml	RCO DL

Remarks, Calculations, Results — long form please

COUNT AS uCI/L
LASER PRINTOUT
Cs 134 <1.51E-3 uci/l
Cs 137 <2.06E-3 uci/l
Eu 154 <4.14E-3 uci/l over

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	DHMilian			

Date 9-23-91

R347-5630

Eu 155 <2.35E-3 uci/l
Co 60 <1.17E-3 uci/l
Sn 113 <1.44E-3 uci/l
Ru 106 (RuRh 106) <2.22E-2 uci/l
Nb 94 <8.41E-4 uci/l
Ce 144 (CePr 144) <1.01E-2 uci/l
Ra-226 <1.89E-2 uCi/L

1149

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5730	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA-540-121	uCI/L	W1TE2	0

Sample Size	Customer ID
? .100-10ml-.500 (202	791 CONC

Remarks, Calculations, Results — long form please

COUNT AS uCI/L
LASER PRINTOUT
Co 60 <4.71 uci/l
Cs 134 4.01E-2 uci/l
Cs 137 5.07E-4 uci/l over

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	Eu Lewis			

Date 9-23-91

R348-5730

Eu 154 <1.93E' uci/l
Eu 155 <6.84E' uci/l
Sn 113 <4.98E' uci/l
Ru 106 - RuRh 106 <4.97E-2 uci/l
Nb 94 <7.93 uci/l
Ce 144 CePr 144 <2.72E-2 uci/l
Ra-226 ~~<5.52E-2 uci/l~~ < 7.75E-1 uCi/L

GAMMA ENERGY ANALYSIS - UNDIGESTED SAMPLE

1150

Sample No	Sample Point	Date	Time Issued	Priority
R 340.-5930	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA-340-121	uCi/L	W1E2	0

Sample Size	Customer ID
1 .100/1ml-.500	241 CUBE

Remarks, Calculations, Results
CONTI AS WELL
LASER PRINTOUT
Duplicate Sample
long form please
Co^{60} <8.03 neil
Cs^{134} 3.93 E^{2} neil lower

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	Eva Bueka			
Hrs	Hrs	Hrs	Hrs	Hrs
Log Stop				
Date 9-23-91	Time Completed	Lab Unit Supv		

Cs^{137} 5.06 E^{4} neil ✓ R348-5830
Eu^{154} <1.28 E^{1} neil
Eu^{155} <6.87 E^{1} neil
Sn^{113} <5.05 E^{1} neil
~~Ru^{106}~~ $RuRh^{106}$ <4.81 E^{2} neil
Nb^{94} <7.18 neil
~~Ce^{144}~~ $(CePr^{144})$ <2.71 E^{2} neil
Ra-226 ~~<6.35 E^{1} neil~~ 1.77 x 10 uCi/L
assuming it is in equilibrium with Pb^{214}

1151

Sample No	Sample Point	Date	Time Issued	Priority
R 340.-5930	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA-340-121	% RECOVERY	W1E2	0

Sample Size	Customer ID
1 .100/1ml-.500	241 CUBE

Remarks, Calculations, Results
SOURCE STDRD ID
SPIKE ID32E49
SPIKE VOLUME .50uml
long form please
Co^{60} $\frac{1.16E^{3}}{202} \times 2 = 1.139E^{1} / 1.0775E^{1}$ x100 = 106.7%
Cs^{137} $\left(\frac{5.23E^{4}}{202} - \frac{5.07E^{4}}{202}\right) \times 2 = 1.584E^{1} / 1.2723E^{1}$ x100 = 124.5%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	Eva Bueka			
Hrs	Hrs	Hrs	Hrs	Hrs
Log Stop				
Date 9-23-91	Time Completed	Lab Unit Supv		

1152

Sample No	Sample Point	Date	Time Issued	Priority
R 341.-5930	106AW R	9-23-91	10:41	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
GEA	LA-340-121	% RECOVERY	W1E2	0

Sample Size	Customer ID
1 .50uml	STD

Remarks, Calculations, Results
COLX STDD 32B49
R901 STD VAL 1.2723E1
RESULT 1.24E1 % REC 97.5%
R905 STD VAL 1.0775E1
RESULT 1.11E1 % REC 103.0%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	Eva Bueka			
Hrs	Hrs	Hrs	Hrs	Hrs
Log Stop				
Date 9-23-91	Time Completed	Lab Unit Supv		

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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-F V2.06 SOFTWARE

23-SEP-9115:14:05

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 1.0
DETECTOR NUMBER: 1 / GEOMETRY NUMBER: 42
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
YZED BY: 61453

SAMPLE DESCRIPTION: R-346-5530
GEOMETRY DESCRIPTION: 22ML LIQ
SAMPLE SIZE: 1.0000E-03 LI / CONVERSION FACTOR: 5.0000E-01
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 14:23:54

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3004. SECONDS
DEAD TIME: 0.13 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91

23-SEP-9115:14:05

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

PK	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1C	1127.73	563.33	1.24	264.	436.	12.6	CS-134, EU-152
2C	1139.81	569.37	1.24	270.	840.	10.5	CS-134, BI-207
3	1210.54	604.73	1.34	300.	5280.	2.9	CS-134
4	1324.34	661.63	1.45	190.	3725.	3.4	CS-137
4B		661.82			35.	46.4	
5C	1592.47	795.68	1.46	119.	3640.	3.6	CS-134
6C	1604.69	801.79	1.46	103.	387.	9.7	CS-134
7	2346.52	1172.73	1.81	122.	2374.	4.3	CO-60
8	2664.84	1331.92	1.83	21.	2162.	4.3	CO-60
9	2730.29	1364.65	1.63	21.	96.	25.1	CS-134
10	2800.76	1399.90	1.65	10.	28.	50.9	I-132
11	2921.32	1460.19	1.87	5.	221.	13.6	K-40

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY
B - ENVIRONMENTAL BACKGROUND PEAK

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0011
BACKGROUND DESCRIPTION: BK0011
BACKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
BACKGROUND LIVE TIME: 6000. SECONDS

23-SEP-9115:14:05

SAMPLE: R-346-5530
\ COLLECTED ON 23-SEP-91 AT 14:23:54
\YED 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 uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<5.53E-01		LLD<5.53E-01		911.07	
AC-228A	LLD<5.53E-01		LLD<5.53E-01		911.10	
AC-228B	LLD<8.41E-01		LLD<8.41E-01		338.40	
AG-108M	LLD<1.30E-01		LLD<1.30E-01		433.94	
AG-110M	LLD<6.05E-01		LLD<6.05E-01		657.76	
AM-241	LLD<6.01E-01		LLD<6.01E-01		59.54	
AM-243	LLD<1.76E-01		LLD<1.76E-01		74.67	
AM-243A	LLD<1.76E-01		LLD<1.76E-01		74.67	
AM-243B	LLD<1.94E+01		LLD<1.94E+01		43.10	
AR-41	LLD<1.04E-01		LLD<1.04E-01		1293.64	
AU-198	LLD<1.26E-01		LLD<1.26E-01		411.80	
BA-133	LLD<1.71E-01		LLD<1.71E-01		356.02	
BA-139	LLD<3.26E-01		LLD<3.26E-01		165.85	
BA-140	LLD<5.00E-01		LLD<5.00E-01		537.27	
BA-141	LLD<3.35E-01		LLD<3.35E-01		190.23	
BE-7	LLD<1.29E+00		LLD<1.29E+00		477.59	
07	LLD<1.35E-01		LLD<1.35E-01		569.70	
12	LLD<1.09E+00		LLD<1.09E+00		727.27	
BI-214	LLD<1.12E+00		LLD<1.12E+00		609.32	
BI-214A	LLD<1.12E+00		LLD<1.12E+00		609.32	
BI-214B	LLD<1.06E+00		LLD<1.06E+00		1120.28	
BI-214C	LLD<4.08E-01		LLD<4.08E-01		1764.51	
CD-109	LLD<2.37E+00		LLD<2.37E+00		88.03	
CE-139	LLD<7.39E-02		LLD<7.39E-02		165.85	
CE-141	LLD<1.23E-01		LLD<1.23E-01		145.44	
CEPR144	LLD<1.04E+00		LLD<1.04E+00		133.51	
CO-56	LLD<1.29E-01		LLD<1.29E-01		846.76	
CO-57	LLD<6.64E-02		LLD<6.64E-02		122.06	
CO-58	LLD<1.18E-01		LLD<1.18E-01		810.75	
CO-60	1.08E+01	+-4.74E-01	1.08E+01	+-4.74E-01	1332.50	-0.58
					1173.24	-0.50
CR-51	LLD<8.53E-01		LLD<8.53E-01		320.09	
CS-134	1.39E+01	+-5.22E-01	1.39E+01	+-5.22E-01	795.84	-0.16
					604.70	0.03
CS-136	LLD<1.40E-01		LLD<1.40E-01		818.51	
CS-137	1.20E+01	+-4.39E-01	1.20E+01	+-4.39E-01	661.65	-0.02
CS-138	LLD<8.29E-02		LLD<8.29E-02		1435.86	
EU-152	LLD<3.74E-01		LLD<3.74E-01		1408.01	
EU-154	LLD<2.38E-01		LLD<2.38E-01		1274.45	
EU-155	LLD<2.54E-01		LLD<2.54E-01		105.31	
FE-59	LLD<3.07E-01		LLD<3.07E-01		1099.25	
I 31	LLD<1.60E-01		LLD<1.60E-01		482.20	
03	LLD<1.04E-01		LLD<1.04E-01		279.20	
31	LLD<1.32E-01		LLD<1.32E-01		364.48	
I-132	LLD<1.53E-01		LLD<1.53E-01		667.69	
I-133	LLD<1.46E-01		LLD<1.46E-01		529.69	
I-134	LLD<2.02E-01		LLD<2.02E-01		847.03	

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I-135	LLD<2.75E-01		LLD<2.75E-01		1260.41	
K-40	1.11E+01	+-1.51E+00	1.11E+01	+-1.51E+00	1460.75	-0.56
KR-85	LLD<2.92E+01		LLD<2.92E+01		513.99	
KR-85M	LLD<8.72E-02		LLD<8.72E-02		151.17	
·87	LLD<3.23E-01		LLD<3.23E-01		402.58	
·-89	LLD<4.10E+00		LLD<4.10E+00		220.90	
LA-140	LLD<5.96E-02		LLD<5.96E-02		1596.20	
LA-142	LLD<3.24E-01		LLD<3.24E-01		641.83	
MN-54	LLD<1.44E-01		LLD<1.44E-01		834.83	
MN-56	LLD<1.45E-01		LLD<1.45E-01		846.76	
NA-22	LLD<8.46E-02		LLD<8.46E-02		1274.55	
NA-24	LLD<2.26E-01		LLD<2.26E-01		1368.60	
NB-94	LLD<1.15E-01		LLD<1.15E-01		702.63	
NB-95	LLD<1.21E-01		LLD<1.21E-01		765.78	
NB-97	LLD<7.33E-01		LLD<7.33E-01		657.92	
NP-237	LLD<6.10E-01		LLD<6.10E-01		86.50	
NP-238	LLD<5.18E-01		LLD<5.18E-01		984.45	
NP-239	LLD<5.87E-01		LLD<5.87E-01		277.60	
PA-233	LLD<2.56E-01		LLD<2.56E-01		311.98	
PA-234M	LLD<2.69E+01		LLD<2.69E+01		1001.03	
PB-210	LLD<1.59E+01		LLD<1.59E+01		46.50	
PB-212	LLD<1.83E-01		LLD<1.83E-01		239.00	
PB-212A	LLD<1.82E-01		LLD<1.82E-01		239.00	
PB-212B	LLD<2.49E+00		LLD<2.49E+00		300.10	
PB-214	LLD<2.70E-01		LLD<2.70E-01		351.92	
PB-214A	LLD<2.70E-01		LLD<2.70E-01		351.92	
PB-214B	LLD<4.92E-01		LLD<4.92E-01		295.21	
PO-210	LLD<1.24E+04		LLD<1.24E+04		804.00	
PO-214	LLD<6.21E+03		LLD<6.21E+03		799.70	
PO-216	LLD<1.23E+04		LLD<1.23E+04		804.90	
239	LLD<8.18E+02		LLD<8.18E+02		129.30	
PU-241	LLD<3.12E+04		LLD<3.12E+04		148.57	
RA-224	LLD<2.03E+00		LLD<2.03E+00		240.99	
RA-226	LLD<2.02E+00		LLD<2.02E+00		186.10	
RB-88	LLD<6.26E-01		LLD<6.26E-01		1836.00	
RB-89	LLD<6.84E-01		LLD<6.84E-01		1031.88	
RN-220	LLD<1.17E+02		LLD<1.17E+02		549.73	
RU-103	LLD<1.33E-01		LLD<1.33E-01		497.08	
RURH106	LLD<2.64E+00		LLD<2.64E+00		621.80	
SB-124	LLD<4.71E-01		LLD<4.71E-01		602.72	
SB-125	LLD<9.32E-01		LLD<9.32E-01		176.33	
SC-46	LLD<1.59E-01		LLD<1.59E-01		1120.45	
SE-75	LLD<1.36E-01		LLD<1.36E-01		264.66	
SN-113	LLD<1.84E-01		LLD<1.84E-01		391.67	
SR-85	LLD<1.28E-01		LLD<1.28E-01		513.99	
SR-91	LLD<2.46E-01		LLD<2.46E-01		555.60	
SR-92	LLD<6.54E-02		LLD<6.54E-02		1383.94	
TA-182	LLD<4.45E-01		LLD<4.45E-01		1121.30	
TC-99M	LLD<6.93E-02		LLD<6.93E-02		140.51	
TE-123M	LLD<7.42E-02		LLD<7.42E-02		159.00	
TE-125M	LLD<1.91E+01		LLD<1.91E+01		109.27	
TE-132	LLD<8.65E-02		LLD<8.65E-02		228.16	
TH-228	LLD<6.41E+00		LLD<6.41E+00		84.37	
TH-234	LLD<1.35E+00		LLD<1.35E+00		92.50	
TH-234A	LLD<1.35E+00		LLD<1.35E+00		92.50	
234B	LLD<4.52E+00		LLD<4.52E+00		63.30	
208	LLD<1.70E-01		LLD<1.70E-01		583.14	
U-235	LLD<1.29E-01		LLD<1.29E-01		185.71	
U-235A	LLD<1.29E-01		LLD<1.29E-01		185.71	
U-235B	LLD<5.59E-01		LLD<5.59E-01		143.76	

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U-237	LLD<3.58E-01	LLD<3.58E-01	208.00
W-187	LLD<4.26E-01	LLD<4.26E-01	685.74
XE-131M	LLD<3.41E+00	LLD<3.41E+00	163.98
XE-133	LLD<2.28E-01	LLD<2.28E-01	81.00
133M	LLD<7.60E-01	LLD<7.60E-01	233.21
135	LLD<1.01E-01	LLD<1.01E-01	249.79
XE-138	LLD<7.33E-01	LLD<7.33E-01	258.41
Y-88	LLD<5.94E-02	LLD<5.94E-02	1836.06
Y-91	LLD<3.95E+01	LLD<3.95E+01	1204.90
Y-91M	LLD<1.86E-01	LLD<1.86E-01	555.60
ZN-65	LLD<3.60E-01	LLD<3.60E-01	1115.55
ZR-95	LLD<2.22E-01	LLD<2.22E-01	756.73
ZR-97	LLD<1.26E-01	LLD<1.26E-01	743.33
TOTAL	4.78E+01 +-1.72E+00	4.78E+01 +-1.72E+00	

STANDARD DEVIATION = 0.28

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 1.53E-09 UC/LI
TOTAL MEASURED ACTIVITY = 4.78E+01 (+-1.72E+00) UC/LI
% TECH. SPEC. = ****** (+-****)

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
1127.73	563.33	436.	12.6	1.94E+01
1139.81	569.37	840.	10.5	3.77E+01
1604.69	801.79	387.	9.7	2.35E+01
2730.29	1364.65	96.	25.1	9.00E+00
2800.76	1399.90	28.	50.9	2.71E+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-F V2.06 SOFTWARE

23-SEP-9116:13:20

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 1.0
DETECTOR NUMBER: 1 / GEOMETRY NUMBER: 42
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
ANALYZED BY: 61453

SAMPLE DESCRIPTION: R-347-5630
GEOMETRY DESCRIPTION: 22ML LIQ
SAMPLE SIZE: 2.2000E-02 LI / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 15:23:11

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3001. SECONDS
DEAD TIME: 0.03 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91

23-SEP-9116:13:20

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

	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1	2921.70	1460.38	1.83	11.	173.	16.2	K-40
1B		1461.77			182.	11.2	

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

B - ENVIRONMENTAL BACKGROUND PEAK

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0011
BACKGROUND DESCRIPTION: BK0011
BACKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
BACKGROUND LIVE TIME: 6000. SECONDS

23-SEP-9116:13:20

SAMPLE: R-347-5630
TA COLLECTED ON 23-SEP-91 AT 15:23:11
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 uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<4.99E-03		LLD<4.99E-03		911.07	
AC-228A	LLD<4.99E-03		LLD<4.99E-03		911.10	
AC-228B	LLD<7.36E-03		LLD<7.36E-03		338.40	
AG-108M	LLD<9.15E-04		LLD<9.15E-04		433.94	
AG-110M	LLD<1.81E-03		LLD<1.81E-03		657.76	
AM-241	LLD<5.84E-03		LLD<5.84E-03		59.54	
AM-243	LLD<1.87E-03		LLD<1.87E-03		74.67	
AM-243A	LLD<1.87E-03		LLD<1.87E-03		74.67	
AM-243B	LLD<1.84E-01		LLD<1.84E-01		43.10	
AR-41	LLD<1.86E-03		LLD<1.86E-03		1293.64	
AU-198	LLD<8.80E-04		LLD<8.80E-04		411.80	
BA-133	LLD<1.51E-03		LLD<1.51E-03		356.02	
BA-139	LLD<3.28E-03		LLD<3.28E-03		165.85	
BA-140	LLD<3.77E-03		LLD<3.77E-03		537.27	
BA-141	LLD<3.30E-03		LLD<3.30E-03		190.23	
BE-7	LLD<9.84E-03		LLD<9.84E-03		477.59	
BI-207	LLD<1.08E-03		LLD<1.08E-03		569.70	
BI-212	LLD<1.19E-02		LLD<1.19E-02		727.27	
BI-214	LLD<4.05E-03		LLD<4.05E-03		609.32	
BI-214A	LLD<4.05E-03		LLD<4.05E-03		609.32	
BI-214B	LLD<1.15E-02		LLD<1.15E-02		1120.28	
BI-214C	LLD<6.84E-03		LLD<6.84E-03		1764.51	
CD-109	LLD<2.61E-02		LLD<2.61E-02		88.03	
CE-139	LLD<7.42E-04		LLD<7.42E-04		165.85	
CE-141	LLD<1.25E-03		LLD<1.25E-03		145.44	
CEPR144	LLD<1.01E-02		LLD<1.01E-02		133.51	
CO-56	LLD<1.24E-03		LLD<1.24E-03		846.76	
CO-57	LLD<6.52E-04		LLD<6.52E-04		122.06	
CO-58	LLD<1.06E-03		LLD<1.06E-03		810.75	
CO-60	LLD<1.17E-03		LLD<1.17E-03		1332.50	
CR-51	LLD<7.55E-03		LLD<7.55E-03		320.09	
CS-134	LLD<1.51E-03		LLD<1.51E-03		795.84	
CS-136	LLD<9.12E-04		LLD<9.12E-04		818.51	
CS-137	LLD<2.06E-03		LLD<2.06E-03		661.65	
CS-138	LLD<2.24E-03		LLD<2.24E-03		1435.86	
EU-152	LLD<6.73E-03		LLD<6.73E-03		1408.01	
EU-154	LLD<4.14E-03		LLD<4.14E-03		1274.45	
EU-155	LLD<2.35E-03		LLD<2.35E-03		105.31	
FE-59	LLD<2.64E-03		LLD<2.64E-03		1099.25	
HF-181	LLD<1.19E-03		LLD<1.19E-03		482.20	
HG-203	LLD<9.63E-04		LLD<9.63E-04		279.20	
I-131	LLD<1.06E-03		LLD<1.06E-03		364.48	
I-132	LLD<1.21E-03		LLD<1.21E-03		667.69	
I-133	LLD<1.06E-03		LLD<1.06E-03		529.69	
I-134	LLD<2.00E-03		LLD<2.00E-03		847.03	
I-135	LLD<5.78E-03		LLD<5.78E-03		1260.41	
K-40	LLD<4.41E-02		LLD<4.41E-02		1460.75	

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KR-85	LLD<3.70E-01	LLD<3.70E-01	513.99
KR-85M	LLD<8.24E-04	LLD<8.24E-04	151.17
KR-87	LLD<2.50E-03	LLD<2.50E-03	402.58
KR-89	LLD<4.01E-02	LLD<4.01E-02	220.90
40	LLD<1.50E-03	LLD<1.50E-03	1596.20
42	LLD<2.94E-03	LLD<2.94E-03	641.83
MN-54	LLD<1.04E-03	LLD<1.04E-03	834.83
MN-56	LLD<1.39E-03	LLD<1.39E-03	846.76
NA-22	LLD<1.47E-03	LLD<1.47E-03	1274.55
NA-24	LLD<1.59E-03	LLD<1.59E-03	1368.60
NB-94	LLD<8.41E-04	LLD<8.41E-04	702.63
NB-95	LLD<1.43E-03	LLD<1.43E-03	765.78
NB-97	LLD<2.19E-03	LLD<2.19E-03	657.92
NP-237	LLD<6.09E-03	LLD<6.09E-03	86.50
NP-238	LLD<6.10E-03	LLD<6.10E-03	984.45
NP-239	LLD<4.76E-03	LLD<4.76E-03	277.60
PA-233	LLD<2.42E-03	LLD<2.42E-03	311.98
PA-234M	LLD<2.72E-01	LLD<2.72E-01	1001.03
PB-210	LLD<1.50E-01	LLD<1.50E-01	46.50
PB-212	LLD<1.70E-03	LLD<1.70E-03	239.00
PB-212A	LLD<1.70E-03	LLD<1.70E-03	239.00
PB-212B	LLD<2.38E-02	LLD<2.38E-02	300.10
PB-214	LLD<2.58E-03	LLD<2.58E-03	351.92
PB-214A	LLD<2.58E-03	LLD<2.58E-03	351.92
PB-214B	LLD<4.57E-03	LLD<4.57E-03	295.21
PO-210	LLD<1.15E+02	LLD<1.15E+02	804.00
PO-214	LLD<1.22E+01	LLD<1.22E+01	799.70
PO-216	LLD<6.56E+01	LLD<6.56E+01	804.90
PU-239	LLD<7.53E+00	LLD<7.53E+00	129.30
41	LLD<3.06E+02	LLD<3.06E+02	148.57
24	LLD<1.85E-02	LLD<1.85E-02	240.99
RA-226	LLD<1.89E-02	LLD<1.89E-02	186.10
RB-88	LLD<8.95E-03	LLD<8.95E-03	1836.00
RB-89	LLD<7.52E-03	LLD<7.52E-03	1031.88
RN-220	LLD<1.01E+00	LLD<1.01E+00	549.73
RU-103	LLD<9.06E-04	LLD<9.06E-04	497.08
RURH106	LLD<2.22E-02	LLD<2.22E-02	621.80
SB-124	LLD<1.10E-03	LLD<1.10E-03	602.72
SB-125	LLD<1.04E-02	LLD<1.04E-02	176.33
SC-46	LLD<1.73E-03	LLD<1.73E-03	1120.45
SE-75	LLD<1.12E-03	LLD<1.12E-03	264.66
SN-113	LLD<1.44E-03	LLD<1.44E-03	391.67
SR-85	LLD<1.62E-03	LLD<1.62E-03	513.99
SR-91	LLD<2.09E-03	LLD<2.09E-03	555.60
SR-92	LLD<1.49E-03	LLD<1.49E-03	1383.94
TA-182	LLD<4.67E-03	LLD<4.67E-03	1121.30
TC-99M	LLD<6.80E-04	LLD<6.80E-04	140.51
TE-123M	LLD<6.97E-04	LLD<6.97E-04	159.00
TE-125M	LLD<1.71E-01	LLD<1.71E-01	109.27
TE-132	LLD<7.92E-04	LLD<7.92E-04	228.16
TH-228	LLD<6.51E-02	LLD<6.51E-02	84.37
TH-234	LLD<1.24E-02	LLD<1.24E-02	92.50
TH-234A	LLD<1.24E-02	LLD<1.24E-02	92.50
TH-234B	LLD<4.24E-02	LLD<4.24E-02	63.30
[illegible]8	LLD<1.20E-03	LLD<1.20E-03	583.14
[illegible]	LLD<1.22E-03	LLD<1.22E-03	185.71
[illegible]35A	LLD<1.22E-03	LLD<1.22E-03	185.71
U-235B	LLD<5.62E-03	LLD<5.62E-03	143.76
U-237	LLD<3.11E-03	LLD<3.11E-03	208.00
W-187	LLD<4.73E-03	LLD<4.73E-03	685.74

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XE-131M	LLD<3.27E-02	LLD<3.27E-02	163.98
XE-133	LLD<2.27E-03	LLD<2.27E-03	81.00
XE-133M	LLD<6.51E-03	LLD<6.51E-03	233.21
XE-135	LLD<8.73E-04	LLD<8.73E-04	249.79
138	LLD<6.59E-03	LLD<6.59E-03	258.41
88	LLD<8.50E-04	LLD<8.50E-04	1836.06
Y-91	LLD<5.56E-01	LLD<5.56E-01	1204.90
Y-91M	LLD<1.58E-03	LLD<1.58E-03	555.60
ZN-65	LLD<4.12E-03	LLD<4.12E-03	1115.55
ZR-95	LLD<2.22E-03	LLD<2.22E-03	756.73
ZR-97	LLD<1.05E-03	LLD<1.05E-03	743.33
TOTAL	0.00E-01 +-0.00E-01	0.00E-01 +-0.00E-01	

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

ALL DETECTED PEAKS WERE USED IN THE ANALYSIS

PEAKS ELIMINATED BY BACKGROUND SUBTRACTION

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
2921.70	1460.38	173.	16.2	1.71E+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-F V2.06 SOFTWARE

23-SEP-9117:13:16

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 1.0
DETECTOR NUMBER: 1 / GEOMETRY NUMBER: 42
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
YZED BY: 62820

SAMPLE DESCRIPTION: R348-5730
GEOMETRY DESCRIPTION: 22ML LIQ
SAMPLE SIZE: 1.0000E-03 LI / CONVERSION FACTOR: 4.9505E-03
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 16:22:48

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3020. SECONDS
DEAD TIME: 0.66 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91

23-SEP-9117:13:16

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

K	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1	53.81	26.52	0.83	2711.	259.	53.6	SB/TE-X
2	1025.01	511.98	1.54	2184.	580.	24.4	I-133,TL-208,
2B		510.84			74.	27.6	NA-22,ZN-65, RH-106
3	1139.96	569.45	1.10	927.	241.	38.2	CS-134, BI-207
4	1210.50	604.71	1.34	757.	1495.	7.3	CS-134
5	1324.36	661.64	1.42	572.	153750.	0.5	CS-137
5B		661.82			35.	46.4	
6C	1592.49	795.70	1.41	35.	1041.	6.8	CS-134
7C	1604.61	801.75	1.41	37.	91.	17.5	CS-134
8	2920.95	1460.01	1.69	7.	198.	14.5	K-40

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY
B - ENVIRONMENTAL BACKGROUND PEAK

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0011
KGROUND DESCRIPTION: BK0011
CKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
BACKGROUND LIVE TIME: 6000. SECONDS

23-SEP-9117:13:16

SAMPLE: R348-5730
A COLLECTED ON 23-SEP-91 AT 16:22:48
AYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT.

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

NUCLIDE	ACTIVITY CONCENTRATION IN uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<2.49E+01		LLD<2.49E+01		911.07	
AC-228A	LLD<2.49E+01		LLD<2.49E+01		911.10	
AC-228B	LLD<2.31E+02		LLD<2.31E+02		338.40	
AG-108M	LLD<4.23E+01		LLD<4.23E+01		433.94	
AG-110M	LLD<3.79E+02		LLD<3.79E+02		657.76	
AM-241	LLD<1.62E+02		LLD<1.62E+02		59.54	
AM-243	LLD<4.87E+01		LLD<4.87E+01		74.67	
AM-243A	LLD<4.87E+01		LLD<4.87E+01		74.67	
AM-243B	LLD<5.11E+03		LLD<5.11E+03		43.10	
AR-41	LLD<9.07E+00		LLD<9.07E+00		1293.64	
AU-198	LLD<3.66E+01		LLD<3.66E+01		411.80	
BA-133	LLD<4.67E+01		LLD<4.67E+01		356.02	
BA-139	LLD<8.45E+01		LLD<8.45E+01		165.85	
BA-140	LLD<1.17E+02		LLD<1.17E+02		537.27	
BA-141	LLD<9.55E+01		LLD<9.55E+01		190.23	
BE-7	LLD<4.32E+02		LLD<4.32E+02		477.59	
[illegible]07	LLD<2.39E+01		LLD<2.39E+01		569.70	
[illegible]12	LLD<6.05E+01		LLD<6.05E+01		727.27	
[illegible]-214	LLD<7.77E+01		LLD<7.77E+01		609.32	
BI-214A	LLD<7.77E+01		LLD<7.77E+01		609.32	
BI-214B	LLD<4.81E+01		LLD<4.81E+01		1120.28	
BI-214C	LLD<3.04E+01		LLD<3.04E+01		1764.51	
CD-109	LLD<6.07E+02		LLD<6.07E+02		88.03	
CE-139	LLD<1.91E+01		LLD<1.91E+01		165.85	
CE-141	LLD<3.25E+01		LLD<3.25E+01		145.44	
CEPR144	LLD<2.72E+02		LLD<2.72E+02		133.51	
CO-56	LLD<6.82E+00		LLD<6.82E+00		846.76	
CO-57	LLD<1.79E+01		LLD<1.79E+01		122.06	
CO-58	LLD<6.72E+00		LLD<6.72E+00		810.75	
CO-60	LLD<4.71E+00		LLD<4.71E+00		1332.50	
CR-51	LLD<2.37E+02		LLD<2.37E+02		320.09	
CS-134	4.01E+02	+-2.76E+01	4.01E+02	+-2.76E+01	795.84	-0.15
					604.70	0.01
CS-136	LLD<6.74E+00		LLD<6.74E+00		818.51	
CS-137	5.07E+04	+-6.65E+02	5.07E+04	+-6.65E+02	661.65	-0.01
CS-138	LLD<1.13E+01		LLD<1.13E+01		1435.86	
EU-152	LLD<3.60E+01		LLD<3.60E+01		1408.01	
EU-154	LLD<1.93E+01		LLD<1.93E+01		1274.45	
EU-155	LLD<6.84E+01		LLD<6.84E+01		105.31	
FE-59	LLD<1.38E+01		LLD<1.38E+01		1099.25	
HF-181	LLD<5.08E+01		LLD<5.08E+01		482.20	
[illegible]03	LLD<2.96E+01		LLD<2.96E+01		279.20	
I	LLD<3.69E+01		LLD<3.69E+01		364.48	
[illegible]2	LLD<2.35E+01		LLD<2.35E+01		667.69	
I-133	LLD<3.48E+01		LLD<3.48E+01		529.69	
I-134	LLD<1.17E+01		LLD<1.17E+01		847.03	
I-135	LLD<2.68E+01		LLD<2.68E+01		1260.41	

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K-40	9.98E+02	+-1.46E+02	9.98E+02	+-1.46E+02	1460.75	-0.74
KR-85	LLD<8.00E+03		LLD<8.00E+03		513.99	
KR-85M	LLD<2.26E+01		LLD<2.26E+01		151.17	
KR-87	LLD<9.23E+01		LLD<9.23E+01		402.58	
·89	LLD<1.11E+03		LLD<1.11E+03		220.90	
LA-140	LLD<8.68E+00		LLD<8.68E+00		1596.20	
LA-142	LLD<6.19E+01		LLD<6.19E+01		641.83	
MN-54	LLD<7.63E+00		LLD<7.63E+00		834.83	
MN-56	LLD<7.70E+00		LLD<7.70E+00		846.76	
NA-22	LLD<6.87E+00		LLD<6.87E+00		1274.55	
NA-24	LLD<1.16E+01		LLD<1.16E+01		1368.60	
NB-94	LLD<7.93E+00		LLD<7.93E+00		702.63	
NB-95	LLD<7.90E+00		LLD<7.90E+00		765.78	
NB-97	LLD<4.60E+02		LLD<4.60E+02		657.92	
NP-237	LLD<1.63E+02		LLD<1.63E+02		86.50	
NP-238	LLD<2.53E+01		LLD<2.53E+01		984.45	
NP-239	LLD<1.53E+02		LLD<1.53E+02		277.60	
PA-233	LLD<7.12E+01		LLD<7.12E+01		311.98	
PA-234M	LLD<1.30E+03		LLD<1.30E+03		1001.03	
PB-210	LLD<4.25E+03		LLD<4.25E+03		46.50	
PB-212	LLD<4.89E+01		LLD<4.89E+01		239.00	
PB-212A	LLD<4.87E+01		LLD<4.87E+01		239.00	
PB-212B	LLD<6.94E+02		LLD<6.94E+02		300.10	
PB-214	LLD<7.75E+01		LLD<7.75E+01		351.92	
PB-214A	LLD<7.75E+01		LLD<7.75E+01		351.92	
PB-214B	LLD<1.31E+02		LLD<1.31E+02		295.21	
PO-210	LLD<8.80E+05		LLD<8.80E+05		804.00	
PO-214	LLD<3.39E+05		LLD<3.39E+05		799.70	
PO-216	LLD<6.68E+05		LLD<6.68E+05		804.90	
PU-239	LLD<2.13E+05		LLD<2.13E+05		129.30	
241	LLD<8.54E+06		LLD<8.54E+06		148.57	
RA-224	LLD<5.24E+02		LLD<5.24E+02		240.99	
RA-226	LLD<5.52E+02		LLD<5.52E+02		186.10	
RB-88	LLD<5.33E+01		LLD<5.33E+01		1836.00	
RB-89	LLD<3.84E+01		LLD<3.84E+01		1031.88	
RN-220	LLD<2.33E+04		LLD<2.33E+04		549.73	
RU-103	LLD<3.88E+01		LLD<3.88E+01		497.08	
RURH106	LLD<4.97E+02		LLD<4.97E+02		621.80	
SB-124	LLD<3.25E+01		LLD<3.25E+01		602.72	
SB-125	LLD<2.53E+02		LLD<2.53E+02		176.33	
SC-46	LLD<7.23E+00		LLD<7.23E+00		1120.45	
SE-75	LLD<3.65E+01		LLD<3.65E+01		264.66	
SN-113	LLD<4.98E+01		LLD<4.98E+01		391.67	
SR-85	LLD<3.51E+01		LLD<3.51E+01		513.99	
SR-91	LLD<4.47E+01		LLD<4.47E+01		555.60	
SR-92	LLD<7.17E+00		LLD<7.17E+00		1383.94	
TA-182	LLD<2.07E+01		LLD<2.07E+01		1121.30	
TC-99M	LLD<1.81E+01		LLD<1.81E+01		140.51	
TE-123M	LLD<1.98E+01		LLD<1.98E+01		159.00	
TE-125M	LLD<5.20E+03		LLD<5.20E+03		109.27	
TE-132	LLD<2.32E+01		LLD<2.32E+01		228.16	
TH-228	LLD<1.67E+03		LLD<1.67E+03		84.37	
TH-234	LLD<3.59E+02		LLD<3.59E+02		92.50	
TH-234A	LLD<3.59E+02		LLD<3.59E+02		92.50	
TH-234B	LLD<1.19E+03		LLD<1.19E+03		63.30	
208	LLD<2.64E+01		LLD<2.64E+01		583.14	
.35	LLD<3.57E+01		LLD<3.57E+01		185.71	
U-235A	LLD<3.57E+01		LLD<3.57E+01		185.71	
U-235B	LLD<1.49E+02		LLD<1.49E+02		143.76	
U-237	LLD<9.47E+01		LLD<9.47E+01		208.00	

W-187	LLD<2.83E+01	LLD<2.83E+01	685.74
XE-131M	LLD<8.95E+02	LLD<8.95E+02	163.98
XE-133	LLD<6.09E+01	LLD<6.09E+01	81.00
XE-133M	LLD<2.07E+02	LLD<2.07E+02	233.21
35	LLD<2.65E+01	LLD<2.65E+01	249.79
38	LLD<2.00E+02	LLD<2.00E+02	258.41
Y-88	LLD<5.04E+00	LLD<5.04E+00	1836.06
Y-91	LLD<2.47E+03	LLD<2.47E+03	1204.90
Y-91M	LLD<3.39E+01	LLD<3.39E+01	555.60
ZN-65	LLD<2.25E+01	LLD<2.25E+01	1115.55
ZR-95	LLD<1.07E+01	LLD<1.07E+01	756.73
ZR-97	LLD<7.30E+00	LLD<7.30E+00	743.33
TOTAL	5.21E+04 +-6.81E+02	5.21E+04 +-6.81E+02	

STANDARD DEVIATION = 0.35

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 1.06E-08 UC/LI
TOTAL MEASURED ACTIVITY = 5.21E+04 (+-6.81E+02) UC/LI
% TECH. SPEC. = ****** (+-****)

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
53.81	26.52	259.	53.6	1.71E+03
1025.01	511.98	507.	28.2	2.07E+01
1139.96	569.45	241.	38.2	1.08E+01
1604.61	801.75	91.	17.5	5.55E+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-F V2.06 SOFTWARE

23-SEP-9118:12:36

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 1.0
DETECTOR NUMBER: 1 / GEOMETRY NUMBER: 42
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
ANALYZED BY: 62820

SAMPLE DESCRIPTION: R348-5830
GEOMETRY DESCRIPTION: 22ML LIQ
SAMPLE SIZE: 1.0000E-03 LI / CONVERSION FACTOR: 4.9505E-03
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 17:22:08

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3020. SECONDS
DEAD TIME: 0.66 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91

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

	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1	53.91	26.56	0.83	2658.	203.	67.3	SB/TE-X
2	1025.16	512.05	1.21	2333.	509.	28.5	TL-208,NA-22,
2B		510.84			74.	27.6	ZN-65,RH-106
3	1210.58	604.75	1.33	913.	1413.	8.2	CS-134
4	1324.36	661.64	1.41	596.	153493.	0.5	CS-137
4B		661.82			35.	46.4	
5C	1592.55	795.72	1.43	46.	1019.	7.2	CS-134
6C	1604.62	801.76	1.43	47.	101.	21.8	CS-134
7	2921.40	1460.24	1.85	13.	176.	16.1	K-40

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

C- MULTIPLET ANALYSIS CONVERGED NORMALLY
B- ENVIRONMENTAL BACKGROUND PEAK

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0011
BACKGROUND DESCRIPTION: BK0011
BACKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
:GROUND LIVE TIME: 6000. SECONDS

LMHS 08/31/92

23-SEP-9118:12:36

WHC-SD-WM-DP-025
Addendum 17 Rev 0

SAMPLE: R348-5830
`TA COLLECTED ON 23-SEP-91 AT 17:22:08
.CAYED 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 uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<2.44E+01		LLD<2.44E+01		911.07	
AC-228A	LLD<2.44E+01		LLD<2.44E+01		911.10	
AC-228B	LLD<2.30E+02		LLD<2.30E+02		338.40	
AG-108M	LLD<4.23E+01		LLD<4.23E+01		433.94	
AG-110M	LLD<3.79E+02		LLD<3.79E+02		657.76	
AM-241	LLD<1.62E+02		LLD<1.62E+02		59.54	
AM-243	LLD<4.88E+01		LLD<4.88E+01		74.67	
AM-243A	LLD<4.88E+01		LLD<4.88E+01		74.67	
AM-243B	LLD<5.15E+03		LLD<5.15E+03		43.10	
AR-41	LLD<9.07E+00		LLD<9.07E+00		1293.64	
AU-198	LLD<3.70E+01		LLD<3.70E+01		411.80	
BA-133	LLD<4.69E+01		LLD<4.69E+01		356.02	
BA-139	LLD<8.52E+01		LLD<8.52E+01		165.85	
BA-140	LLD<1.16E+02		LLD<1.16E+02		537.27	
BA-141	LLD<9.66E+01		LLD<9.66E+01		190.23	
BE-7	LLD<4.30E+02		LLD<4.30E+02		477.59	
BI-207	LLD<2.38E+01		LLD<2.38E+01		569.70	
-212	LLD<6.42E+01		LLD<6.42E+01		727.27	
-214	LLD<7.99E+01		LLD<7.99E+01		609.32	
BI-214A	LLD<7.99E+01		LLD<7.99E+01		609.32	
BI-214B	LLD<5.12E+01		LLD<5.12E+01		1120.28	
BI-214C	LLD<3.63E+01		LLD<3.63E+01		1764.51	
CD-109	LLD<6.09E+02		LLD<6.09E+02		88.03	
CE-139	LLD<1.93E+01		LLD<1.93E+01		165.85	
CE-141	LLD<3.21E+01		LLD<3.21E+01		145.44	
CEPR144	LLD<2.71E+02		LLD<2.71E+02		133.51	
CO-56	LLD<7.39E+00		LLD<7.39E+00		846.76	
CO-57	LLD<1.81E+01		LLD<1.81E+01		122.06	
CO-58	LLD<7.26E+00		LLD<7.26E+00		810.75	
CO-60	LLD<8.03E+00		LLD<8.03E+00		1332.50	
CR-51	LLD<2.35E+02		LLD<2.35E+02		320.09	
CS-134	3.93E+02	+-2.85E+01	3.93E+02	+-2.85E+01	795.84	-0.12
					604.70	0.05
CS-136	LLD<7.84E+00		LLD<7.84E+00		818.51	
CS-137	5.06E+04	+-6.64E+02	5.06E+04	+-6.64E+02	661.65	-0.01
CS-138	LLD<1.46E+01		LLD<1.46E+01		1435.86	
EU-152	LLD<2.76E+01		LLD<2.76E+01		1408.01	
EU-154	LLD<1.28E+01		LLD<1.28E+01		1274.45	
EU-155	LLD<6.87E+01		LLD<6.87E+01		105.31	
FE-59	LLD<1.17E+01		LLD<1.17E+01		1099.25	
HF-181	LLD<5.04E+01		LLD<5.04E+01		482.20	
HG-203	LLD<2.99E+01		LLD<2.99E+01		279.20	
I 131	LLD<3.66E+01		LLD<3.66E+01		364.48	
32	LLD<2.35E+01		LLD<2.35E+01		667.69	
I-133	LLD<3.56E+01		LLD<3.56E+01		529.69	
I-134	LLD<1.12E+01		LLD<1.12E+01		847.03	
I-135	LLD<2.57E+01		LLD<2.57E+01		1260.41	

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K-40	8.89E+02	+-1.44E+02	8.89E+02	+-1.44E+02	1460.75	-0.51
KR-85	LLD<8.07E+03		LLD<8.07E+03		513.99	
KR-85M	LLD<2.26E+01		LLD<2.26E+01		151.17	
KR-87	LLD<9.18E+01		LLD<9.18E+01		402.58	
89	LLD<1.10E+03		LLD<1.10E+03		220.90	
140	LLD<8.68E+00		LLD<8.68E+00		1596.20	
LA-142	LLD<5.90E+01		LLD<5.90E+01		641.83	
MN-54	LLD<7.53E+00		LLD<7.53E+00		834.83	
MN-56	LLD<8.35E+00		LLD<8.35E+00		846.76	
NA-22	LLD<4.54E+00		LLD<4.54E+00		1274.55	
NA-24	LLD<1.36E+01		LLD<1.36E+01		1368.60	
NB-94	LLD<7.38E+00		LLD<7.38E+00		702.63	
NB-95	LLD<7.18E+00		LLD<7.18E+00		765.78	
NB-97	LLD<4.60E+02		LLD<4.60E+02		657.92	
NP-237	LLD<1.61E+02		LLD<1.61E+02		86.50	
NP-238	LLD<2.82E+01		LLD<2.82E+01		984.45	
NP-239	LLD<1.55E+02		LLD<1.55E+02		277.60	
PA-233	LLD<7.27E+01		LLD<7.27E+01		311.98	
PA-234M	LLD<1.01E+03		LLD<1.01E+03		1001.03	
PB-210	LLD<4.27E+03		LLD<4.27E+03		46.50	
PB-212	LLD<4.77E+01		LLD<4.77E+01		239.00	
PB-212A	LLD<4.75E+01		LLD<4.75E+01		239.00	
PB-212B	LLD<6.97E+02		LLD<6.97E+02		300.10	
PB-214	LLD<7.76E+01		LLD<7.76E+01		351.92	
PB-214A	LLD<7.76E+01		LLD<7.76E+01		351.92	
PB-214B	LLD<1.28E+02		LLD<1.28E+02		295.21	
PO-210	LLD<8.20E+05		LLD<8.20E+05		804.00	
PO-214	LLD<3.41E+05		LLD<3.41E+05		799.70	
PO-216	LLD<6.94E+05		LLD<6.94E+05		804.90	
239	LLD<2.10E+05		LLD<2.10E+05		129.30	
241	LLD<8.30E+06		LLD<8.30E+06		148.57	
RA-224	LLD<5.30E+02		LLD<5.30E+02		240.99	
RA-226	LLD<5.56E+02		LLD<5.56E+02		186.10	
RB-88	LLD<6.35E+01		LLD<6.35E+01		1836.00	
RB-89	LLD<3.99E+01		LLD<3.99E+01		1031.88	
RN-220	LLD<2.35E+04		LLD<2.35E+04		549.73	
RU-103	LLD<3.96E+01		LLD<3.96E+01		497.08	
RURH106	LLD<4.81E+02		LLD<4.81E+02		621.80	
SB-124	LLD<3.39E+01		LLD<3.39E+01		602.72	
SB-125	LLD<2.57E+02		LLD<2.57E+02		176.33	
SC-46	LLD<7.70E+00		LLD<7.70E+00		1120.45	
SE-75	LLD<3.65E+01		LLD<3.65E+01		264.66	
SN-113	LLD<5.05E+01		LLD<5.05E+01		391.67	
SR-85	LLD<3.54E+01		LLD<3.54E+01		513.99	
SR-91	LLD<4.61E+01		LLD<4.61E+01		555.60	
SR-92	LLD<5.98E+00		LLD<5.98E+00		1383.94	
TA-182	LLD<2.07E+01		LLD<2.07E+01		1121.30	
TC-99M	LLD<1.80E+01		LLD<1.80E+01		140.51	
TE-123M	LLD<1.97E+01		LLD<1.97E+01		159.00	
TE-125M	LLD<5.06E+03		LLD<5.06E+03		109.27	
TE-132	LLD<2.33E+01		LLD<2.33E+01		228.16	
TH-228	LLD<1.69E+03		LLD<1.69E+03		84.37	
TH-234	LLD<3.61E+02		LLD<3.61E+02		92.50	
TH-234A	LLD<3.61E+02		LLD<3.61E+02		92.50	
34B	LLD<1.21E+03		LLD<1.21E+03		63.30	
08	LLD<2.70E+01		LLD<2.70E+01		583.14	
235	LLD<3.59E+01		LLD<3.59E+01		185.71	
U-235A	LLD<3.59E+01		LLD<3.59E+01		185.71	
U-235B	LLD<1.46E+02		LLD<1.46E+02		143.76	
U-237	LLD<9.57E+01		LLD<9.57E+01		208.00	

W-187	LLD<2.83E+01	LLD<2.83E+01	685.74
XE-131M	LLD<8.84E+02	LLD<8.84E+02	163.98
XE-133	LLD<6.20E+01	LLD<6.20E+01	81.00
XE-133M	LLD<2.07E+02	LLD<2.07E+02	233.21
-135	LLD<2.64E+01	LLD<2.64E+01	249.79
-138	LLD<2.01E+02	LLD<2.01E+02	258.41
Y-88	LLD<6.00E+00	LLD<6.00E+00	1836.06
Y-91	LLD<2.56E+03	LLD<2.56E+03	1204.90
Y-91M	LLD<3.49E+01	LLD<3.49E+01	555.60
ZN-65	LLD<2.16E+01	LLD<2.16E+01	1115.55
ZR-95	LLD<1.34E+01	LLD<1.34E+01	756.73
ZR-97	LLD<7.69E+00	LLD<7.69E+00	743.33
TOTAL	5.19E+04 +-6.80E+02	5.19E+04 +-6.80E+02	

STANDARD DEVIATION = 0.26

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 1.06E-08 UC/LI
TOTAL MEASURED ACTIVITY = 5.19E+04 (+-6.80E+02) UC/LI
% TECH. SPEC. = ****** (+-****)

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
53.91	26.56	203.	67.3	1.32E+03
1025.16	512.05	435.	33.6	1.78E+01
1604.62	801.76	101.	21.8	6.15E+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-F V2.06 SOFTWARE

23-SEP-9119:10:48

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 1.0
DETECTOR NUMBER: 1 / GEOMETRY NUMBER: 42
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
YZED BY: 62820

SAMPLE DESCRIPTION: R348-5930
GEOMETRY DESCRIPTION: 22ML LIQ
SAMPLE SIZE: 1.0000E-03 LI / CONVERSION FACTOR: 4.9505E-03
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 18:20:17

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3023. SECONDS
DEAD TIME: 0.76 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91

08/31/92
75

23-SEP-9119:10:48

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	55.60	27.41	0.83	3093.	416.	36.0	SB/TE-X
2	1024.70	511.83	1.38	2361.	512.	27.7	I-133,TL-208,
2B		510.84			74.	27.6	NA-22,ZN-65, RH-106
3C	1127.72	563.33	1.33	1192.	576.	18.5	CS-134, EU-152
4C	1139.82	569.38	1.33	1102.	1021.	15.5	CS-134, BI-207
5	1210.55	604.74	1.40	1141.	6704.	2.8	CS-134
6	1324.35	661.63	1.41	781.	158530.	0.5	CS-137
6B		661.82			35.	46.4	
7C	1592.48	795.69	1.46	169.	4615.	3.2	CS-134
8C	1604.66	801.78	1.46	149.	439.	9.8	CS-134
9	2346.57	1172.76	1.76	120.	2453.	4.2	CO-60
10	2664.77	1331.88	1.78	27.	2290.	4.2	CO-60
11	2730.12	1364.57	0.82	23.	96.	25.4	CS-134
12	2801.28	1400.15	1.61	16.	36.	48.5	BI-214
13	2921.33	1460.20	1.91	10.	189.	15.2	K-40

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY
B - ENVIRONMENTAL BACKGROUND PEAK

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0011
BACKGROUND DESCRIPTION: BK0011
BACKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
BACKGROUND LIVE TIME: 6000. SECONDS

emkp 08/31/92

23-SEP-9119:10:48

SAMPLE: R348-5930
A COLLECTED ON 23-SEP-91 AT 18:20:17
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 uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<5.63E+01		LLD<5.63E+01		911.07	
AC-228A	LLD<5.63E+01		LLD<5.63E+01		911.10	
AC-228B	LLD<2.47E+02		LLD<2.47E+02		338.40	
AG-108M	LLD<4.42E+01		LLD<4.42E+01		433.94	
AG-110M	LLD<3.86E+02		LLD<3.86E+02		657.76	
AM-241	LLD<1.74E+02		LLD<1.74E+02		59.54	
AM-243	LLD<5.10E+01		LLD<5.10E+01		74.67	
AM-243A	LLD<5.10E+01		LLD<5.10E+01		74.67	
AM-243B	LLD<5.43E+03		LLD<5.43E+03		43.10	
AR-41	LLD<1.05E+01		LLD<1.05E+01		1293.64	
AU-198	LLD<3.91E+01		LLD<3.91E+01		411.80	
BA-133	LLD<4.93E+01		LLD<4.93E+01		356.02	
BA-139	LLD<9.01E+01		LLD<9.01E+01		165.85	
BA-140	LLD<1.27E+02		LLD<1.27E+02		537.27	
BA-141	LLD<1.00E+02		LLD<1.00E+02		190.23	
BE-7	LLD<4.50E+02		LLD<4.50E+02		477.59	
07	LLD<2.69E+01		LLD<2.69E+01		569.70	
12	LLD<1.16E+02		LLD<1.16E+02		727.27	
BI-214	LLD<1.38E+02		LLD<1.38E+02		609.32	
BI-214A	LLD<1.38E+02		LLD<1.38E+02		609.32	
BI-214B	LLD<1.02E+02		LLD<1.02E+02		1120.28	
BI-214C	LLD<3.63E+01		LLD<3.63E+01		1764.51	
CD-109	LLD<6.42E+02		LLD<6.42E+02		88.03	
CE-139	LLD<2.04E+01		LLD<2.04E+01		165.85	
CE-141	LLD<3.40E+01		LLD<3.40E+01		145.44	
CEPR144	LLD<2.87E+02		LLD<2.87E+02		133.51	
CO-56	LLD<1.43E+01		LLD<1.43E+01		846.76	
CO-57	LLD<1.90E+01		LLD<1.90E+01		122.06	
CO-58	LLD<1.38E+01		LLD<1.38E+01		810.75	
CO-60	1.15E+03	+-4.95E+01	1.15E+03	+-4.95E+01	1332.50	-0.62
					1173.24	-0.48
CR-51	LLD<2.50E+02		LLD<2.50E+02		320.09	
CS-134	1.78E+03	+-6.12E+01	1.78E+03	+-6.12E+01	795.84	-0.16
					604.70	0.04
CS-136	LLD<1.50E+01		LLD<1.50E+01		818.51	
CS-137	5.23E+04	+-6.84E+02	5.23E+04	+-6.84E+02	661.65	-0.02
CS-138	LLD<1.25E+01		LLD<1.25E+01		1435.86	
EU-152	LLD<4.11E+01		LLD<4.11E+01		1408.01	
EU-154	LLD<2.67E+01		LLD<2.67E+01		1274.45	
EU-155	LLD<7.26E+01		LLD<7.26E+01		105.31	
FE-59	LLD<3.26E+01		LLD<3.26E+01		1099.25	
81	LLD<5.30E+01		LLD<5.30E+01		482.20	
03	LLD<3.16E+01		LLD<3.16E+01		279.20	
I-131	LLD<3.90E+01		LLD<3.90E+01		364.48	
I-132	LLD<2.70E+01		LLD<2.70E+01		667.69	
I-133	LLD<3.77E+01		LLD<3.77E+01		529.69	
I-134	LLD<2.26E+01		LLD<2.26E+01		847.03	

:-135	LLD<3.32E+01		LLD<3.32E+01	1260.41	
:-40	9.56E+02	+-1.46E+02	9.56E+02 +-1.46E+02	1460.75	-0.55
:R-85	LLD<8.58E+03		LLD<8.58E+03	513.99	
:R-85M	LLD<2.35E+01		LLD<2.35E+01	151.17	
:R-87	LLD<9.72E+01		LLD<9.72E+01	402.58	
:R-89	LLD<1.18E+03		LLD<1.18E+03	220.90	
.A-140	LLD<6.02E+00		LLD<6.02E+00	1596.20	
.A-142	LLD<6.58E+01		LLD<6.58E+01	641.83	
1N-54	LLD<1.39E+01		LLD<1.39E+01	834.83	
1N-56	LLD<1.61E+01		LLD<1.61E+01	846.76	
1A-22	LLD<9.49E+00		LLD<9.49E+00	1274.55	
1A-24	LLD<2.29E+01		LLD<2.29E+01	1368.60	
1B-94	LLD<1.40E+01		LLD<1.40E+01	702.63	
1B-95	LLD<1.36E+01		LLD<1.36E+01	765.78	
1B-97	LLD<4.68E+02		LLD<4.68E+02	657.92	
1P-237	LLD<1.70E+02		LLD<1.70E+02	86.50	
1P-238	LLD<6.17E+01		LLD<6.17E+01	984.45	
1P-239	LLD<1.65E+02		LLD<1.65E+02	277.60	
PA-233	LLD<7.66E+01		LLD<7.66E+01	311.98	
PA-234M	LLD<2.75E+03		LLD<2.75E+03	1001.03	
PB-210	LLD<4.52E+03		LLD<4.52E+03	46.50	
PB-212	LLD<5.14E+01		LLD<5.14E+01	239.00	
PB-212A	LLD<5.12E+01		LLD<5.12E+01	239.00	
PB-212B	LLD<7.45E+02		LLD<7.45E+02	300.10	
PB-214	LLD<8.13E+01		LLD<8.13E+01	351.92	
PB-214A	LLD<8.13E+01		LLD<8.13E+01	351.92	
PB-214B	LLD<1.38E+02		LLD<1.38E+02	295.21	
PO-210	LLD<1.48E+06		LLD<1.48E+06	804.00	
PO-214	LLD<7.07E+05		LLD<7.07E+05	799.70	
PO-216	LLD<1.34E+06		LLD<1.34E+06	804.90	
PU-239	LLD<2.28E+05		LLD<2.28E+05	129.30	
PU-241	LLD<8.62E+06		LLD<8.62E+06	148.57	
RA-224	LLD<5.57E+02		LLD<5.57E+02	240.99	
RA-226	LLD<5.80E+02		LLD<5.80E+02	186.10	
RB-88	LLD<6.35E+01		LLD<6.35E+01	1836.00	
RB-89	LLD<7.64E+01		LLD<7.64E+01	1031.88	
RN-220	LLD<2.63E+04		LLD<2.63E+04	549.73	
RU-103	LLD<4.15E+01		LLD<4.15E+01	497.08	
RURH106	LLD<5.40E+02		LLD<5.40E+02	621.80	
SB-124	LLD<5.77E+01		LLD<5.77E+01	602.72	
SB-125	LLD<2.67E+02		LLD<2.67E+02	176.33	
SC-46	LLD<1.53E+01		LLD<1.53E+01	1120.45	
SE-75	LLD<3.89E+01		LLD<3.89E+01	264.66	
SN-113	LLD<5.36E+01		LLD<5.36E+01	391.67	
SR-85	LLD<3.76E+01		LLD<3.76E+01	513.99	
SR-91	LLD<5.09E+01		LLD<5.09E+01	555.60	
SR-92	LLD<7.17E+00		LLD<7.17E+00	1383.94	
TA-182	LLD<4.79E+01		LLD<4.79E+01	1121.30	
TC-99M	LLD<1.90E+01		LLD<1.90E+01	140.51	
TE-123M	LLD<2.06E+01		LLD<2.06E+01	159.00	
TE-125M	LLD<5.48E+03		LLD<5.48E+03	109.27	
TE-132	LLD<2.45E+01		LLD<2.45E+01	228.16	
TH-228	LLD<1.76E+03		LLD<1.76E+03	84.37	
TH-234	LLD<3.76E+02		LLD<3.76E+02	92.50	
TH-234A	LLD<3.76E+02		LLD<3.76E+02	92.50	
TH-234B	LLD<1.29E+03		LLD<1.29E+03	63.30	
TL-208	LLD<3.12E+01		LLD<3.12E+01	583.14	
U-235	LLD<3.74E+01		LLD<3.74E+01	185.71	
U-235A	LLD<3.74E+01		LLD<3.74E+01	185.71	
U-235B	LLD<1.52E+02		LLD<1.52E+02	143.76	

Lenther 08/31/92

U-237	LLD<1.01E+02	LLD<1.01E+02	208.00
W-187	LLD<4.66E+01	LLD<4.66E+01	685.74
XE-131M	LLD<9.39E+02	LLD<9.39E+02	163.98
XE-133	LLD<6.47E+01	LLD<6.47E+01	81.00
XE-133M	LLD<2.17E+02	LLD<2.17E+02	233.21
[illegible] 5	LLD<2.80E+01	LLD<2.80E+01	249.79
XE-138	LLD<2.16E+02	LLD<2.16E+02	258.41
Y-88	LLD<6.00E+00	LLD<6.00E+00	1836.06
Y-91	LLD<4.20E+03	LLD<4.20E+03	1204.90
Y-91M	LLD<3.85E+01	LLD<3.85E+01	555.60
ZN-65	LLD<3.86E+01	LLD<3.86E+01	1115.55
ZR-95	LLD<2.38E+01	LLD<2.38E+01	756.73
ZR-97	LLD<1.38E+01	LLD<1.38E+01	743.33
TOTAL	5.61E+04 +-7.04E+02	5.61E+04 +-7.04E+02	

STANDARD DEVIATION = 0.29

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 6.91E-09 UC/LI
TOTAL MEASURED ACTIVITY = 5.61E+04 (+-7.04E+02) UC/LI
% TECH. SPEC. = ****** (+-****)

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
55.60	27.41	416.	36.0	2.15E+03
1024.70	511.83	438.	32.7	1.79E+01
1127.72	563.33	576.	18.5	2.56E+01
1139.82	569.38	1021.	15.5	4.58E+01
1604.66	801.78	439.	9.8	2.66E+01
2730.12	1364.57	96.	25.4	9.04E+00
2801.28	1400.15	36.	48.5	3.42E+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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:ANBERRA SPECTRAN-F V2.06 ,SOFTWARE

:3-SEP-9120:09:35


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

1CA UNIT NUMBER:   2     /     ADC UNIT NUMBER: 1.0
)ETECTOR NUMBER:    1    /     GEOMETRY NUMBER:  42
SPECTRUM SIZE:  4096 CHANNELS
)RDER OF SMOOTHING FUNCTION:     5
1UMBER OF BACKGROUND CHANNELS:  4 ON EACH SIDE OF PEAK
'EAK CONFIDENCE FACTOR: 85.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
:RROR QUOTATION: 1.96 SIGMA UNCERTAINTY

:NVIRONMENTAL BACKGROUND SUBTRACTED
.LD CALCULATION PERFORMED
1EASURED ENERGY DIFFERENCES LISTED
1ULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
ANALYZED BY:        62820

SAMPLE DESCRIPTION: R361-5530
GEOMETRY DESCRIPTION:  22ML LIQ
SAMPLE SIZE:   1.0000E-03 LI       / CONVERSION FACTOR: 5.0000E-01
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL000

COLLECT STARTED ON 23-SEP-91 AT 19:19:24

COLLECT LIVE TIME:    3000. SECONDS
        REAL TIME:    3004. SECONDS
        DEAD TIME:     0.13 %

 DECAYED TO      0. DAYS,  0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 28-JUN-91
EFFICIENCY CALIBRATION PERFORMED 23-MAY-91
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P E A K A N A L Y S I S

	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1C	1127.62	563.28	1.32	257.	462.	11.4	CS-134, EU-152
2C	1139.86	569.40	1.32	266.	848.	10.0	CS-134, BI-207
3	1210.52	604.72	1.36	239.	5182.	2.9	CS-134
4	1324.34	661.63	1.44	164.	3846.	3.3	CS-137
4B		661.82			35.	46.4	
5C	1592.49	795.69	1.42	159.	3618.	3.7	CS-134
6C	1604.57	801.74	1.42	133.	332.	10.4	CS-134
7	2346.59	1172.77	1.76	111.	2361.	4.3	CO-60
8	2664.87	1331.94	1.78	20.	2231.	4.2	CO-60
9	2730.61	1364.81	2.15	7.	87.	23.1	CS-134
10	2921.37	1460.22	2.16	11.	177.	15.9	K-40

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 85.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY
B - ENVIRONMENTAL BACKGROUND PEAK

B ROUND SUBTRACTION PERFORMED USING FILE BK0011
BACKGROUND DESCRIPTION: BK0011
BACKGROUND COLLECT STARTED ON 10-JAN-85 AT 12:00:00
BACKGROUND LIVE TIME: 6000. SECONDS

23-SEP-9120:09:35

SAMPLE: R361-5530
DATA COLLECTED ON 23-SEP-91 AT 19:19:24
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 uCi/LI MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AC-228	LLD<5.44E-01		LLD<5.44E-01		911.07	
AC-228A	LLD<5.44E-01		LLD<5.44E-01		911.10	
AC-228B	LLD<8.35E-01		LLD<8.35E-01		338.40	
AG-108M	LLD<1.31E-01		LLD<1.31E-01		433.94	
AG-110M	LLD<6.09E-01		LLD<6.09E-01		657.76	
AM-241	LLD<6.08E-01		LLD<6.08E-01		59.54	
AM-243	LLD<1.82E-01		LLD<1.82E-01		74.67	
AM-243A	LLD<1.82E-01		LLD<1.82E-01		74.67	
AM-243B	LLD<1.94E+01		LLD<1.94E+01		43.10	
AR-41	LLD<9.70E-02		LLD<9.70E-02		1293.64	
AU-198	LLD<1.26E-01		LLD<1.26E-01		411.80	
BA-133	LLD<1.76E-01		LLD<1.76E-01		356.02	
BA-139	LLD<3.13E-01		LLD<3.13E-01		165.85	
BA-140	LLD<5.25E-01		LLD<5.25E-01		537.27	
BA-141	LLD<3.31E-01		LLD<3.31E-01		190.23	
BE-7	LLD<1.26E+00		LLD<1.26E+00		477.59	
BI-207	LLD<1.35E-01		LLD<1.35E-01		569.70	
BI-212	LLD<1.04E+00		LLD<1.04E+00		727.27	
BI-214	LLD<1.10E+00		LLD<1.10E+00		609.32	
BI-214A	LLD<1.10E+00		LLD<1.10E+00		609.32	
BI-214B	LLD<1.05E+00		LLD<1.05E+00		1120.28	
BI-214C	LLD<4.40E-02		LLD<4.40E-02		1764.51	
CD-109	LLD<2.31E+00		LLD<2.31E+00		88.03	
CE-139	LLD<7.09E-02		LLD<7.09E-02		165.85	
CE-141	LLD<1.22E-01		LLD<1.22E-01		145.44	
CEPR144	LLD<1.01E+00		LLD<1.01E+00		133.51	
CO-56	LLD<1.23E-01		LLD<1.23E-01		846.76	
CO-57	LLD<6.74E-02		LLD<6.74E-02		122.06	
CO-58	LLD<1.19E-01		LLD<1.19E-01		810.75	
CO-60	1.11E+01	+-4.82E-01	1.11E+01	+-4.82E-01	1332.50	-0.56
					1173.24	-0.47
CR-51	LLD<8.56E-01		LLD<8.56E-01		320.09	
CS-134	1.38E+01	+-5.38E-01	1.38E+01	+-5.38E-01	795.84	-0.15
					604.70	0.03
CS-136	LLD<1.28E-01		LLD<1.28E-01		818.51	
CS-137	1.24E+01	+-4.44E-01	1.24E+01	+-4.44E-01	661.65	-0.02
CS-138	LLD<1.92E-01		LLD<1.92E-01		1435.86	
EU-152	LLD<2.18E-01		LLD<2.18E-01		1408.01	
EU-154	LLD<2.16E-01		LLD<2.16E-01		1274.45	
EU-155	LLD<2.48E-01		LLD<2.48E-01		105.31	
FE-59	LLD<2.93E-01		LLD<2.93E-01		1099.25	
HF-181	LLD<1.44E-01		LLD<1.44E-01		482.20	
HG-203	LLD<1.06E-01		LLD<1.06E-01		279.20	
I-131	LLD<1.34E-01		LLD<1.34E-01		364.48	
I-132	LLD<1.41E-01		LLD<1.41E-01		667.69	
I-133	LLD<1.37E-01		LLD<1.37E-01		529.69	
I-134	LLD<1.95E-01		LLD<1.95E-01		847.03	

71

08/31/92
82

I-135	LLD<3.59E-01		LLD<3.59E-01		1260.41	
K-40	8.84E+00	+-1.41E+00	8.84E+00	+-1.41E+00	1460.75	-0.53
KR-85	LLD<3.12E+01		LLD<3.12E+01		513.99	
KR-85M	LLD<8.17E-02		LLD<8.17E-02		151.17	
K[illegible]	LLD<3.24E-01		LLD<3.24E-01		402.58	
K	LLD<4.05E+00		LLD<4.05E+00		220.90	
LA-140	LLD<4.41E-02		LLD<4.41E-02		1596.20	
LA-142	LLD<3.21E-01		LLD<3.21E-01		641.83	
MN-54	LLD<1.19E-01		LLD<1.19E-01		834.83	
MN-56	LLD<1.39E-01		LLD<1.39E-01		846.76	
NA-22	LLD<7.68E-02		LLD<7.68E-02		1274.55	
NA-24	LLD<1.95E-01		LLD<1.95E-01		1368.60	
NB-94	LLD<1.21E-01		LLD<1.21E-01		702.63	
NB-95	LLD<1.10E-01		LLD<1.10E-01		765.78	
NB-97	LLD<7.38E-01		LLD<7.38E-01		657.92	
NP-237	LLD<6.26E-01		LLD<6.26E-01		86.50	
NP-238	LLD<5.65E-01		LLD<5.65E-01		984.45	
NP-239	LLD<5.84E-01		LLD<5.84E-01		277.60	
PA-233	LLD<2.56E-01		LLD<2.56E-01		311.98	
PA-234M	LLD<2.61E+01		LLD<2.61E+01		1001.03	
PB-210	LLD<1.53E+01		LLD<1.53E+01		46.50	
PB-212	LLD<1.73E-01		LLD<1.73E-01		239.00	
PB-212A	LLD<1.73E-01		LLD<1.73E-01		239.00	
PB-212B	LLD<2.47E+00		LLD<2.47E+00		300.10	
PB-214	LLD<2.77E-01		LLD<2.77E-01		351.92	
PB-214A	LLD<2.77E-01		LLD<2.77E-01		351.92	
PB-214B	LLD<4.82E-01		LLD<4.82E-01		295.21	
PO-210	LLD<1.30E+04		LLD<1.30E+04		804.00	
PO-214	LLD<6.27E+03		LLD<6.27E+03		799.70	
P[illegible]6	LLD<1.19E+04		LLD<1.19E+04		804.90	
P 9	LLD<8.05E+02		LLD<8.05E+02		129.30	
PU-241	LLD<3.20E+04		LLD<3.20E+04		148.57	
RA-224	LLD<1.97E+00		LLD<1.97E+00		240.99	
RA-226	LLD<1.99E+00		LLD<1.99E+00		186.10	
RB-88	LLD<5.26E-01		LLD<5.26E-01		1836.00	
RB-89	LLD<6.80E-01		LLD<6.80E-01		1031.88	
RN-220	LLD<1.11E+02		LLD<1.11E+02		549.73	
RU-103	LLD<1.39E-01		LLD<1.39E-01		497.08	
RURH106	LLD<2.65E+00		LLD<2.65E+00		621.80	
SB-124	LLD<4.61E-01		LLD<4.61E-01		602.72	
SB-125	LLD<9.60E-01		LLD<9.60E-01		176.33	
SC-46	LLD<1.58E-01		LLD<1.58E-01		1120.45	
SE-75	LLD<1.35E-01		LLD<1.35E-01		264.66	
SN-113	LLD<1.78E-01		LLD<1.78E-01		391.67	
SR-85	LLD<1.37E-01		LLD<1.37E-01		513.99	
SR-91	LLD<2.22E-01		LLD<2.22E-01		555.60	
SR-92	LLD<6.54E-02		LLD<6.54E-02		1383.94	
TA-182	LLD<4.60E-01		LLD<4.60E-01		1121.30	
TC-99M	LLD<6.71E-02		LLD<6.71E-02		140.51	
TE-123M	LLD<7.44E-02		LLD<7.44E-02		159.00	
TE-125M	LLD<1.88E+01		LLD<1.88E+01		109.27	
TE-132	LLD<8.71E-02		LLD<8.71E-02		228.16	
TH-228	LLD<6.34E+00		LLD<6.34E+00		84.37	
TH-234	LLD<1.34E+00		LLD<1.34E+00		92.50	
T[illegible]4A	LLD<1.34E+00		LLD<1.34E+00		92.50	
T 4B	LLD<4.47E+00		LLD<4.47E+00		63.30	
TL-208	LLD<1.62E-01		LLD<1.62E-01		583.14	
U-235	LLD<1.26E-01		LLD<1.26E-01		185.71	
U-235A	LLD<1.26E-01		LLD<1.26E-01		185.71	
U-235B	LLD<5.57E-01		LLD<5.57E-01		143.76	

U-237	LLD<3.55E-01	LLD<3.55E-01	208.00
W-187	LLD<4.05E-01	LLD<4.05E-01	685.74
XE-131M	LLD<3.28E+00	LLD<3.28E+00	163.98
XE-133	LLD<2.37E-01	LLD<2.37E-01	81.00
XE-133M	LLD<7.65E-01	LLD<7.65E-01	233.21
XE-135	LLD<1.01E-01	LLD<1.01E-01	249.79
XE-138	LLD<7.39E-01	LLD<7.39E-01	258.41
Y-88	LLD<4.99E-02	LLD<4.99E-02	1836.06
Y-91	LLD<4.31E+01	LLD<4.31E+01	1204.90
Y-91M	LLD<1.68E-01	LLD<1.68E-01	555.60
ZN-65	LLD<3.60E-01	LLD<3.60E-01	1115.55
ZR-95	LLD<2.18E-01	LLD<2.18E-01	756.73
ZR-97	LLD<1.21E-01	LLD<1.21E-01	743.33
TOTAL	4.62E+01 +-1.65E+00	4.62E+01 +-1.65E+00	

STANDARD DEVIATION = 0.27

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 1.47E-09 UC/LI
TOTAL MEASURED ACTIVITY = 4.62E+01 (+-1.65E+00) UC/LI
% TECH. SPEC. = ****** (+-****)

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 85.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
1127.62	563.28	462.	11.4	2.05E+01
1139.86	569.40	848.	10.0	3.81E+01
1604.57	801.74	332.	10.4	2.02E+01
2730.61	1364.81	87.	23.1	8.12E+00

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: URANIUM	Sample Prep: UNDIGESTED

Instrument: WB88807	Procedure/Rev: LA-925-106/A-2
Technologist: J. KUNKEL	Date: 10-23-91
Starting Time: 16:00	Temperature: 23degC
Ending Time: 20:00	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5540	11		
2	REAGENT BLANK	R347-5640	12		
3	SAMPLE 791 COMP	R348-5740	13		
4	SAM DUP 791 COMP	R348-5840	14		
5	SPIKE OF 791 COMP	R348-5940	15		
6	FINAL LMCS CHECK STD	R361-5540	16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	126B38/0.1 mL			NA
SPIKE	90B38/0.1 mL			NA
SAMPLES RERUN.				

A-6000-881 (03/92)

9 3 1 2 8 3 5 0 7 4

URANIUM ANALYSIS - UNDIGESTED SAMPLE

WHC-SD-WM-DP-025
ADDENDUM 17 REV 0

Serial No	Sample Point	Date	Time Issued	Priority
R 346.-5540	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Returns
U	LA-925-106	% RECOVERY	W1TE2	3

Sample Size: ?.100-10 - .100
Customer ID: STD

Remarks, Calculations, Results:
S267 UF1C
STD# 126838 RESULT $2.78E^{-2}$
STD VAL. $3.01E^{-2}$ %REC 91.4%
SPIKE ID/VAL 90838 6.25^{-4}
SPIKE VOL. .100

RERUN .14 .45

$$\frac{(.14)(.982)(6.25E^{-4})(.1)(1010)}{.45-[(.982)(.14)]}$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				
res	res	0 res	res	res

Date: 10-23-91

Serial No	Sample Point	Date	Time Issued	Priority
R 347.-5640	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Returns
U	LA-925-106	G/L	W1TE2	3

Sample Size: ? ml
Customer ID: REG BL

Remarks, Calculations, Results:
REAGENT BLANK .02 .23
90838 5.68^{-5}
.100

RERUN

$$\frac{(.02)(.985)(5.68E^{-5})(.1)(1)}{.23-[(.985)(.02)]} = <5.32E^{-7}\ g/l$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				
res	res	res	res	res

Date: 10-23-91

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5740	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Returns
U	LA-925-106	G/L	W1TE2	3

Sample Size: ?.100-10 - .500
Customer ID: 791 COMP

Remarks, Calculations, Results:
90838 6.25^{-4} .20 .46
.100

RERUN

$$\frac{(.20)(.984)(6.25E^{-4})(202)(.1)}{.46-[(.20)(.984)]} = 9.43E^{-3}\ g/l$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				
res	res	res	res	res

Date: 10-23-91

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5840	106AW R	9-20-91	11:40	26

Determination	Method/Standard	Result Units	Charge Code	Returns
U	LA-925-106	G/L	W1TE2	3

Sample Size: ?.100-10 - .500
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE .21 .48
90838 6.25^{-4}
.100

RERUN

$$\frac{(.21)(.984)(6.25E^{-4})(.1)(202)}{.48-[(.21)(.984)]} = 9.54E^{-3}\ g/l$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				
res	res	res	res	res

Date: 10-23-91

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5940	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Returns
U	LA-925-106	% RECOVERY	W1TE2	3

Sample Size: ?.100-10 - .500
Customer ID: 791 COMP

Remarks, Calculations, Results:
SAMPLE SPIKED ID .48
SPIKE ID 90838 6.25^{-4} .74
SPIKE VOLUME .100

RERUN

Spiked .100-10-.500
126838 .100-10-.500

42.4%

Jerry M. Kunkel Matrix interference

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				
res	res	res	res	res

Date: 10-23-91

Serial No	Sample Point	Date	Time Issued	Priority
R 361.-5540	106AW R	9-23-91	10:43	25

Determination	Method/Standard	Result Units	Charge Code	Persons
U	LA-925-106	% RECOVERY	W1E2	3

Sample Size	Customer ID
2.100 - 10 - .100	STD

Remarks, Conclusions, Results

5267 UFIC
STDW 126838 RESULT 2.757E-2 .13
STD VOL 3.04E-2 %REC .42 90.7% RERUN
SPIKE ID/VOL 90838 6.25E-4
SPIKE VOL .10R

$$\frac{(.13)(.982)(6.25E^{-4})(.1)(100)}{.42 - [(.13)(.982)]}$$

Jerry M. Kunkel

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
80518				
Initials	Initials	Initials	Initials	Initials

Date	Time Completed	Supervisor
10-23-91		

R348-5940

$$\frac{(.48)(.984)(6.25E^{-4})(.1)(20\,\text{ml})}{(.74) - [(.48)(.984)]}$$ JK 5-29-92

$$\left(\frac{2.23E^{-2}}{20\,\text{ml}} - \frac{9.60E^{-3}}{20\,\text{ml}}\right) 20\,\text{ml}$$ JK 5-29-92 JK 5-29-92 JK 5-29-92

$$1.29E^{-2} / 3.04E^{-2}$$

9 3 1 2 3 3 5 0 7 6

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: PLUTONIUM 239/240	Sample Prep: UNDIGESTED

Instrument: WB57237	Procedure/Rev: LA-503-156/C-3
Technologist: J. KUNKEL	Date: 10-18-91
Starting Time: 15:00 (10-18-91)	Temperature: 23degC
Ending Time: 10:30 (10-21-91)	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5581	11		
2	REAGENT BLANK	R347-5681	12		
3	SAMPLE 791 COMP	R348-5781	13		
4	SAM DUP 791 COMP	R348-5881	14		
5	FINAL LMCS CHECK STD	R361-5581	15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	43B43/0.1 mL			N/A

A-6000-881 (03/92)

9312853077

4.3 3950

Sample No	Sample Point	Date	Time Issued	Priority
K 346.-5581	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Results
PU239/240	LA-503-156	% RECOVERY	W1TE2	0

Sample Size: .100-10-.100 .050 spike — Customer ID: BID

Remarks, Calculations, Results: LDF 1211 AR001 40843 "AEA-480 MIN" ATTACH PRINT OUT
STDN 43843 RESULT 1.61E-2
STD VAL. 7.6148' %REC 112.170

Jerry M. Kuehl 7170 trans

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518		69549		

Date: 10-18-91

#1 10-21 [illegible] R 346-5581

$\frac{1054}{5} = 6$

$\frac{(202.8)(2)(.5380)}{305.47} = 7170$

4.4 4049

Sample No	Sample Point	Date	Time Issued	Priority
K 347.-5681	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Results
PU239/240	LA-503-156	uCI/L	W1TE2	0

Sample Size: 1ml .050 spike — Customer ID: REU BL

Remarks, Calculations, Results: REAGENT BLANK 40843 "AEA-480 MIN" ATTACH PRINT OUT
COUNT AS uCI/L
<7.62E-3 uCi/l

Jerry M. Kuehl 6870 trans

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518		69549		

Date: 10-18-91

#2 10-21 [illegible] R 347-5681

$\frac{637}{5} = 8$ [illegible] 8/21/92

$\frac{(115.4)(2)(.9027)}{305.47} = 6870$

4.2 4049

Sample No	Sample Point	Date	Time Issued	Priority
K 348.-5781	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Results
PU239/240	LA-503-156	uCI/L	W1TE2	0

Sample Size: 1ml .050 spike — Customer ID: 791 CONF

Remarks, Calculations, Results: COUNT AS uCI/L 40843 "AEA-480 MIN" ATTACH PRINT OUT
9.98E-2 uCi/l

Jerry M. Kuehl 8970 trans

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518				

Date: 10-18-91

#3 10-21 [illegible] R 348-5781

$\frac{1331}{5} = 8$

$\frac{(258.2)(2)(.5240)}{304.66} = 8970$

9312835078

4.2 2265

Serial No.	Sample Point	Date	Time Issued	Priority
K 348.-5881	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Report
PU239/40	LA-503-156	uCI/L	WITEZ	C

Sample Size: 1 ml .050 Spike 40843
Customer ID: 291 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L
9.79E-2 uci/l
"AEA-480 MIN" ATTACH PRINT OUT

Jerry M. Kindel 9470 trans

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
RDSIR	69569			
Date	Time Completed			
10-18-91				

#1 10-21 mc
1395 / 5 -8

R348-5881

$$\frac{(271.4)(2)(.5298)}{305.47} = 9470$$

4.4 4047

Serial No.	Sample Point	Date	Time Issued	Priority
K 361.-5581	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Units	Charge Code	Report
PU239/40	LA-503-156	% RECOVERY	WITEZ	C

Sample Size: .100÷10-.100 .050 Spike 40843
Customer ID: STD

Remarks, Calculations, Results:
EDP R211 AR001
STDN 43843 RESULT 9.96E'
STD VAL. 9.01146' %REC 110.6%
"AEA-480 MIN" ATTACH PRINT OUT

Jerry M. Kindel 7870 trans

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
RDSIR				
Date	Time Completed			
10-18-91				

#2 10-21 mc
1161 / 5 -12

R361-5581

$$\frac{(220.2)(2)(.5424)}{305.68} = 7870$$

9312863507 9

G E N E R A L A L P H A E N E R G Y A N A L Y S I S

Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R346-5581
File ID: SD3950.SPC

Counted on: 10/22/91 @ 2: 0
Detector/Geometry number: 7/ 1
Count time: 21280. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	1548.4	1553.1	361.849	361.849	24.000	14.213	12.000	7.474
2	196.2	199.0	303.093	303.093	20.000	13.118	10.000	7.214
3	1182.9	1179.1	229.706	229.706	20.000	14.072	10.000	9.661

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Pu236	0.5380	5.756	5.760	-0.004	0.07	42.39	239.62	0.108E-03
2	Pu238	0.0722	5.499	5.489	0.010	0.07	5.69	43.75	0.197E-04
	Am241		5.480	5.489	-0.009				0.151E-04
3	Pu239	0.3898	5.143	5.152	-0.009	0.06	30.71	170.13	0.766E-04
	Pu240		5.144	5.152	-0.008				0.766E-04

DETECTOR CALIBRATION

Energy(MEV) = 4.095 + (0.0046)*Channel
Energy range (MeV): 4.095 TO 6.450
Efficiency = 0.1805 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	28004.0	100.000
Smoothed	28003.3	99.998
Composite fit	27940.4	99.773
Residuals	62.9	0.225

Analyzed by: _____ _____
JLA

UNCLASSIFIED 08/31/92
91

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1 LEGEND:  RAW = ....  MODELED PEAKS = 1,2,..., ETC
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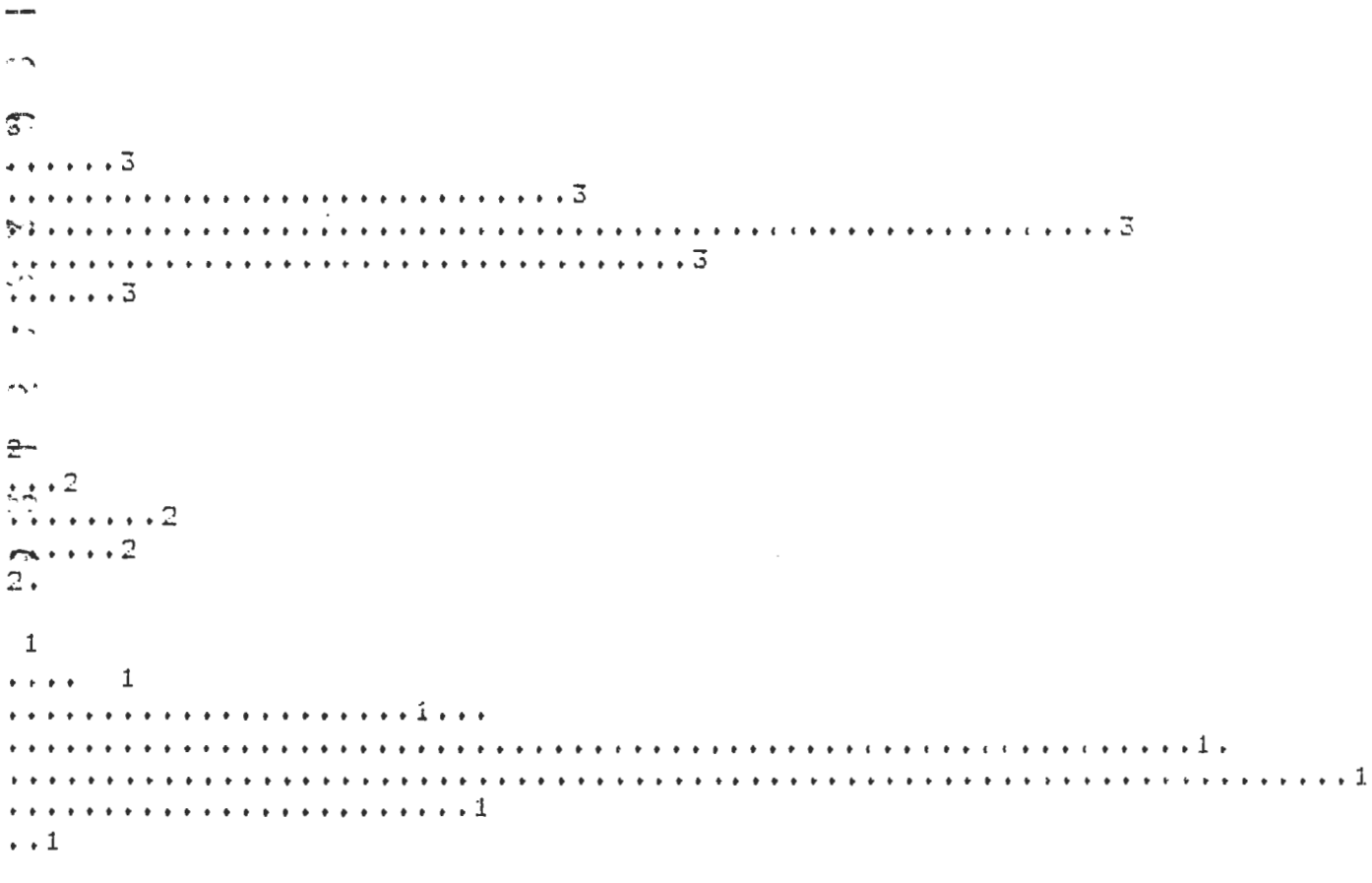


DMAH 12/31/92
92

Raw Data Dump for AEA Spectrum: SF:SD3950.SPC

1	0.	0.	0.	0.	0.	1.	0.	0.	2.	0.
11	0.	0.	0.	1.	1.	1.	1.	2.	0.	0.
21	0.	0.	0.	0.	0.	1.	2.	0.	1.	1.
31	0.	1.	0.	0.	1.	0.	2.	1.	1.	0.
	1.	0.	0.	0.	1.	0.	0.	2.	1.	0.
--	0.	0.	2.	0.	0.	0.	0.	1.	1.	0.
61	0.	0.	1.	0.	0.	0.	0.	2.	1.	2.
71	3.	0.	0.	0.	2.	0.	0.	0.	1.	1.
81	0.	0.	0.	1.	1.	1.	1.	1.	0.	0.
91	0.	0.	3.	1.	1.	1.	2.	0.	0.	0.
101	2.	0.	0.	0.	1.	1.	3.	0.	1.	0.
111	0.	2.	1.	0.	1.	1.	0.	0.	0.	2.
121	0.	1.	3.	0.	1.	0.	0.	1.	0.	0.
131	2.	0.	0.	0.	0.	3.	0.	1.	1.	1.
141	2.	1.	0.	0.	1.	0.	0.	0.	0.	0.
151	0.	1.	1.	0.	3.	2.	2.	1.	2.	0.
161	1.	1.	1.	1.	2.	1.	1.	0.	1.	1.
171	1.	2.	2.	2.	4.	1.	2.	1.	0.	2.
181	0.	4.	1.	2.	1.	1.	0.	1.	1.	5.
191	2.	3.	1.	2.	2.	3.	8.	5.	0.	5.
201	11.	11.	12.	13.	17.	14.	8.	26.	43.	36.
211	56.	66.	89.	104.	124.	141.	176.	215.	284.	340.
221	403.	421.	486.	573.	635.	631.	661.	680.	677.	637.
231	590.	526.	488.	403.	338.	268.	192.	154.	110.	79.
241	43.	30.	17.	16.	2.	4.	6.	6.	4.	0.
251	3.	4.	6.	2.	7.	5.	4.	4.	0.	1.
261	4.	2.	2.	1.	4.	2.	9.	4.	3.	3.
271	8.	3.	6.	5.	3.	3.	7.	8.	9.	8.
281	6.	16.	11.	12.	17.	22.	27.	25.	25.	36.
1	45.	49.	57.	64.	82.	100.	76.	102.	115.	99.
1	118.	102.	95.	105.	116.	79.	68.	65.	64.	46.
311	34.	25.	10.	11.	13.	8.	2.	3.	5.	7.
321	4.	7.	3.	5.	3.	3.	3.	4.	9.	8.
331	3.	8.	8.	5.	13.	20.	26.	27.	33.	38.
341	58.	77.	92.	101.	166.	176.	226.	284.	321.	392.
351	436.	437.	539.	572.	615.	726.	785.	804.	858.	846.
361	915.	801.	833.	732.	628.	543.	431.	359.	288.	176.
371	141.	82.	56.	45.	23.	12.	11.	7.	0.	1.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.
421	0.	0.	0.	0.	1.	0.	1.	0.	0.	1.
431	0.	2.	1.	1.	0.	0.	0.	0.	1.	0.
441	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	1.	0.	0.	0.	1.	1.	0.	0.	0.	0.
471	0.	0.	1.	2.	2.	0.	0.	1.	1.	0.
481	1.	0.	1.	0.	0.	0.	0.	1.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S

Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R347-5681
File ID: SD4049.SPC

Counted on: 10/22/91 @ 2: 0
Detector/Geometry number: 8/ 1
Count time: 21321. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	1262.8	1275.3	364.513	364.513	20.000	9.496	10.000	4.811
2	112.3	111.5	305.703	305.703	20.000	10.791	10.000	5.412
3	6.4	3.8	273.587	273.587	36.000	1.486	18.000	5.112
4	6.4	6.1	259.621	259.621	16.000	11.476	8.000	4.594
5	7.7	7.5	231.378	231.378	28.000	13.937	14.000	3.032

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi
1	Cm244	0.9027	5.796	5.777	0.019	0.04	30.19	203.01	0.91[illegible]4
	Cm243		5.786	5.777	0.009				0.125E-03
2	Pu238	0.0828	5.499	5.501	-0.002	0.05	2.77	25.87	0.117E-04
	Am241		5.480	5.501	-0.021				0.893E-05
3		0.0009		5.350		0.01	0.03	0.21	0.939E-07
4		0.0050		5.284		0.05	0.17	1.12	0.502E-06
5	Pu239	0.0086	5.143	5.151	-0.008	0.07	0.29	1.93	0.866E-06
	Pu240		5.144	5.151	-0.007				0.868E-06

DETECTOR CALIBRATION

Energy(MEV) = 4.064 + (0.0047)*Channel
Energy range (MeV): 4.064 TO 6.470
Efficiency = 0.1467 CPM/DPM

TOTAL COUNT DATA:

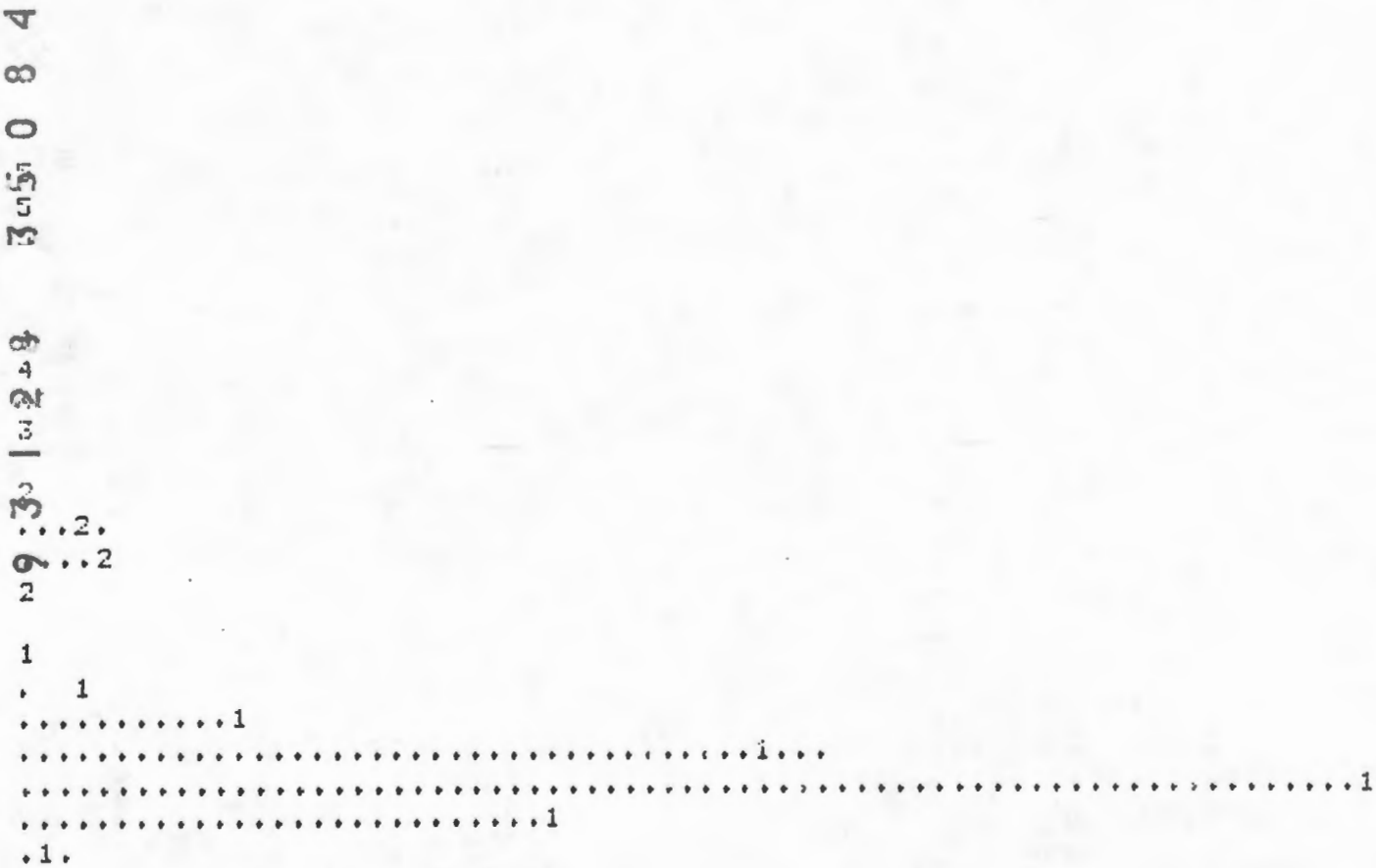
Item	Total	% Recovery
Raw spectrum	11812.0	100.000
Smoothed	11812.0	100.000
Composite fit	11883.3	100.604
Residuals	-71.4	-0.604

Analyzed by: _____
JLA

[illegible] 10/31/92
94

9312835083

1 LEGEND: RAW = ... MODELED PEAKS = 1,2,,, ETC 4699.2



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95

Raw Data Dump for AEA Spectrum: SF:SD4049.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	2.	1.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
101	0.	0.	0.	0.	0.	1.	0.	0.	1.	0.
111	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
121	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.
131	2.	0.	0.	1.	0.	3.	1.	1.	1.	1.
141	1.	0.	1.	1.	0.	1.	0.	0.	1.	2.
151	0.	0.	1.	1.	0.	0.	1.	0.	1.	0.
161	0.	1.	0.	0.	1.	0.	0.	1.	0.	0.
171	0.	0.	1.	1.	0.	0.	0.	1.	0.	0.
181	0.	0.	0.	0.	0.	2.	0.	0.	1.	0.
191	0.	0.	1.	0.	2.	1.	0.	1.	0.	0.
201	2.	2.	0.	1.	0.	2.	1.	2.	2.	0.
211	0.	1.	0.	1.	2.	5.	4.	0.	2.	2.
221	1.	3.	0.	1.	3.	7.	4.	5.	8.	1.
231	6.	2.	2.	7.	3.	2.	3.	6.	0.	1.
241	1.	2.	1.	0.	0.	1.	0.	1.	0.	3.
251	2.	2.	0.	1.	5.	7.	0.	5.	5.	4.
261	3.	2.	2.	2.	1.	1.	4.	2.	3.	1.
271	2.	1.	5.	6.	2.	1.	2.	2.	0.	1.
281	3.	1.	3.	3.	3.	2.	7.	13.	11.	13.
291	11.	20.	14.	23.	29.	33.	29.	34.	48.	47.
301	58.	48.	69.	68.	71.	55.	70.	37.	46.	35.
311	20.	18.	9.	5.	6.	3.	4.	3.	3.	5.
321	2.	8.	10.	7.	6.	2.	7.	8.	5.	2.
331	3.	8.	11.	5.	6.	10.	7.	12.	9.	9.
341	17.	14.	21.	32.	29.	50.	66.	102.	133.	185.
351	216.	258.	263.	301.	379.	379.	436.	508.	527.	577.
361	657.	672.	780.	772.	723.	677.	539.	416.	291.	203.
371	117.	61.	27.	19.	7.	2.	1.	1.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
421	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
431	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
471	0.	0.	0.	0.	1.	0.	0.	0.	0.	2.
481	0.	1.	0.	1.	0.	0.	0.	0.	0.	1.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

3

08/31/92

G E N E R A L A L P H A E N E R G Y A N A L Y S I S

Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R348-5781
File ID: SD6043.SPC

Counted on: 10/26/91 @ 1: 0
Detector/Geometry number: 6/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	7.0	6.5	473.513	473.513	24.000	17.569	12.000	5.133
2	2608.8	2675.2	361.440	361.440	20.000	11.600	10.000	3.969
3	438.3	442.5	303.810	303.810	20.000	13.124	10.000	4.080
4	1998.4	2016.8	231.309	231.309	20.000	11.363	10.000	4.164

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
.		0.0015		6.294		0.08	0.16	0.84	0.579E-06
2	Pu236	0.5240	5.756	5.768	-0.012	0.05	55.36	291.18	0.131E-03
	Cm243		5.786	5.768	0.018				0.176E-03
3	Pu238	0.0936	5.499	5.497	0.002	0.06	9.89	70.78	0.319E-04
	Am241		5.480	5.497	-0.017				0.244E-04
4	Pu239	0.3809	5.143	5.156	-0.013	0.05	40.24	207.43	0.934E-04
	Pu240		5.144	5.156	-0.012				0.934E-04

DETECTOR CALIBRATION

Energy(MEV) = 4.069 + (0.0047)*Channel
Energy range (MeV): 4.069 TO 6.475
Efficiency = 0.1940 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	53803.0	100.000
Smoothed	53803.0	100.000
Composite fit	52825.1	98.182
Residuals	977.9	1.818

Analyzed by: _____
62820

86

8/31/92
97

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SPECTRUM SB8045.SPC
1 LEGEND:  RAW = ....  MODELED PEAKS = 1,2,..; ETC                    8736.6

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87

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08/31/92
98

Raw Data Dump for AEA Spectrum: SF:SD6043.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	1.	0.	0.	1.	1.
21	1.	1.	0.	0.	2.	0.	1.	1.	0.	0.
31	0.	0.	0.	0.	0.	0.	1.	0.	0.	1.
[illegible]	2.	0.	2.	0.	2.	1.	2.	1.	1.	1.
[illegible]	3.	2.	0.	4.	1.	0.	1.	2.	1.	2.
61	1.	3.	1.	0.	0.	0.	1.	1.	2.	2.
71	2.	1.	2.	0.	1.	1.	2.	3.	0.	3.
81	2.	3.	0.	2.	3.	2.	0.	0.	1.	3.
91	2.	4.	2.	2.	0.	2.	3.	4.	2.	1.
101	4.	4.	2.	2.	4.	3.	2.	2.	6.	3.
111	3.	4.	3.	4.	5.	5.	6.	3.	5.	5.
121	5.	3.	5.	7.	9.	4.	6.	7.	4.	7.
131	6.	8.	3.	6.	8.	7.	4.	6.	8.	7.
141	15.	5.	10.	15.	12.	18.	11.	9.	7.	20.
151	15.	17.	25.	10.	18.	18.	12.	13.	8.	10.
161	18.	20.	17.	15.	8.	19.	18.	21.	17.	10.
171	16.	17.	20.	17.	24.	21.	17.	26.	22.	26.
181	20.	23.	32.	23.	26.	39.	32.	23.	43.	34.
191	42.	42.	45.	43.	46.	44.	38.	46.	56.	57.
201	69.	78.	99.	71.	79.	97.	106.	129.	142.	139.
211	184.	196.	208.	224.	285.	335.	359.	406.	459.	534.
221	550.	640.	679.	736.	792.	906.	1035.	1054.	1149.	117[illegible].
231	1195.	1042.	1003.	891.	763.	540.	419.	276.	182.	114.
241	77.	30.	28.	13.	9.	12.	20.	9.	6.	11.
251	6.	12.	14.	11.	10.	13.	16.	9.	20.	18.
261	13.	26.	13.	16.	12.	15.	19.	14.	25.	19.
271	12.	17.	27.	21.	22.	17.	36.	31.	33.	39.
281	32.	45.	59.	51.	62.	60.	68.	76.	80.	90.
[illegible]	95.	127.	162.	160.	180.	175.	172.	198.	238.	223.
[illegible]	253.	246.	238.	253.	256.	200.	196.	143.	149.	113.
311	78.	53.	60.	45.	55.	37.	41.	37.	34.	32.
321	47.	51.	58.	56.	59.	69.	62.	80.	68.	69.
331	81.	104.	92.	97.	128.	156.	147.	182.	185.	189.
341	227.	272.	306.	347.	417.	436.	519.	575.	679.	795.
351	863.	932.	1035.	1071.	1145.	1157.	1260.	1301.	1358.	1427.
361	1473.	1499.	1335.	1198.	1045.	808.	588.	423.	273.	1[illegible].
371	80.	48.	19.	13.	5.	3.	1.	2.	1.	1.
381	1.	1.	1.	1.	0.	0.	1.	0.	0.	1.
391	0.	1.	1.	0.	0.	1.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
411	0.	0.	0.	1.	1.	0.	0.	1.	0.	0.
421	1.	1.	0.	0.	1.	3.	0.	1.	0.	1.
431	0.	1.	0.	1.	1.	2.	0.	0.	0.	2.
441	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
451	3.	0.	0.	1.	0.	1.	0.	0.	5.	1.
461	2.	0.	1.	1.	3.	3.	2.	4.	5.	2.
471	6.	2.	3.	4.	6.	2.	2.	2.	2.	2.
481	2.	2.	1.	0.	0.	1.	0.	0.	0.	0.
491	0.	1.	0.	0.	1.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S

Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R348-5881
File ID: SD2269.SPC

Counted on: 10/22/91 @ 2: 0
Detector/Geometry number: 6/ 1
Count time: 21312. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	1919.6	1942.4	364.376	364.376	24.000	16.753	12.000	8.000
2	304.8	315.9	306.391	306.391	24.000	17.159	12.000	7.181
3	1421.3	1429.8	232.660	232.660	24.000	16.450	12.000	9.067
4	13.6	7.3	153.502	153.502	84.000	2.000	42.000	0.200

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ml
1	Cm244	0.5298	5.796	5.784	0.012	0.08	57.64	321.64	0.145 3
	Cm243		5.786	5.784	0.002				0.19E_ 3
2	Pu238	0.0897	5.499	5.512	-0.013	0.08	9.76	75.66	0.341E-04
	Am241		5.480	5.512	-0.032				0.261E-04
3	Pu239	0.3768	5.143	5.165	-0.022	0.08	40.99	228.77	0.103E-03
	Pu240		5.144	5.165	-0.021				0.103E-03
4	Np237	0.0037	4.781	4.793	-0.012	0.01	0.40	2.58	0.116E-05

DETECTOR CALIBRATION

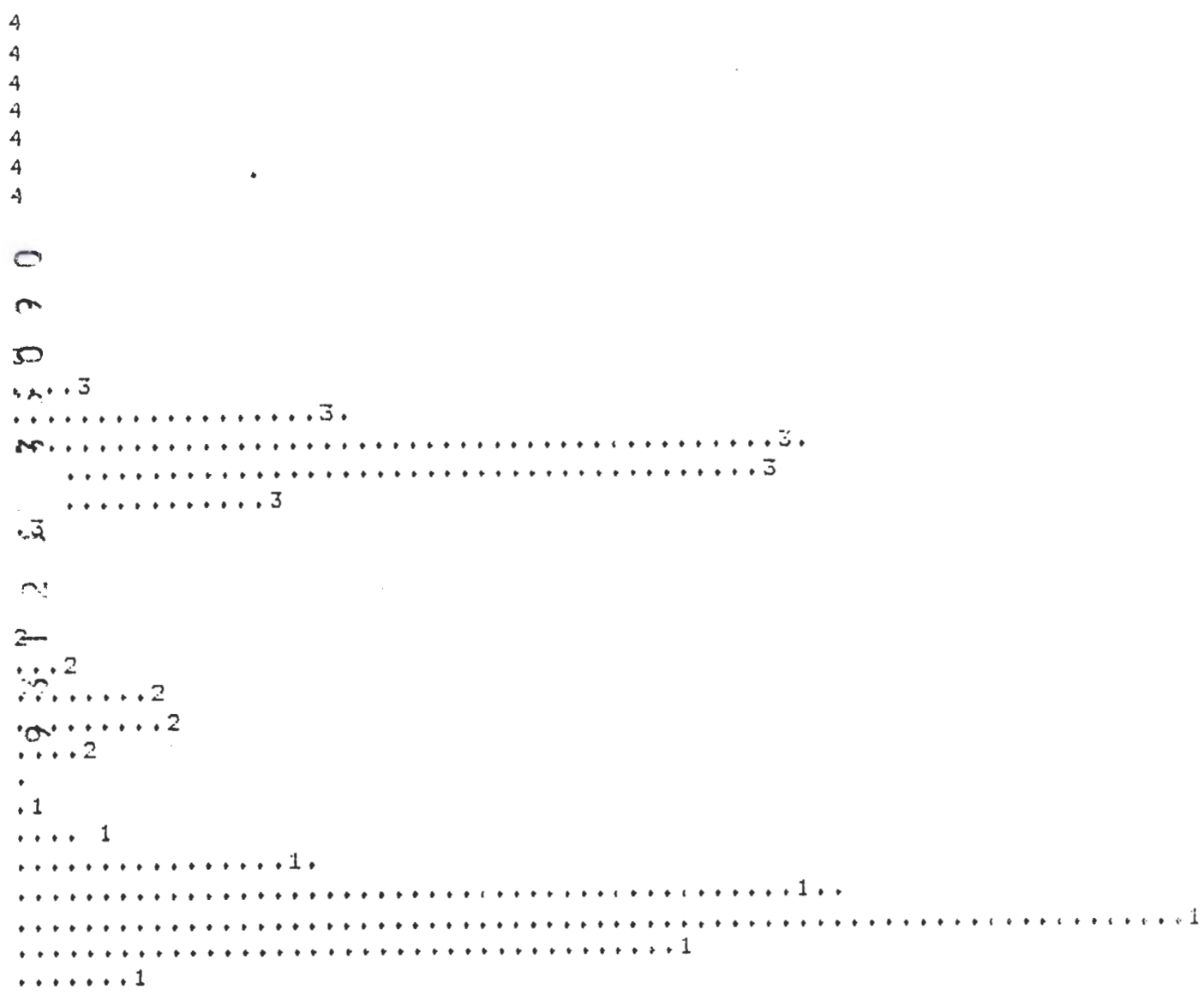
Energy(MEV) = 4.072 + (0.0047)*Channel
Energy range (MeV): 4.072 TO 6.476
Efficiency = 0.1792 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	38640.0	100.000
Smoothed	38640.0	100.000
Composite fit	38644.7	100.012
Residuals	-4.7	-0.012

Analyzed by: _____
JLA

9312863500 89


1 LEGEND: RAW = ... MODELED PEAKS = 1,2,..., ETC
7378.5

Raw Data Dump for AEA Spectrum: SP:SD2269.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	1.	0.	2.	0.	0.	1.	0.	4.	3.	0.
21	1.	1.	1.	0.	0.	1.	0.	3.	1.	0.
31	0.	0.	3.	0.	1.	0.	0.	0.	0.	0.
41	2.	1.	1.	0.	1.	1.	1.	1.	0.	0.
51	0.	1.	0.	0.	1.	2.	0.	0.	0.	1.
61	1.	2.	0.	0.	1.	2.	0.	1.	2.	0.
71	0.	0.	1.	0.	1.	1.	0.	0.	0.	1.
81	0.	0.	0.	3.	1.	0.	0.	0.	2.	0.
91	0.	1.	3.	0.	0.	0.	0.	2.	1.	0.
101	1.	0.	0.	2.	1.	0.	1.	2.	1.	0.
111	2.	0.	0.	1.	4.	0.	3.	1.	2.	1.
121	0.	3.	4.	1.	3.	0.	3.	1.	0.	2.
131	2.	4.	2.	3.	0.	2.	5.	5.	6.	2.
141	4.	3.	5.	9.	5.	3.	4.	9.	12.	8.
151	6.	4.	8.	9.	6.	4.	6.	8.	9.	6.
161	4.	3.	8.	8.	4.	7.	5.	2.	2.	3.
171	2.	3.	6.	6.	3.	2.	7.	5.	9.	5.
181	5.	5.	6.	3.	1.	8.	6.	4.	6.	6.
191	8.	9.	9.	8.	6.	10.	10.	10.	8.	6.
201	11.	9.	14.	18.	18.	12.	26.	24.	31.	47.
211	53.	77.	98.	109.	108.	149.	161.	232.	266.	310.
221	350.	397.	480.	526.	562.	629.	719.	749.	747.	755.
231	802.	776.	800.	697.	693.	566.	537.	433.	336.	276.
241	231.	179.	139.	94.	52.	35.	27.	11.	13.	10.
251	4.	9.	7.	2.	7.	2.	6.	8.	5.	9.
261	6.	5.	5.	4.	4.	5.	9.	4.	8.	1.
271	2.	7.	10.	3.	8.	3.	6.	4.	4.	12.
281	17.	12.	10.	17.	25.	24.	29.	35.	39.	30.
291	52.	68.	70.	90.	103.	105.	119.	122.	147.	150.
301	147.	158.	170.	167.	167.	153.	163.	154.	140.	150.
311	113.	112.	69.	59.	54.	49.	28.	24.	16.	12.
321	17.	7.	10.	8.	14.	11.	6.	5.	8.	10.
331	10.	11.	19.	26.	17.	32.	28.	29.	42.	52.
341	71.	76.	77.	119.	160.	192.	219.	258.	322.	363.
351	420.	490.	549.	573.	657.	783.	807.	866.	950.	940.
361	1051.	1072.	1114.	1024.	996.	909.	901.	815.	648.	61[illegible].
371	477.	387.	276.	214.	133.	106.	83.	45.	27.	12.
381	11.	7.	5.	1.	1.	0.	0.	1.	0.	0.
391	1.	0.	0.	0.	1.	1.	0.	0.	0.	0.
401	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	1.	0.	1.	1.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	4.	1.	1.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
461	0.	1.	0.	0.	0.	1.	0.	0.	1.	0.
471	1.	0.	0.	2.	0.	2.	4.	3.	0.	0.
481	1.	1.	0.	0.	0.	0.	1.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S

Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R361-5581
File ID: SD4047.SPC

Counted on: 10/21/91 @17: 0
Detector/Geometry number: 8/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	1823.0	1856.3	364.062	364.062	20.000	9.953	10.000	4.386
2	233.5	234.8	305.370	305.370	20.000	10.825	10.000	5.102
3	1403.4	1412.1	233.125	233.125	20.000	10.381	10.000	5.887

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Pu236	0.5424	5.756	5.772	-0.016	0.05	33.22	223.14	0.101E-03
	Cm243		5.786	5.772	0.014				0.135E-03
	Pu238	0.0690	5.499	5.496	0.003	0.05	4.23	38.64	0.174E-04
	Am241		5.480	5.496	-0.016				0.133E-04
3	Pu239	0.3886	5.143	5.157	-0.014	0.05	23.80	156.65	0.706E-04
	Pu240		5.144	5.157	-0.013				0.706E-04

DETECTOR CALIBRATION

Energy(MEV) = 4.061 + (0.0047)*Channel
Energy range (MeV): 4.061 TO 6.467
Efficiency = 0.1519 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	30619.0	100.000
Smoothed	30618.0	99.997
Composite fit	30619.2	100.001
Residuals	-1.2	-0.004

Analyzed by: _____
62820

```
SPECTRUM SB4047.SPC
1 LEGEND:  RAW = ....  MODELED PEAKS = 1,2,..,  ETC                    6769.5

3
.3 3
.3.........3.
.3.........................................3
.3.........................................3
.........3
.
2
.3
.....2
.9...2
.2

.1
...  1
...............1
.........................................1...
.......................................................................1
.........................1
.1
```

Raw Data Dump for AEA Spectrum: SP:SD4047.SPC

1	0.	0.	0.	0.	0.	-1.	1.	1.	0.	0.
11	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
21	0.	2.	0.	0.	0.	1.	0.	0.	1.	0.
31	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
	1.	0.	0.	0.	1.	0.	0.	0.	0.	1.
	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
61	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	2.	0.	0.	0.	0.	0.	1.	0.	0.	1.
81	1.	0.	0.	0.	1.	0.	2.	0.	0.	1.
91	0.	0.	5.	1.	0.	0.	0.	0.	1.	0.
101	1.	1.	0.	1.	0.	2.	0.	0.	0.	0.
111	0.	0.	0.	0.	1.	0.	0.	1.	1.	0.
121	0.	1.	0.	0.	0.	3.	1.	1.	1.	4.
131	3.	0.	1.	1.	2.	2.	1.	2.	2.	0.
141	0.	2.	0.	2.	1.	1.	2.	0.	0.	1.
151	0.	2.	0.	0.	0.	1.	3.	1.	1.	2.
161	2.	0.	2.	0.	0.	1.	2.	0.	4.	2.
171	2.	6.	1.	1.	1.	2.	1.	2.	4.	1.
181	1.	1.	3.	3.	4.	10.	5.	4.	5.	9.
191	8.	9.	6.	3.	8.	11.	10.	9.	6.	12.
201	10.	12.	13.	9.	14.	15.	16.	28.	31.	23.
211	29.	42.	39.	47.	75.	78.	112.	127.	185.	183.
221	209.	301.	356.	343.	444.	549.	582.	659.	725.	788.
231	799.	805.	824.	791.	671.	567.	452.	348.	224.	135.
241	71.	39.	34.	12.	3.	1.	1.	1.	1.	1.
251	0.	1.	1.	4.	4.	5.	5.	4.	2.	3.
261	3.	4.	3.	5.	3.	2.	4.	9.	2.	4.
271	4.	6.	3.	5.	6.	9.	4.	2.	5.	7.
281	9.	6.	12.	13.	7.	11.	18.	19.	21.	26.
	36.	30.	39.	57.	67.	58.	78.	81.	96.	126.
	116.	120.	125.	143.	131.	134.	125.	96.	77.	66.
311	54.	40.	15.	13.	12.	8.	7.	5.	7.	2.
321	16.	6.	7.	10.	9.	9.	7.	6.	15.	11.
331	8.	27.	18.	18.	16.	19.	28.	22.	30.	29.
341	45.	59.	60.	91.	121.	141.	175.	223.	263.	313.
351	374.	388.	507.	526.	613.	636.	704.	729.	800.	932.
361	983.	1020.	1045.	1011.	1059.	923.	730.	564.	425.	250.
371	146.	76.	41.	14.	9.	2.	3.	0.	1.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	1.	0.	0.	0.	0.	0.	1.
441	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
471	0.	1.	0.	0.	1.	0.	0.	0.	3.	0.
481	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: AMERCIUM 241	Sample Prep: UNDIGESTED

Instrument: WB57237	Procedure/Rev: LA-503-156/C-3
Technologist: J. KUNKEL	Date: 10-18-91
Starting Time: 15:00	Temperature: 23degC
Ending Time: 20:30	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5582	11		
2	REAGENT BLANK	R347-5682	12		
3	SAMPLE 791 COMP	R348-5782	13		
4	SAM DUP 791 COMP	R348-5882	14		
5	FINAL LMCS CHECK STD	R361-5582	15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	43B43/0.1 mL			N/A
SAMPLES RERUN.				

A-6000-881 (03/92)

4.3 7671

Sample No	Sample Point	Date	Time Issued	Priority
R 346.-5582	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Results
AM241	LA-503-156	RERUN	W1TE2	1

Sample Size: ? .100-10ml-1 .100ml spik 18845 — Customer ID: STD

Remarks, Calculations, Results

EDP R201 AR001

STD# 43843 RESULT 3.25E'

STD VAL 2.14E' %REC 103.570

$$\frac{(.5827)(2.274E^{-3})(.1)(1000)(101)}{.4112} =$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518	69547			

Date: 10-18-91

#2 10-19-91

2623/5 -12 R346-5582

3.2 2283

Sample No	Sample Point	Date	Time Issued	Priority
R 347.-5682	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Results
AM241	LA-503-156	RERUN	W1TE2	1

Sample Size: ? 1ml .100 spike — Customer ID: REG DL

18843

Remarks, Calculations, Results

REAGENT BLANK

COUNT AS uCI/L

$$\frac{(3851)(2.274E^{-3})(.1)(1000)(1)}{.5825} = 1.57E^{-1}\ uCi/l$$

Jerry M. Kunkel

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518	69547			

Date: 10-18-91

#1 10-19-91

1364/5 -8 R347-5682

3.3 5964

Sample No	Sample Point	Date	Time Issued	Priority
R 348.-5782	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Results
AM241	LA-503-156	RERUN	W1TE2	1

Sample Size: ? 1ml .10ml Spike — Customer ID: 791 COMP

18845

Remarks, Calculations, Results

COUNT AS uCI/L

$$\frac{(.0404)(2.274E^{-3})(.1)(1000)(1)}{.9050} = 2.27E^{-4}\ uCi/l$$

Jerry M. Kunkel 24/5 Not Detected APR 2

Analyst 1	Analyst 2	Analyst 3	Analyst 4	Analyst 5
80518	69547			

Date: 10-18-91

#3 10-19-91

873/5 -9 R348-5782

3.4 4063

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5882	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Limits	Charge Code	Remarks
AM241	LA-503-156	[illegible]	W11E2	1

Sample Size: ? 1 ml .10 ml spike 18843

Customer ID: 291 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L

$$\frac{(.0812)(2.274E^{-3})(.1)(1000)(1)}{.9146} = 2.02E^{-2}$$ uci/L

Jerry M. Kuehl 241/243Cm Not detected PR 27 1992

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
80518	69547	[illegible]		
Date	Time Completed	Lab Unit Mgr		
10-18-91		[illegible]	[illegible]	

#1 10-19-91 AJ

499/5 - 8

R 348-5882

4.1 5011

Serial No	Sample Point	Date	Time Issued	Priority
R 361.-5582	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Limits	Charge Code	Remarks
AM241	LA-503-156	% RECOVERY	W11F2	1

Sample Size: ? .100-1 ml-1 .1 ml spike 18843

Customer ID: STD

Remarks, Calculations, Results:
EDP R201 AR001
STDN43 843 RESULT 3.48E1
STD VAL 3.1416E1 %REC 110.9/70
.5567 .3672 10/10/91
(.3672)(2.274E-3)(.1)(1000)(101)
.5567 .3672 10/10/91 uci/L

Jerry M. Kuehl

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
80518	69547	[illegible]	[illegible]	[illegible]
Date	Time Completed	Lab Unit Mgr		
10-18-91		[illegible]	[illegible]	

#3 10-19-91 AJ

1264/5 - 9

B5142
A34
R 361-5582

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R346-5562
File ID: SD7671.SPC

Counted on: 10/26/91 @ 1: 0
Detector/Geometry number: 7/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	15.5	13.5	367.099	367.099	32.000	41.132	16.000	2.972
2	3077.7	3114.8	300.363	300.363	32.000	27.944	16.000	7.927
3	1645.9	1752.3	254.709	254.709	28.000	18.660	14.000	2.715
4	1.1	0.0	107.940	107.940	12.000	12.123	6.000	6.102
5	2.7	1.8	79.291	79.291	16.000	13.112	8.000	4.939

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Cm244	0.0038	5.796	5.802	-0.006	0.19	0.91	6.48	0.292E-05
	Cm243		5.786	5.802	-0.016				0.400E-05
2	Am241	0.5827	5.480	5.488	-0.008	0.13	91.03	691.66	0.312E-03
	Pu238		5.499	5.488	0.011				0.407E-03
3	Am243	0.4112	5.234	5.274	-0.040	0.09	64.24	4171.29	0.188E-02
4		0.0000		4.584		0.06	0.00	0.00	0.000E+00
5		0.0002		4.449		0.06	0.04	0.27	0.120E-06

DETECTOR CALIBRATION

Energy(MEV) = 4.077 + (0.0047)*Channel
Energy range (MeV): 4.077 TO 6.483
Efficiency = 0.1400 CPM/DPM

TOTAL COUNT DATA:

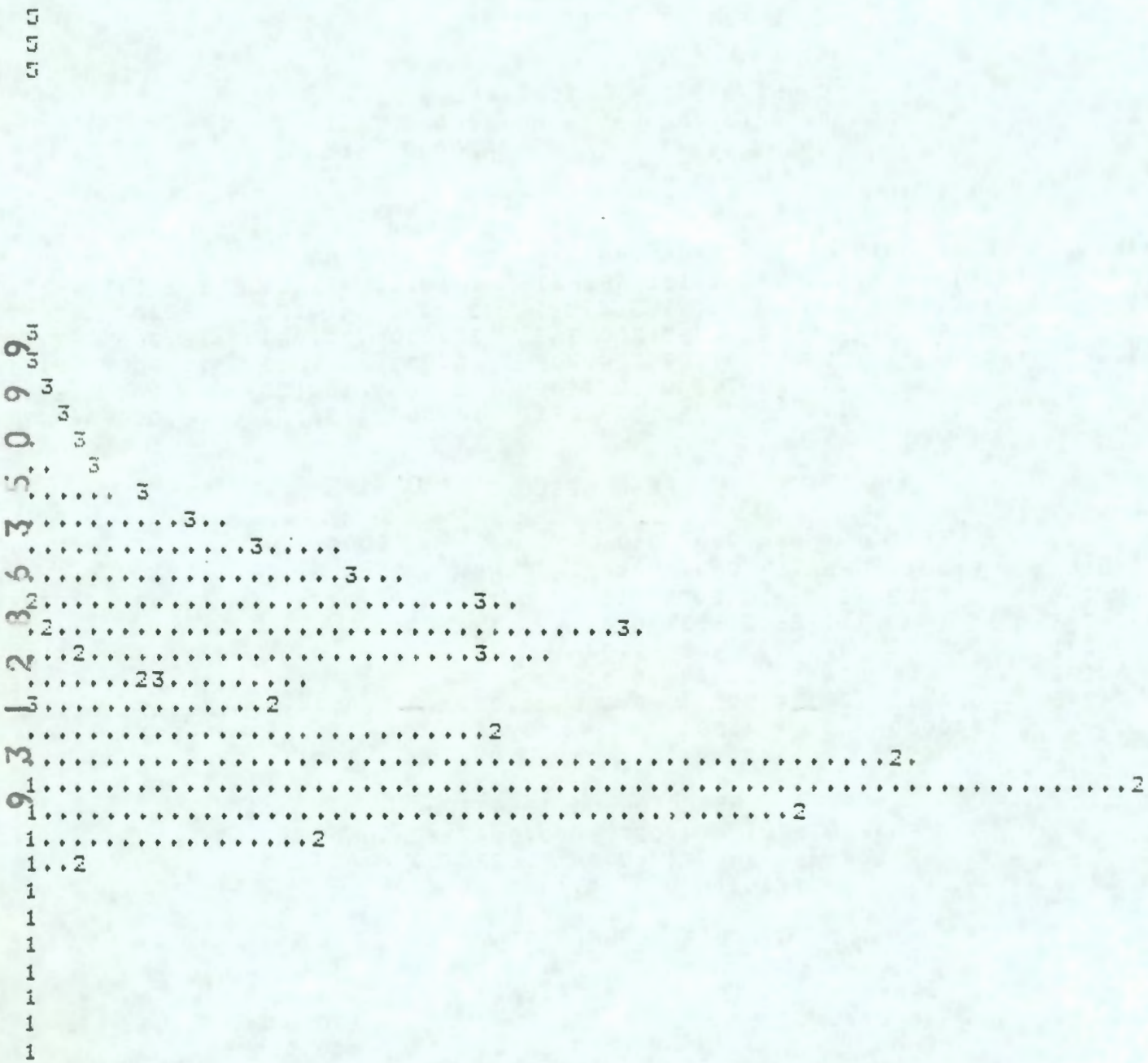
Item	Total	% Recovery
Raw spectrum	76181.0	100.000
Smoothed	76181.1	100.000
Composite fit	78103.8	102.524
Residuals	-1922.8	-2.524

Analyzed by: _____
62820

emmm 08/31/92
109

SPECTRUM SD7671.SPC

1 LEGEND: RAW = ... MODELED PEAKS = 1,2,..., ETC 12040.9



Raw Data Dump for AEA Spectrum: SF:SD7671.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	1.	2.	0.	0.	1.	1.
21	4.	2.	2.	0.	2.	4.	1.	2.	0.	2.
31	1.	0.	1.	3.	1.	0.	2.	2.	0.	3.
41	2.	2.	1.	0.	1.	2.	4.	0.	1.	0.
51	1.	2.	1.	0.	0.	1.	0.	3.	0.	2.
61	0.	0.	1.	0.	2.	0.	3.	0.	3.	1.
71	1.	1.	3.	1.	2.	6.	0.	2.	1.	4.
81	3.	1.	2.	2.	0.	2.	1.	2.	1.	3.
91	0.	1.	4.	0.	2.	1.	0.	3.	3.	0.
101	1.	0.	1.	5.	2.	4.	3.	3.	0.	4.
111	0.	2.	3.	1.	1.	1.	2.	5.	0.	2.
121	2.	0.	0.	1.	2.	1.	2.	1.	2.	2.
131	1.	2.	1.	2.	3.	2.	2.	2.	1.	6.
141	1.	4.	3.	2.	3.	2.	1.	3.	3.	4.
151	5.	5.	4.	5.	2.	6.	1.	2.	3.	2.
161	2.	5.	6.	5.	3.	7.	5.	8.	1.	3.
171	2.	8.	7.	3.	9.	2.	7.	6.	13.	10.
181	5.	8.	5.	11.	11.	9.	7.	11.	13.	19.
191	21.	15.	18.	27.	23.	31.	29.	34.	49.	41.
201	58.	51.	63.	70.	61.	88.	96.	106.	133.	112.
211	138.	147.	183.	207.	231.	213.	264.	287.	279.	330.
221	305.	345.	359.	386.	419.	406.	438.	460.	523.	519.
231	514.	528.	497.	540.	487.	499.	540.	554.	556.	570.
241	659.	650.	702.	729.	686.	773.	802.	817.	812.	858.
251	883.	956.	975.	934.	897.	896.	847.	817.	744.	698.
261	626.	563.	528.	453.	436.	382.	353.	319.	291.	268.
271	258.	244.	275.	244.	310.	329.	316.	376.	432.	488.
-1	559.	559.	648.	698.	822.	857.	933.	1083.	1072.	1133.
1	1290.	1372.	1463.	1475.	1601.	1535.	1622.	1620.	1651.	1589.
301	1615.	1534.	1441.	1387.	1288.	1208.	1017.	953.	840.	715.
311	670.	523.	461.	361.	304.	260.	204.	164.	113.	100.
321	63.	53.	29.	19.	28.	25.	13.	9.	2.	3.
331	5.	3.	2.	0.	1.	0.	0.	0.	0.	0.
341	2.	0.	3.	2.	1.	0.	4.	1.	3.	3.
351	0.	7.	5.	9.	2.	6.	6.	6.	6.	5.
361	7.	12.	8.	6.	6.	10.	8.	8.	10.	5.
371	5.	7.	2.	12.	6.	9.	7.	4.	4.	2.
381	1.	2.	0.	1.	0.	1.	1.	0.	0.	0.
391	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	1.	0.	1.	0.	1.	0.	0.	1.
421	1.	0.	0.	0.	0.	0.	0.	0.	0.	3.
431	0.	0.	1.	0.	0.	1.	0.	0.	1.	2.
441	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
451	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
471	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
481	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R347-5682
File ID: S02283.SPC

Counted on: 10/26/91 @10: 0
Detector/Geometry number: 2/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	7.2	6.6	434.511	434.511	24.000	20.611	12.000	9.142
2	119.1	122.5	368.951	368.951	28.000	15.761	14.000	5.126
3	1900.5	1897.1	302.489	302.489	28.000	18.998	14.000	7.292
4	2621.7	2634.4	256.783	256.783	24.000	16.800	12.000	4.585
5	8.3	6.9	148.498	148.498	32.000	209.374	16.000	13.395

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/
1	Cm242	0.0013	6.115	6.113	0.002	0.10	0.15	1.05	0.471E-06
2	Cm243	0.0247	5.786	5.805	-0.019	0.07	2.83	19.53	0.880E-05
	Cm244		5.796	5.805	-0.009				0.642E-05
3	Pu238	0.3859	5.499	5.492	0.007	0.09	44.24	309.09	0.139E-03
	Am241		5.480	5.492	-0.012				0.107E-03
4		0.5825		5.278		0.08	66.78	335.91	0.151E-03
5	Np237	0.0056	4.640	4.769	-0.129	0.98	0.64	53.77	0.242E-04
	Np237		4.781	4.769	0.012				0.167E-05

DETECTOR CALIBRATION

Energy(MEV) = 4.071 + (0.0047)*Channel
Energy range (MeV): 4.071 TO 6.477
Efficiency = 0.1988 CPM/DPM

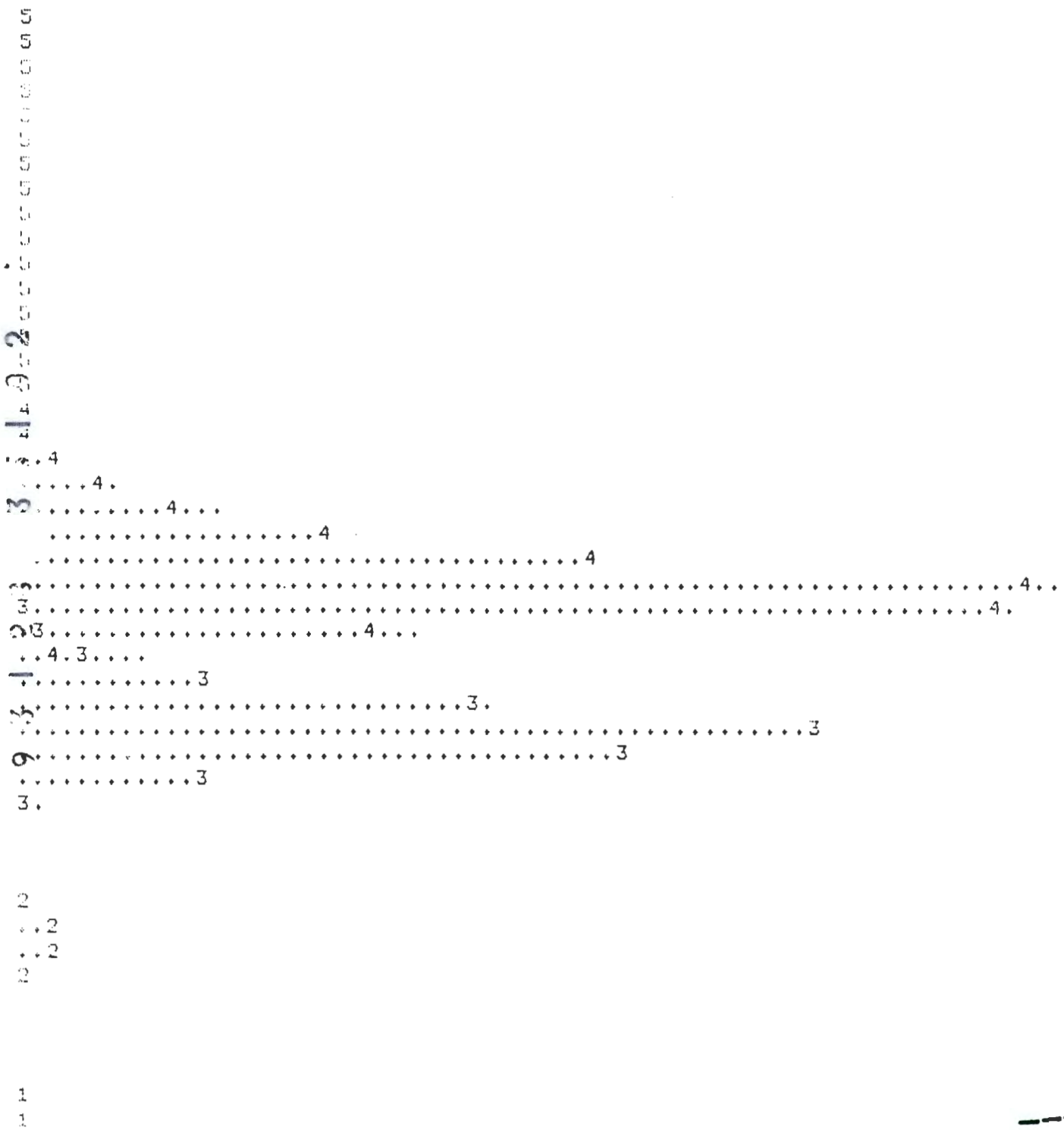
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	57360.0	100.000
Smoothed	57359.1	99.998
Composite fit	57325.0	99.939
Residuals	34.1	0.059

Analyzed by: _____
62820

LMA 12/31/92

9 3 1 2 8 6 3 5 1 0 1



Raw Data Dump for AEA Spectrum: SP:SD2283.SPC

1	0.	0.	0.	0.	0.	1.	0.	3.	1.	0.
11	1.	0.	3.	4.	0.	1.	1.	2.	1.	0.
21	1.	1.	2.	1.	1.	0.	3.	1.	1.	0.
31	0.	0.	0.	0.	0.	1.	0.	3.	0.	0.
41	0.	2.	1.	0.	2.	2.	1.	0.	2.	0.
51	0.	3.	0.	2.	2.	2.	0.	4.	0.	1.
61	1.	1.	2.	2.	1.	1.	1.	2.	0.	1.
71	2.	1.	1.	2.	1.	2.	2.	0.	1.	2.
81	2.	3.	1.	2.	0.	1.	0.	0.	0.	3.
91	3.	1.	2.	4.	2.	2.	0.	1.	1.	0.
101	1.	4.	0.	1.	2.	2.	2.	1.	3.	2.
111	2.	4.	1.	1.	3.	3.	1.	4.	3.	3.
121	3.	1.	2.	1.	0.	7.	3.	4.	4.	3.
131	2.	1.	3.	4.	2.	1.	5.	2.	2.	5.
141	5.	5.	3.	4.	6.	4.	7.	5.	3.	4.
151	3.	6.	3.	5.	4.	4.	3.	4.	3.	2.
161	0.	4.	3.	7.	6.	5.	8.	5.	6.	6.
171	6.	8.	7.	6.	7.	6.	12.	7.	4.	3.
181	4.	6.	12.	6.	8.	6.	11.	9.	5.	12.
191	14.	8.	17.	6.	9.	14.	17.	11.	13.	14.
201	12.	23.	24.	29.	25.	31.	28.	38.	30.	30.
211	47.	52.	72.	71.	73.	82.	99.	117.	134.	134.
221	160.	166.	186.	207.	223.	241.	245.	285.	324.	280.
231	316.	295.	331.	322.	310.	317.	335.	352.	410.	416.
241	524.	512.	616.	705.	794.	815.	919.	1004.	1078.	1169.
251	1206.	1362.	1411.	1443.	1412.	1487.	1431.	1359.	1304.	1175.
261	965.	827.	704.	602.	487.	407.	321.	283.	221.	158.
271	167.	118.	103.	118.	120.	108.	93.	119.	126.	115.
281	147.	178.	181.	195.	209.	289.	318.	397.	424.	488.
291	525.	598.	666.	733.	835.	809.	962.	967.	982.	1077.
301	1043.	1085.	962.	944.	844.	797.	725.	638.	512.	411.
311	346.	291.	248.	167.	140.	119.	81.	57.	56.	29.
321	19.	17.	9.	4.	5.	3.	3.	2.	2.	4.
331	1.	1.	3.	2.	0.	1.	1.	6.	6.	5.
341	6.	7.	6.	4.	9.	7.	19.	14.	15.	17.
351	18.	15.	17.	32.	25.	39.	38.	46.	31.	63.
361	45.	41.	60.	53.	60.	64.	67.	70.	64.	64.
371	59.	40.	51.	42.	38.	26.	23.	16.	10.	4.
381	4.	2.	2.	0.	1.	0.	0.	1.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	1.	0.	0.	1.	0.	0.	1.
411	0.	0.	1.	0.	2.	0.	1.	0.	1.	2.
421	1.	2.	1.	3.	3.	1.	2.	4.	1.	1.
431	7.	5.	5.	1.	6.	5.	2.	0.	3.	3.
441	1.	2.	0.	1.	3.	1.	0.	1.	1.	0.
451	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	1.	0.	0.	1.	1.
471	0.	1.	0.	0.	1.	1.	0.	0.	1.	0.
481	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R348-5782
File ID: SD3964.SPC

Counted on: 10/26/91 @10: 0
Detector/Geometry number: 3/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	10.6	10.3	376.643	376.643	16.000	11.856	8.000	2.428
2	216.2	208.0	308.190	308.190	24.000	16.662	12.000	4.267
3	2525.7	2513.2	262.164	262.164	24.000	15.614	12.000	6.157

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Cm244	0.0047	5.796	5.828	-0.032	0.06	0.28	1.39	0.625E-06
2	Pu238	0.0904	5.499	5.499	-0.000	0.08	5.42	37.35	0.168E-04
	Am241		5.480	5.499	-0.019				0.129E-04
3		0.9050		5.278		0.07	54.24	269.34	0.121E-03

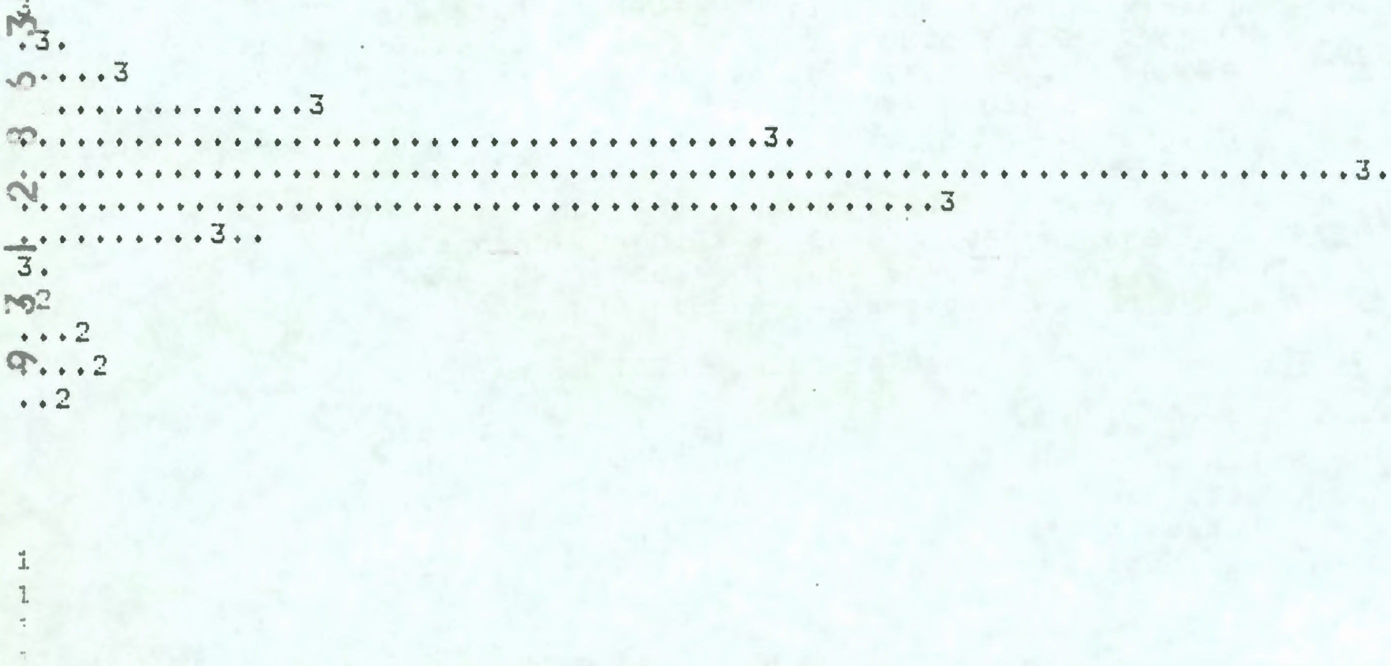
DETECTOR CALIBRATION

Energy(MEV) = 4.020 + (0.0048)*Channel
Energy range (MeV): 4.020 TO 6.477
Efficiency = 0.2014 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	30771.0	100.000
Smoothed	30770.9	100.000
Composite fit	29970.3	97.398
Residuals	800.6	2.602

Analyzed by: _____
62820



Raw Data Dump for AEA Spectrum: SP:SD3964.SPC

1	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
11	1.	3.	2.	1.	2.	0.	1.	1.	1.	2.
21	5.	2.	1.	1.	2.	0.	0.	0.	1.	0.
31	0.	1.	0.	2.	0.	1.	0.	0.	0.	1.
1	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
1	0.	1.	0.	0.	1.	0.	2.	1.	1.	0.
61	1.	2.	1.	2.	1.	0.	2.	1.	0.	0.
71	0.	1.	2.	1.	0.	2.	0.	0.	1.	0.
81	2.	3.	0.	2.	1.	0.	0.	1.	0.	1.
91	1.	0.	1.	0.	0.	2.	2.	2.	0.	0.
101	1.	0.	0.	1.	2.	6.	3.	1.	1.	0.
111	1.	0.	0.	2.	3.	1.	2.	1.	1.	0.
121	1.	5.	3.	0.	1.	3.	1.	2.	1.	1.
131	1.	1.	1.	2.	4.	2.	5.	2.	1.	4.
141	3.	4.	6.	2.	2.	2.	7.	4.	4.	5.
151	5.	6.	5.	2.	7.	5.	4.	8.	3.	1.
161	6.	8.	8.	2.	2.	6.	3.	4.	4.	6.
171	8.	4.	2.	5.	8.	5.	6.	8.	7.	9.
181	12.	8.	7.	8.	10.	10.	13.	12.	10.	14.
191	12.	11.	14.	11.	11.	10.	10.	14.	10.	14.
201	23.	17.	16.	17.	13.	15.	12.	17.	22.	23.
211	25.	25.	25.	24.	24.	21.	42.	43.	30.	27.
221	29.	41.	41.	43.	59.	39.	38.	50.	72.	61.
231	64.	91.	64.	92.	103.	131.	128.	140.	141.	164.
241	211.	223.	254.	267.	325.	362.	432.	437.	541.	630.
251	700.	740.	877.	1009.	991.	1124.	1222.	1298.	1393.	1380.
261	1424.	1427.	1354.	1208.	1072.	958.	808.	684.	534.	393.
271	331.	239.	197.	150.	132.	89.	80.	78.	52.	39.
281	34.	24.	33.	16.	22.	14.	13.	26.	18.	26.
[illegible]	26.	31.	33.	37.	44.	52.	54.	76.	71.	88.
[illegible]	79.	102.	107.	111.	100.	115.	135.	121.	124.	89.
[illegible]	92.	78.	70.	62.	51.	36.	25.	29.	22.	13.
321	17.	8.	6.	3.	0.	1.	3.	3.	3.	0.
331	0.	1.	1.	1.	0.	0.	1.	2.	0.	0.
341	0.	0.	1.	2.	1.	2.	1.	0.	1.	2.
351	1.	1.	0.	5.	5.	3.	1.	0.	3.	4.
361	2.	2.	2.	3.	3.	2.	3.	3.	5.	3.
371	6.	4.	6.	7.	3.	7.	8.	3.	7.	5.
381	2.	1.	1.	1.	2.	0.	1.	1.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
421	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
431	0.	0.	1.	1.	0.	0.	1.	0.	0.	1.
441	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
471	0.	1.	1.	0.	0.	1.	0.	0.	1.	0.
481	2.	0.	0.	1.	1.	1.	0.	0.	0.	0.
491	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R348-5882
File ID: SD4063.SPC

Counted on: 10/26/91 @10: 0
Detector/Geometry number: 4/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	4.1	3.9	361.611	361.611	28.000	18.546	14.000	4.585
2	106.9	104.3	299.167	299.167	16.000	10.370	8.000	3.837
3	1344.4	1331.4	253.417	253.417	20.000	10.612	10.000	5.856

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Cm244	0.0043	5.796	5.780	0.016	0.09	0.11	0.73	0.328E-06
	Cm243		5.786	5.780	0.006				0.449 6
2	Pu238	0.0812	5.499	5.486	0.013	0.05	2.02	19.21	0.866 5
	Am241		5.480	5.486	-0.006				0.663E-05
3	Am243	0.9146	5.234	5.271	-0.037	0.05	22.77	1417.05	0.638E-03

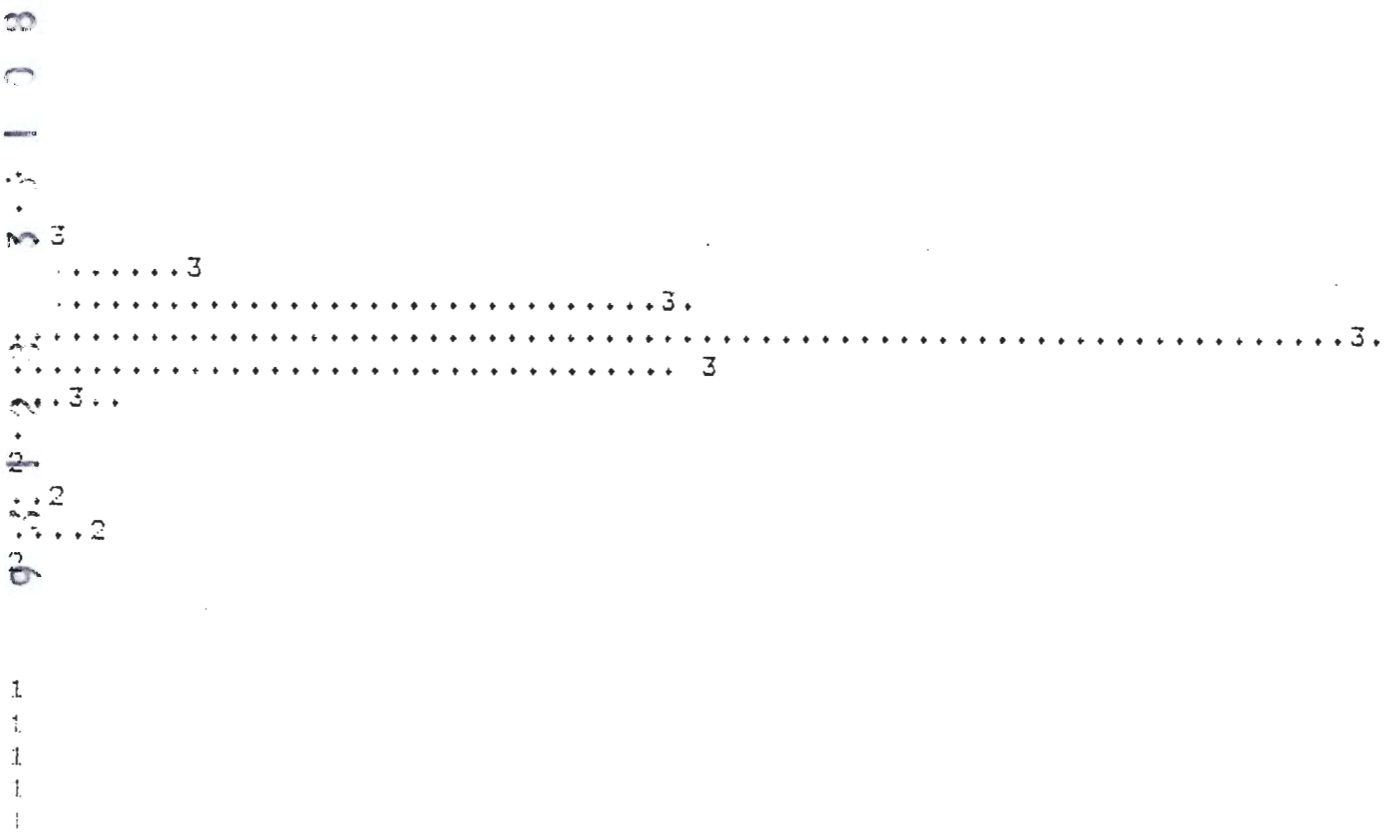
DETECTOR CALIBRATION

Energy(MEV) = 4.080 + (0.0047)*Channel
Energy range (MeV): 4.080 TO 6.487
Efficiency = 0.1461 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	12869.0	100.000
Smoothed	12869.0	100.000
Composite fit	12450.5	96.748
Residuals	418.4	3.252

Analyzed by: _____
62820



Raw Data Dump for AEA Spectrum: SF:SD4063.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
41	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
51	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.
61	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
71	0.	1.	0.	0.	1.	0.	0.	0.	1.	0.
81	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
101	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.
111	0.	0.	0.	0.	0.	0.	1.	0.	1.	3.
121	0.	1.	0.	1.	0.	0.	2.	0.	1.	0.
131	1.	1.	4.	1.	1.	0.	0.	2.	0.	2.
141	1.	4.	1.	0.	2.	1.	1.	1.	1.	1.
151	0.	1.	0.	2.	0.	1.	2.	1.	0.	2.
161	1.	0.	0.	2.	0.	0.	1.	2.	2.	0.
171	1.	1.	0.	3.	1.	1.	2.	1.	3.	0.
181	0.	2.	2.	2.	0.	5.	3.	1.	6.	3.
191	1.	1.	4.	5.	8.	2.	9.	3.	3.	8.
201	2.	3.	5.	4.	5.	5.	7.	14.	15.	14.
211	17.	11.	6.	12.	12.	22.	14.	17.	18.	10.
221	14.	12.	15.	26.	18.	27.	10.	31.	19.	32.
231	37.	55.	47.	72.	87.	74.	101.	122.	128.	162.
241	206.	255.	289.	338.	391.	471.	549.	564.	715.	710.
251	781.	782.	764.	753.	721.	569.	456.	346.	197.	127.
261	98.	72.	47.	34.	36.	29.	32.	36.	23.	5.
271	14.	7.	3.	6.	8.	4.	3.	2.	2.	12.
281	6.	10.	13.	12.	12.	20.	18.	24.	23.	31.
291	29.	32.	52.	61.	46.	50.	59.	66.	64.	62.
301	49.	49.	34.	19.	12.	6.	10.	4.	6.	1.
311	5.	2.	6.	1.	1.	0.	0.	0.	0.	1.
321	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
331	0.	1.	0.	0.	0.	0.	1.	1.	0.	0.
341	1.	0.	1.	2.	0.	1.	1.	0.	1.	5.
351	1.	0.	3.	3.	1.	0.	1.	1.	2.	4.
361	4.	2.	0.	1.	2.	1.	2.	1.	1.	1.
371	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
421	1.	0.	0.	0.	2.	0.	0.	0.	1.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
451	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
461	0.	0.	1.	1.	0.	1.	2.	0.	1.	0.
471	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.
481	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

G E N E R A L A L P H A E N E R G Y A N A L Y S I S
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R361-5582
File ID: SD5011.SPC

Counted on: 10/26/91 @10: 0
Detector/Geometry number: 5/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	2769.7	2755.2	302.770	302.770	24.000	14.119	12.000	6.060
2	1769.9	1747.6	256.128	256.128	20.000	12.621	10.000	4.362
3	432.5	466.5	231.164	231.164	16.000	3.604	8.000	1.161

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Peak Centroid Obs.	Peak Centroid Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Pu238	0.5567	5.499	5.489	0.010	0.06	55.97	310.19	0.140E-03
	Am241		5.480	5.489	-0.009				0.107E-03
2		0.3672		5.274		0.06	36.91	147.29	0.663E-04
3	Pu239	0.0761	5.143	5.160	-0.017	0.02	7.65	30.52	0.137E-04
	Pu240		5.144	5.160	-0.016				0.137E-04

DETECTOR CALIBRATION

Energy(MEV) = 4.096 + (0.0046)*Channel
Energy range (MeV): 4.096 TO 6.451
Efficiency = 0.2506 CPM/DPM

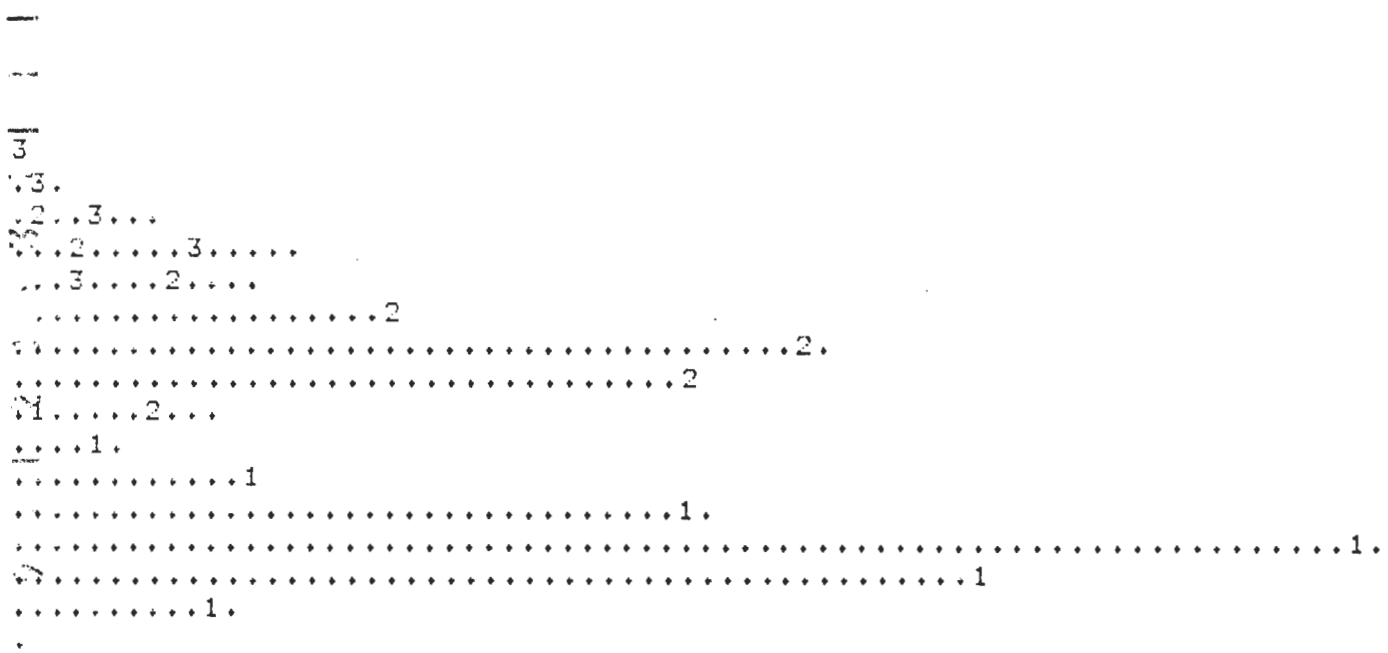
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	50623.0	100.000
Smoothed	50623.0	100.000
Composite fit	50264.1	99.291
Residuals	358.9	0.709

Analyzed by: _____
62820

SPECTRUM SBS011.SPC

1 LEGEND: RAW = ... MODELED PEAKS = 1,2,.., ETC 10262.6



Raw Data Dump for AEA Spectrum: SF:SD5011.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
21	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	1.	0.	1.	0.	0.	0.	0.	1.	0.	0.
41	1.	2.	1.	1.	1.	0.	1.	0.	0.	0.
51	2.	0.	0.	1.	0.	2.	1.	1.	0.	0.
61	0.	1.	1.	1.	0.	0.	0.	1.	0.	1.
71	0.	1.	2.	0.	0.	0.	2.	0.	0.	0.
81	2.	0.	1.	1.	0.	0.	2.	0.	2.	1.
91	0.	0.	0.	0.	2.	3.	3.	2.	2.	1.
101	0.	0.	3.	1.	1.	1.	0.	0.	0.	0.
111	1.	2.	1.	0.	1.	1.	3.	1.	0.	4.
121	2.	0.	1.	2.	0.	2.	1.	1.	3.	2.
131	1.	1.	0.	1.	0.	2.	1.	2.	2.	0.
141	4.	2.	1.	0.	1.	0.	0.	0.	1.	1.
151	2.	1.	1.	1.	3.	1.	1.	3.	5.	1.
161	5.	0.	3.	5.	5.	5.	3.	1.	5.	1.
171	2.	4.	6.	0.	6.	4.	3.	4.	3.	3.
181	4.	3.	6.	6.	2.	6.	8.	3.	4.	5.
191	7.	13.	11.	15.	9.	9.	16.	8.	21.	12.
201	23.	18.	24.	30.	23.	24.	39.	37.	41.	58.
211	50.	59.	63.	77.	88.	105.	125.	123.	163.	166.
221	201.	204.	218.	233.	280.	304.	320.	357.	336.	367.
231	341.	309.	268.	270.	228.	213.	204.	187.	201.	258.
241	259.	273.	376.	373.	473.	499.	588.	616.	672.	719.
251	863.	931.	917.	989.	1055.	1029.	956.	874.	740.	608.
261	453.	352.	290.	208.	177.	156.	117.	101.	101.	98.
271	94.	83.	84.	89.	80.	103.	100.	104.	123.	149.
[illegible]	156.	199.	209.	244.	288.	316.	356.	459.	482.	569.
[illegible]	635.	746.	814.	904.	1011.	1144.	1219.	1357.	1498.	1479.
[illegible]	1622.	1652.	1520.	1432.	1278.	1115.	922.	702.	536.	462.
311	344.	248.	203.	141.	132.	110.	73.	54.	36.	19.
321	13.	6.	2.	0.	0.	0.	0.	0.	2.	1.
331	0.	0.	3.	0.	0.	0.	0.	1.	1.	0.
341	0.	0.	3.	0.	0.	1.	0.	1.	0.	0.
351	0.	1.	0.	2.	0.	2.	0.	1.	1.	0.
361	0.	1.	0.	2.	0.	2.	0.	2.	1.	1.
371	2.	1.	0.	1.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
421	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
431	1.	1.	0.	0.	1.	0.	0.	1.	0.	0.
441	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	2.	1.	0.	0.	0.	1.	0.	0.	0.
481	0.	0.	1.	1.	0.	0.	2.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: TECHNETIUM 99	Sample Prep: UNDIGESTED

Instrument: WB27818, WC16085	Procedure/Rev: LA-438-101/D-1
Technologist: L. TEMPLE	Date: 09-25-91
Starting Time: 10:30	Temperature: NA
Ending Time: 14:12	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5584	11		
2	REAGENT BLANK	R347-5684	12		
3	SAMPLE 791 COMP	R348-5784	13		
4	SAM DUP 791 COMP	R348-5884	14		
5	FINAL LMCS CHECK STD	R361-5584	15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	28B49/0.250 mL			NA
SPIKE	49B39/0.1 mL			NA
SAMPLES RERUN.				

A-6000-881 (03/92)

9 3 1 2 8 5 3 5 1 1 3

-2

Serial No.	Sample Point	Date	Time Issued	Priority
R 346.-5584	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
TC99	LA-438-101	% RECOVERY RERUN	W1TE2	1

Sample Size	Customer ID
? 250λ	STD

Remarks, Calculations, Results:
EDP S363 TC99
STDN 28849 RESULT 1.882
STD VAL 2.0542 %REC 92%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	W Raymond			
Log Stepp				

Date	Time Completed	Lab Unit Mgr
9-25-91		

-4

Serial No.	Sample Point	Date	Time Issued	Priority
R 347.-5684	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
TC99	LA-438-101	uCI/L RERUN	W1TE2	1

Sample Size	Customer ID
? 100λ Spike spike # 49639	REG BL

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L < 3.03E-2

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	W Raymond			
Log Stepp				

Date	Time Completed	Lab Unit Mgr
9-25-91		

-6

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5784	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
TC99	LA-438-101	uCI/L RERUN	W1TE2	1

Sample Size	Customer ID
? 500λ	791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L
1.88E1
~~9.39E1 ml/l~~
DMS
9/26/91

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	W Raymond			
Log Stepp				

Date	Time Completed	Lab Unit Mgr
9-25-91		

-8

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5884	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
TC99	LA-438-101	uCI/L RERUN	W1TE2	1

Sample Size	Customer ID
? 500λ	791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L
1.48E1 ml/l

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	W Raymond			
Log Stepp				

Date	Time Completed	Lab Unit Mgr
9-25-91		

-10

Serial No.	Sample Point	Date	Time Issued	Priority
R 361.-5584	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
TC99	LA-438-101	% RECOVERY	W1TE2	1

Sample Size	Customer ID
? 250λ	STD

Remarks, Calculations, Results:
EDP S363 TC99
STDN 28849 RESULT 1.90
STD VAL 2.0542 %REC 92.5%

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
81808	W Raymond			
Log Stepp				

Date	Time Completed	Lab Unit Mgr
9-25-91		

9 3 1 2 8 3 5 1 1 4

```
USER: 5 ID:TC-99. ALL   PRESET TIME: 10.00              WED 25 SEP 1991 19:21
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N   RS232:N
H#: 3 AQC:Y QCF:N RCM:Y 2 PHASE MONITOR:Y POST CHK:N VIAL:G VOLUME:1
RCM-TIME:  0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB:   0.00 BKG 2SIG:  0.00 LSR:   0

SINGLE LABEL DPM  SET UP ON  19 SEP 1990  09:22

UNKNOWN ID:TC 99 DIRECT            UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR  ISO1:0 1.00000
UNKNOWN UNITS        ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N    BACKGROUND QUENCH CURVES:Y
STANDARD ID:131B28-A 1-10          QUENCH LIMITS   LOW:73.67    HIGH:207.7
HALF LIFE(DAYS)  ISO1:N
STANDARD DPM     ISO1:0.00000000

SAM  POS  CH     CPM     2SIG%  TIME   EL TIME AVG H#        RCM%  2P        ERR

B1  **- 1  1     42.30  9.72  10.00    11.03  68.3          0.21
    H#:  68.  69.  68

BACKGROUND QUENCH CURVES: CONSTANT

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A:  42.30000      B:0.00000000      C:0.00000000      D:0.00000000000
```

BACKGROUND QUENCH CURVE CORRELATION TABLE

BKG	H#	MEASURED CPM.	CALCULATED CPM.	PERCENT DIFF.	FLAG
1	68.3	42.30	42.30	0.00	

```
BACKGROUND QUENCH LIMITS   LOW:0.000    HIGH:1000.
     TOTAL QUENCH LIMITS   LOW:73.67    HIGH:207.7

SAM  POS  CH     CPM     2SIG%  TIME   EL TIME AVG H#        RCM%  2P        CHK

  1 **- 3  1    415.30  3.10  10.00    22.09 155.0          1.82 **
     ISO1 %EFF CH1:93.71                              ISO1 DPM  :398.0267

  2 **- 4  1   2512.20  1.26  10.00    32.98 156.0          0.34 **
     ISO1 %EFF CH1:93.63                              ISO1 DPM  :2637.974

  3 **- 5  1     52.10  8.76  10.00    43.59 122.0          0.93 **
     ISO1 %EFF CH1:94.74                              ISO1 DPM  :10.24386
```

BEST AVAILABLE COPY


```
SAM  POS  CH     CPM     2SIG%  TIME   EL TIME AVG H#        RCM%  2P        CHK

  4 **- 6  1   2111.90  1.38  10.00    54.39 156.0          0.37 **
     ISO1 %EFF CH1:93.63                              ISO1 DPM  :2210.434

  5 **- 7  1   6679.30  0.77  10.00    65.49 158.0          0.10 **
    H#: 159. 157
     ISO1 %EFF CH1:93.46                              ISO1 DPM  :7101.110

  6 **- 8  1   8566.90  0.68  10.00    76.26 156.0          0.09 **
     ISO1 %EFF CH1:93.63                              ISO1 DPM  :9104.382

  7 **- 9  1   6506.10  0.78  10.00    87.08 156.0          0.12 **
     ISO1 %EFF CH1:93.63                              ISO1 DPM  :6903.654

  8 **-10  1   9795.30  0.67  10.00    97.89 160.0          0.09 **
     ISO1 %EFF CH1:93.31                              ISO1 DPM  :9381.048

  9 **-11  1    420.10  3.09  10.00   108.91 158.5          1.35 **
    H#: 159. 158
     ISO1 %EFF CH1:93.49                              ISO1 DPM  :404.3912

 10 **-12  1   2522.40  1.26  10.00   119.69 159.0          0.26 **
```

11

8/31/92

126

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: IODINE 129	Sample Prep: UNDIGESTED

Instrument: WB57237, WB57265	Procedure/Rev: LA-378-103/B-0
Technologist: J. KUNKEL	Date: 09-25-91
Starting Time: 08:00	Temperature: 23degC
Ending Time: NA	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5585	11		
2	REAGENT BLANK	R347-5685	12		
3	SAMPLE 791 COMP	R348-5785	13		
4	SAM DUP 791 COMP	R348-5885	14		
5	FINAL LMCS CHECK STD	R361-5585	15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	38B46/1.0 mL			N/A

A-6000-881 (03/92)

9312835116

IODINE I-129 ANALYSIS - UNDIGESTED ANALYSIS

6646

Serial No.	Sample Point	Date	Time Issued	Priority
R 346.-5585	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Retyne
I129	LA-378-103	% RECOVERY	W11E2	0

Sample Size: ? 1ml
Customer ID: STD

Remarks, Calculations, Results:
EDP 592H ITANK
STD# 38846 RESULT
STD VAL %REC
GROSS WT 2.7558
TARE WT. 2.7410
NET WT. .0148

$\frac{(3.07E-4)(1000)}{.0148/.0305} = 6.33E-1 / 6.18E-1$

102.4%

Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	Eric Bryan			
PRS	PRS	PRS	PRS	PRS

Date: 9-25-91 | Time Completed | Lab Unit Mgr

6647

Serial No.	Sample Point	Date	Time Issued	Priority
R 347.-5685	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Retyne
I129	LA-378-103	uCI/L	W11E2	0

Sample Size: ? 1ml
Customer ID: REG BL.

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L
2.7616
2.7540
.0076

$\frac{(<2.04E-5)(1000)}{.0076/.0305} = <8.18E-2$

Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	Eric Bryan			
PRS	PRS	PRS	PRS	PRS

Date: 9-25-91 | Time Completed | Lab Unit Mgr

6648

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5785	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Retyne
I129	LA-378-103	uCI/L	W11E2	0

Sample Size: ? 1ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L
2.7384
2.7273
.0111

$\frac{(<1.73E-5)(1000)}{.0111/.0305} = <4.75E-2$

Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	Eric Bryan			
PRS	PRS	PRS	PRS	PRS

Date: 9-25-91 | Time Completed | Lab Unit Mgr

6649

Serial No.	Sample Point	Date	Time Issued	Priority
R 349.-5885	106AW R	9-20-91	11:47	26

Determination	Method/Standard	Result Units	Charge Code	Retyne
I129	LA-378-103	uCI/L	W11E2	0

Sample Size: ? 1ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L
2.7402
2.7253
.0149

$\frac{(<1.82E-5)(1000)}{.0149/.0305} = <3.73E-2$

Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	Eric Bryan			
PRS	PRS	PRS	PRS	PRS

Date: 9-25-91 | Time Completed | Lab Unit Mgr

6650

Serial No.	Sample Point	Date	Time Issued	Priority
R 361.-5585	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Units	Charge Code	Retyne
I129	LA-378-103	% RECOVERY	W11E2	0

Sample Size: ? 1ml
Customer ID: STD

Remarks, Calculations, Results:
EDP 592H ITANK
STD# 38846 RESULT
STD VAL %REC
GROSS WT 2.7719
TARE WT. 2.7565
NET WT. .0154

$\frac{(3.13E-4)(1000)}{.0154/.0305} = 6.20E-1 / 6.18E-1$

100.3%

Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	67597			
PRS	PRS	PRS	PRS	PRS

Date: 9-25-91 | Time Completed | Lab Unit Mgr

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*                                                                     *
          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-F V2.06 SOFTWARE

25-SEP-9120:33:14

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 4.0
DETECTOR NUMBER: 6 / GEOMETRY NUMBER: 1
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 95.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

TRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
YZED BY: 62820

SAMPLE DESCRIPTION: R346-5585
GEOMETRY DESCRIPTION: I-129/CULTURE TUBE
SAMPLE SIZE: 1.0000E+00 EA / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL129

COLLECT STARTED ON 25-SEP-91 AT 19:43:05

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3002. SECONDS
DEAD TIME: 0.07 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 21-JUN-90
EFFICIENCY CALIBRATION PERFORMED 18-JUN-90

25-SEP-9120:33:14

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
1C	147.23	29.31	1.39	782.	8831.	2.9	
2C	167.77	33.41	1.39	473.	2117.	7.0	CE-144
3	197.05	39.26	1.18	216.	1332.	6.9	I-129,BI-212

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 95.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0024
BACKGROUND DESCRIPTION: BKG
BACKGROUND COLLECT STARTED ON 4-JUN-90 AT 13:00:00
BACKGROUND LIVE TIME: 3000. SECONDS
BACKGROUND WAS INSIGNIFICANT

25-SEP-9120:33:14

SAMPLE: R346-5585
COLLECTED ON 25-SEP-91 AT 19:43:05
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 uCi/EA MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AM-241	LLD<1.83E-06		LLD<1.83E-06		59.54	
AM-243	LLD<8.27E-07		LLD<8.27E-07		74.67	
I-129	3.07E-04	+-2.13E-05	3.07E-04	+-2.13E-05	39.60	-0.34
SB-125	LLD<1.83E-05		LLD<1.83E-05		176.33	
SE-75	LLD<1.71E-06		LLD<1.71E-06		136.00	
SN-113	LLD<3.01E-06		LLD<3.01E-06		391.67	
TOTAL	3.07E-04	+-2.13E-05	3.07E-04	+-2.13E-05		

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 5.77E-03 UC/EA
TOTAL MEASURED ACTIVITY = 3.07E-04 (+-2.13E-05) UC/EA
% TECH. SPEC. = 5.33 (+-0.37)

ERROR QUOTATION AT 1.96 SIGMA
CONFIDENCE LEVEL AT 95.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
147.23	29.31	8831.	2.9	1.27E+01
167.77	33.41	2117.	7.0	2.05E+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-F V2.06 SOFTWARE

25-SEP-9122:00:03

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 4.0
DETECTOR NUMBER: 6 / GEOMETRY NUMBER: 1
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 95.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
ANALYZED BY: 62820

SAMPLE DESCRIPTION: R347-5685
GEOMETRY DESCRIPTION: I-129/CULTURE TUBE
SAMPLE SIZE: 1.0000E+00 EA / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL129

COLLECT STARTED ON 25-SEP-91 AT 21:09:53

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3001. SECONDS
DEAD TIME: 0.03 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 21-JUN-90
EFFICIENCY CALIBRATION PERFORMED 18-JUN-90

25-SEP-9122:00:03

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

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 95.0%

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0024
BACKGROUND DESCRIPTION: BKG
BACKGROUND COLLECT STARTED ON 4-JUN-90 AT 13:00:00
BACKGROUND LIVE TIME: 3000. SECONDS
BACKGROUND WAS INSIGNIFICANT

9 3 1 2 8 3 5 1 2 2

25-SEP-9122:00:03

SAMPLE: R347-5685
EA COLLECTED ON 25-SEP-91 AT 21:09:53
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 uCi/EA MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AM-241	LLD<1.86E-06		LLD<1.86E-06		59.54	
AM-243	LLD<1.11E-06		LLD<1.11E-06		74.67	
I-129	LLD<2.04E-05		LLD<2.04E-05		39.60	
SB-125	LLD<2.25E-05		LLD<2.25E-05		176.33	
SE-75	LLD<1.73E-06		LLD<1.73E-06		136.00	
SN-113	LLD<4.16E-06		LLD<4.16E-06		391.67	
TOTAL	0.00E-01	+-0.00E-01	0.00E-01	+-0.00E-01		

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 95.0%

ALL DETECTED PEAKS WERE USED IN THE ANALYSIS

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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-F V2.06 SOFTWARE

25-SEP-9122:54:07

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 4.0
DETECTOR NUMBER: 6 / GEOMETRY NUMBER: 1
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 95.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

TRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
YZED BY: 62820

SAMPLE DESCRIPTION: R348-5785
GEOMETRY DESCRIPTION: I-129/CULTURE TUBE
SAMPLE SIZE: 1.0000E+00 EA / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL129

COLLECT STARTED ON 25-SEP-91 AT 22:03:58

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3001. SECONDS
DEAD TIME: 0.03 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 21-JUN-90
EFFICIENCY CALIBRATION PERFORMED 18-JUN-90

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

K	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1	146.94	29.25	1.41	286.	665.	12.8	

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 95.0%

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0024
BACKGROUND DESCRIPTION: BKG
BACKGROUND COLLECT STARTED ON 4-JUN-90 AT 13:00:00
BACKGROUND LIVE TIME: 3000. SECONDS
BACKGROUND WAS INSIGNIFICANT

9 3 1 2 8 6 3 5 1 2 5

25-SEP-9122:54:07

SAMPLE: R348-5785
COLLECTED ON 25-SEP-91 AT 22:03:58
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 uCi/EA MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AM-241	LLD<1.98E-06		LLD<1.98E-06		59.54	
AM-243	LLD<9.16E-07		LLD<9.16E-07		74.67	
I-129	LLD<1.73E-05		LLD<1.73E-05		39.60	
SB-125	LLD<1.97E-05		LLD<1.97E-05		176.33	
SE-75	LLD<1.95E-06		LLD<1.95E-06		136.00	
SN-113	LLD<3.63E-06		LLD<3.63E-06		391.67	
TOTAL	0.00E-01	+-0.00E-01	0.00E-01	+-0.00E-01		

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 95.0%

PEAKS NOT USED IN ANALYSIS

..ROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
146.94	29.25	665.	12.8	9.62E-01

25-SEP-9123:48:05

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

K	CENTROID CHANNEL	ENERGY KEV	FWHM KEV	BACKGND COUNTS	NET AREA COUNTS	ERROR %	NUCLIDES
1	147.66	29.39	1.25	237.	576.	13.5	

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 95.0%

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0024
BACKGROUND DESCRIPTION: BKG
BACKGROUND COLLECT STARTED ON 4-JUN-90 AT 13:00:00
BACKGROUND LIVE TIME: 3000. SECONDS
BACKGROUND WAS INSIGNIFICANT

25-SEP-9123:48:05

'LE: R348-5885
\ COLLECTED ON 25-SEP-91 AT 22:57:57
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 uCi/EA MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AM-241	LLD<1.92E-06		LLD<1.92E-06		59.54	
AM-243	LLD<8.27E-07		LLD<8.27E-07		74.67	
I-129	LLD<1.82E-05		LLD<1.82E-05		39.60	
SB-125	LLD<1.77E-05		LLD<1.77E-05		176.33	
SE-75	LLD<1.84E-06		LLD<1.84E-06		136.00	
SN-113	LLD<4.76E-06		LLD<4.76E-06		391.67	
TOTAL	0.00E-01	+-0.00E-01	0.00E-01	+-0.00E-01		

ERROR QUOTATION AT 1.96 SIGMA
LLD CONFIDENCE LEVEL AT 95.0%

PEAKS NOT USED IN ANALYSIS

.IROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
147.66	29.39	576.	13.5	8.20E-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-F V2.06 SOFTWARE

25-SEP-9123:48:05

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 4.0
DETECTOR NUMBER: 6 / GEOMETRY NUMBER: 1
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 95.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
LYZED BY: 62820

SAMPLE DESCRIPTION: R348-5885
GEOMETRY DESCRIPTION: I-129/CULTURE TUBE
SAMPLE SIZE: 1.0000E+00 EA / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL129

COLLECT STARTED ON 25-SEP-91 AT 22:57:57

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3002. SECONDS
DEAD TIME: 0.07 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 21-JUN-90
EFFICIENCY CALIBRATION PERFORMED 18-JUN-90

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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-F V2.06 SOFTWARE

26-SEP-9101:14:25

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

MCA UNIT NUMBER: 2 / ADC UNIT NUMBER: 4.0
DETECTOR NUMBER: 6 / GEOMETRY NUMBER: 1
SPECTRUM SIZE: 4096 CHANNELS
ORDER OF SMOOTHING FUNCTION: 5
NUMBER OF BACKGROUND CHANNELS: 4 ON EACH SIDE OF PEAK
PEAK CONFIDENCE FACTOR: 95.0%
IDENTIFICATION ENERGY WINDOW: +- 1.50 KEV
ERROR QUOTATION: 1.96 SIGMA UNCERTAINTY

ENVIRONMENTAL BACKGROUND SUBTRACTED
LLD CALCULATION PERFORMED
MEASURED ENERGY DIFFERENCES LISTED
MULTIPLET ANALYSIS PERFORMED

SPECTRAL DATA READ DIRECTLY FROM MULTICHANNEL ANALYZER AN1:
ZED BY: 69549

SAMPLE DESCRIPTION: R361-5585
GEOMETRY DESCRIPTION: I-129/CULTURE TUBE
SAMPLE SIZE: 1.0000E+00 EA / CONVERSION FACTOR: 1.0000E+00
STANDARD SIZE: 1.0000E+00 EA
ANALYSIS LIBRARY FILE: ANL129

COLLECT STARTED ON 26-SEP-91 AT 00:24:17

COLLECT LIVE TIME: 3000. SECONDS
REAL TIME: 3002. SECONDS
DEAD TIME: 0.07 %

DECAYED TO 0. DAYS, 0.0000 HOURS BEFORE THE START OF COLLECT

ENERGY CALIBRATION PERFORMED 21-JUN-90
EFFICIENCY CALIBRATION PERFORMED 18-JUN-90

08/31/92
~~141~~

26-SEP-9101:14:25

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
1C	147.30	29.32	1.38	749.	9427.	2.7	
2C	167.71	33.40	1.38	392.	2182.	6.4	CE-144
3	196.61	39.18	1.38	137.	1357.	6.4	I-129,BI-212

ERROR QUOTATION AT 1.96 SIGMA
PEAK CONFIDENCE LEVEL AT 95.0%

C - MULTIPLET ANALYSIS CONVERGED NORMALLY

BACKGROUND SUBTRACTION PERFORMED USING FILE BK0024
BACKGROUND DESCRIPTION: BKG
BACKGROUND COLLECT STARTED ON 4-JUN-90 AT 13:00:00
BACKGROUND LIVE TIME: 3000. SECONDS
BACKGROUND WAS INSIGNIFICANT

9 3 1 2 8 6 3 5 1

08/31/92
~~142~~

26-SEP-9101:14:25

SAMPLE: R361-5585
COLLECTED ON 26-SEP-91 AT 00:24:17
YED 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 uCi/EA MEASURED	ERROR	DECAY CORRECTED	ERROR	ENERGY COMPARISON (KEV) EXPECT	DIFF
AM-241	LLD<2.12E-06		LLD<2.12E-06		59.54	
AM-243	LLD<9.44E-07		LLD<9.44E-07		74.67	
I-129	3.13E-04	+-1.99E-05	3.13E-04	+-1.99E-05	39.60	-0.42
SB-125	LLD<1.92E-05		LLD<1.92E-05		176.33	
SE-75	LLD<1.67E-06		LLD<1.67E-06		136.00	
SN-113	LLD<3.82E-06		LLD<3.82E-06		391.67	
TOTAL	3.13E-04	+-1.99E-05	3.13E-04	+-1.99E-05		

EBAR = ***** MEV/DISINTEGRATION
MAXIMUM PERMISSABLE ACTIVITY = 5.77E-03 UC/EA
TOTAL MEASURED ACTIVITY = 3.13E-04 (+-1.99E-05) UC/EA
% TECH. SPEC. = 5.42 (+-0.34)

ERROR QUOTATION AT 1.96 SIGMA
CONFIDENCE LEVEL AT 95.0%

PEAKS NOT USED IN ANALYSIS

CENTROID CHANNEL	ENERGY KEV	NET AREA COUNTS	ERROR %	GAMMAS/SEC
147.30	29.32	9427.	2.7	1.35E+01
167.71	33.40	2182.	6.4	2.11E+00

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: STRONTIUM 90	Sample Prep: UNDIGESTED

Instrument: WB27812	Procedure/Rev: LA-220-101/D-0
Technologist: J. KUNKEL	Date: 10-03-91
Starting Time: 12:00 (10-03-91)	Temperature: 23degC
Ending Time: 09:00 (10-04-91)	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5586	11		
2	REAGENT BLANK	R347-5686	12		
3	SAMPLE 791 COMP	R348-5786	13		
4	SAM DUP 791 COMP	R348-5886	14		
5	FINAL LMCS CHECK STD	R361-5586	15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	150B46/1.0 mL			NA

A-6000-881 (03/92)

9312863513 3

STRONTIUM 90 ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
R 346.-5586	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
SR90	LA-220-101	% RECOVERY	WITE2	0

Sample Size: ? 1 ml
Customer ID: STD

Remarks, Calculations, Results:
COUNT ON DETECTOR#11
S376 ITS

STDN 150846 RESULT 7.97E-1 8.1598 7.1533
8.0742 7.0463,
.0856 .0860
.0870

STD VAL 7.71E-1 %REC 103.3%

Sep Time: 1415
Sep Date: 10-3-91
Jerry M. Kunkel

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	69549			
Hrs	Hrs	Hrs	Hrs	Hrs

Date: 10-3-91

11/2 10-4-91 1045 R346-5586 ΔT=20.5

7404 / 10 - 13 (A) 1 ml

7547 / 10 (D)

Sr Calculation by ALJ on 10-04-1991 at 13:17:53
Det #11 2 -inch mount Sr eff : .3919 Y eff : .4443

Sample size : 1 ml Dilution : 1 Method : 1

Mount # 1 Decay time = 20.5 hrs

7404 / 10 - 13.0 = 6.8221E-01 uCi/L strontium .856 7.97E-1

Mount # 2 Decay time = 20.5 hrs

7547 / 10 - 13.0 = 6.9562E-01 uCi/L strontium .870 7.80E-1

Serial No	Sample Point	Date	Time Issued	Priority
R 347.-5686	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
SR90	LA-220-101	uCI/L	WITE2	0

Sample Size: ? 1 ml
Customer ID: REG BL

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L

7.9369 8.3805 <4.42E-3
7.8582, 8.3033
.0782 .0772
Jerry M. Kunkel

Sep Time: 14:15
Sep Date: 10-3-91

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	69549			
Hrs	Hrs	Hrs	Hrs	Hrs

Date: 10-3-91

11/2 10-4-91 1130 R347-5686 ΔT=21.25

B3 / 10 - 13 1 ml

140 / 10 (D)

Sr Calculation by ALJ on 10-04-1991 at 13:19:14
Det #11 2 -inch mount Sr eff : .3919 Y eff : .4443

Sample size : 1 ml Dilution : 1 Method : 1

Mount # 1 Decay time = 21.25 hrs

133 / 10 - 13.0 (2.7744E-03 uCi/L strontium

Mount # 2 Decay time = 21.25 hrs

140 / 10 - 13.0 (3.4599E-03 uCi/L strontium .742

Serial No	Sample Point	Date	Time Issued	Priority
R 348.-5786	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Reruns
SR90	LA-220-101	uCI/L	WITE2	0

Sample Size: ? 1 ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L

8.3960 8.1328 2.94E1
8.3156, 8.0520
.0804 .0808
Jerry M. Kunkel

Sep Time: 1415
Sep Date: 10-3-91

Analyst-1	Analyst-2	Analyst-3	Analyst-4	Analyst-5
80518	69549			
Hrs	Hrs	Hrs	Hrs	Hrs

Date: 10-3-91

11/2 10-4-91 1200 R348-5786 ΔT=21.75

00 353824 / 10 - 13 1 ml

01 255558 / 10

Sr Calculation by ALJ on 10-04-1991 at 13:20:10
Det #11 2 -inch mount Sr eff : .3919 Y eff : .4443

Sample size : 1 ml Dilution : 1 Method : 1

Mount # 1 Decay time = 21.75 hrs

253824 / 10 - 13.0 = 2.3559E+01 uCi/L strontium .804 2.93E1

Mount # 2 Decay time = 21.75 hrs

255558 / 10 - 13.0 = 2.3720E+01 uCi/L strontium .808 2.94E1

STRONTIUM 90 ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
R 340.-5886	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Percent
SR90	LA-220-101	uCI/L	W1TE2	0

Sample Size: ? 1 ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L
8.3120 8.4319 2.95E1
8.2335, 8.3533
.0785 .0786
Sep Time: 1415
Sep Date: 10-3-91
Jerry M. Kunkel

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
80518	69547			
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Log Book Page	
10-3-91			

11/2 10-4-91 12:30 ΔT = 22.25
R348-5886
249862 / 10 -13
251932 / 10
1 ml

Sr Calculation by ALJ on 10-04-1991 at 13:24:02
Det 011 2 -inch mount Sr eff : .3919 Y eff : .4443
Sample size : 1 mL Dilution : 1 Method : 1
Mount # 1 Decay time = 22.25 hrs
249862 / 10 - 13.0 = 2.3101E+01 uCi/L strontium
.785 2.94E1
Mount # 2 Decay time = 22.25 hrs
251932 / 10 - 13.0 = 2.3292E+01 uCi/L strontium
.786 2.96E1

Serial No	Sample Point	Date	Time Issued	Priority
R 361.-5586	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Units	Charge Code	Percent
SR90	LA-220-101	% RECOVERY	W1TE2	0

Sample Size: ? 1 ml
Customer ID: STD

Remarks, Calculations, Results:
COUNT ON DETECTOR#11
S376 ITS
STD# 150846 RESULT 7.30E-1
STD VAL 7.71E-1 %REC 93.36
7.2770 8.3867
7.1912 8.3017,
.0858 .0850
Sep Time: 1415
Sep Date: 10-3-91
Jerry M. Kunkel

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
80518	69547			
Hrs	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Log Book Page	
10-3-91			

11/2 10-4-91 1300 ΔT = 22.75
R361-5586
7196 / 10 -13
6952 / 10
1 ml

Sr Calculation by ALJ on 10-04-1991 at 13:27:58
Det 011 2 -inch mount Sr eff : .3919 Y eff : .4443
Sample size : 1 mL Dilution : 1 Method : 1
Mount # 1 Decay time = 22.75 hrs
7196 / 10 - 13.0 = 6.5110E-01 uCi/L strontium
.858 7.59E-1
Mount # 2 Decay time = 22.75 hrs
6952 / 10 - 13.0 = 6.2862E-01 uCi/L strontium
.850 7.40E-1

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: SELENIUM 79	Sample Prep: UNDIGESTED

Instrument: WB27818, WC16085	Procedure/Rev: LA-365-132/B-0
Technologist: D. JACKSON	Date: 09-25-91
Starting Time: 08:30	Temperature: NA
Ending Time: 15:30	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	REAGENT BLANK	R347-5689	11		
2	SAMPLE 791 COMP	R348-5789	12		
3	SAM DUP 791 COMP	R348-5889	13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
NOT AVAILABLE.				

A-6000-881 (03/92)

9 3 1 2 8 3 5 1 3 6

SELENIUM 79 ANALYSIS - UNDIGESTED SAMPLE

Serial No.	Sample Point	Date	Time Issued	Priority
R 347.-5689	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
SE79	LA-365-132	uCI/L	W1TE2	0

Sample Size: 1.0 ml
Customer ID: REG. BL.

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L

0.7830
0.7670 SPC 5-24-92
0.0160 .0 .8

$$\frac{(<10)(1000)}{(2.22E^{6})(.8)(1)} = <5.63E^{-3}\ \text{uci/l}$$

Analyst - 1: 6C275 | Analyst - 2: RWilson | Analyst - 3: | Analyst - 4: | Reviewed: [signature]
Date: 9-25-91 | Time Completed: | Date Updated:

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5789	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
SE79	LA-365-132	U/L	W1TE2	0

Sample Size: ? 1.0 ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L

0.7708
0.7531 SPC 5-24-92
0.0177

$$\frac{(65.154)(1000)}{(2.22E^{6})(.889)(1)} = 3.30E^{-2}\ \text{uci/l}$$

FLAG SAMP/DUP > 20% DIF.

Analyst - 1: 6C275 | Analyst - 2: RWilson | Analyst - 3: | Analyst - 4: | Reviewed: [signature]
Date: 9-25-91 | Time Completed: | Date Updated:

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5889	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Rerun
SE79	LA-365-132	U/L	W1TE2	0

Sample Size: ? 1.0 ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L

FLAG: SAMP/DUP < 20% DIFFERENCE

0.7781
0.7608 SPC 5-24-92
0.0173 .02 .86

$$\frac{(89.5228)(1000)}{(2.22E^{6})(1)(.865)} = 4.66E^{-2}\ \text{uci/l}$$

Analyst - 1: 6C275 | Analyst - 2: RWilson | Analyst - 3: | Analyst - 4: | Reviewed: [signature]
Date: 9-25-91 | Time Completed: | Date Updated:

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WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: TRITIUM	Sample Prep: UNDIGESTED

Instrument: WB27818, WC16085	Procedure/Rev: LA-218-113/B-0
Technologist: V. MASSIE	Date: 10-07-91
Starting Time: NA	Temperature: NA
Ending Time: NA	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	INITIAL LMCS CHECK STD	R346-5587	11		
2	REAGENT BLANK	R347-5687	12		
3	SAMPLE 791 COMP	R348-5787	13		
4	SAM DUP 791 COMP	R348-5887	14		
5	SPIKE OF 791 COMP	R348-5987	15		
6	FINAL LMCS CHECK STD	R361-5587	16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
LMCS CHECK STD	34B49/1.0 mL			NA
SPIKE	34B49/1.0 mL			NA

A-6000-881 (03/92)

TRITIUM ANALYSIS - UNDIGESTED SAMPLE

9 3 1 2 8 3 5 1 4 0

1

Serial No.	Sample Point	Date	Time Issued	Priority
R 346.-5587	106AW R	9-20-91	11:34	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	% RECOVERY	W1TE2	0

Sample Size: ? 1ml
Customer ID: STD

Remarks, Calculations, Results:
EDP R907 ENVSTD
STD# 34849 RESULT 6.37E-1
STD VAL. 6.46E-1 %REC 98.6%

$$\frac{(1414.849)(1000)}{(1)(2.22E6)} =$$

Analyst: 68549 Date: 10-7-91

2

Serial No.	Sample Point	Date	Time Issued	Priority
R 347.-5687	106AW R	9-20-91	11:39	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	uCI/L	W1TE2	0

Sample Size: ? 1ml
Customer ID: REG BL.

Remarks, Calculations, Results:
REAGENT BLANK
COUNT AS uCI/L

$$\frac{(25)(1000)}{2.22E6} = <1.13E-2 \text{ uCi/l}$$

Analyst: 68549 Date: 10-7-91

3

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5787	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	uCI/L	W1TE2	0

Sample Size: ? 1ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
COUNT AS uCI/L

$$\frac{(26432.96)(1000)}{2.22E6} = 1.19E1 \text{ uCi/l}$$

Analyst: 68549 Date: 10-7-91

4

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5887	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	uCI/L	W1TE2	0

Sample Size: ? 1ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
DUPLICATE SAMPLE
COUNT AS uCI/L

$$\frac{(26752.02)(1000)}{2.22E6} = 1.21E1 \text{ uCi/l}$$

Analyst: 68549 Date: 10-7-91

5

Serial No.	Sample Point	Date	Time Issued	Priority
R 348.-5987	106AW R	9-20-91	11:42	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	% RECOVERY	W1TE2	0

Sample Size: ? 1ml
Customer ID: 791 COMP

Remarks, Calculations, Results:
SAMPLE SPIKED ID ENV Std 34849
SPIKE ID
SPIKE VOLUME - 5ml
COUNT AS uCI/L

$$\frac{(13201.94)(1000)}{2.22E6} = 5.95$$

1.19E1 - 5.95 = 5.95 / 6.46E-1 92.1%

Analyst: 68549 Date: 10-7-91

6

Serial No.	Sample Point	Date	Time Issued	Priority
R 361.-5587	106AW R	9-23-91	10:43	26

Determination	Method/Standard	Result Units	Charge Code	Retype
H3	LA-218-113	% RECOVERY	W1TE2	0

Sample Size: ? 1ml
Customer ID: STD

Remarks, Calculations, Results:
EDP R907 ENVSTD
STD# 34849 RESULT 6.49E-1
STD VAL. 6.46E-1 %REC 100.5%

$$\frac{(1440.382)(1000)}{2.22E6} =$$

Analyst: 68549 Date: 10-7-91

USER: 1 ID:H-3 TRITIUM PRESET TIME: 10.00 MON [illegible] OCT [illegible]
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RSD2:N
H# [illegible] ADC:Y DES:Y RCM:Y 2 PHASE MONITOR:Y POST CHK:N [illegible]:C [illegible]:1
RCM-TIME: [illegible] LIT:999.95
CHANNEL [illegible] 2SIGMA: 0.10 EXC SUB: 0.00 BKG 2SIG: [illegible] DPM.

SINGLE LABEL DPM SET UP ON 19 SEP 1988 16.50

UNKNOWN ID:H-3 TRITIUM UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR ISO1:@ 1.00000
UNKNOWN UNITS ISO1:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:PACKARD 6008501 #54 QUENCH LIMITS LOW:0.000 HIGH:252.0
HALF LIFE(DAYS) ISO1: [illegible]503.000
STANDARD DPM ISO1: 260100.0

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	CP	SR
B.	**- 1	1	19.60	14.29	10.00	10.63	92.0	1.58	**	

BACKGROUND QUENCH CURVES: CONSTANT

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 19.60000 B:0.00000000 C:0.00000000 D:0.00000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

BKG	H#	MEASURED CPM.	CALCULATED CPM.	PERCENT DIFF.	FLAG
1	92.0	19.60	19.60	0.00	

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:0.000 HIGH:252.0

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	CP	SR
1	**- 3	1	647.80	2.49	10.00	21.62	94.0	0.13	**	
	ISO1 %EFF CH1 44.40						ISO1 DPM	:1414.849		
2	**- 4	1	19.90	14.16	10.00	32.35	95.0	1.04	**	
	ISO1 %EFF CH1:44.64						ISO1 DPM	:0.672069		
3	**- 5	1	11629.30	0.59	10.00	43.13	96.0	0.01	**	
	ISO1 %EFF CH1:43.92						ISO1 DPM	:26432.96		
4	**- 6	1	11961.20	0.58	10.00	53.91	93.0	0.01	**	
	ISO1 %EFF CH1:44.64						ISO1 DPM	:26752.02		

1

emass 8/31/92

9 3 1 2 8 6 3 5 1 4 1

PAGE:

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG	H#	TCM:	2?
5	**- 7	1	39[illegible]2.70	0.32	10.00	64.67	93.0		0.01	**
	ISO: %EFF CH1:4[illegible].44							ISO: DPM	:[illegible]	
6	**- 8	[illegible]	434.70	2.51	10.00	75.41	101.0		0.31	**
	ISO: %EFF CH1:4[illegible].70							ISO: DPM	:1440.732	

CALIBRATION SUCCESSFUL MON 07 OCT 1991 18:0[illegible]

9 3 1 2 8 3 5 1 4 2

WESTINGHOUSE HANFORD COMPANY
222-S LABORATORY

ANALYTICAL BATCH

Lab Segment Serial No.: R348	Customer ID: 791 COMPOSITE
Analysis: TOTAL ALPHA/ALPHA ENERGY	Sample Prep: UNDIGESTED

Instrument: WB57237 WB57265	Procedure/Rev: LA-548-101/A-2
Technologist: NA	Date: 06-04-92
Starting Time: NA	Temperature: NA
Ending Time: NA	Chemist: S. CATLOW

	Description	Lab ID		Description	Lab ID
1	SAMPLE 791 COMP	R348-1250	11		
2			12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		

Standard Type	Primary Book No. and Aliquot Vol.	Second Book No. and Aliquot Vol.	Third Book No. and Aliquot Vol.	Final Vol. of Standard
NA				

A-6000-881 (03/92)

9 3 1 2 3 6 5 3 5 1 4 3

TOTAL ALPHA/ALPHA ENERGY ANALYSIS - UNDIGESTED SAMPLE

4.4 8381

Serial No	Sample Point	Date	Time Issued	Priority
R 308. 1250	10a ~~[illegible]~~ 6-3-92	9-30-91	11:40	25

Discriminator	Internal Standard	Result Units	Charge Code	Forms
A1/SEA	LA-514-101	uCi/Sample	111700	0

Sample Size	Customer ID
2	291 COMP

Remarks, Calculations, Results:

^{234}U - 1.49×10^{-6} g/L

^{235}U - 4.26×10^{-4} g/L

^{238}U - 8.97×10^{-3} g/L

AEA-400 MIN
ATTACH PRINT OUT

Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
64965	[illegible]			
J.A. Cutts 6-4-92	Hrs	Hrs	Hrs	Hrs

Date	Time Completed	Lab Unit Mgr	
6-4-92		S.H. Cutts 6/4/92	[illegible]

#2 6-4-92 [illegible]

$\frac{2338}{30} - 9$ 132.87 g/m

^{234}U	.6507	87.21 g/m	6.48×10^{-3} g/m	0.016%	1.49×10^{-6} g/L
^{235}U	.0645	8.94	4.55×10^{-6}	4.38%	4.26×10^{-4} g
^{238}U	.2115	29.6	2.91×10^{-5}	92.96%	8.97×10^{-3} g

9 3 1 2 8 3 5 1 4 4

S A Catto 8/31/92

GENERAL ALPHA ENERGY ANALYSIS
Rev. 1.10

DATA REDUCTION REPORT

SAMPLE
R-348-1250
File ID: SD8351.SPC

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED THE ANALYSIS RUN ON PAGES 145 TO 147 .

Counted on: 6/ 4/92 @17: 0
Detector/Geometry number: 8/ 1
Count time: 30000. Sec

PEAK ANALYSIS

Peak ID	Peak height Initial	Peak height Final	Peak center Initial	Peak center Final	FWHM Initial	FWHM Final	Tau Initial	Tau Final
1	10.2	10.2	301.307	301.307	20.000	9.742	10.000	4.593
2	6.4	6.5	263.507	263.507	20.000	14.790	10.000	1.574
3	58.6	60.4	228.323	228.323	20.000	7.795	10.000	4.055
4	629.6	579.4	148.296	148.296	28.000	19.944	14.000	15.413
5	55.6	53.3	87.054	87.054	16.000	9.311	8.000	2.290
6	317.9	318.7	23.800	23.800	16.000	7.071	8.000	14.648

PEAK RESULTS

Peak ID	Isotope	AEA Fract.	Peak Centroid Exp.	Obs.	Diff.	FWHM	Count Rate c/m	d/m	Activity uCi/ea
1	Pu238	0.0093	5.499	5.496	0.003	0.05	0.18	1.20	0.538E-06
	Am241		5.480	5.496	-0.016				0.412E-06
2		0.0149		5.318		0.07	0.29	1.38	0.623E-06
3	Pu239	0.0492	5.143	5.153	-0.010	0.04	0.94	4.56	0.205E-05
	Pu240		5.144	5.153	-0.009				0.205E-05
4	Np237	0.6507	4.781	4.777	0.004	0.09	12.46	69.34	0.312E-04
5		0.0645		4.489		0.04	1.23	5.98	0.269E-05
6	U 238	0.2115	4.200	4.192	0.008	0.03	4.05	25.46	0.115E-04

DETECTOR CALIBRATION

Energy(MEV) = 4.080 + (0.0047)*Channel
Energy range (MeV): 4.080 TO 6.486
Efficiency = 0.2066 CPM/DPM

TOTAL COUNT DATA:

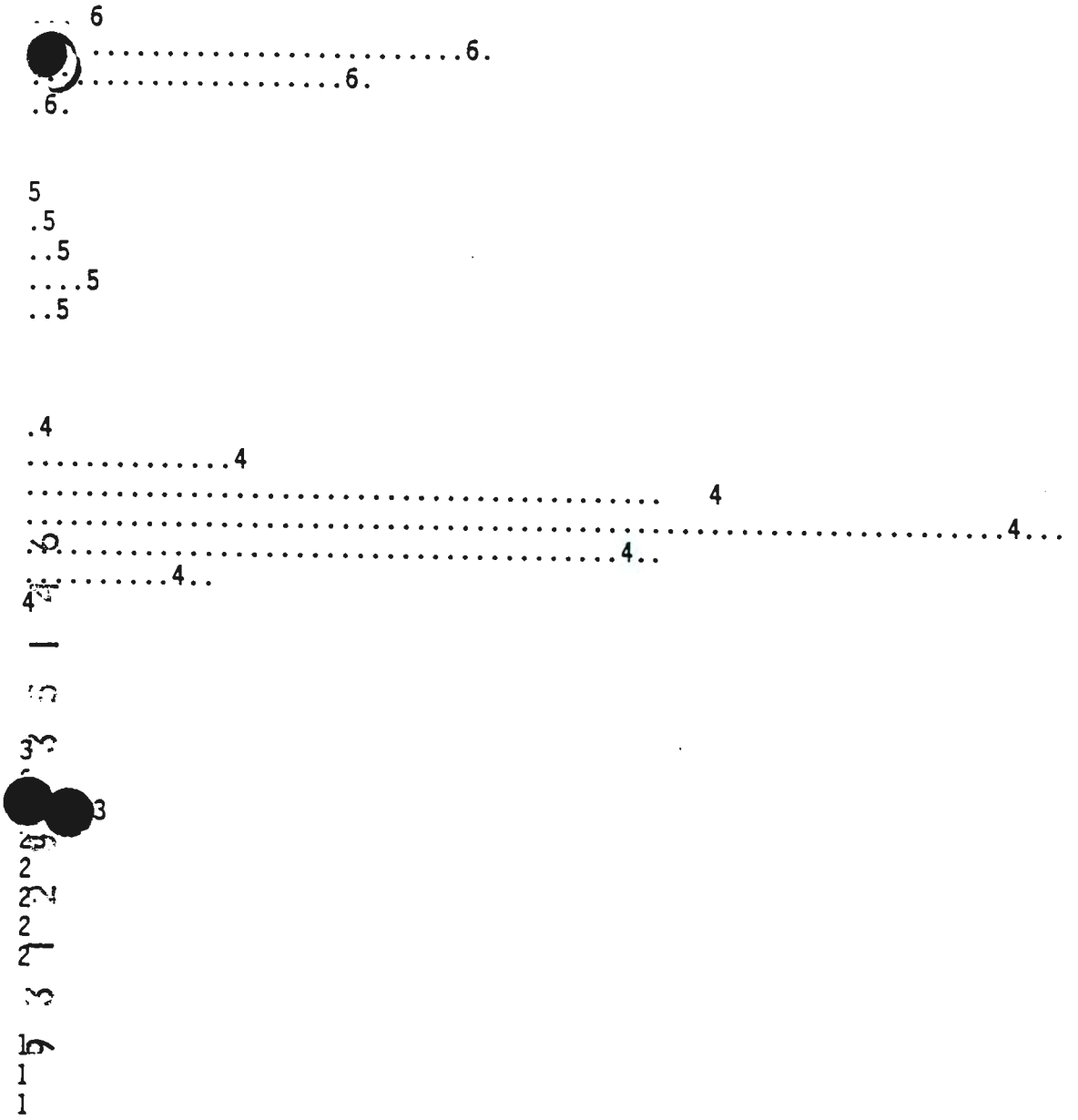
Item	Total	% Recovery
Raw spectrum	9673.0	100.000
Smoothed	9673.0	100.000
Composite fit	9577.6	99.014
Residuals	95.4	0.986

Analyzed by: _____
61453

emmo 08/31/92

SPECTRUM SD8351.SPC

1 LEGEND: RAW = ... MODELED PEAKS = 1,2,.., ETC 2321.9



Raw Data Dump for AEA Spectrum: SP:SD8351.SPC

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	117.	156.	171.	153.	160.
21	175.	165.	209.	194.	176.	144.	101.	60.	35.	11.
31	8.	4.	1.	1.	2.	1.	0.	1.	0.	0.
41	1.	0.	2.	2.	0.	1.	1.	1.	2.	3.
51	2.	0.	1.	3.	3.	5.	5.	3.	6.	7.
61	7.	9.	10.	12.	9.	15.	10.	10.	10.	7.
71	10.	15.	6.	10.	9.	14.	15.	19.	13.	26.
81	20.	22.	21.	30.	32.	41.	29.	32.	27.	24.
91	14.	7.	5.	2.	3.	2.	1.	0.	0.	0.
101	3.	1.	2.	1.	2.	4.	3.	3.	1.	3.
111	3.	5.	2.	1.	1.	5.	5.	4.	3.	3.
121	7.	8.	9.	12.	17.	10.	22.	26.	43.	31.
131	48.	66.	63.	95.	119.	139.	155.	154.	168.	195.
141	221.	235.	248.	291.	319.	440.	363.	376.	350.	297.
151	211.	182.	150.	162.	154.	152.	159.	170.	124.	116.
161	66.	33.	17.	8.	2.	3.	2.	5.	3.	2.
171	2.	0.	1.	1.	1.	0.	1.	0.	0.	0.
181	1.	0.	1.	1.	1.	2.	0.	1.	1.	1.
191	1.	0.	2.	0.	1.	1.	2.	3.	1.	0.
201	0.	3.	3.	1.	0.	1.	1.	4.	4.	2.
211	[illegible]	3.	6.	9.	5.	12.	17.	13.	16.	20.
[illegible]	24.	30.	20.	28.	35.	34.	38.	34.	34.	33.
231	24.	27.	8.	5.	3.	0.	2.	2.	1.	0.
241	0.	3.	0.	2.	2.	1.	1.	2.	1.	2.
251	3.	4.	5.	2.	1.	5.	3.	2.	4.	4.
261	2.	3.	2.	4.	5.	4.	1.	4.	1.	2.
271	0.	1.	0.	2.	1.	0.	1.	1.	0.	2.
281	0.	1.	0.	0.	0.	0.	1.	4.	0.	1.
291	2.	3.	6.	4.	4.	8.	2.	6.	5.	5.
301	3.	7.	9.	3.	4.	0.	3.	1.	0.	0.
311	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
321	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.
331	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.
341	0.	0.	0.	0.	0.	1.	1.	4.	1.	1.
351	0.	3.	2.	0.	2.	1.	0.	0.	2.	0.
361	1.	1.	1.	0.	0.	0.	2.	1.	1.	0.
371	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
461	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
[illegible]	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								