Rocky Flats Independent Verification

Sampling and Survey Report

Evaluation and Interpretation of the Residual Radiological Surface Contamination Sampling Results

Building 779, Annex A
Survey Units 779–21 and 779–23

January 2000

Work Performed Under DOE Contract No. DE–AC13–96GJ87335

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Acronyms and Abbreviations

Am-241	americium-241
CCV	continuing calibration verification
CDPHE	Colorado Department of Public Health and Environment
CLP	Contract Laboratory Program
cpm	counts per minute
cm^2	square centimeter(s)
CV	coefficient of variation
D&D	decontamination and decomissioning
DCGL	derived concentration guideline level
$DCGL_{EMC}$	derived concentration guideline level-elevated measurement comparison
$DCGL_W$	derived concentration guideline level-average concentration
DOE	U.S. Department of Energy
dpm	disintegration(s) per minute
DQA	data quality analysis
DQI	data quality indicator
DQO	data quality objectives
EPA	U.S. Environmental Protection Agency
GJO	Grand Junction Office
IV	independent verification
IVC	independent verification contractor
IVP	independent verification program
L_c	critical detection level
LCS	laboratory control sample
m	meter(s)
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	minimum detectable activity
mm	millimeter(s)
m^2	square meter(s)
NIST	National Institute of Standards and Technology
PB	preparation blank
pCi	picoCurie(s)
Pu-238	plutonium-238
Pu-239	plutonium-239
Pu-240	plutonium-240
QA	quality assurance
QC	quality control
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RMRS	Rocky Mountain Remediation Services
SAP	Sampling and Analysis Plan
U	uranium
UCL_{95}	95 percent upper confidence limit

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1.0 Introduction

1.1 Background

This sampling and survey report evaluates the final status survey data collected in Building 779, Annex A, both by the Rocky Flats Environmental Technology Site's (RFETS) Contractors (Kaiser-Hill, Rocky Mountain Remediation Services, L.L.C., and their subcontractors, hereafter referred to as the Contractor) and by MACTEC–ERS, the independent verification contractor (IVC). Data collected by the IVC is designed to independently assess and verify the RFETS' compliance with the approved derived concentration guideline levels (DCGLs) established for the buildings in the 779 Cluster. Data collected by the Contractor has been reviewed by the IVC and compared with the independent verification data collected by the IVC.

The sampling and survey data collected has been compared with the approved surface contamination concentration benchmark values known as DCGLs. The RFETS DCGLs for surface contamination concentration are specified in the Contractor's Closeout Radiological Survey Plan for the 779 Cluster (RMRS 1999a). The independent verification DCGLs are specified in the IVC's *Independent Verification Sampling and Analysis Plan for Building 779 Cluster* (IV SAP) (DOE 1999a).

Samples collected and surveys performed to obtain independent verification and corroboration of the RFETS sampling and survey results were collected in accordance with the U.S. Environmental Protection Agency (EPA), Colorado Department of Public Health and Environment (CDPHE), and U.S. Department of Energy (DOE) approved *Independent Verification Sampling and Analysis Plan for Building 779 Cluster* (DOE 1999a). The data is evaluated herein principally on the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) data quality assessment methods, conventional guidance from EPA, and accepted practice and methods used in radiological site assessment and characterization. Principal guidance documents include:

- *Multi-Agency Radiation Survey and Site Investigation Manual* (EPA 1997)
- *Data Quality Objectives Process for Superfund* (EPA 1993)
- *Guidance for Data Quality Assessment—Practical Methods for Data Analysis* (EPA 1998)
- *Manual for Conducting Radiological Surveys in Support of License Termination* (NRC 1992)
- *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys* (NRC 1995)

A common theme in these guidance sources is the use of a seven-step data quality objective (DQO) activity as the foundation for the sampling and analysis plan (SAP) development and subsequent data evaluation.

Following this introductory background is a discussion of Annex A history and an overview of the assessment and independent verification process used. Section 2 describes the field methods and procedures used to collect data. Section 3 presents the sampling results and summary

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statistics for each subset of data. It also describes the data reduction process used and statistical comparisons of the data subsets and their significance. Section 4 presents the sampling results in the context of compliance with the benchmark values and Section 5 presents the survey and sampling results in a graphic format for easier visualization. Evaluation of the Contractor's Final Status Radiological Survey, computations, and conclusions are presented in Section 6. The IVC collected data are compared to their respective DQOs in what is termed the Data Quality Analysis in Section 7. Section 8 summarizes the data quality analysis, provides objective assessment of the concentrations of residual contamination found in the building, and offers conclusions and recommendations for disposition of the building. Appendices are included to provide additional detail where appropriate.

The risk manager and decision maker for this project is DOE–Rocky Flats Field Office (DOE–RFFO).

1.2 Building 779 History

The Building 779 Cluster is located on DOE's Rocky Flats site near Golden, Colorado. The site is a former nuclear weapons production facility. The various process facilities and laboratories were grouped together with their various support buildings and structures and identified as "clusters," with the building number of the principal building as the cluster name (e.g., the Building 779 Cluster). The 779 Cluster was primarily used for research and development activities and supported a number of various operations as part of the research and development mission including: 1) process chemistry technology, 2) physical metallurgy, 3) machining and gauging, 4) joining technology, and 5) hydriding operations. No processes or operations are now active.

Annex A and the loading dock are single-level structures that are connected to the north and east side of Building 779. Annex A contained numerous laboratories and support facilities that were utilized for nuclear weapons research and development. The exterior walls of Annex A are cinder block and concrete. The exterior walls of the loading dock are galvanized steel, cinder block and concrete.

1.3 Current Condition of Annex A

Annex A underwent a decontamination and decommissioning (D&D) process to ready it for final status radiological survey. In the D&D process, the building was stripped of utility services, and equipment and penetrations were removed or cut flush with the walls. All penetrations in the slab were grouted and will remain until environmental restoration is accomplished. One contaminated slab penetration (approximately 12 inches by 12 inches) had a metal frame with fixed contamination. The penetration could not be easily decontaminated and was therefore grouted and a plate was affixed over the penetration and imbedded metal frame. The plate will be labeled and painted orange by the contractor prior to demolition to indicate the presence of radioactive contamination. All other areas where contamination was detected were decontaminated by the contractor prior to conducting the final survey. Numerous floor, walls and ceiling surfaces were hydrolased to remove paint. The interior of Annex A and the loading dock was subdivided into ten survey units. The IVC randomly selected two of the ten units as part of the overall Building 779 independent verification. At the request of the Contractors, the IVC has prepared this stand-alone report for Annex A.

1.4 Overview of the Assessment and Independent Verification Process

The approach used to independently determine whether Annex A met the mean, or average, benchmark release criteria (derived concentration guideline level-average concentration [$DCGL_W$]) followed the MARSSIM method. Five of 41 survey units identified in Building 779 were selected for actual measurement by the IVC. In this case, survey units 779–21 and 779–23 (Annex A) were two of the five selected for independent verification, thus meeting the contractual requirement to assess 5 to 10 percent of the Contractor's results. The IVC used oversight of the Contractor's scanning surveys and a critical review of the data collected by the Contractor to independently determine compliance with the maximum concentration benchmark release criteria (derived concentration guideline level-elevated measurement comparison [$DCGL_{EMC}$]).

The first step in the process to independently assess the Contractor's basis for decision on the disposition of Annex A was to review the Contractor's *Closeout Radiological Survey Plan for the 779 Cluster* (RMRS 1999a) and associated D&D planning documents. All comments and issues raised by the IVC were reported to DOE–RFFO and were addressed by the RFETS Contractor and implemented in the final status survey plan, as necessary.

The Contractor's SAP establishes the criteria which, when met, represent acceptable levels of risk from exposure to residual contamination which might be present in the building. DOE–RFFO, EPA, and CDPHE agreed upon surface contamination concentration criteria below which further remedial action would not be warranted. These criteria, or DCGLs, serve as the benchmarks against which the building surfaces were to be measured. The Contractor's DCGLs are:

- The mean removable alpha surface contamination concentration in the selected survey unit(s) is below 20 disintegrations per minute (dpm)/100 square centimeters (cm^2).
- The mean total alpha surface contamination concentration attributable to transuranic radioactivity as measured by direct surface emission in the selected survey unit(s) is below 100 dpm/100 cm^2 (averaged over 1 square meter [m^2]).
- The mean total alpha surface contamination concentration attributable to uranium series radioactivity[1] as measured by direct surface emission in the selected survey unit(s) is below 1,000 dpm/100 cm^2 (averaged over 1 m^2).
- The maximum total alpha surface contamination concentration attributable to transuranic radioactivity as measured by direct surface emission in the selected survey unit(s) is below 300 dpm/100 cm^2.
- The maximum total alpha surface contamination concentration attributable to uranium series radioactivity as measured by direct surface emission in the selected survey unit(s) is below 5,000 dpm/100 cm^2.

[1]In cases where isotopic composition is not determined, the SAP requires the application of the more restrictive limits associated with the transuranic series radionuclides.

- The mean total alpha contamination concentration attributable to transuranic radioactivity on and beneath a surface with a surface coating as measured by collection and analysis of a surface media sample in the selected survey unit(s) is below 100 dpm/100 cm^2.

- The mean total alpha contamination concentration attributable to uranium series radioactivity on and beneath a surface with a surface coating as measured by collection and analysis of a surface media sample in the selected survey unit(s) is below 1,000 dpm/100 cm^2.

After reviewing the Contractor's SAP, an IV SAP was constructed. The IV SAP was developed in consultation with DOE–RFFO, EPA, and CDPHE. It was designed to detect and measure the concentration of the radioactive contamination remaining in survey units selected for independent verification such that statistically appropriate analyses could be used to determine whether the results obtained by the Contractor in the same survey unit could be verified or corroborated by the IVC. The IV SAP alone does not collect enough data to make the required decision for the entire building but provides sufficient data for critical comparison with the Contractor's conclusion in a single survey unit. In the case of Annex A, the IVC performed surveys and sampled two of ten possible interior survey units (779–21 and 779–23) identified by the Contractor.

The next step was to observe and evaluate the Contractor's implementation of the final status survey against the criteria established in the SAP. The IVC Health Physicist is permanently assigned to Rocky Flats and works on site to observe the Contractor's sampling and survey methods and review analytical processes.

The fourth element of the independent verification process was to provide blind matrix samples to the Contractor for inclusion in their sample batches from Building 779 Cluster. The blind samples included both blanks and spikes of smear filter paper matrices and surface media matrices. Blind matrix samples are being included in the Contractor's sample batches from Building 779 as the Contractor's manpower and schedule permits. It is important to note that it is not critical to the sampling objective to introduce Stage-I quality control samples to a particular batch of the Contractor's samples or even while they are sampling a particular building or survey unit being considered for independent verification.

Finally, and with the approved IV SAP, the sampling plan was executed. The IVC collected samples and performed measurements in the selected survey units in order to corroborate the results obtained by the Contractor. The measurements and samples were obtained in accordance with the *Independent Verification Sampling and Analysis Plan for Building 779 Cluster* (DOE 1999a).

The field data was reviewed in the field with representatives from DOE and the Contractor. The EPA and CDPHE have been apprized of the results of independent verification field data collected. Field data was recorded both on paper (Appendix D) and electronically (Appendix H). Following data collection, the data was verified and reduced so that the appropriate comparisons and analyses could be conducted. The presentation of the results of the field sampling are detailed in this report along with the IVC's recommendations and verification of Annex A final status survey results.

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2.0 Field Investigation

2.1 Mobilization

Prior to mobilizing the independent verification sampling team at the site, each member of the team was provided with a copy of the IV SAP and was trained on the field sampling equipment and procedures to be used. The Contractor made detailed measurements of the building and supplied simple architectural drawings of the survey units in Annex A (779–21 and 779–23) to be used in laying out the sampling grids and sample locations.

Mobilization to the field began the week of October 5, 1999, for survey unit 779–21 and the week of October 25, 1999, for survey unit 779–23. The sampling team personnel had completed all required RFETS training necessary to support the sampling and survey work during a previous visit to RFETS. Equipment was staged and final details were arranged.

The radiation survey detectors selected for this application were gas-filled, proportional counters made by Eberline; model HP-100. Gas filled detectors are subject to response and calibration variation with changes in altitude. Consequently, the HP-100 probes were field calibrated on site at the RFETS altitude and using RFETS supplied counting gas. The instrument and probe package was response checked and verified to be in working order and within the parameters established in the SAP. The surface media sampling tool was tested and test measurements were made confirming the suitability of the measurement protocol. A walk-through of the building was made to assess the condition of the building, to identify any intrinsic safety issues, and to compare the building structure and features with the assumptions made and procedures outlined in the SAP. It was concluded that the assumptions used to develop the SAP and its associated procedures were consistent with the conditions existing in the building and that the procedures developed for characterizing the contaminant concentrations in the building accounted for these conditions.

2.2 Field Selection of Survey Units for Independent Verification

The first step in the sample allocation strategy was to select from among the 41 survey units available in Building 779 those survey units to be sampled and surveyed by the IVC. The random selection process assigned greater weighting or priority to survey units with a classification indicating greater potential to exceed the allowable radiological concentration. Table 2–1 lists the 41 survey units identified by the Contractor for Building 779 (RMRS 1999b). A simple, commercially available, spreadsheet program with a random number generation feature was used to randomly select the survey units to be independently verified. Appendix A contains a printout of the survey units selected by the computer generated random number method. Survey units 779–21 and 779–23, Annex A, that included rooms 143, 144, 145, 146, 147, 148, 151, and 152, were two of five units selected for Building 779.

2.3 Field Identification of Sample Locations

Once the survey units to be verified had been selected, the proposed location of each measurement and sample was laid out using the sample allocation protocol specified in the SAP. Drawings of the survey units were created with the walls and ceiling "unfolded" and set flat to

Table 2–1. Survey Units Identified for Building 779

Survey Unit Description	Survey Unit #	Survey Classification	Weight Factor
Rooms 170/172 Floor and Lower Walls (including Mezzanine above Room 172)	779–01	Class 1	6
Room 171 Vaults	779–02	Class 1	6
Rooms 171/172 Upper Walls and Ceilings	779–03	Class 2	2
Stairs between Rooms 171 and 272, Rooms 270/272, and the Room 170 Dumbwaiter	779–04	Class 2	2
Exterior South/West Walls and Roof	779–05	Class 2	2
Exterior West Wall outside of Room 142, and Roof	779–06	Class 2	2
Exterior Annex A West/North Wall and Roof	779–07	Class 2	2
Dock Walls and Roof	779–08	Class 2	2
Exterior Walls and Roof of Admin Building and Duct Tower	779–09	Class 2	2
2nd Floor Admin Building—Rooms 201 through 214	779–15	Class 3	1
Floor in Room 208	779–16	Class 1	6
1st Floor Admin Building—Rooms 105 through 113	779–17	Class 3	1
Rooms 100, 101, 101A, 104, 116, 116A, 116B, 117	779–18	Class 3	1
Dock and Ramp	779–19	Class 3	1
Rooms 114, 115, 115A, Exhaust Duct Tower	779–20	Class 2	2
Rooms 143, 144, 145, 146, 147, 148, 151	779–21	Class 1	6
Room 150	779–22	Class 1	6
Room 152	779–23	Class 1	6
Rooms 154, 156	779–24	Class 1	6
Rooms 160, 160A	779–25	Class 1	6
Rooms 153, 153A, 153B, 155	779–26	Class 1	6
Rooms 157, 159	779–27	Class 1	6
Rooms 161, 163, 163A, 167, 167A,	779–28	Class 2	2
Rooms 162, 164, 165, 166	779–29	Class 2	2
Hallway to Annex A , Bridge to B777	779–30	Class 2	2
Room 217	779–32	Class 1	6
Rooms 219, 221, 221A, 221B, 221C, 223, 225, 229, 230, 231, 232, 233, 235, 271, 173, 274, 275, 277	779–33	Class 2	2
Rooms 215, 218, 220, 224	779–34	Class 1	6
Rooms 222, 222A	779–35	Class 1	6
Rooms 216, 226	779–36	Class 1	6
Room 228	779–37	Class 1	6
Rooms 234, 234A, 234B	779–38	Class 1	6
Rooms 103, 103A, 103B, 118, 120, 121, 121A, 121B, 173	779–39	Class 2	2
Rooms 122, 123, 126, 127	779–40	Class 2	2
Rooms 142, 142 Mezzanine	779–41	Class 2	2
Rooms 119, 124, 125, 128, 129, 132, 134, 135, 136, 138	779–42	Class 2	2
Room 001 and Pits	779–43	Class 1	6
Rooms 130, 131, 133	779–44	Class 1	6
Room 137	779–45	Class 1	6
Rooms 139, 140, 140A, 140B	779–46	Class 1	6
Rooms 141, 141A, 141B, 141C	779–47	Class 1	6
By assigning weighting factors to the survey units based on radiological classification, the independent verification survey will preferably select survey units which have a higher probability of exceeding the applicable DCGLs. Class 1 survey units (the most likely to be contaminated) are three times more likely to be selected than Class 2 units and six times more likely than Class 3 units.			

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assist the process of spatial distribution and sample location recording. The survey units were then divided by a 2-meter sampling grid superimposed over the surface of the survey units. Figure 2–1 shows the sample grid layout for survey units 779–21 and 779–23.

The selection and distribution of sampling locations within each survey unit was made using the protocol approved in the SAP including:

- Random selection of the sampling starting point within the selected survey unit(s) (Appendix A),
- Systematic distribution of sample locations within the selected survey unit(s) to ensure representative spatial coverage of the survey unit, and
- Personnel safety during the execution of the sampling plan

Drawings of each surface within the survey unit and actual sample locations as determined in the field are shown on Figure 2–2. After the sample locations were allocated, an inspection of each survey unit was conducted to ensure that each sample location selected could be accessed and sampled safely. Three sample locations in survey unit 779–21 were relocated in accordance with the sample relocation protocol outlined in the SAP due to safety issues. The samples relocated are annotated on the drawings in Figure 2–2.

Sample locations were next laid out on the building surfaces within the survey units. Each sample location was measured out and marked on the surface with a permanent marker. Unique alpha-numeric bar codes (Figure 2–3) were affixed to the surface adjacent to the selected sample location. A duplicate bar code was affixed to the field data sheet and the bar code number was recorded on a copy of the survey unit drawings. It should be noted that all sample locations were selected without prior knowledge of contaminant concentrations in the area and before radiological survey instruments were employed. In this way, sample locations were not biased.

2.4 Sampling Equipment and Procedures

2.4.1 Radiological Instrumentation

The field measurement instrument used for measuring surface deposited radiological contamination was the Eberline, E-600 Smart Portable Multi-purpose Radiation Survey Instrument with a modified Eberline HP-100 gas proportional detector probe. The detector was fitted with an Eberline "Smart Pack" to convert the conventional detector to be compatible with the microprocessor based E-600 and to electronically store the probe's calibration data. The probe's alpha channel was calibrated to a plutonium-239 (Pu-239) National Institute of Standards and Technology (NIST) traceable calibration source. The calibration certificate for the source is provided in Appendix B and the calibration data sheets for the instruments are provided in Appendix G. Figure 2–4 shows the configuration used to measure the alpha surface emission activity on the surfaces in the survey unit. The direct measurement data was collected in accordance with the procedure outlined in the SAP.

INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-21** **Number of Sample Locations: 29** **Grid size: 2m x 2m**

Classification: 1 **Survey Unit Description: A Annex, Rooms 143,144,145,146,147,148,151**

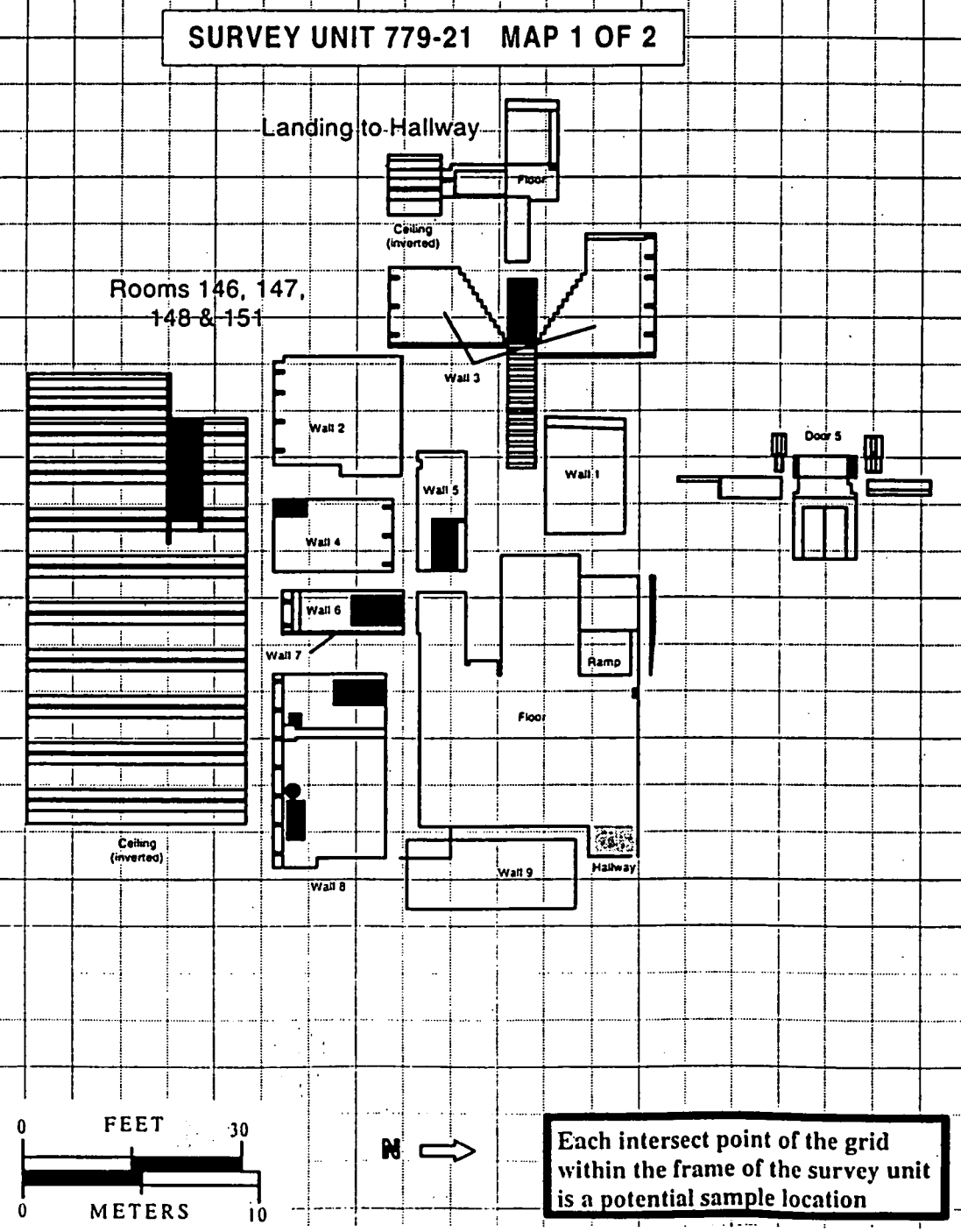

Figure 2–1. Sampling Grid—Survey Unit 779–21

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INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-21** **Number of Sample Locations: 29** **Grid size: 2m x 2m**

Classification: 1 **Survey Unit Description: A Annex, Rooms 143,144,145,146,147,148,151**

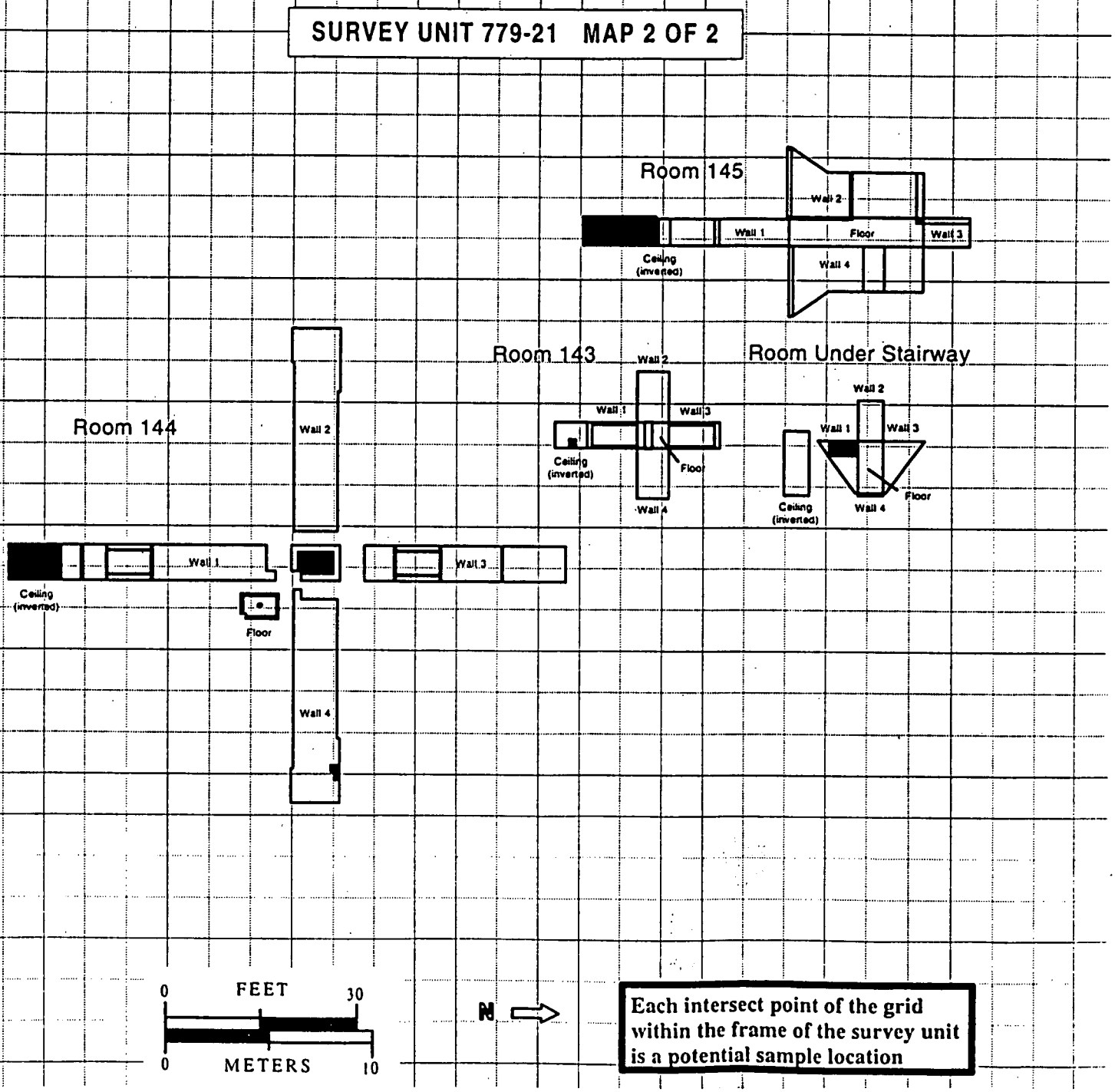

Figure 2–1 (continued). Sampling Grid—Survey Unit 779–21

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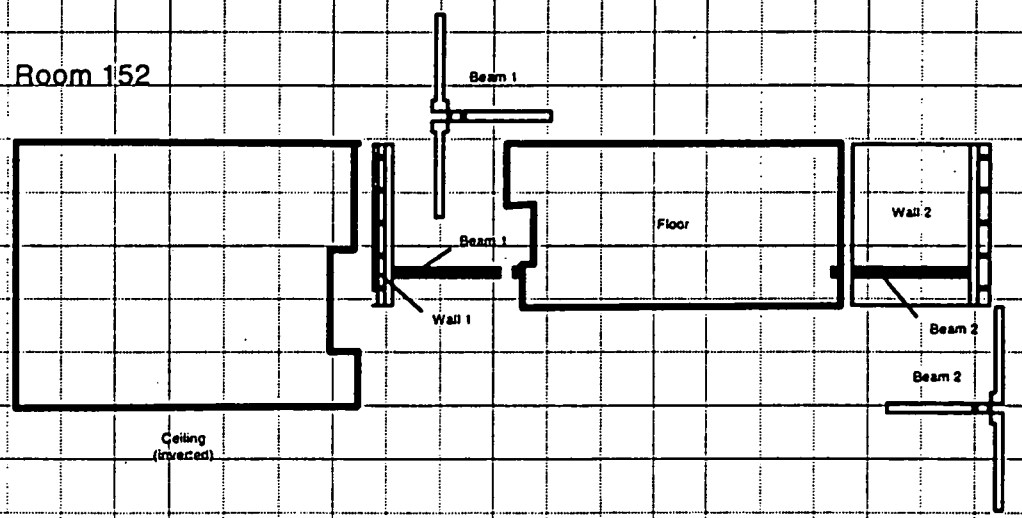
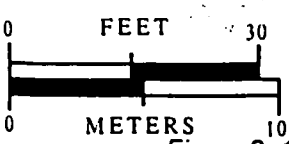
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-23** **Number of Sample Locations: 29**

Classification: 1 **Survey Unit Description: A Annex, Room 152** **Grid Size: 2m x 2m**

SURVEY UNIT 779-23 MAP 1 OF 1





N

Each intersect point of the grid within the frame of the survey unit is a potential sample location

Figure 2–1 (continued). Sampling Grid—Survey Unit 779-23

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INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-21** **Number of Sample Locations: 29** **Grid size: 2m x 2m**

Classification: 1 **Survey Unit Description: A Annex, Rooms 143,144,145,146,147,148,151**

SURVEY UNIT 779-21 MAP 1 OF 2

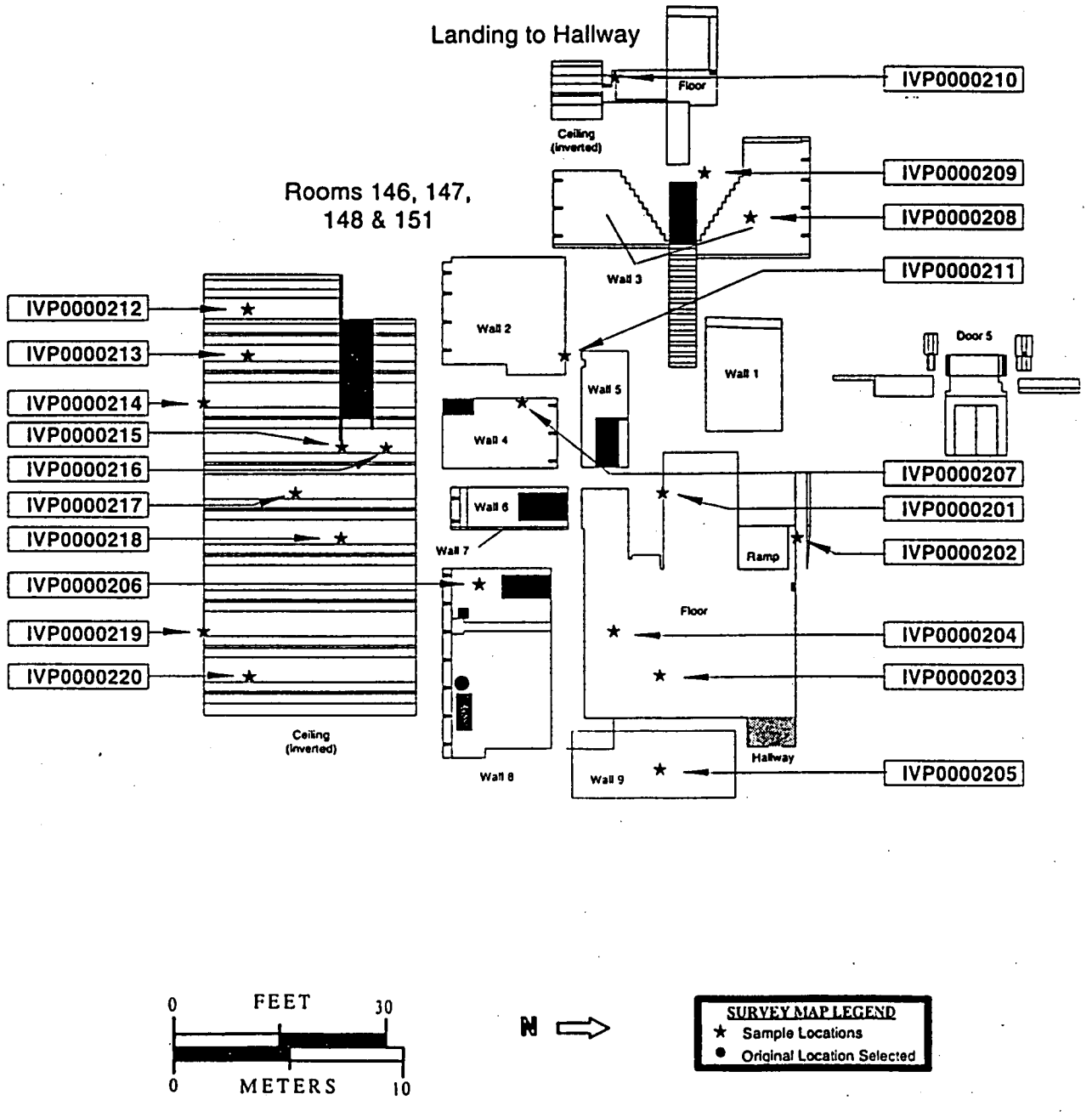

Figure 2–2. Selected Sample Locations—Survey Unit 779–21

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INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-21** **Number of Sample Locations: 29** **Grid size: 2m x 2m**

Classification: 1 **Survey Unit Description: A Annex, Rooms 143,144,145,146,147,148,151**

SURVEY UNIT 779-21 MAP 2 OF 2

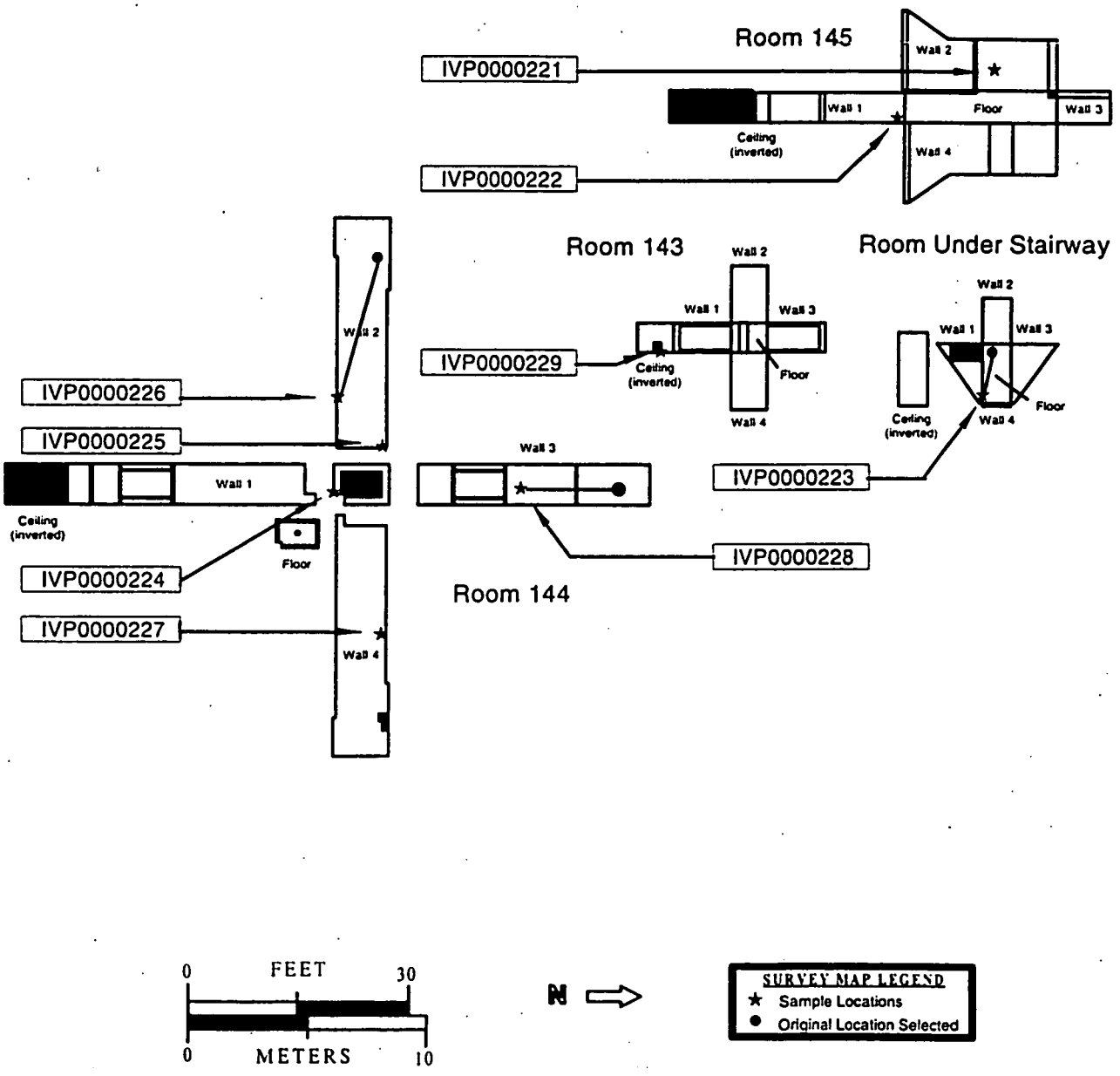

Figure 2–2 (continued). Selected Sample Locations—Survey Unit 779–21

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INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Building: 779 **Survey Unit: 779-23** **Number of Sample Locations: 29**

Classification: 1 **Survey Unit Description: A Annex, Room 152** **Grid Size: 2m x 2m**

SURVEY UNIT 779-23 MAP 1 OF 1

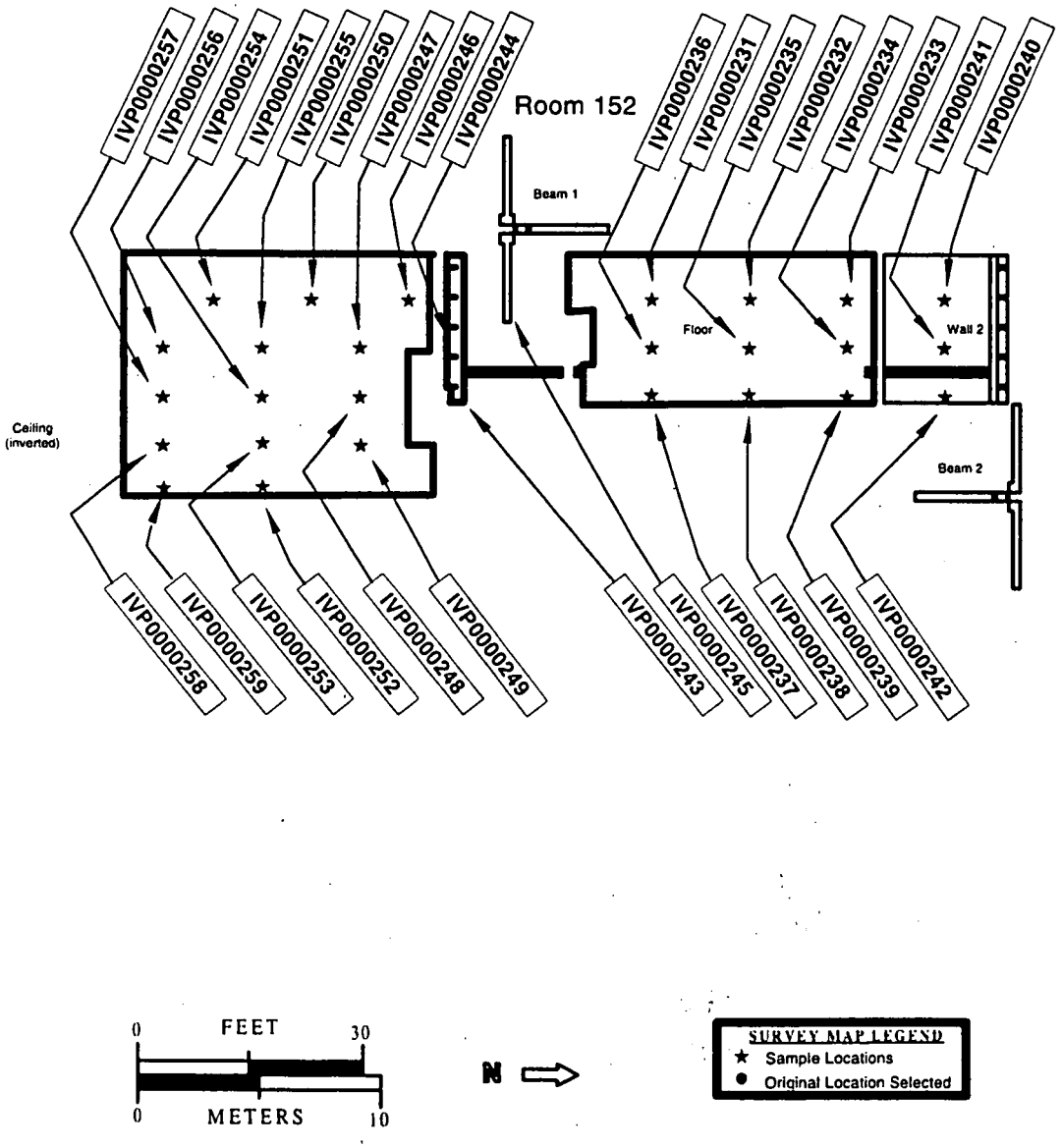

Figure 2–2 (continued). Selected Sample Locations—Survey Unit 779–23

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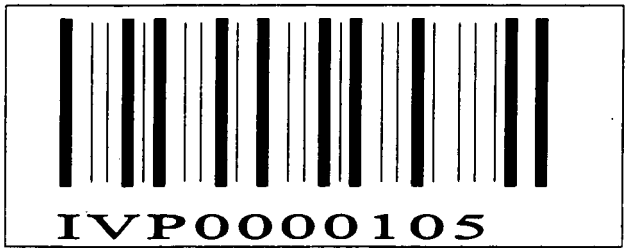

Figure 2–3. Sample Location Identifier

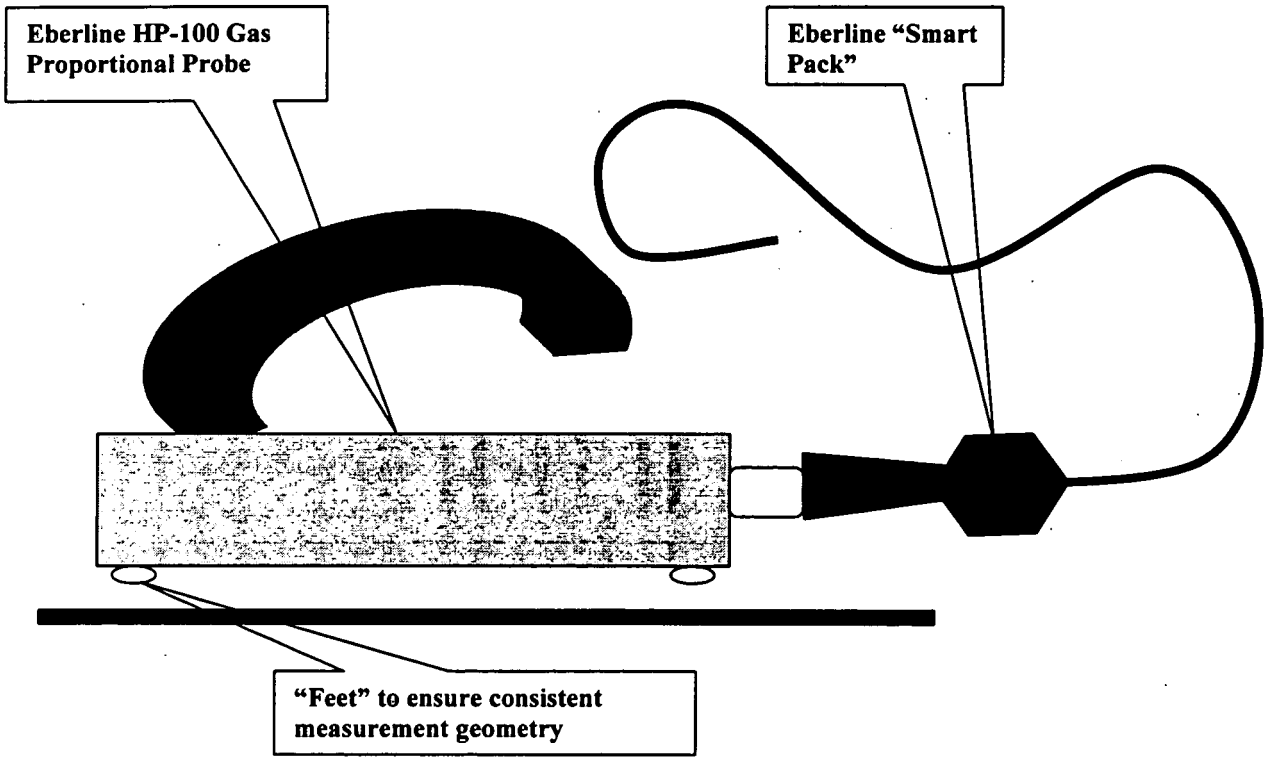

Figure 2–4. Direct Static Surface Contamination Measurement Configuration

2.4.2 Sampling

2.4.2.1 Smear Sampling

Smears were used to wipe the surfaces in order to measure the potential for removable radioactivity on the survey unit surfaces. The IVC chose to use 47 millimeter (mm) disc smears made of a duck cloth material rather than the typical paper or cellulose fiber filters commonly used since many of the surfaces requiring measurement are very rough. The duck cloth smears are very durable and will pick-up loose contaminants from even very rough or abrasive surfaces without disintegrating. The smear samples were collected after the direct static surface measurements were obtained. The technician wiped the surface within the 100 cm^2 sample area applying moderate pressure. Each smear was placed individually into a glassine envelope to

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prevent cross contamination and static charge induced migration of contaminants. Each glassine envelope containing a smear sample was then over-packed in a small sealable plastic bag and then in a manila sample envelope. The envelope was then marked with a bar code label linking it to the sample location from which it was obtained, and entered into a sample custody system to preserve sample integrity for subsequent analysis at the Grand Junction Office (GJO) Analytical Laboratory. The smear samples were secured in a sample box sealed with tamper-evident custody seals at the sample site until the field sampling was complete and then transported to the GJO Analytical Laboratory.

In all, 29 smear samples were collected from each survey unit—one at each of the 29 survey locations. These were submitted to the GJO Analytical Laboratory for radiological analysis. The results of these measurements are summarized in Section 3 and the laboratory analytical report is contained in Appendix C.

2.4.2.2 Surface Media Sampling

Paint and other surface coatings or residues present on the surfaces of the building presented an obstruction to detection and measurement of the radioactive surface contamination which might have been present. To assess the potential for, and measure the concentration of, contaminants which might be present in and/or beneath painted or coated surfaces, a "veneer" of the surface (including any surface coating or residue) was removed. When there was no surface coating or residue present, but the radiological measurement of the surface exceeded the *a priori* estimate of the critical detection level of 22 dpm/100 cm^2, a veneer of the substrate was collected to assess the potential for a near-surface contamination layer embedded in a porous surface. A disposable plastic containment was erected over the selected sample location. A heavy duty, rotary impact drill (Figure 2–5) was fitted with a special bit designed to pulverize the surface without drilling into it. The bit was inserted through a port in the containment. Only the bit penetrated the containment. The impact tool was moved over the surface removing the thinnest possible layer until all surface coating within the 100 cm^2 sample area was removed.

To be inserted later—PHOTO OF THE DRILL AND BIT

Figure 2–5. Photo of Rotary Impact Drill and Bit

The surface material removed (the sample) was collected in the bottom of the plastic containment. The technician collected the removed media as a sample. The sample was then transferred to a small sealable plastic vial. A bar code label linking the sample location from which it was obtained was affixed to the vial and entered into a sample custody system to preserve sample integrity for subsequent analysis at the GJO Analytical Laboratory (see Figure 2–6). The vials were placed in a sealable plastic bag and secured in a sample box sealed with tamper-evident custody seals at the sample site until the field sampling was complete and then transported to the analytical lab.

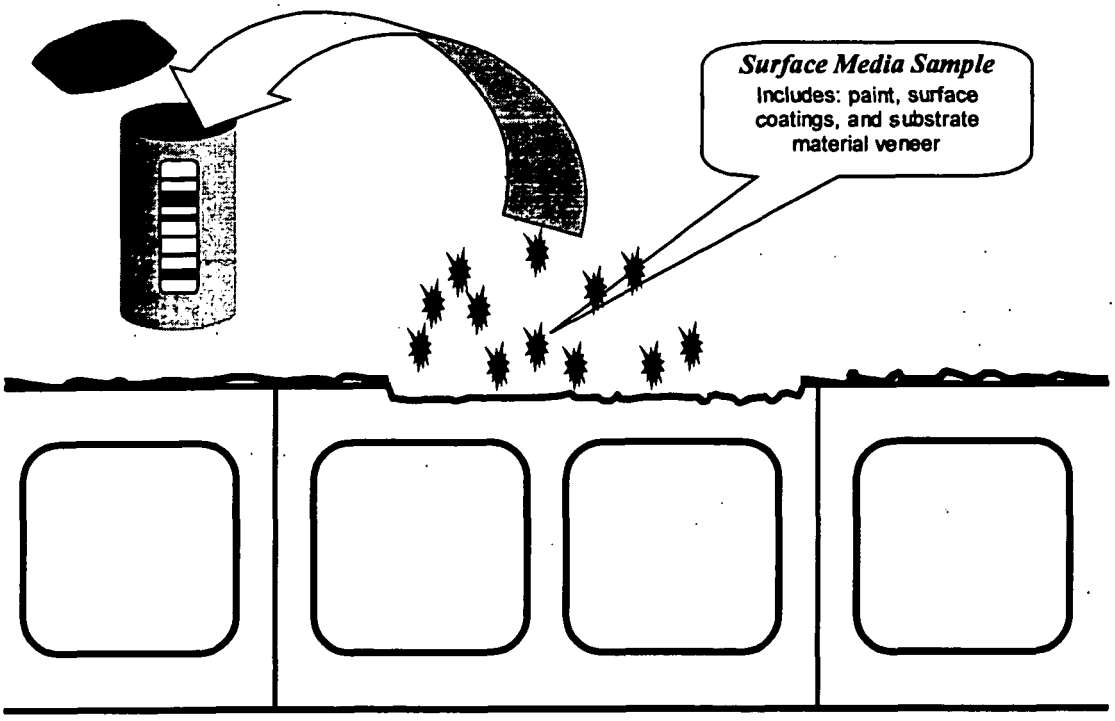

Figure 2–6. Surface Media Sample Collection

2.4.3 Laboratory Measurements

Smears and surface media samples were processed and analyzed at the GJO Analytical Laboratory using the methods and procedures identified in Tables 2–2 and 2–3 and prescribed in the IV SAP.

Table 2–2. Smear Sample Analytical Method

Laboratory Method—Gross Alpha Radioactivity	
Counting method	Gas Proportional Low-Background Alpha/Beta Counting System
Instrumentation	Canberra Model 2404
Procedure(s)	Procedure RC–8, "Gross Alpha/Beta Analysis" (WASTREN–GJ)
Laboratory procedures are governed by QA/QC procedures specified in Handbook of Analytical and Sample-Preparation Procedures (WASTREN–GJ).	

Table 2–3. Surface Media Sample Analytical Method

Laboratory Method—Alpha Radioactivity by Isotope Specific Species	
Counting method	Alpha radioactivity by alpha spectroscopy
Instrumentation	1" PIPS with Canberra Alpha Management Software (AMS) Model 48-0721, Ver. 1.0
Procedure(s)	Solids Digestion, Chemical Extraction, Sample Precipitation, and Sample Counting Procedure RC–19, "Alpha Spectrometry" (WASTREN–GJ).
Laboratory procedures are governed by QA/QC procedures specified in Handbook of Analytical and Sample-Preparation Procedures (WASTREN–GJ).	

Based on the EPA's terminology, the methods described in Tables 2–2 and 2–3 are categorized as Analytical Level V because they are non-conventional in the EPA's Contract Laboratory Program (CLP) (EPA 1988). However, comparing the level of quality assurance and quality control (QA/QC) embodied in these procedures, they are comparable to EPA's CLP Analytical Level IV.

2.4.4 Field Measurements

2.4.4.1 Background Determination

Background was determined in the survey unit being surveyed before, and at least every 2 hours during, each sampling shift. Additionally, background measurements were collected immediately prior to, and immediately after, changing out a detector probe. In the center of the survey unit, a masonite hardboard surface (the back of a clipboard) that has essentially no inherent alpha radioactivity and which was clearly "unaffected" (i.e., clearly not part of the potentially contaminated buildings within the 779 Cluster) was used for establishing background according to the procedure detailed in the SAP. This method establishes the background associated with the instrument only. Background measurements were recorded both electronically and by hand.

2.4.4.2 Direct Static Surface Radioactivity Measurements

Each of the 29 sample locations identified within each survey unit was directly measured to assess the alpha radioactivity deposited on the surface. Direct static field measurements were made using the approved procedure in the IV SAP. Each measurement was collected for 90 seconds, in the instrument's "SCALER" operating mode, and at a fixed distance of approximately 0.125 inch (1/8th inch) from the surface. When the acquisition count time was complete, the result was read, manually recorded, and electronically logged into the instrument's memory. Direct measurement results greater than the instrument's *a priori* critical detection level (L_c) of 22 dpm/100 cm^2 triggered the need to collect a surface media sample even where no surface coating existed. In cases where surface media samples were indicated and collected, a second direct static measurement was made at the same location following removal of the surface veneer. Often, the direct measurement reading obtained subsequent to the veneer removal was unchanged or greater indicating the likelihood that the substrate media (typically concrete) contained an appreciable and measurable alpha background radioactivity that was attenuated by the veneer[1]. In these circumstances, a field decision was made as to the need for the collection of additional surface media to determine compliance with the DCGLs. Pertinent observations regarding the nature of the surface, substrate material, or instrument response were recorded. No anomalies were noted during the direct static measurement process.

[1]To avoid the need for making reference survey unit measurements to characterize and quantify natural radioactivity, background has been narrowly defined in the Contractor's Closeout Radiological Survey Plan to include only radiation measured by the instrument system operating in "free air". This definition excludes radioactivity which might be present in the building materials but which has not been contributed or added by DOE. All naturally occurring radioactivity measured during Final Status Survey is to be considered "contributed" or attributable to DOE activities and compared to the applicable DCGLs.

End of current text

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3.0 Sampling and Survey Results

Sampling and survey results are divided into four basic categories for discussion, analysis, and comparison with the applicable DCGLs. The categories correspond to the three fundamental samples or measurements employed in the independent verification: Smear sampling, Direct Static Measurements, and Surface Media Samples. The fourth category is for QC data. QC data is presented in Section 6.0 of this report.

3.1 Direct Static Field Measurements

Direct measurements of the radioactivity emission from surfaces were made using static, 90-second counting intervals, over which the total counts were integrated. The measurements recorded were gross values normalized to dpm/100 cm^2. In the context of this sampling evolution, a "gross measurement" means a measurement made with a radiation detection instrument to which no background correction has been applied. Raw or gross data is important when measurements will be used to make statistical inferences, since not all data will necessarily have the same correction factors applied to properly reduce them to meaningful numbers. Reporting gross or raw data also permits one to analyze the functionality of the instrument with which the measurement was made, and to verify the appropriateness of the data reduction process. The data reduction process for the field measurement data collected in this sampling evolution involves corrections for the efficiency of the radiation detector to the subject radiation and the instrument response to background sources of radiation (excluding surface media contribution to background).

The use of the Eberline E-600 Smart Portable Multi-purpose Radiation Survey Instrument in this application provides a platform for accommodating the probe specific factors including efficiency, high voltage, discrimination thresholds, crossover correction factors and calibration set up parameters within the detector's associated "smart pack" microchip. These correction factors are common to all of the direct field measurements made with the E-600 and HP-100 detector for this SAP. As a result of incorporating these factors, the instrument reads out and electronically logs data points directly in units of dpm/100 cm^2. These readings were not, however, field corrected for background radiation.

3.1.1 Background Measurements

The assessment of an instrument's response to background radiation is important from two perspectives. First, it permits the assessment of the minimum sensitivity (detection limit) for the instrument and measurement process in the presence of background radiation. The *a posteriori* minimum detectable activity (MDA) is calculated from this actual background data. Second, by assessing the instrument's response to background radiation in terms of the units that field data will be collected, a correction can be applied to the field measurement data to permit determination of radioactivity present in excess of background. Because the naturally occurring concentrations of background radioactivity in building materials used in the construction of the buildings in the 779 Cluster were expected to be below and well within the DCGL benchmarks for radioactive contamination on building surfaces, the Contractor chose to assign all building material background radioactivity as part of the DOE contributed activity for comparison against the DCGL. As a result, no attempt was made to measure the concentrations of naturally occurring radioactivity measurable on surfaces in a "reference survey unit" or unaffected area. Still, there was the need to measure and account for the instrument's response to other sources of

background radiation (e.g., cosmic radiation) which could otherwise not be distinguished from the contaminant of concern.

To accommodate the need for correcting the instrument data for sensitivity to background radiation, excluding that present in the substrate of the surfaces being measured, instrument background measurements were collected periodically over the sampling period. In all, 54 measurements (27 in each unit) of the alpha background radiation level were recorded over the sampling period in accordance with the procedure for determining background (DOE 1999a). Each background measurement made during the sampling period is presented in Table 3–1.

Table 3–1. Direct Static Measurement Background Data, Annex A

Sample Location	Survey Unit 779–21		Survey Unit 779–23	
	Date	Recorded Value (dpm/100 cm^2)	Date	Recorded Value (dpm/100 cm^2)
BACKGROUND	10/5/99	33.10	10/26/99	11.70
BACKGROUND	10/5/99	20.70	10/26/99	8.39
BACKGROUND	10/5/99	12.40	10/26/99	5.06
BACKGROUND	10/5/99	16.60	10/26/99	8.18
BACKGROUND	10/5/99	16.60	10/26/99	11.60
BACKGROUND	10/5/99	24.80	10/26/99	15.10
BACKGROUND	10/5/99	24.80	10/26/99	14.50
BACKGROUND	10/5/99	29.00	10/26/99	18.20
BACKGROUND	10/5/99	24.80	10/26/99	11.10
BACKGROUND	10/5/99	11.40	10/26/99	8.16
BACKGROUND	10/5/99	11.30	10/26/99	14.90
BACKGROUND	10/5/99	18.00	10/26/99	14.70
BACKGROUND	10/6/99	20.70	10/26/99	18.50
BACKGROUND	10/6/99	29.00	10/26/99	15.20
BACKGROUND	10/6/99	41.40	10/26/99	15.20
BACKGROUND	10/6/99	41.40	10/27/99	7.64
BACKGROUND	10/6/99	12.40	10/27/99	7.64
BACKGROUND	10/6/99	37.20	10/27/99	7.91
BACKGROUND	10/6/99	16.60	10/27/99	7.84
BACKGROUND	10/6/99	12.40	10/27/99	4.29
BACKGROUND	10/6/99	41.40	10/27/99	4.16
BACKGROUND	10/7/99	29.00	10/28/99	21.50
BACKGROUND	10/7/99	37.20	10/28/99	14.50
BACKGROUND	10/7/99	24.80	10/28/99	21.40
BACKGROUND	10/7/99	8.28	10/28/99	11.40
BACKGROUND	10/7/99	33.10	10/28/99	14.70
BACKGROUND	10/7/99	24.80	10/28/99	14.80

From these measurements, it was determined that background did not change appreciably over the duration of each sampling period, but was appreciably different between the two sampling periods. When the direct static measurement background data is analyzed both graphically and with goodness-of-fit tests (Figure 3–1), it shows that the measurements are better represented by, or fit to, a lognormal distribution for survey unit 779–21 and a normal distribution for survey unit 779–23. A lognormal distribution is the expected condition for instrument response to alpha

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DATA EVALUATION STATISTICS

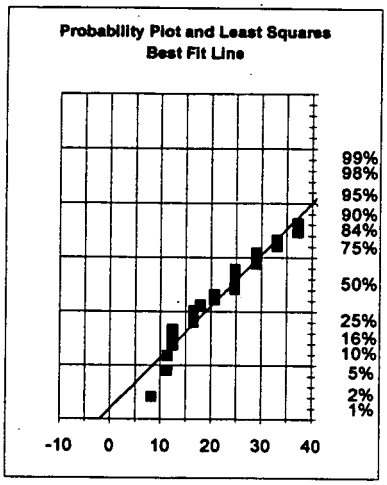
Data Description
"Free Air" Instrument Background
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

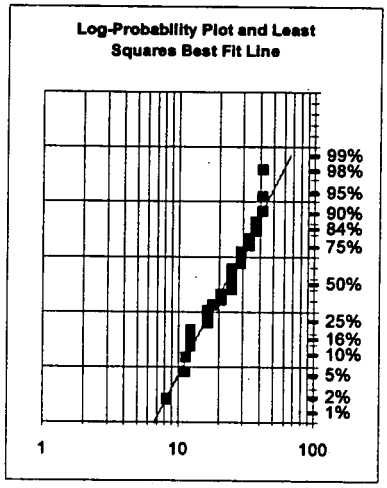
Critical Level	22
UNITS - dpm/100 cm^2	
Sample Data	
8.28	
11.30	
11.40	
12.40	
12.40	
12.40	
16.60	
16.60	
16.60	
18.00	
20.70	
20.70	
24.80	
24.80	
24.80	
24.80	
24.80	
29.00	
29.00	
29.00	
33.10	
33.10	
37.20	
37.20	
41.40	
41.40	
41.40	

Descriptive Statistics	
Number of Samples	27.000
Mean	24.192
Median	24.800
Standard Deviation	10.176
CV	0.420651
Range	33.120
Minimum	8.280
Maximum	41.400
GM	22.003
GSD	1.583
Mean of LN(Data)	3.091
SD of LN(Data)	0.459
Percent > Critical Level	51.852

Normal Statistics	
Mean	24.192
UCL(Mean) - Z	28.030
LCL(Mean) - Z	20.353
95%ile - Z	40.932
Percent > Critical Level	58.527
W Test (Data)	0.937531
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	22.003
GSD	1.583
AM of data	24.192
AM - MVUE	24.348
AM - MLE	24.452
UCL - Norm t stats	28.217
LCL - Norm t stats	20.166
UCL LogNorm t	29.326
LCL LogNorm t	20.389
UCL - Modified Cox	29.485
LCL - Modified Cox	20.106
UCL - "Exact"	
LCL - "Exact"	
95%ile	46.850
UTL 95%, 95%	62.239
Percent > Critical Level	50.012
PEP (Upper)	62.764
PEP (Lower)	37.25952
W Test (ln Data)	0.941417
Lognorm (a=0.05)?	Yes





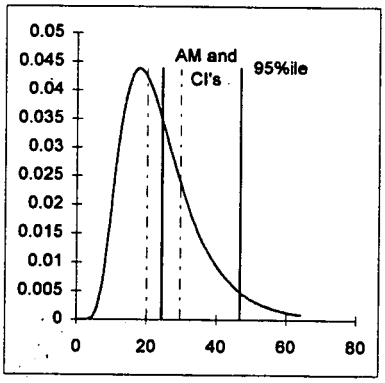


Figure 3–1. Data Evaluation Statistics—"Free Air" Instrument Background, 779–21

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DATA EVALUATION STATISTICS

Data Description

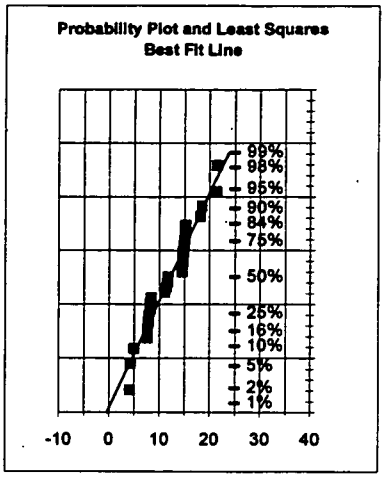
"Free Air" Instrument Background
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-23

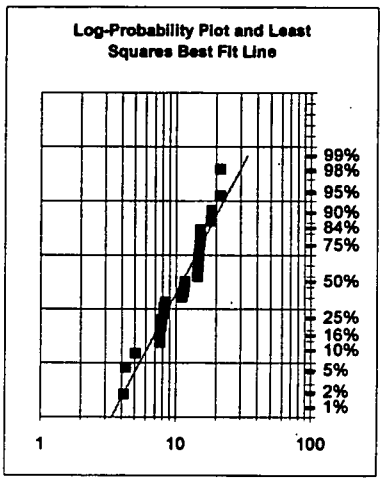
Critical Level	22
UNITS - dpm/100 cm^2	
Sample Data	
4.16	
4.29	
5.06	
7.64	
7.64	
7.84	
7.91	
8.16	
8.18	
8.39	
11.10	
11.40	
11.60	
11.70	
14.50	
14.50	
14.70	
14.70	
14.80	
14.90	
15.10	
15.20	
15.20	
18.20	
18.50	
21.40	
21.50	

Descriptive Statistics	
Number of Samples	27.000
Mean	12.158
Median	11.700
Standard Deviation	4.871
CV	0.400659
Range	17.340
Minimum	4.160
Maximum	21.500
GM	11.107
GSD	1.578
Mean of LN(Data)	2.408
SD of LN(Data)	0.456
Percent > Critical Level	0.000

Normal Statistics	
Mean	12.158
UCL(Mean) - Z	13.996
LCL(Mean) - Z	10.321
95%ile - Z	20.171
Percent > Critical Level	2.167
W Test (Data)	0.942567
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	11.107
GSD	1.578
AM of data	12.158
AM - MVUE	12.272
AM - MLE	12.324
UCL - Norm t stats	14.085
LCL - Norm t stats	10.231
UCL LogNorm t	14.760
LCL LogNorm t	10.290
UCL - Modified Cox	14.838
LCL - Modified Cox	10.150
UCL - "Exact"	
LCL - "Exact"	
95%ile	23.516
UTL 95%, 95%	31.174
Percent > Critical Level	6.696
PEP (Upper)	13.973
PEP (Lower)	2.001226
W Test (ln Data)	0.916663
Lognorm (a=0.05)?	No





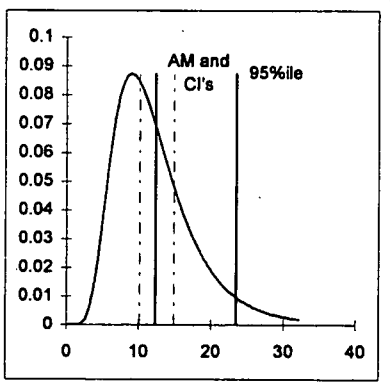


Figure 3–1 (continued). Data Evaluation Statistics—"Free Air" Instrument Background, 779–23

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background radiation due to the naturally low alpha background count rate and the Poisson distribution associated with low level radiation counting. The direct static field measurements collected in the survey units fit the same distributions (see Section 3.1.2). The variance in the recorded background data was small and within the range expected for a gas proportional counter measuring alpha background radiation (see Appendix E for complete background data set).

Table 3–2 shows the background data summary statistics.

Table 3–2. Background Data Summary Statistics, Annex A

Statistic	Survey Unit 779–21	Survey Unit 779–23
Number of Measurements	27	27
Arithmetic Mean	24.19	12.16
Standard Deviation (sample)	10.18	4.87
Coefficient of Variation	0.42	0.40
Max	41.40	21.50
Median	24.80	11.7
Minimum	8.28	4.16
Range	33.12	17.34
Geometric Mean	22.00	11.11
UCL (lognormal "t", a=0.05)	29.33	14.76
LCL (lognormal "t", b=0.05)	20.39	10.29

3.1.1.1 Background Adjustment

Because the background and survey unit sample sets were both lognormally and normally distributed, it was decided that the geometric (or lognormal) mean background value recorded over the sampling period (22.0 and 11.1 dpm/100 cm^2, respectively) would be used to correct the gross direct static surface contamination measurements for subsequent comparison to the applicable DCGL. In some situations, a graphical or visual distinction can be made between measurements containing background only and those with added radioactivity. For example, when elevated or contributed activity is present, a graphical distinction can be clearly seen between the population of measurements containing only background response and those containing elevated or contributed activity. This is not typically the case with alpha radioactivity. No graphic distinction between measurement results attributable to background and those with activity in excess of background is clearly discernable with this data set.

Calculational methods are needed to assess the surface activity above background that could be distinguished with statistical significance from background. As discussed earlier, the geometric mean instrument background measurements over the field sampling period were 22.0 and 11.1 dpm/100 cm^2, respectively. With the E-600 instruments used, the background radiation influence on the instrument's readings was processed with efficiency corrections and probe size corrections such that background measurements and sample measurements alike read out in units of dpm/100 cm^2. In order to calculate the statistically significant surface activity which could be distinguished from background (*a posteriori* MDA), it was necessary to convert the background measurement units from dpm/100 cm^2 to units of counts per minute (cpm). In this case, the more conservative metric, the arithmetic mean, was chosen to calculate the detection sensitivity achieved to prevent overstating the actual sensitivity achieved. The converted mean background count rates for the sampling periods are 4.87 and 2.37 cpm, respectively (Table 3–3). Using the

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actual instrument field measurement parameters, a calculation of the actual field measurement MDA can be determined by solving Equations 3–1, 3–2, and 3–3.

Table 3–3. Static Surface Contamination Measurement MDA Parameters

Parameter		Value Used		Remarks
		779–21	779–23	
C_b	Background Counts	7.30	3.55	Values used are 24.192 and 12.158 dpm/100 cm^2 converted to units of counts (cpm × T_s)
T_s	Sample count time (in minutes)	1.5		Count time programmed into the calibrated instrument specifically for this sampling event
A_P	Probe size	100		cm^2
ϵ_T	Instrument system efficiency in counts/disintegration	0.20	0.195	Actual efficiency for the individual probe is programmed into the memory chip of the probes' smart pack and for the two probes used was 20.76% and 19.49%. These represent effectively equivalent measures of efficiency and probe performance.

The following calculations define the *a posteriori* MDA.

$$MDA = \frac{3 + 4.65\sqrt{C_b}}{T_s \times \frac{A_p}{100cm^2} \times \epsilon_T} \qquad (3\text{–}1)$$

Where: MDA = the minimum surface activity concentration above background radioactivity (in dpm/100 cm^2) that can be detected with 95 percent confidence.
C_b = the total number of background counts over the sample count period (T_s).
T_s = sample count time (in minutes).
A_P = probe size (in cm^2).
ϵ_T = counting system efficiency in count/disintegration.

$$MDA = \frac{3 + 4.65\sqrt{7.30}}{1.5 \times 1 \times 0.20} \qquad MDA = \frac{3 + 4.65\sqrt{3.55}}{1.5 \times 1 \times 0.195} \qquad (3\text{–}2)$$

$$MDA = \frac{15.56}{0.302} = 52\ dpm/100\ cm^2 \qquad MDA = \frac{11.76}{0.293} = 40\ dpm/100\ cm^2 \qquad (3\text{–}3)$$

Therefore the "gross" field instrument readings, using the procedures identified in the Building 779 Cluster IV SAP, which can be distinguished as different from background (the adjusted gross MDA) are:

$$24 + 52 = 76\ dpm/100\ cm^2 \qquad 12 + 40 = 52\ dpm/100\ cm^2 \qquad (3\text{–}4)$$

Having identified the *a posteriori* MDA for the field sampling measurements and the adjusted gross MDAs, a simple sort of the gross field measurement data points was performed to identify those measurements from survey unit 779–21 and 779–23 which were greater than 76 dpm/100 cm^2 and 52 dpm/100 cm^2, respectively. Those locations with gross surface activity

greater than the adjusted gross MDA are credited as positive indicators of added radioactivity, while those less than the adjusted gross MDA are statistically indistinguishable from background values.

Rather than correct each individual measurement for background, the gross measurement data set was statistically analyzed. The data set was treated as lognormally distributed, the overall best fit for the data set collected. This treatment conforms to standard EPA methodology for data evaluation statistics, and generally yields conservative estimates of the upper confidence intervals and percentiles values. To correct for the instrument's response to background, the geometric mean background, 22.0 and 11.1 dpm/100 cm^2, respectively, was subtracted from the geometric mean of the total surface activity measured by surface emission data set of interest. When comparisons of other metrics (e.g., the median) are provided for information, the comparable background metric is also used to correct the reading for background radiation influence. For example, when the net (background corrected) ***median*** direct static surface contamination metric is reported, the ***median*** value of the background data set has been subtracted from the ***median*** value of the gross direct static surface contamination measurement data set.

3.1.2 Field Measurement Data

Direct static measurements were made at the 29 selected sample locations in each of the two survey units (779–21 and 779–23). Figure 2–2 shows the layout of both survey units and the sample locations selected in accordance with the sample allocation protocol identified in the IV SAP (DOE 1999a). They were made prior to collection of a smear sample at the location and prior to collecting a surface media sample. In this way, the "total" surface deposited activity emission rate, whether from fixed or removable radioactivity, was accounted for. In all, 33 direct static surface measurements were made in each survey unit prior to collecting surface samples. Four of these, in each survey unit, were replicate measurements collected as part of the overall QA/QC as described in the SAP. For data reduction purposes, the arithmetic mean of a replicate measurement and the corresponding initial measurement was used as the reported value for a specific sample location at which a replicate measurement was made. Consequently, there are a total of 29 data points (Table 3–4) for each survey unit included in the overall characterization of the building's mean residual surface contamination level as measured by direct surface emission. Further information about the duplicate samples and the assurance of precision and variability are presented in Sections 6.0 and 7.0.

A number of statistical tests of the data were performed to assess the data sets. A key test of the data set is for goodness-of-fit. It is important because it identifies the underlying distribution of the data set and permits the analyst as well as the decision makers and risk managers to compare appropriate metrics calculated from the data. The W-test was used to measure the relative goodness of the fit of the observed data distribution to both the normal and lognormal standard distributions. Other distributions were not entertained for this data set since the data were expected to be either normally or lognormally distributed (based on knowledge of radioactivity distribution in the environment and in background) and because the probability plots and histograms generated gave no evidence that other than normal or lognormal distributions might be present. For the direct static measurement data set, the W-test identified the lognormal distribution as the best fit for survey unit 779–21 and the normal distribution for survey unit 779–23. The data evaluation statistics are provided in Figure 3–2. Table 3–5 summarizes the

direct surface measurement data, uncorrected for background, collected in survey units 779–21 and 779–23.

Table 3–4. Direct Static Surface Contamination Measurements, Annex A

Survey Unit 779–21		Survey Unit 779–23		Instrument Operating Mode	Channel Selected	Background Compensation Mode
Sample Location	Recorded dpm/100 cm^2	Sample Location	Recorded dpm/100 cm^2			
IVP0000201	24.80	IVP0000231	20.80	Scaler	Alpha	Gross
IVP0000202	20.70	IVP0000232	20.70	Scaler	Alpha	Gross
IVP0000203	16.60	IVP0000233	3.38	Scaler	Alpha	Gross
IVP0000204	41.40	IVP0000234	7.00	Scaler	Alpha	Gross
IVP0000205	29.00	IVP0000235	20.60	Scaler	Alpha	Gross
IVP0000206	16.60	IVP0000236	24.00	Scaler	Alpha	Gross
IVP0000207	12.40	IVP0000237	20.50	Scaler	Alpha	Gross
IVP0000208	4.14	IVP0000238	17.40	Scaler	Alpha	Gross
IVP0000209	20.70	IVP0000239	10.30	Scaler	Alpha	Gross
IVP0000210	4.14	IVP0000240	7.45	Scaler	Alpha	Gross
IVP0000211	16.60	IVP0000241	24.70	Scaler	Alpha	Gross
IVP0000212	24.85	IVP0000242	12.70	Scaler	Alpha	Gross
IVP0000213	20.70	IVP0000243	17.30	Scaler	Alpha	Gross
IVP0000214	20.70	IVP0000244	17.40	Scaler	Alpha	Gross
IVP0000215	10.80	IVP0000245	17.40	Scaler	Alpha	Gross
IVP0000216	13.90	IVP0000246	20.40	Scaler	Alpha	Gross
IVP0000217	3.90	IVP0000247	10.20	Scaler	Alpha	Gross
IVP0000218	12.25	IVP0000248	17.10	Scaler	Alpha	Gross
IVP0000219	14.00	IVP0000249	13.60	Scaler	Alpha	Gross
IVP0000220	13.90	IVP0000250	3.55	Scaler	Alpha	Gross
IVP0000221	16.60	IVP0000251	10.30	Scaler	Alpha	Gross
IVP0000222	8.28	IVP0000252	10.60	Scaler	Alpha	Gross
IVP0000223	4.14	IVP0000253	21.00	Scaler	Alpha	Gross
IVP0000224	16.60	IVP0000254	10.60	Scaler	Alpha	Gross
IVP0000225	20.70	IVP0000255	14.10	Scaler	Alpha	Gross
IVP0000226	29.00	IVP0000256	10.70	Scaler	Alpha	Gross
IVP0000227	78.60	IVP0000257	13.90	Scaler	Alpha	Gross
IVP0000228	12.40	IVP0000258	21.00	Scaler	Alpha	Gross
IVP0000229	33.10	IVP0000259	12.65	Scaler	Alpha	Gross

DATA EVALUATION STATISTICS

Data Description

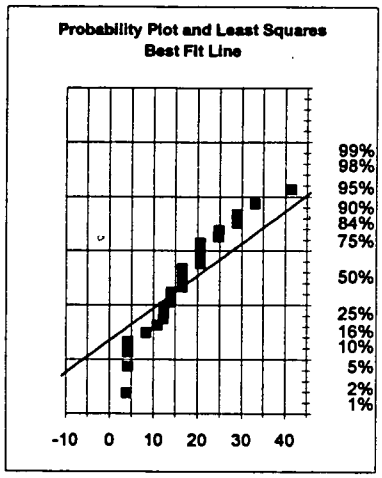
Direct Static Surface Measurements
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

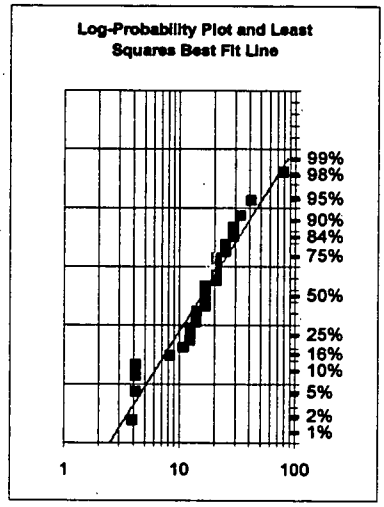
DCGL	100
UNITS - dpm/100 cm^2	
Sample Data	
3.90	
4.14	
4.14	
4.14	
8.28	
10.80	
12.25	
12.40	
12.40	
13.90	
13.90	
14.00	
16.60	
16.60	
16.60	
16.60	
16.60	
20.70	
20.70	
20.70	
20.70	
20.70	
24.80	
24.85	
29.00	
29.00	
33.10	
41.40	
78.60	

Descriptive Statistics	
Number of Samples	29.000
Mean	19.362
Median	16.600
Standard Deviation	14.445
CV	0.746043
Range	74.700
Minimum	3.900
Maximum	78.600
GM	15.510
GSD	2.012
Mean of LN(Data)	2.741
SD of LN(Data)	0.699
Percent > DCGL	0.000

Normal Statistics	
Mean	19.362
UCL(Mean) - Z	24.619
LCL(Mean) - Z	14.105
95%ile - Z	43.124
Percent > DCGL	0.000
W Test (Data)	0.762025
Normal (a=0.05)?	No

Lognormal Statistics	
GM	15.510
GSD	2.012
AM of data	19.362
AM - MVUE	19.604
AM - MLE	19.806
UCL - Norm t stats	24.857
LCL - Norm t stats	13.868
UCL LogNorm t	25.842
LCL LogNorm t	15.180
UCL - Modified Cox	26.404
LCL - Modified Cox	14.555
UCL - "Exact"	
LCL - "Exact"	
95%ile	49.001
UTL 95%, 95%	73.995
Percent > DCGL	0.385
PEP (Upper)	1.846
PEP (Lower)	0.026123
W Test (ln Data)	0.929152
Lognorm (a=0.05)?	Yes





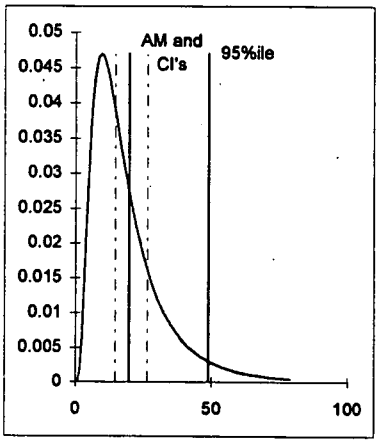


Figure 3–2. Data Evaluation Statistics—Direct Static Surface Measurements, 779–21

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DATA EVALUATION STATISTICS

Data Description

Direct Static Surface Measurements
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-23

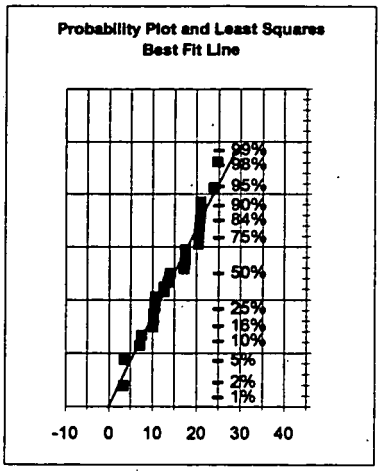
DCGL	100
UNITS - dpm/100 cm^2	

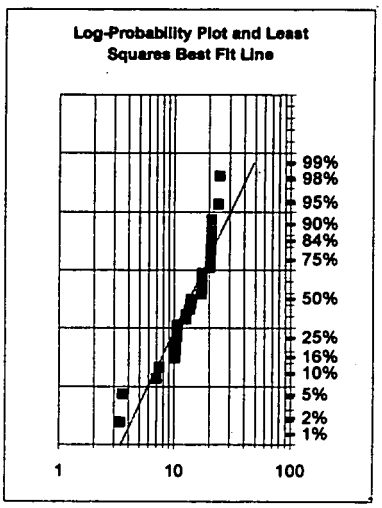
Sample Data
3.38
3.55
7.00
7.45
10.20
10.30
10.30
10.60
10.60
10.70
12.65
12.70
13.60
13.90
14.10
17.10
17.30
17.40
17.40
17.40
20.40
20.50
20.60
20.70
20.80
21.00
21.00
24.00
24.70

Descriptive Statistics	
Number of Samples	29.000
Mean	14.873
Median	14.100
Standard Deviation	5.846
CV	0.393037
Range	21.320
Minimum	3.380
Maximum	24.700
GM	13.438
GSD	1.659
Mean of LN(Data)	2.598
SD of LN(Data)	0.506
Percent > DCGL	0.000

Normal Statistics	
Mean	14.873
UCL(Mean) - Z	17.001
LCL(Mean) - Z	12.746
95%ile - Z	24.490
Percent > DCGL	0.000
W Test (Data)	0.949439
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	13.438
GSD	1.659
AM of data	14.873
AM - MVUE	15.202
AM - MLE	15.277
UCL - Norm t stats	17.097
LCL - Norm t stats	12.650
UCL LogNorm t	18.523
LCL LogNorm t	12.600
UCL - Modified Cox	18.662
LCL - Modified Cox	12.383
UCL - "Exact"	
LCL - "Exact"	
95%ile	30.916
UTL 95%, 95%	41.670
Percent > DCGL	0.004
PEP (Upper)	0.078
PEP (Lower)	1.71E-05
W Test (ln Data)	0.864172
Lognorm (a=0.05)?	No





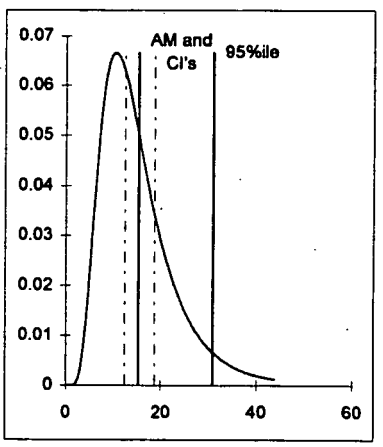


Figure 3–2 (continued). Data Evaluation Statistics—Direct Static Surface Measurements, 779–23

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Table 3–5. Summary Statistics, Direct Static Measurements, Annex A

Statistic	Survey Unit 779–21 Value	Survey Unit 779–23 Value
Number of Measurements	29	29
Arithmetic Mean	19.36	14.9
Standard Deviation (sample)	14.45	5.85
Coefficient of Variation	0.75	0.39
Max	78.60	24.7
Median	16.60	14.1
Minimum	3.90	3.38
Range	74.70	21.32
Geometric Mean	15.51	13.44
UCL (lognormal "t", a=0.05)	25.84	18.52
LCL (lognormal "t", b=0.05)	15.18	12.60

From Table 3–5 and the data evaluation and summary statistics, it is evident that for survey unit 779–21, approximately 76 percent of all the measurements are at or below the geometric mean background value of 22.0 dpm/100 cm^2 and the critical detection level of 22 dpm/100 cm^2. Those that exceed the critical level give some evidence of activity above background but not enough to be quantified with certainty. All measurements except one are below the adjusted gross MDA (MDA_{Gross}) of 76 dpm/100 cm^2 for the field measurement process. The maximum value of 78.6 dpm/100 cm^2 was measured on the cinder block wall inside the elevator shaft in room 144 of survey unit 779–17 at sample location IVP0000227.

Only 34 percent of the measurements taken in survey unit 779–23 are at or below the geometric mean background value of 11.1 dpm/100 cm^2 yet 93 percent are below the critical detection level of 22 dpm/100 cm^2. Once again, those that exceed the critical level give some evidence of activity above background but not enough to be quantified with certainty. All measurements are below the MDA_{Gross} of 52 dpm/100 cm^2 for the field measurement process. The maximum value of 24.7 dpm/100 cm^2 was measured on the sealant covered concrete north wall of survey unit 779–23 at sample location IVP0000241.

The test of $DCGL_W$ for total surface contamination concentration as measured by direct surface emission is the mean (the geometric mean in the case of unit 779–21 since this data set is determined to be lognormally distributed and the arithmetic mean in the case of unit 779–23 since this data set is determined to be normally distributed) of the data sets. Section 4.0 provides detailed analysis of the data set in comparison to the applicable DCGL values.

3.1.2.1 Post Surface Media Sampling Measurements

Follow-up direct static measurements were made after each surface media sample was collected in an effort to assure that all of the contaminant which might have been present beneath the immediate surface was removed by the physical sampling process. This measurement was necessary to validate the assumption that any contaminant that may have been deposited beneath a paint layer or embedded in the porous substrate was limited to only shallow deposition and would be collected and measured by the surface media sampling. Evidence of elevated radioactivity by direct measurement after a thin surface veneer had been removed might call into question the validity of that assumption, requiring further investigation. The results, however, are not considered in the data set used to evaluate compliance with the $DCGL_W$ for total surface

contamination as measured by direct surface emission. Nonetheless, the post surface media sampling measurements are considered important since they might detect radioactivity that is potentially "hidden" from detection by direct surface emission measurements made before removal of the surface coating or veneer.

A total of 18 (14 from unit 779–21 and 4 from unit 779–23) surface media samples (Table 3–6) were collected from sample locations which met the stringent surface media sample inclusion criteria (DOE 1999a). A total of 19 direct static surface measurements were made at the 18 surface media sample locations subsequent to collecting surface samples. One of these was a replicate measurement collected as part of the overall QA/QC as described in the SAP. Where the replicate measurement was made, the arithmetic mean of the replicate measurement and the corresponding initial measurement was used as the reported value for that specific sample location.

Table 3–6. Post Surface Media Sample Direct Static Surface Measurements

Survey Unit 779–21		Survey Unit 779–23		Instrument Operating Mode	Channel Selected	Background Compensation Mode
Sample Location	Recorded dpm/100 cm^2	Sample Location	Recorded dpm/100 cm^2			
IVP0000201	29.00	IVP0000236	30.90	Scaler	Alpha	Gross
IVP0000203	16.60	IVP0000240	21.00	Scaler	Alpha	Gross
IVP0000204	33.10	IVP0000241	13.90	Scaler	Alpha	Gross
IVP0000205	20.70	IVP0000242	5.47	Scaler	Alpha	Gross
IVP0000208	24.80			Scaler	Alpha	Gross
IVP0000210	4.14			Scaler	Alpha	Gross
IVP0000211	20.70			Scaler	Alpha	Gross
IVP0000212	33.10			Scaler	Alpha	Gross
IVP0000221	33.10			Scaler	Alpha	Gross
IVP0000222	12.40			Scaler	Alpha	Gross
IVP0000223	20.70			Scaler	Alpha	Gross
IVP0000226	20.70			Scaler	Alpha	Gross
IVP0000227	24.80			Scaler	Alpha	Gross
IVP0000229	4.14			Scaler	Alpha	Gross

Again, a number of statistical tests of the data were performed to assess the data set. The W-test was used to measure the relative goodness of the fit of the observed data distribution. The W-test and histogram showed the survey units 779–21 and 779–23 data sets to be normally distributed. The data evaluation statistics are provided in Figure 3–3. Table 3–7 summarizes the post surface media sampling direct surface measurement data, uncorrected for background, collected in survey unit 779–21 and 779–23.

DATA EVALUATION STATISTICS

Data Description

Direct Static Surface Measurements (Post Surface Media Sampling)
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

DCGL	100

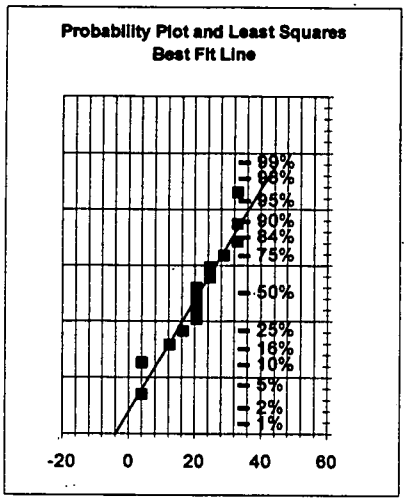
UNITS - dpm/100 cm^2

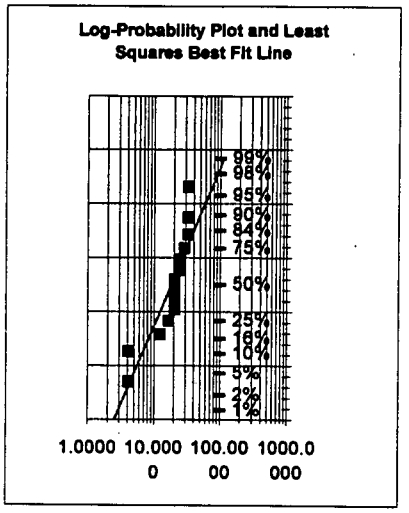
Sample Data
4.14
4.14
12.40
16.60
20.70
20.70
20.70
20.70
24.80
24.80
29.00
33.10
33.10
33.10

Descriptive Statistics	
Number of Samples	14.000
Mean	21.284
Median	20.700
Standard Deviation	9.580
CV	0.450113
Range	28.960
Minimum	4.140
Maximum	33.100
GM	18.144
GSD	1.983
Mean of LN(Data)	2.898
SD of LN(Data)	0.684
Percent > DCGL	0.000

Normal Statistics	
Mean	21.284
UCL(Mean) - Z	26.303
LCL(Mean) - Z	16.266
95%ile - Z	37.044
Percent > DCGL	0.000
W Test (Data)	0.909869
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	18.144
GSD	1.983
AM of data	21.284
AM - MVUE	22.482
AM - MLE	22.931
UCL - Norm t stats	26.816
LCL - Norm t stats	15.753
UCL LogNorm t	34.044
LCL LogNorm t	15.446
UCL - Modified Cox	34.984
LCL - Modified Cox	14.448
UCL - "Exact"	
LCL - "Exact"	
95%ile	55.931
UTL 95%, 95%	108.556
Percent > DCGL	0.631
PEP (Upper)	4.206
PEP (Lower)	0.00858
W Test (ln Data)	0.765541
Lognorm (a=0.05)?	No





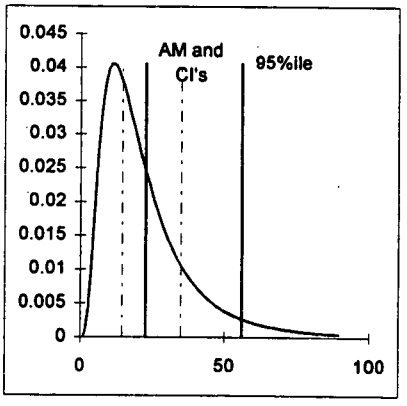


Figure 3–3. Data Evaluation Statistics—Direct Static Surface Measurements, 779–21 (Post Surface Media Sampling)

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DATA EVALUATION STATISTICS

Data Description

Direct Static Surface Measurements (Post Surface Media Sampling)
Building 779 Cluster Independent Verification Project
Building 779, Annex A, Survey Unit 779-23

DCGL	100

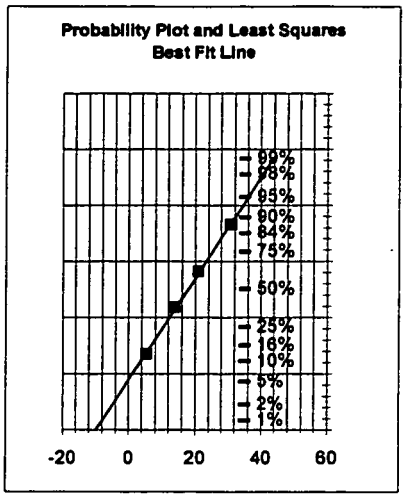
UNITS - dpm/100 cm²

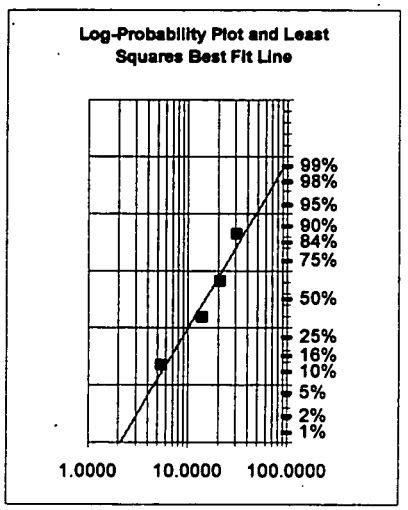
Sample Data
5.47
13.90
21.00
30.90

Descriptive Statistics	
Number of Samples	4.000
Mean	17.818
Median	17.450
Standard Deviation	10.787
CV	0.605424
Range	25.430
Minimum	5.470
Maximum	30.900
GM	14.904
GSD	2.103
Mean of LN(Data)	2.702
SD of LN(Data)	0.744
Percent > DCGL	0.000

Normal Statistics	
Mean	17.818
UCL(Mean) - Z	28.389
LCL(Mean) - Z	7.246
95%ile - Z	35.562
Percent > DCGL	0.000
W Test (Data)	0.998104
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	14.904
GSD	2.103
AM of data	17.818
AM - MVUE	18.192
AM - MLE	19.650
UCL - Norm t stats	34.982
LCL - Norm t stats	0.653
UCL LogNorm t	64.154
LCL LogNorm t	6.019
UCL - Modified Cox	72.617
LCL - Modified Cox	4.557
UCL - "Exact"	
LCL - "Exact"	
95%ile	50.644
UTL 95%, 95%	683.602
Percent > DCGL	0.523
PEP (Upper)	12.412
PEP (Lower)	0
W Test (ln Data)	0.955681
Lognorm (a=0.05)?	Yes





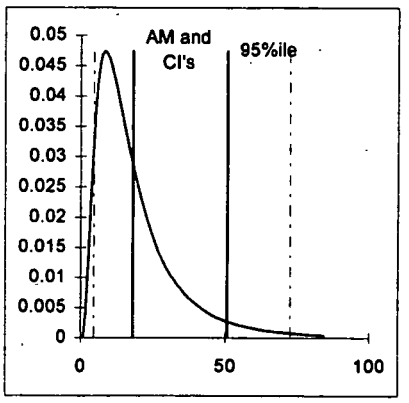


Figure 3–3 (continued). Data Evaluation Statistics—Direct Static Surface Measurements, 779–23 (Post Surface Media Sampling)

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Table 3–7. Summary Statistics, Post Media Sampling Direct Static Measurements, Annex A

Statistic	Survey Unit 779–21	Survey Unit 779–23
Number of Measurements	14	4
Arithmetic Mean	21.28	17.8
Standard Deviation (sample)	9.58	10.79
Coefficient of Variation	0.45	0.61
Max	33.10	30.90
Median	20.70	17.45
Minimum	4.14	5.47
Range	28.96	25.43
Geometric Mean	18.14	14.90
UCL (normal "t", a=0.05)	34.04	34.98
LCL (normal "t", b=0.05)	15.45	0.65

The most telling presentation of the post surface media sampling surface measurements is a side by side comparison of the data set summary statistics with the summary statistics from the direct surface measurements made prior to sampling and the instrument background data collected during the sampling process. Table 3–8 and Table 3–9 compares units 779–21 and 779–23 summary statistics from each of these three data sets.

Table 3–8. Comparison of Direct Static Measurement Data Sets Summary Statistics, Survey Unit 779–21

Statistic	Pre-Surface Media Sampling Measurements Value	Post-Surface Media Sampling Measurements Value	Background Measurements Value
Number of Measurements	29	14	27
Arithmetic Mean	19.36	21.28	24.19
Standard Deviation (sample)	14.45	9.58	10.18
Coefficient of Variation	0.75	0.45	0.42
Max	78.60	33.10	41.40
Median	16.60	20.70	24.80
Minimum	3.90	4.14	8.28
Range	74.70	28.96	33.12
Geometric Mean	15.51	18.14	22.00
UCL (lognormal "t", a=0.05)	25.84	34.04	29.33
LCL (lognormal "t", b=0.05)	15.18	15.45	20.39

From the data evaluation and summary statistics, it is evident that the post surface media sampling direct static measurements for survey unit 779–21 show slightly higher activity than those collected prior to sampling. However, they are slightly lower than the instrument background measurements made over the sampling period. The maximum value of 33.1 dpm/ 100 cm^2 was measured at sample locations IVP0000204, IVP0000212, and IVP0000221.

Table 3–9. Comparison of Direct Static Measurement Data Sets Summary Statistics, Survey Unit 779–23

Statistic	Pre-Surface Media Sampling Measurements Value	Post-Surface Media Sampling Measurements Value	Background Measurements Value
Number of Measurements	29	4	27
Arithmetic Mean	14.87	17.82	12.16
Standard Deviation (sample)	5.85	10.79	4.87
Coefficient of Variation	0.39	0.61	0.40
Max	24.70	30.90	21.50
Median	14.10	17.45	11.70
Minimum	3.38	5.47	4.16
Range	21.32	25.43	17.34
Geometric Mean	13.44	14.90	11.11
UCL (normal "t", a=0.05)	17.10	34.98	14.09
LCL (normal "t", b=0.05)	12.65	0.65	10.23

From the data evaluation and summary statistics, it is evident that the post surface media sampling direct static measurements for survey unit 779–23 show slightly higher activity than those collected prior to sampling and are slightly higher than the instrument background measurements made over the sampling period. The maximum value of 30.9 dpm/100 cm^2 was measured at sample location IVP0000236.

The fact that approximately half the survey results from both units yielded higher direct static measurements of activity once the paint layer had been removed and that the corresponding surface media sample yielded no appreciable measure of radioactivity tends to support the possibility that the building materials have a measurable concentration of naturally occurring radionuclides[1]. For sample locations requiring media sampling, both the pre- and post-surface media sampling direct static measurement data set are presented side-by-side in Table 3–10.

3.2 Laboratory Measurements

The GJO Analytical Laboratory was used to assay all smear and surface media samples collected for independent verification from survey units 779–21 and 779–23. The GJO Analytical Laboratory was selected because of its method capabilities, quality program, autonomy, and ability to meet the detection limits specified in the SAP (DOE 1999a). In each case, the laboratory met or exceeded the contract required detection limit specified in the SAP. Results of samples analyzed are summarized in the following sections below.

[1]Although indications point to the possibility of measurable concentrations of naturally occurring radionuclides, particularly in the concrete materials used in the building construction, no credit is taken by attempting to subtract these from the measured vales in the building. Instead, all radioactivity measured (other than the instrument background) is assumed to be DOE contributed values and is compared against the applicable DCGL to determine compliance with the DQOs.

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Table 3–10. Direct Static Measurement Data Sets, Pre- and Post Media Sampling

Survey Unit 779–21			Survey Unit 779–23		
Sample Location	Pre Media Sampling Measurements (dpm/100 cm^2)	Post Media Sampling Measurements (dpm/100 cm^2)	Sample Location	Pre Media Sampling Measurements (dpm/100 cm^2)	Post Media Sampling Measurements (dpm/100 cm^2)
IVP0000201	24.80	29.00	IVP0000236	24.00	30.90
IVP0000203	16.60	16.60	IVP0000240	7.45	21.00
IVP0000204	41.40	33.10	IVP0000241	24.70	13.90
IVP0000205	29.00	20.70	IVP0000242	12.70	5.47
IVP0000208	4.14	24.80			
IVP0000210	4.14	4.14			
IVP0000211	16.60	20.70			
IVP0000212	24.85	33.10			
IVP0000221	16.60	33.10			
IVP0000222	8.28	12.40			
IVP0000223	4.14	20.70			
IVP0000226	29.00	20.70			
IVP0000227	78.60	24.80			
IVP0000229	33.10	4.14			

3.2.1 Smear Samples

Smear samples were collected at each of the 29 designated sample locations from each survey unit. Smear samples were collected following the initial direct static surface measurement by wiping the surface with an absorbent smear filter media using moderate pressure. The smears were packaged and delivered to the GJO Analytical Laboratory for counting. The 29 smear samples from each survey unit were submitted to the GJO Analytical Laboratory along with two blank and six "spiked" QC smears on October 28, 1999, for analysis. Table 3–11 is provided to aid the reader to keep the sample identification numbers straight. Results and conclusions relative to the QC smear samples are provided in Section 6.0 of this report.

With the exception of the spiked QC samples submitted, the analytical results showed no measurable radioactivity indicating that there is very little likelihood that the $DCGL_W$ for removable surface contamination might be exceeded in the survey unit. Since every sample result was below the detection limit for the analysis (MDA), no statistical inferences can be made for the data set. However, since the method detection limit was significantly below the $DCGL_W$ for removable alpha radioactivity, and each smear sample was shown to have activity less than the detection limit, statistical treatment of the data set is not necessary in order to measure compliance. Table 3–12 summarizes the pertinent information gleaned from the complete analytical report (Requisition #16821). The entire analytical report is provided in Appendix C.

Table 3–11. Smear Sample Identification Crosswalk

Survey Unit 779–21			Survey 779–23		
Field Sample Location ID#	Unique Sample ID#	Laboratory Assigned Sample #	Sample Location ID#	Unique Sample ID#	Laboratory Assigned Sample #
IVP0000201	SMR0000201	263332	IVP0000231	SMR0000231	263366
IVP0000202	SMR0000202	263333	IVP0000232	SMR0000232	263367
IVP0000203	SMR0000203	263334	IVP0000233	SMR0000233	263368
IVP0000204	SMR0000204	263335	IVP0000234	SMR0000234	263369
IVP0000205	SMR0000205	263336	IVP0000235	SMR0000235	263370
IVP0000206	SMR0000206	263337	IVP0000236	SMR0000236	263371
IVP0000207	SMR0000207	263338	IVP0000237	SMR0000237	263372
IVP0000208	SMR0000208	263339	IVP0000238	SMR0000238	263373
IVP0000209	SMR0000209	263340	IVP0000239	SMR0000239	263374
IVP0000210	SMR0000210	263341	IVP0000240	SMR0000240	263375
IVP0000211	SMR0000211	263342	IVP0000241	SMR0000241	263376
IVP0000212	SMR0000212	263343	IVP0000242	SMR0000242	263377
IVP0000213	SMR0000213	263344	IVP0000243	SMR0000243	263378
IVP0000214	SMR0000214	263345	IVP0000244	SMR0000244	263379
IVP0000215	SMR0000215	263346	IVP0000245	SMR0000245	263380
IVP0000216	SMR0000216	263347	IVP0000246	SMR0000246	263381
IVP0000217	SMR0000217	263348	IVP0000247	SMR0000247	263382
IVP0000218	SMR0000218	263349	IVP0000248	SMR0000248	263383
IVP0000219	SMR0000219	263350	IVP0000249	SMR0000249	263384
IVP0000220	SMR0000220	263351	IVP0000250	SMR0000250	263385
IVP0000221	SMR0000221	263352	IVP0000251	SMR0000251	263386
IVP0000222	SMR0000222	263353	IVP0000252	SMR0000252	263387
IVP0000223	SMR0000223	263354	IVP0000253	SMR0000253	263388
IVP0000224	SMR0000224	263355	IVP0000254	SMR0000254	263389
IVP0000225	SMR0000225	263356	IVP0000255	SMR0000255	263390
IVP0000226	SMR0000226	263357	IVP0000256	SMR0000256	263391
IVP0000227	SMR0000227	263358	IVP0000257	SMR0000257	263392
IVP0000228	SMR0000228	263359	IVP0000258	SMR0000258	263393
IVP0000229	SMR0000229	263360	IVP0000259	SMR0000259	263394
BLANK, 259728	SMR0000591	263362	SPIKE, NDL290	SMR0000160	263395
BLANK, 259729	SMR0000592	263363	SPIKE, NDL292	SMR0000161	263396
SPIKE, 259763	SMR0000593	263364	SPIKE, NDL294	SMR0000162	263397
SPIKE, 259764	SMR0000594	263361			
SPIKE, 259765	SMR0000595	263365			

Table 3–12. Summary of Analytical Report Data for Smears

	Survey Unit 779–21	Survey Unit 779–23
Number of Samples	29 (263332 through 263360)	29 (263363 through 263394)
Method Detection Limit (α=0.05)	5.33 dpm/100cm^2	5.33 dpm/100cm^2
Removable Alpha Surface Radioactivity (dpm/100cm^2)	All smear samples were less than (<) MDA	All smear samples were less than (<) MDA
Sample Count Time	6 minutes	6 minutes

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3.2.2 Surface Media Samples

Surface media samples were collected at each sample location when either of two conditions was satisfied (DOE 1999a). First, a sample was collected at each location where a surface coating or residue, such as paint, was present on the selected surface. Second, a sample was collected at each location where the direct static surface measurement exceeded L_c, 22 dpm/100 cm^2, indicating the possible presence of measurable DOE added radioactivity. In all, 18 (14 from unit 779–21 and 4 from unit 779–23) surface media samples were collected; 18 of the 58 designated sample locations having met one or both conditions.

In order to achieve the required detection sensitivity and to distinguish between transuranic and uranium series radionuclides, alpha spectroscopy analysis was chosen to assay the surface media samples. Distinction between transuranic and uranium series nuclides is important because radionuclide series specific DCGLs were established for the surface media samples. Sample masses ranged from approximately 5 to 24 grams and were collected over a 100 cm^2 surface area. The laboratory analyzed each sample for the following radionuclide sets:

- Transuranic Series Isotopes Pu-238, Pu-239/240, and Am-241
- Uranium Series Isotopes U-234, U-235, and U-238

In spectrometric analysis, each isotope has its own counting statistics and detection limit. Many of the sample measurements resulted in one or more of the isotope specific values below the detection limit. When this occurred, a value equal to one half of the sample specific detection limit was used to calculate the total radionuclide series activity. Collated data has been derived from the complete analytical report (Requisition #16822) and presented in Table 3–13. The entire analytical report is provided in Appendix C.

From summary data presented in Table 3–13, several features are apparent:

- Isotopic assay of the contaminants found on and beneath painted and coated surfaces in Annex A indicate the persistent presence of uranium series radionuclides. Each of the 18 samples collected showed detectable concentrations of the two uranium isotopes found most abundantly in nature, U-234 and U-238. This is indicative of the presence of background contributions of these nuclides and is consistent with the background contributions expected in concrete and cinder block materials (NRC 1997).

- Only one sample, IVP000227, from among the 18 collected showed the clear presence of transuranic radioactivity. This sample was collected from inside the elevator shaft in the southwest portion of the survey unit where the highest direct measurement was recorded (78.6 dpm/100 cm^2). The direct static measurement taken after the media sample was taken (24.8 dpm/100 cm^2) indicates the contamination was on the surface of the cinder block and removed with the media sampling. The Contractor had earlier identified radioactive contamination in the shaft and performed a decontamination process to remove it to below the applicable DCGL value. Every other sample result had one or more of the transuranic nuclides of interest at concentrations below the detection limit.

Table 3–13. Surface Media Sample Data, Annex A, Survey Units 779–21 and 779–23—Alpha Isotopic Analysis

Sample Location	Lab Sample ID#	Sample Weight (grams)	Am-241		Pu-238		Pu-239/240		U-234	U-235		U-238	Total Transuranic Activity	Total Uranium Activity
			Reported Value	Reported Value (w/ samples less than MDA @ 0.5 MDA)	Reported Value	Reported Value (w/ samples less than MDA @ 0.5 MDA)	Reported Value	Reported Value (w/ samples less than MDA @ 0.5 MDA)	Reported Value	Reported Value	Reported Value (w/ samples less than MDA @ 0.5 MDA)	Reported Value	dpm/100 cm^2	dpm/100 cm^2
MED0000201	263398	21.10	2.02	2.02	0.38	0.19	1.28	1.28	67.91	2.38	2.38	70.53	3.49	140.82
MED0000203	263399	13.57	2.60	2.60	0.61	0.31	2.90	2.90	25.47	1.69	0.85	23.94	5.81	50.26
MED0000204	263400	15.60	2.92	2.92	0.58	0.29	1.27	1.27	33.60	2.12	2.12	33.51	4.48	69.23
MED0000205	263401	24.35	1.11	1.11	0.35	0.18	1.02	0.51	44.40	2.71	2.71	45.19	1.80	92.30
MED0000208	263402	19.52	1.18	1.18	1.07	0.54	1.13	1.13	30.73	2.11	2.11	33.00	2.85	65.84
MED0000210	263403	3.39	0.41	0.41	0.21	0.11	0.82	0.82	0.52	0.23	0.12	0.56	1.34	1.20
MED0000211	263404	21.94	1.74	1.74	0.89	0.45	1.28	0.64	39.80	1.90	1.90	43.64	2.83	85.34
MED0000212	263405	23.33	0.87	0.44	1.02	0.51	1.12	0.56	33.89	1.58	0.79	36.10	1.51	70.78
MED0000221	263406	16.75	0.50	0.50	0.28	0.14	0.95	0.48	25.49	1.28	0.64	22.53	1.12	48.66
MED0000222	263407	21.64	0.48	0.48	1.31	0.66	1.08	0.54	40.67	3.16	3.16	35.28	1.68	79.11
MED0000223	263408	21.91	2.42	2.42	0.96	0.48	0.96	0.48	37.24	2.59	1.30	40.26	3.38	78.80
MED0000226	263409	16.45	1.39	1.39	0.61	0.31	0.78	0.78	34.57	3.04	1.52	36.09	2.48	72.18
MED0000227	263410	15.44	6.28	6.28	0.50	0.50	27.58	27.58	32.44	1.45	1.45	33.88	34.36	67.77
MED0000229	263411	9.76	0.40	0.20	0.37	0.19	0.37	0.19	18.33	1.14	0.57	18.33	0.57	37.23
MED0000236	263418	15.04	0.32	0.32	0.34	0.34	1.05	1.05	22.87	1.48	0.74	24.87	1.71	48.48
MED0000240	263419	5.22	1.11	1.11	0.29	0.15	0.45	0.45	7.13	1.02	0.51	6.91	1.71	14.55
MED0000241	263420	5.26	0.31	0.16	0.25	0.13	1.19	1.19	6.26	0.37	0.19	6.86	1.47	13.31
MED0000242	263421	7.17	0.35	0.35	0.22	0.11	0.28	0.28	4.91	1.08	0.54	5.18	0.74	10.63

Shaded cells indicate values below the detection limit. The reported value is the sample-specific MDA.

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- The detection limit for a given isotope varied for each sample. This is due to the variation in the total sample mass collected. The laboratory was limited by the mass of sample that could efficiently be processed to extract the nuclides of interest. As a result, the laboratory fractioned a relatively consistent aliquot of the total mass submitted to actually perform the analysis. The larger the sample collected and submitted, the smaller the fraction represented by the aliquot. Thus, the detection limit increased (got poorer) as the total mass collected increased. In each case, however, actual field sampling procedure collected a sample from a 100 cm^2 area until the entire surface had been stripped of the paint layer or surface veneer.

- The one sample which indicated the presence of transuranic activity severely skews the surface media samples for transuranics. This skewness likely results in very conservative estimates of the overall residual transuranic activity in survey unit 779–21.

Surface media sample data evaluation statistics for each survey unit is presented for the uranium series, the transuranic series and the transuranic series excluding sample #263358 in Figures 3–4, 3–5, and 3–6, respectively. For information purposes, the transuranic series data summary statistics have been presented with and without the sample #263358 collected at IVP0000227. Table 3–14 presents the summary statistics for the surface media sample data set, with the transuranic and uranium series nuclides presented as independent subsets.

Table 3–14. Summary Statistics, Surface Media Samples

Statistic	Survey Unit 779–21			Survey Unit 779–23	
	Transuranic Surface Activity Value		Uranium Series Surface Activity Value	Transuranic Surface Activity Value	Uranium Series Surface Activity Value
	w/ MED0000227	w/o MED0000227			
Number of Measurements	14	13	14	4	4
Arithmetic Mean	4.84	2.57	68.54	1.27	21.74
Standard Deviation	8.61	1.47	31.08	0.42	17.90
Coefficient of Variation	1.78	0.57	0.45	0.33	0.82
Max	34.36	5.81	140.82	1.71	48.48
Median	2.66	2.48	70.01	1.32	13.93
Minimum	0.57	0.57	1.20	0.74	10.63
Range	33.79	5.24	139.62	0.97	37.85
Geometric Mean	2.65	2.17	52.45	1.21	17.77
UCL (lognormal "t", a=0.05)	7.24	3.88	86.48	2.32	66.37

DATA EVALUATION STATISTICS

Data Description
Uranium Series Activity, Surface Media Samples
Building 779 Cluster, Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

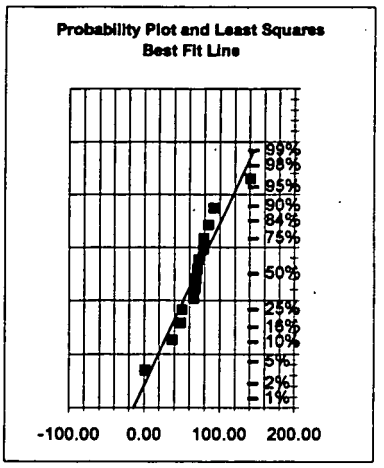
DCGL	5000

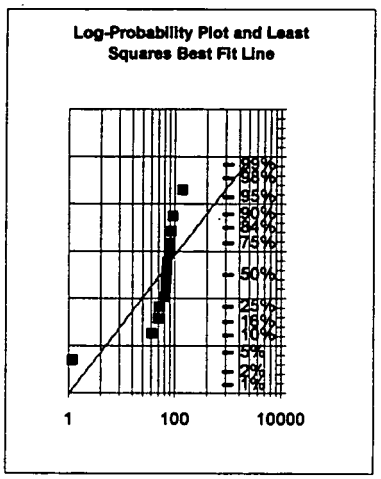
Sample Data
UNITS - dpm/100 cm^2
1.20
37.23
48.66
50.26
65.84
67.77
69.23
70.78
72.18
78.80
79.11
85.34
92.30
140.82

Descriptive Statistics	
Number of Samples	14.000
Mean	68.537
Median	70.005
Standard Deviation	31.082
CV	0.453506
Range	139.620
Minimum	1.200
Maximum	140.820
GM	52.450
GSD	3.101
Mean of LN(Data)	3.960
SD of LN(Data)	1.132
Percent > DCGL	0.000

Normal Statistics	
Mean	68.537
UCL(Mean) - Z	84.819
LCL(Mean) - Z	52.255
95%ile - Z	119.667
Percent > DCGL	0.000
W Test (Data)	0.924835
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	52.450
GSD	3.101
AM of data	68.537
AM - MVUE	93.018
AM - MLE	99.498
UCL - Norm t stats	86.483
LCL - Norm t stats	50.591
UCL LogNorm t	191.237
LCL LogNorm t	51.767
UCL - Modified Cox	217.472
LCL - Modified Cox	39.786
UCL - "Exact"	
LCL - "Exact"	
95%ile	337.433
UTL 95%, 95%	1010.202
Percent > DCGL	0.003
PEP (Upper)	0.187
PEP (Lower)	1.28E-07
W Test (ln Data)	0.559084
Lognorm (a=0.05)?	No





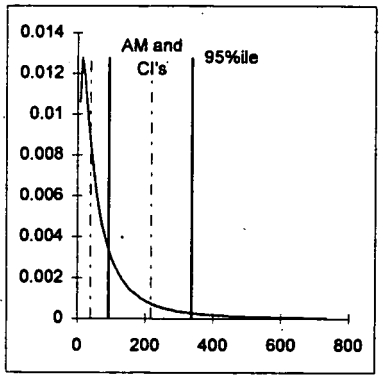


Figure 3–4. Data Evaluation Statistics—Uranium Series Activity, Surface Media Samples

DATA EVALUATION STATISTICS

Data Description
Uranium Series Activity, Surface Media Samples
Building 779 Cluster, Independent Verification Project
Building 779, Annex A, Survey Unit 779-23

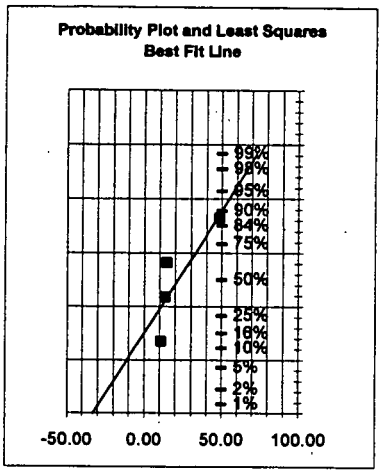
DCGL	5000

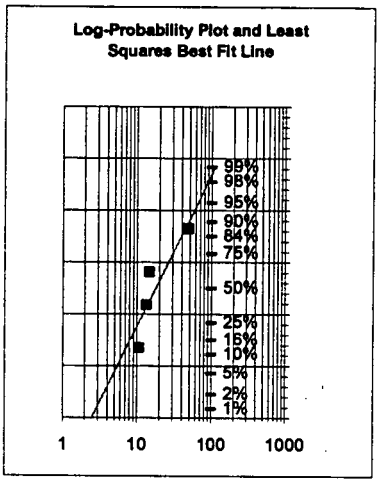
Sample Data
UNITS - dpm/100 cm^2
10.63
13.31
14.55
48.48

Descriptive Statistics	
Number of Samples	4.000
Mean	21.743
Median	13.930
Standard Deviation	17.900
CV	0.823268
Range	37.850
Minimum	10.630
Maximum	48.480
GM	17.774
GSD	1.978
Mean of LN(Data)	2.878
SD of LN(Data)	0.682
Percent > DCGL	0.000

Normal Statistics	
Mean	21.743
UCL(Mean) - Z	39.284
LCL(Mean) - Z	4.201
95%ile - Z	51.188
Percent > DCGL	0.000
W Test (Data)	0.715141
Normal (a=0.05)?	No

Lognormal Statistics	
GM	17.774
GSD	1.978
AM of data	21.743
AM - MVUE	21.039
AM - MLE	22.426
UCL - Norm t stats	50.225
LCL - Norm t stats	-6.740
UCL LogNorm t	66.367
LCL LogNorm t	7.578
UCL - Modified Cox	72.835
LCL - Modified Cox	6.077
UCL - "Exact"	
LCL - "Exact"	
95%ile	54.565
UTL 95%, 95%	593.423
Percent > DCGL	0.000
PEP (Upper)	0.000
PEP (Lower)	0
W Test (ln Data)	0.802137
Lognorm (a=0.05)?	Yes





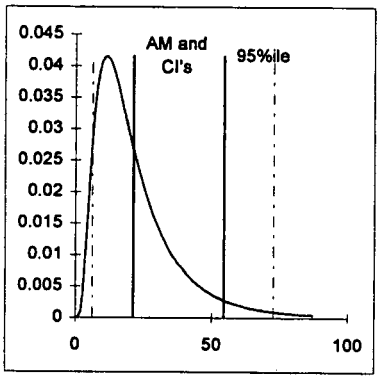


Figure 3–4 (continued). Data Evaluation Statistics—Uranium Series Activity, Surface Media Samples

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DATA EVALUATION STATISTICS

Data Description
Transuranic Activity, Surface Media Samples
Building 779 Cluster, Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

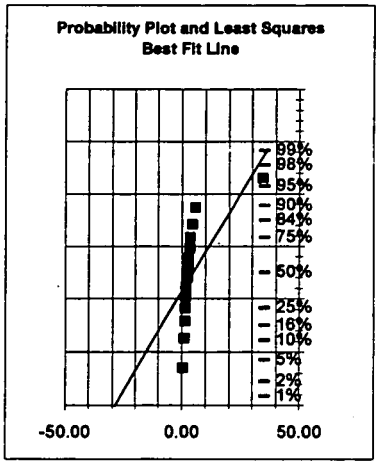
DCGL	100

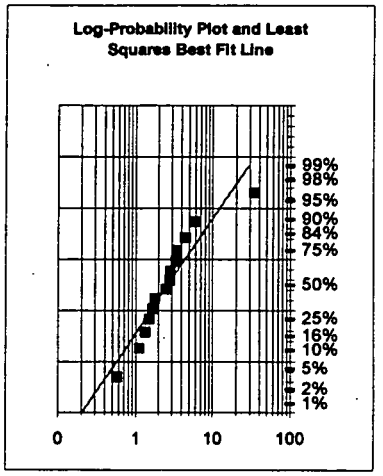
Sample Data
UNITS - dpm/100 cm^2
0.57
1.12
1.34
1.51
1.68
1.80
2.48
2.83
2.85
3.38
3.49
4.48
5.81
34.36

Descriptive Statistics	
Number of Samples	14.000
Mean	4.836
Median	2.655
Standard Deviation	8.614
CV	1.781375
Range	33.790
Minimum	0.570
Maximum	34.360
GM	2.646
GSD	2.598
Mean of LN(Data)	0.973
SD of LN(Data)	0.955
Percent > DCGL	0.000

Normal Statistics	
Mean	4.836
UCL(Mean) - Z	9.348
LCL(Mean) - Z	0.323
95%ile - Z	19.006
Percent > DCGL	0.000
W Test (Data)	0.445219
Normal (a=0.05)?	No

Lognormal Statistics	
GM	2.646
GSD	2.598
AM of data	4.836
AM - MVUE	3.995
AM - MLE	4.173
UCL - Norm t stats	9.809
LCL - Norm t stats	-0.138
UCL LogNorm t	7.242
LCL LogNorm t	2.405
UCL - Modified Cox	7.830
LCL - Modified Cox	2.038
UCL - "Exact"	
LCL - "Exact"	
95%ile	12.724
UTL 95%, 95%	32.090
Percent > DCGL	0.007
PEP (Upper)	0.316
PEP (Lower)	8.72E-07
W Test (ln Data)	0.902357
Lognorm (a=0.05)?	Yes





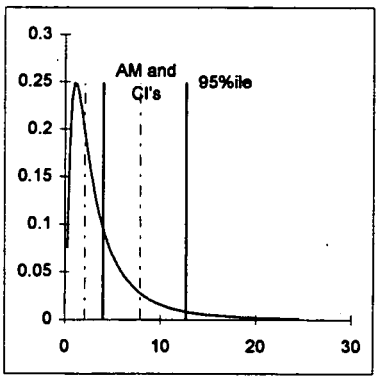


Figure 3–5. Data Evaluation Statistics—Transuranic Series Activity, Surface Media Samples

DATA EVALUATION STATISTICS

Data Description
Transuranic Activity, Surface Media Samples
Building 779 Cluster, Independent Verification Project
Building 779, Annex A, Survey Unit 779-23

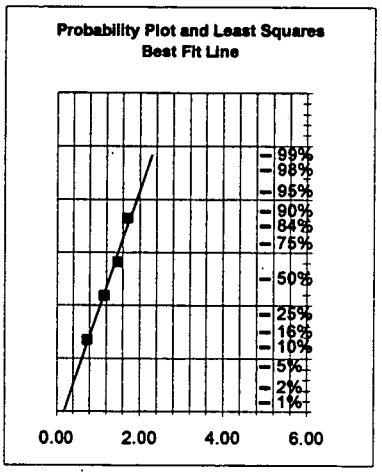
DCGL	100

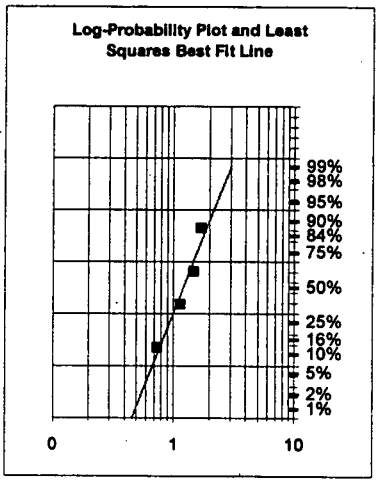
Sample Data
UNITS - dpm/100 cm^2
0.74
1.15
1.48
1.71

Descriptive Statistics	
Number of Samples	4.000
Mean	1.270
Median	1.315
Standard Deviation	0.422
CV	0.331894
Range	0.970
Minimum	0.740
Maximum	1.710
GM	1.211
GSD	1.444
Mean of LN(Data)	0.192
SD of LN(Data)	0.367
Percent > DCGL	0.000

Normal Statistics	
Mean	1.270
UCL(Mean) - Z	1.683
LCL(Mean) - Z	0.857
95%ile - Z	1.963
Percent > DCGL	0.000
W Test (Data)	0.977816
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	1.211
GSD	1.444
AM of data	1.270
AM - MVUE	1.274
AM - MLE	1.296
UCL - Norm t stats	1.941
LCL - Norm t stats	0.599
UCL LogNorm t	2.325
LCL LogNorm t	0.722
UCL - Modified Cox	2.344
LCL - Modified Cox	0.692
UCL - "Exact"	
LCL - "Exact"	
95%ile	2.216
UTL 95%, 95%	8.014
Percent > DCGL	0.000
PEP (Upper)	#NUM!
PEP (Lower)	#NUM!
W Test (ln Data)	0.943726
Lognorm (a=0.05)?	Yes





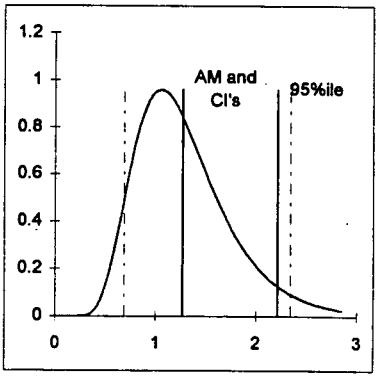


Figure 3–5 (continued). Data Evaluation Statistics—Transuranic Series Activity, Surface Media Samples

5)

DATA EVALUATION STATISTICS

Data Description
Transuranic Activity, Surface Media Samples (without sample MED0000227)
Building 779 Cluster, Independent Verification Project
Building 779, Annex A, Survey Unit 779-21

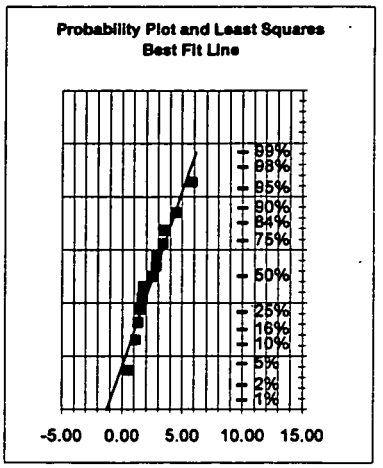
DCGL	100

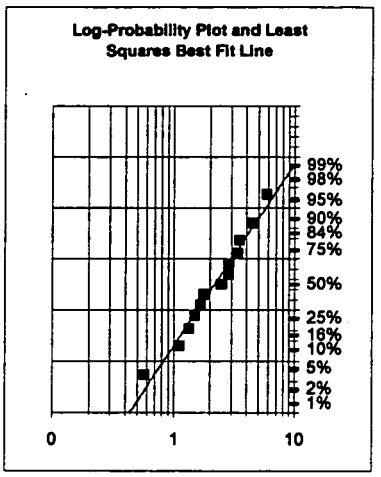
Sample Data
UNITS - dpm/100 cm^2
0.57
1.12
1.34
1.51
1.68
1.80
2.48
2.83
2.85
3.38
3.49
4.48
5.81

Descriptive Statistics	
Number of Samples	13.000
Mean	2.565
Median	2.480
Standard Deviation	1.470
CV	0.573131
Range	5.240
Minimum	0.570
Maximum	5.810
GM	2.172
GSD	1.878
Mean of LN(Data)	0.776
SD of LN(Data)	0.630
Percent > DCGL	0.000

Normal Statistics	
Mean	2.565
UCL(Mean) - Z	3.364
LCL(Mean) - Z	1.766
95%ile - Z	4.983
Percent > DCGL	0.000
W Test (Data)	0.94403
Normal (a=0.05)?	Yes

Lognormal Statistics	
GM	2.172
GSD	1.878
AM of data	2.565
AM - MVUE	2.604
AM - MLE	2.650
UCL - Norm t stats	3.453
LCL - Norm t stats	1.676
UCL LogNorm t	3.879
LCL LogNorm t	1.810
UCL - Modified Cox	3.962
LCL - Modified Cox	1.711
UCL - "Exact"	
LCL - "Exact"	
95%ile	6.128
UTL 95%, 95%	11.693
Percent > DCGL	0.000
PEP (Upper)	0.000
PEP (Lower)	0
W Test (ln Data)	0.974709
Lognorm (a=0.05)?	Yes





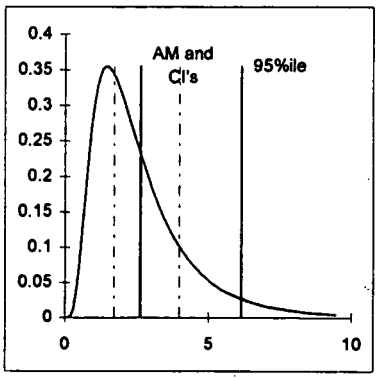


Figure 3–6. Data Evaluation Statistics—Transuranic Activity, Surface Media Samples

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4.0 Analysis of Sample Plan Results for Compliance

In accordance with MARSSIM and other EPA guidance (EPA 1997) (EPA 1993), the Building 779 Cluster IV SAP identified the decision rules which provide the basis for independently verifying and assessing the RFETS Contractor's conclusions and recommendations for risk management actions in Building 779 (DOE 1999a). To accomplish this objective, the IVC was tasked with performing independent measurements of a representative fraction of the Contractor's survey, such that a statistically valid, yet independent conclusion could be drawn. In order to obtain a data set robust enough to allow statistically valid comparisons with the decision rules, the IVC selected and sampled two of the nine designated survey units in Annex A or two of 41 designated survey units in Building 779. The first decision rule supports this decision objective. The IVC was also tasked with reviewing and verifying the Contractor's Closeout Radiological Survey Report and its conclusions. Since the Contractor's decision basis is applied independently to each survey unit, a sampling and statistical test with power comparable to that used by the Contractor was needed in order to compare with the conclusions reached by the Contractor. The second decision rule supports this objective. The decision rules which define compliance for the independent verification of the Building 779 Cluster surveys are specified in the IV SAP (DOE 1999a) and were reviewed by the EPA and approved by DOE and CDPHE. The IVC's SAP specifies the following two decision rules:

If the independent verification survey concludes that, in the selected survey unit(s), the mean (or median) removable surface contamination concentration is below 20 dpm/100 cm^2 gross alpha activity, and the mean (or median) total alpha surface contamination concentration as measured by direct surface emission is below 100 dpm/100 cm^2, and the maximum total alpha surface contamination concentration as measured by direct surface emission is below 300 dpm/100 cm^2, and the mean (or median) contamination concentration on and beneath a surface with a surface coating as measured by collection and analysis of a surface media sample is below 100 dpm/100 cm^2 for all transuranic nuclides combined and below 5,000 dpm/100 cm^2 for all uranium series nuclides combined, then conclude that the survey unit meets the release criterion.

If the IVC survey conclusion disagrees with the Contractor's final status survey conclusion, then refute the Contractor's conclusion for the survey unit and consult with the DOE–RFFO contact for direction on discrepancy resolution.

Demonstrating compliance with the decision rules for independent verification provides DOE with assurance that a substantial and credible case exists for releasing the buildings from further radioactive contamination controls during demolition or disposal.

The first decision rule forms the basis for the five DCGLs, the benchmarks against which measured values are compared to determine compliance. Each component of the decision rule can be reduced to a specific DCGL. The DCGLs for Annex A Closeout Radiological Survey are:

- *20 dpm/100 cm^2 for removable alpha surface contamination*
- *100 dpm/100 cm^2 (mean or median) total alpha surface contamination as measured by direct surface emission*

- *300 dpm/100 cm^2 (maximum) total alpha surface contamination as measured by direct surface emission*
- *100 dpm/100 cm^2 (mean or median) total transuranic surface contamination on and beneath a surface with a surface coating as measured by collection and analysis of a surface media sample*
- *5,000 dpm/100 cm^2 (mean or median) total uranium series surface contamination on and beneath a surface with a surface coating as measured by collection and analysis of a surface media sample*

4.1 Survey and Sampling Results Compared to the DCGLs

The following sections address each component of the sampling performed and compare the results to the applicable DCGLs. While the data sets collected by the IVC have been shown to best fit both normal and lognormal distributions, the $DCGL_W$ values, as stated by the RFETS Contractor (RMRS 1999a), do not specify whether the compliance benchmark assumes the arithmetic mean or some other estimate of central tendency appropriate to the distribution. For example, in the case of lognormally distributed data, the lognormal average (i.e., geometric mean) is a more appropriate indicator of the central tendency. When the distribution is not well known or abnormally skewed, the median value generally provides a good estimate of the central tendency for the data set. For comparison purposes in this report, the arithmetic (or normal) mean, the lognormal mean, and the median value are provided for each data set along with the maximum values observed. These provide the risk managers and decision maker with the range of plausible values that might be encountered and considerable evidence, regardless of the underlying distribution, for comparison with the DCGL benchmarks.

4.1.1 Direct Static Surface Measurements

Table 4–1 presents the gross direct static surface measurement results obtained in survey units 779–21 and 779–23. In this table, no correction for instrument background has been made in order to provide the risk managers and decision makers with the information needed to compare corrected and uncorrected results in the survey unit and correlate the measured residual radioactivity in the survey unit not only with the DCGL but also with the comparable measure of background.

Table 4–2 compares the background adjusted survey unit measurement results to the applicable DCGL. The background adjustment for direct static measurements is made by simply subtracting the central tendency estimate of the background measurements made over the sampling period from the comparable central tendency estimate of the gross, or unadjusted values collected and recorded in the field (see Section 3.1 for detailed discussion of background correction methods employed).

Table 4–1. Comparison of Direct Static Survey Measurements to Applicable DCGLs

Annex A, Survey Units 779-21 and 779-23 Unadjusted (Gross) Measurements (dpm/100 cm²)												
DCGL Value (Total Surface Contamination by direct surface emission)	Arithmetic Mean		Lognormal Geometric Mean		Median		Arithmetic UCL_{95}		Lognormal UCL_{95}		Maximum	
	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23
100 dpm/100 cm²	19.36	14.87	15.51	13.44	16.60	14.10	24.86	17.10	25.84	18.52		
300 dpm/100 cm²											78.6	24.7

Table 4–2. Comparison of Background Adjusted Direct Static Survey Results to Applicable DCGLs

Annex A, Survey Units 779-21 and 779-23 *Background Adjusted (Net) Measurements*[a] (dpm/100 cm²)												
DCGL Value (Total Surface Contamination by direct surface emission)	Arithmetic Mean		Lognormal Geometric Mean		Median		Arithmetic UCL_{95}		Lognormal UCL_{95}		Maximum	
	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23
100 dpm/100 cm²	-4.8[b]	2.27[b]	-6.5[b]	2.33[b]	-8.2[b]	2.4[b]	-3.3[b]	3.01[b]	-3.5[b]	3.76[b]		
300 dpm/100 cm²											37.2[b]	3.2[b]

[a]Background corrected values are provided for information. They are well below the DCGL values and just slightly above background.

[b]The following background values were used to adjust the direct static measurement values:

	779-21	779-23
Arithmetic Mean =	24.2	12.16
Lognormal Geometric Mean =	22.0	11.11
Median =	24.8	11.70
Arithmetic UCL =	28.2	14.09
Lognormal UCL =	29.3	14.76
Maximum =	41.4	21.50

From the above data, it is evident that the surface contamination as measured by direct surface emission from the building surfaces in survey units 779–21 and 779–23 is well below the $DCGL_W$. The IVC did not employ a scanning survey method in the independent verification sampling plan. Rather, the IVC has evaluated the scanning data collected by the Contractor to determine if the data supports the conclusions reached by the Contractor with respect to the $DCGL_{EMC}$. However, it is interesting to note the maximum concentrations measured using direct static methods as they compare to the $DCGL_{EMC}$. The maximum value measured in survey units 779–21 and 779–23 are substantially below the $DCGL_{EMC}$ and the background adjusted mean concentrations are significantly less. The independent verification data cannot exclude the possibility that localized concentrations of surface contamination might exist above the $DCGL_{EMC}$ value. But, given the number of measurements made, knowledge about the nature of the distribution of the data, and the large differences between the data metrics and the $DCGL_{EMC}$, it can be inferred that the likelihood of encountering even moderately sized areas with concentrations exceeding the $DCGL_{EMC}$ is small.

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4.1.2 Smear Samples for Removable Surface Contamination

Smear samples are not subject to the influence of background radiation at the site, but the radiation counting instruments used to assay these samples are subject to background radiation levels at the counting laboratory and have inherent instrument backgrounds which are corrected by the laboratory processing the samples. Since the background corrections performed are not relevant to the conditions encountered in Annex A, only the background adjusted values are provided here in Table 4–3. The raw counting data can be referenced in the analytical laboratory report for the smear samples contained in Appendix C.

Table 4–3. Comparison of Smear Sample Results to Applicable $DCGL_W$.

Annex A, Survey Units 779-21 and 779-23 *Smear Sample Results* *(dpm/100 cm²)*										
DCGL Value	**Arithmetic Mean**		**Lognormal Geometric Mean**		**Median**		**Arithmetic UCL_{95}**	**Lognormal UCL_{95}**	**Maximum**	
	799-21	799-23	799-21	799-23	799-21	799-23			799-21	799-23
20 dpm/100 cm² Removable Surface Contamination	<5.33	<5.33	<5.33	<5.33	<5.33	<5.33	NA	NA	<5.33	<5.33
All 58 smear samples yielded total alpha activity below the detection limit for the analysis. The method detection limit is presented for comparative information.										

From the above data, it is evident that the removable surface contamination, as measured by smear sampling of the surfaces in survey units 779–21 and 779–23, is well below the DCGL.

4.1.3 Surface Media Samples

As with smear samples, surface media samples are not subject to the influence of background radiation at the site, but have been corrected for the background present at the laboratory by the laboratory processing the samples. Again, since the background corrections performed are not relevant to the conditions encountered in the Annex A, only the background adjusted values are provided here in Table 4–4. The raw counting data can be referenced in the analytical laboratory report for the surface media samples contained in Appendix C.

Table 4–4. Comparison of Surface Media Sample Results to Applicable DCGLs

Annex A, Survey Units 779-21 and 779-23 *Surface Media Sample Results* *(dpm/100 cm²)*												
DCGL Value	**Arithmetic Mean**		**Lognormal Geometric Mean**		**Median**		**Arithmetic UCL_{95}**		**Lognormal UCL_{95}**		**Maximum**	
	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23	779-21	779-23
100 dpm/100 cm² Total Transuranic Activity by surface media sample	4.8	1.3	2.6	1.2	2.7	1.3	9.8	1.9	7.2	2.3	34.4	1.7
5,000 dpm/100 cm² Total Uranium Series Activity by surface media sample	68.5	21.7	52.5	17.8	70.0	13.9	86.5	50.2	191.1	66.4	140.8	48.48

From the above data, it is notable that the maximum total transuranic activity contained on and in a thin veneer beneath the surface sampled is significantly below the allowable *mean* value. This is notable in that, as the maximum total transuranic activity collected within the entire survey unit, this measurement represents less than 50 percent of the allowable mean value. This data indicates that it is extremely unlikely that the building contains any added radioactivity and is considered safe for unrestricted release.

In fact, most of the samples measured for transuranic activity resulted in measured concentrations below the method detection limit for the analysis. Some of the transuranic activity reported is attributed to americium-241 (Am-241) owing to interference in the energy window for Am-241 rather than americium activity. (See Appendix C for the method blank data indicating the activity showing up as Am-241 even when no americium is present.)

The total uranium series activity was consistently measured at concentrations exceeding the method detection limit even though the concentrations measured were consistently significantly below the applicable DCGL. The presence of detectable concentrations of uranium series nuclides does not, however, necessarily indicate that the activity is DOE contributed activity. In fact, isotopic ratios present in the samples support the position that the uranium series activity is naturally occurring radioactivity present in the construction materials from which the building was made. Nonetheless, because a decision was made during sampling plan design to avoid the need to make reference survey unit comparisons in order to statistically verify this assumption, all of this activity is herein assumed to be DOE contributed and is compared directly to the applicable DCGL. Even with this conservative assumption, it is clear that the residual uranium series activity on and in a thin veneer beneath the surface sampled is well below the DCGL.

4.2 Summary of Field Sampling Data

As evidenced above, each metric—the arithmetic average, logarithmic average, their respective 95 percent upper confidence limit (UCL_{95}) estimates and the median value—is well below the applicable $DCGL_W$ concentration value. Moreover, the maximum value for each data set is well below not only the applicable $DCGL_{EMC}$ but also below the $DCGL_W$. Based on the direct static measurements, removable smears sample results, and surface media sample results collected in the survey units selected for independent verification (779–21 and 779–23) in Annex A, there is no evidence of radiological surface contamination levels exceeding the selected DCGLs.

Thus, the first of the tests of the DQO decision rule—*the residual radioactivity must not exceed the applicable DCGLs*—has been verified.

End of current text

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5.0 Graphic Presentations of the Survey and Sampling Results

Graphics are a powerful and valuable tool used in reviewing the data collected. Graphic presentations—Normal Probability, Log Probability, and Probability Density Function Plots—have already been provided in Section 3.0 in support of the determination of the underlying distribution of each data set. In addition to these graphical treatments of each of the data sets collected, additional pictorial presentations are provided in Section 6.0 to assist the risk manager and decision maker in evaluating the data. Each form of graphic presentation provides a unique perspective or advantage in the data evaluation process.

5.1 Posting Plots—Spatial Contamination Distribution Graphics

Posting plots are presented for visualizing the spatial contaminant distribution within the survey unit sampled and surveyed by the IVC. Trends in spatial distribution become evident when data is plotted in this manner. The results of each data set, normalized to units of dpm/100 cm^2, are superimposed over the building surfaces. The walls and ceilings in the building are "unfolded" to form a contiguous surface segment, as when a cardboard box is unfolded and laid flat. Three posting plots are provided for each survey unit. One plot (Figure 5–1) displays the 29 direct static surface contamination measurements made in survey units 779–21 and 779–23. The data used to generate these posting plots are "gross" measurements (not corrected for the mean background of 22.0 and 11.1 dpm/100 cm^2, respectively) to avoid negative numbers. Figures 5–2 and 5–3 display the surface media sample results from both survey units for transuranic and uranium series activities, respectively.

The posting plots confirm that no substantial spatial trends in residual activity are present.

5.2 Histograms—Concentration Distribution Graphics

One of the oldest methods used for analyzing data set distributions is the histogram (or frequency plot). The data are divided into units, or bins, representing increments of activity. The data set is than sorted into these bins and the number of data points occurring in each bin (the frequency) is counted and then plotted using a bar graph. This presentation is designed to provide for visual means of assessing the symmetry and variability of the data set. When constructed correctly, the histogram will indicate if the data are skewed and will show the direction of skewness (EPA 1998). Figures 5–4 and 5–5 display the histograms (technically frequency plots) for the background and direct static surface measurement respectively from each survey unit. Figures 5–6, 5–7, and 5–8 display the post-surface media sampling direct static surface measurement, surface media samples for transuranics, and surface media samples for uranium data sets from survey unit 779–21. The display of these data sets for survey unit 779–23 is not presented since only four media samples were taken.

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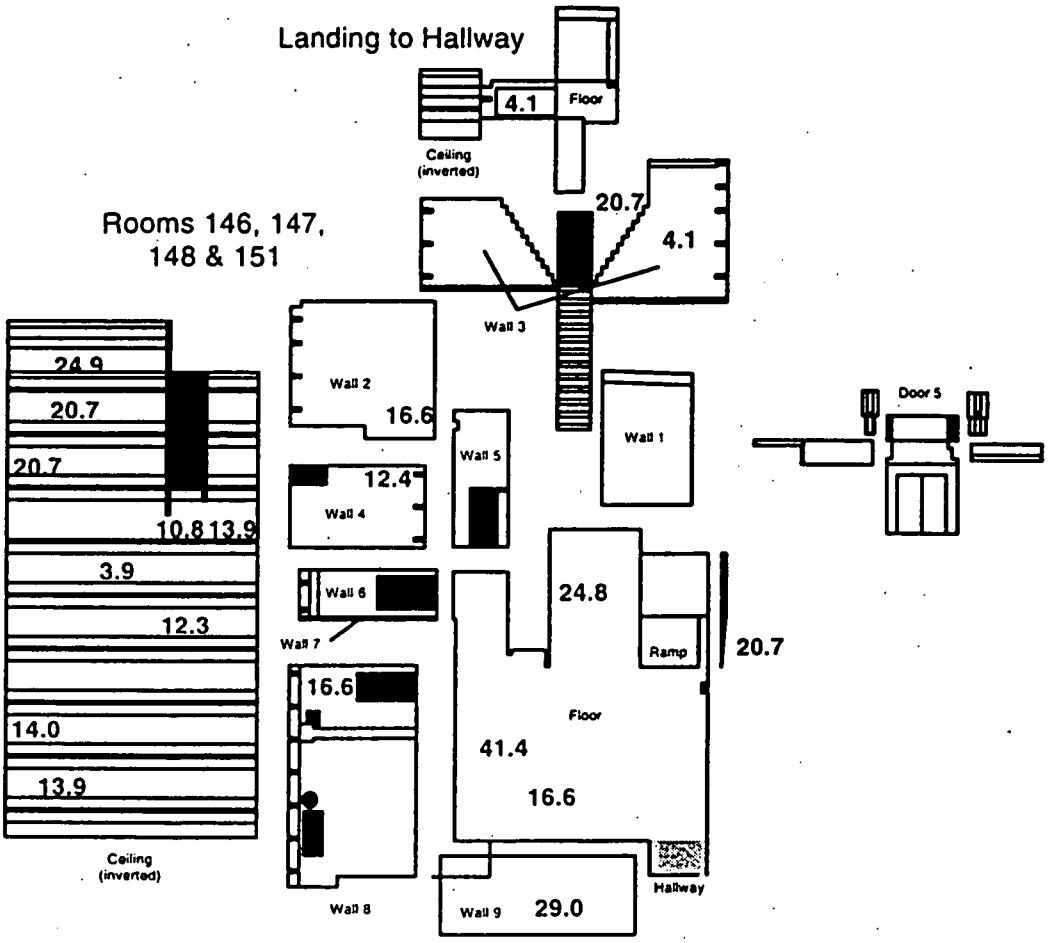
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Posting Plot: Direct Static Measurements

SURVEY UNIT 779-21 MAP 1 OF 2



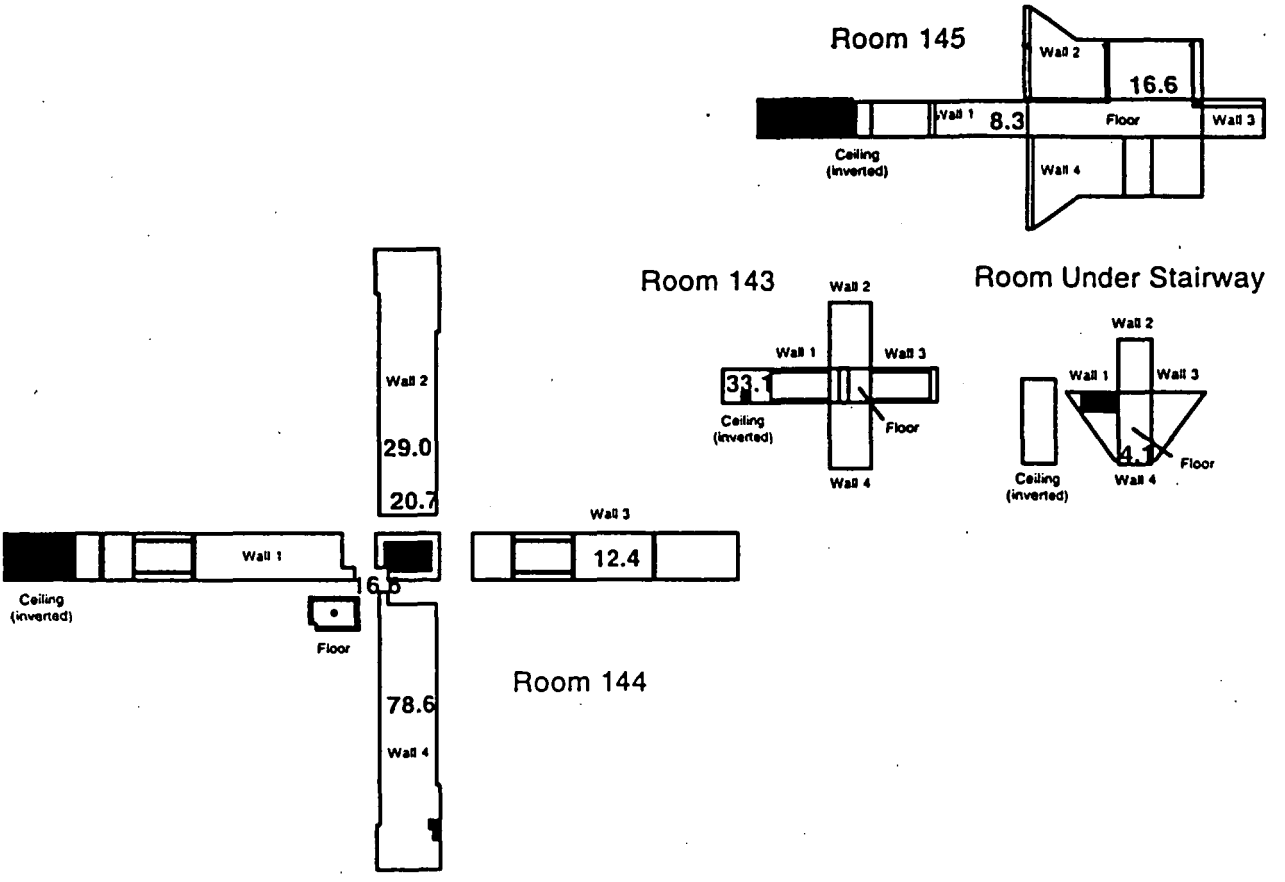
All values "gross" activity in units of dpm/100 cm2

Figure 5–1. Posting Plot—Direct Static Surface Contamination Measurements

INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Posting Plot: Direct Static Measurements

SURVEY UNIT 779-21 MAP 2 OF 2



All values "gross" activity in units of dpm/100 cm2

Figure 5–1 (continued). Posting Plot—Direct Static Surface Contamination Measurements

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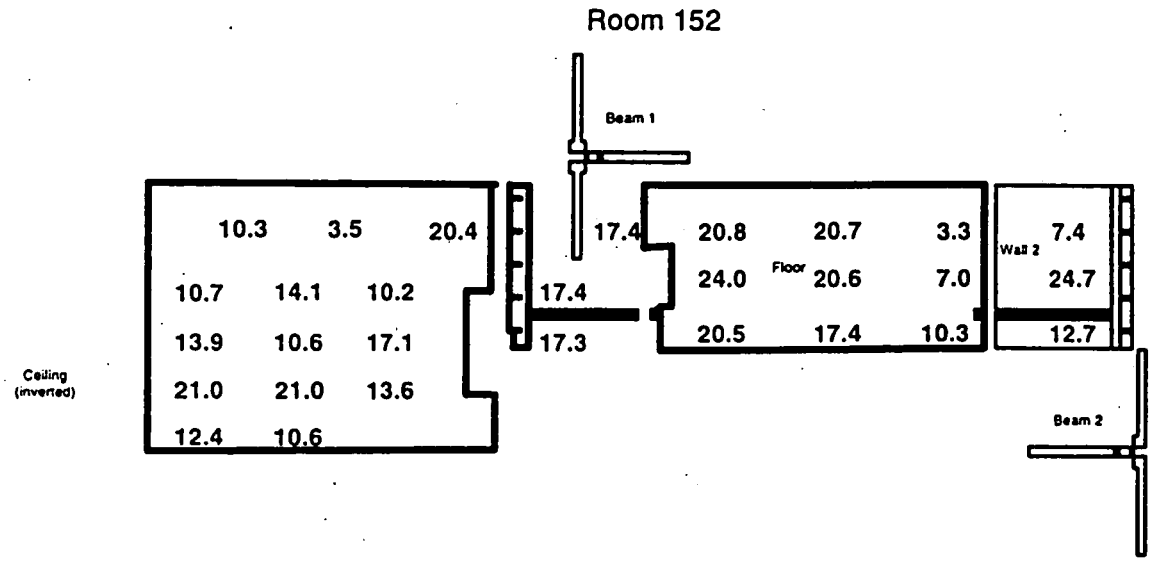
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Posting Plot: Direct Static Measurements

SURVEY UNIT 779-23 MAP 1 OF 1



All values "gross" activity in units of dpm/100 cm2

Figure 5–1 (continued). Posting Plot—Direct Static Surface Contamination Measurements

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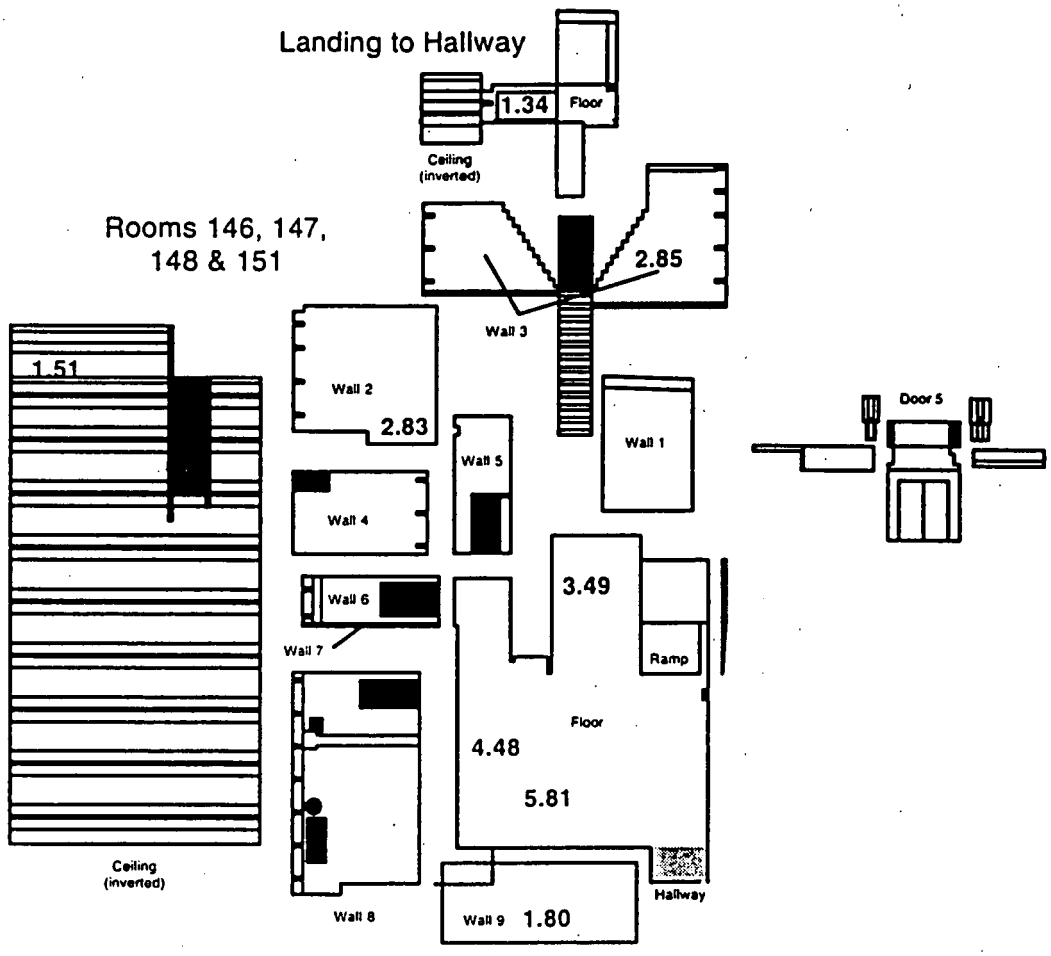
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Transuranic

SURVEY UNIT 779-21 MAP 1 OF 2



All values "gross" activity in units of dpm/100 cm2

Figure 5–2. Posting Plot—Surface Media Samples, Transuranic Activity

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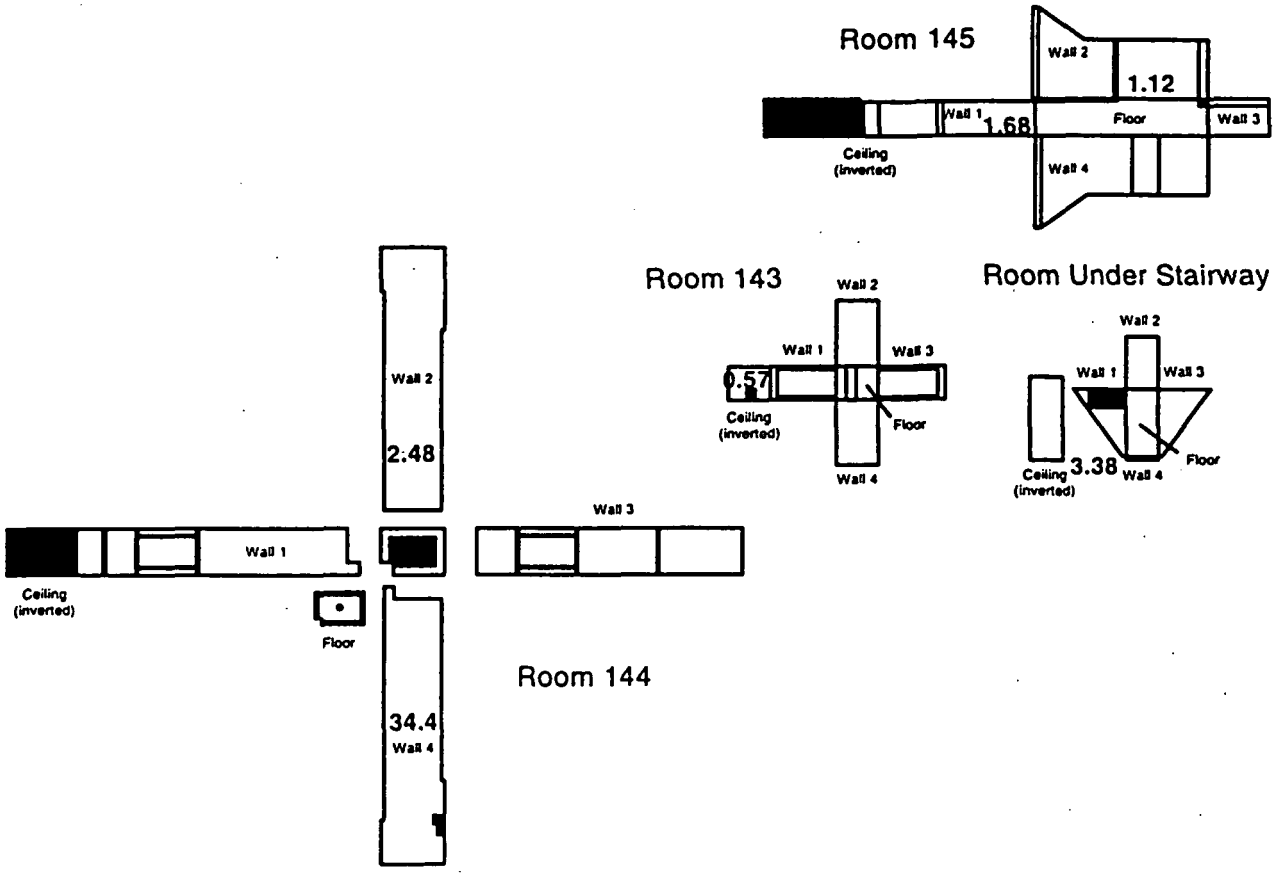
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Transuranic

SURVEY UNIT 779-21 MAP 2 OF 2



All values "gross" activity in units of dpm/100 cm2

Figure 5–2 (continued). Posting Plot—Surface Media Samples, Transuranic Activity

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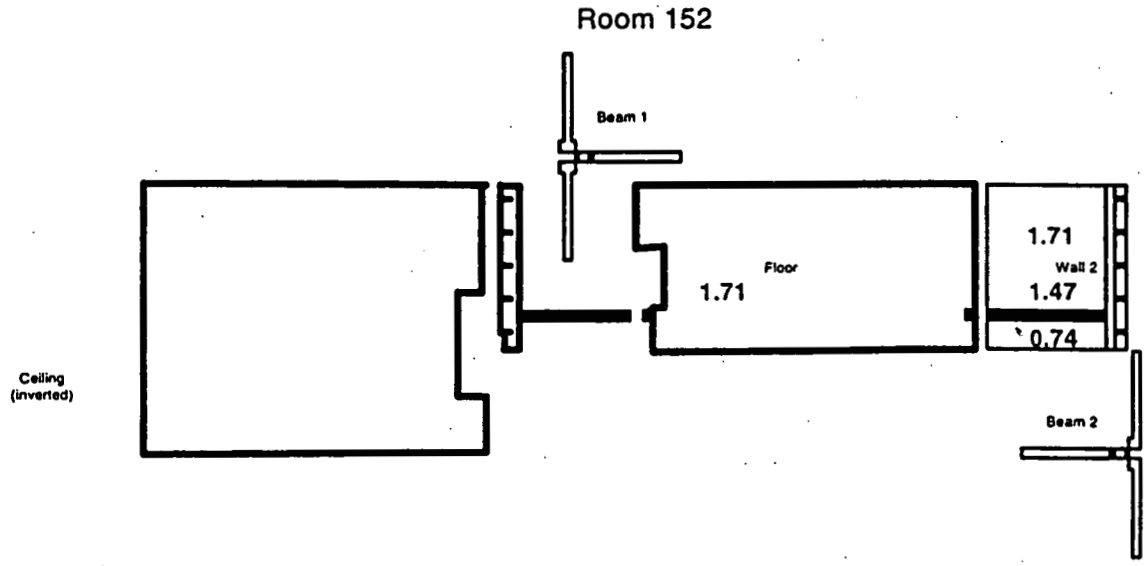
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Transuranic

SURVEY UNIT 779-23 MAP 1 OF 1



All values "gross" activity in units of dpm/100 cm2

Figure 5–2 (continued). Posting Plot—Surface Media Samples, Transuranic Activity

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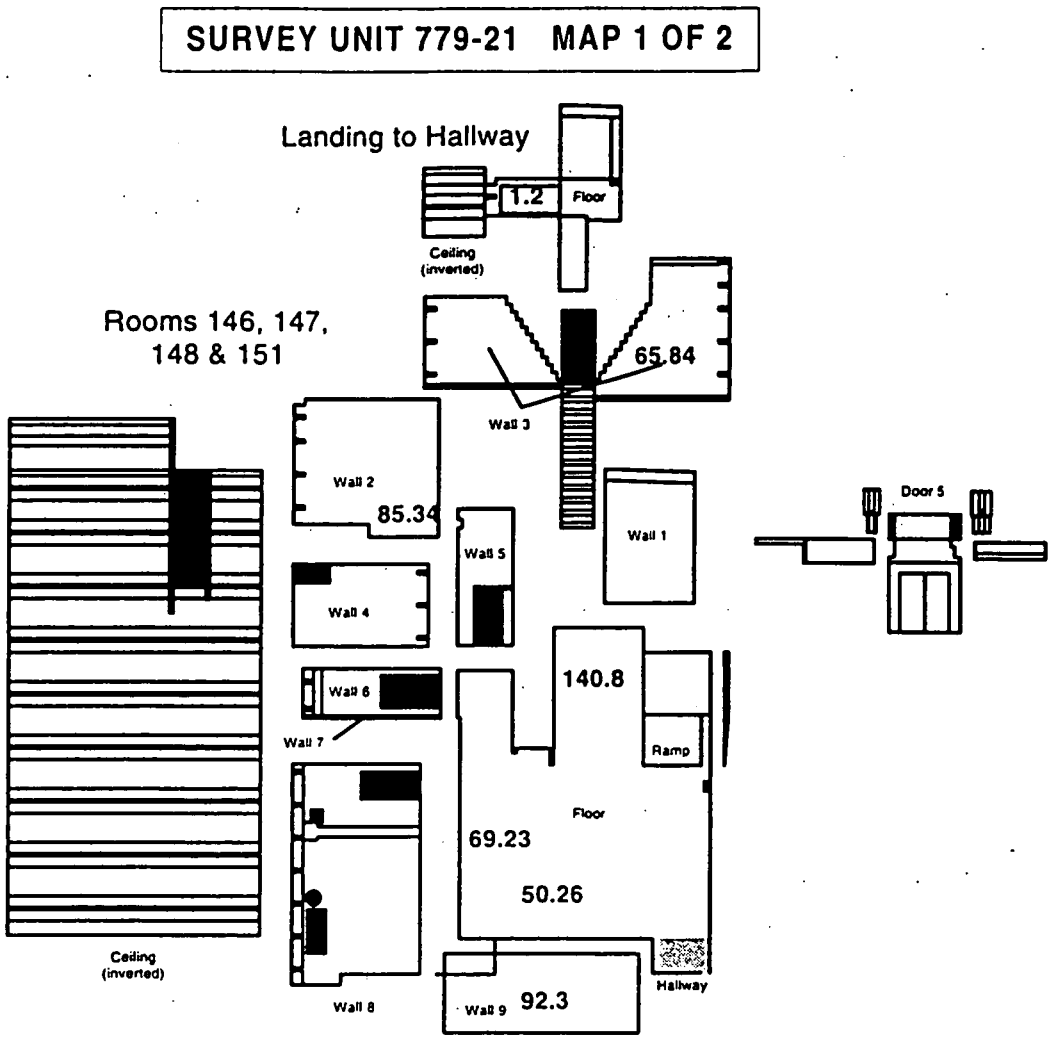
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Uranium



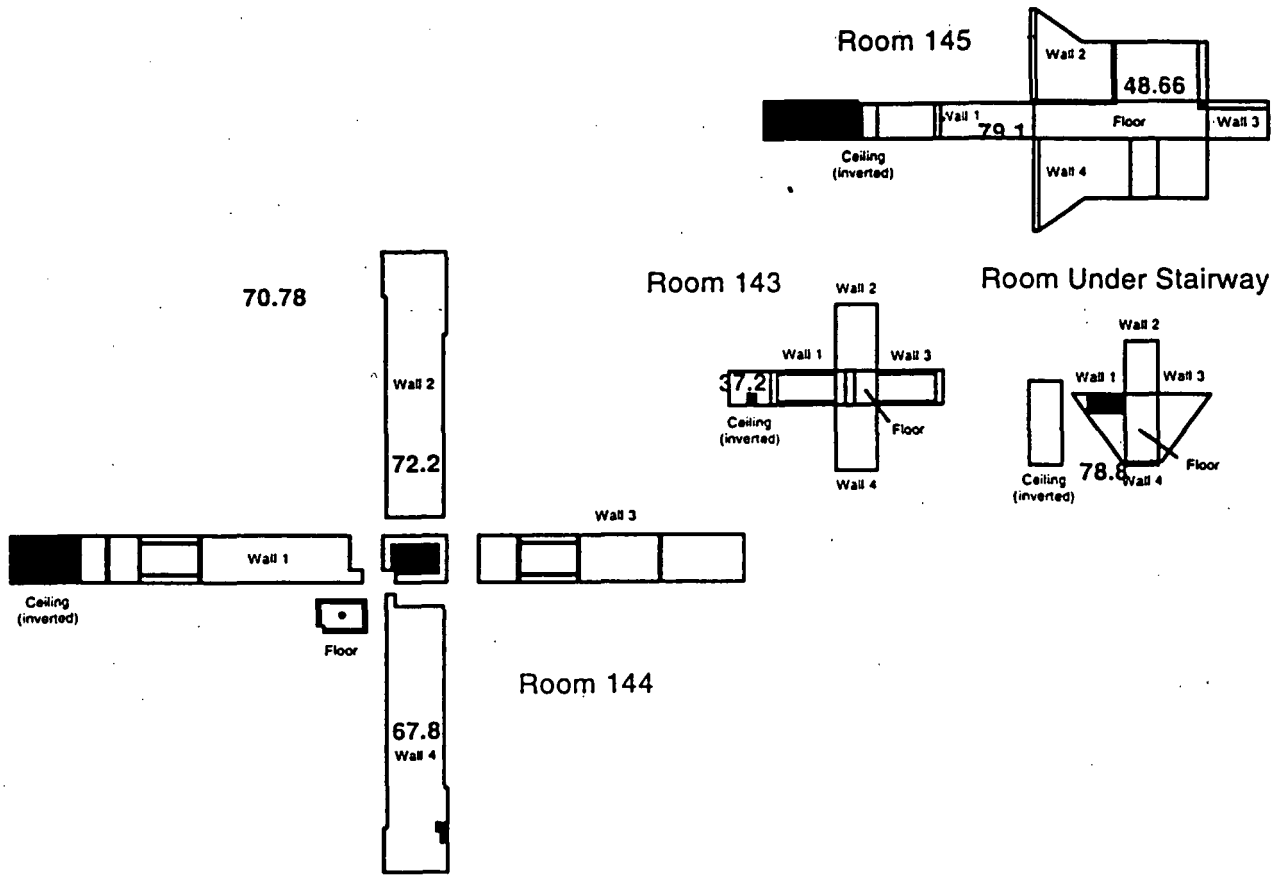
All values "gross" activity in units of dpm/100 cm2

Figure 5–3. Posting Plot—Surface Media Samples, Uranium Series Activity

INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Uranium

SURVEY UNIT 779-21 MAP 2 OF 2



All values "gross" activity in units of dpm/100 cm2

Figure 5–3 (continued). Posting Plot—Surface Media Samples, Uranium Series Activity

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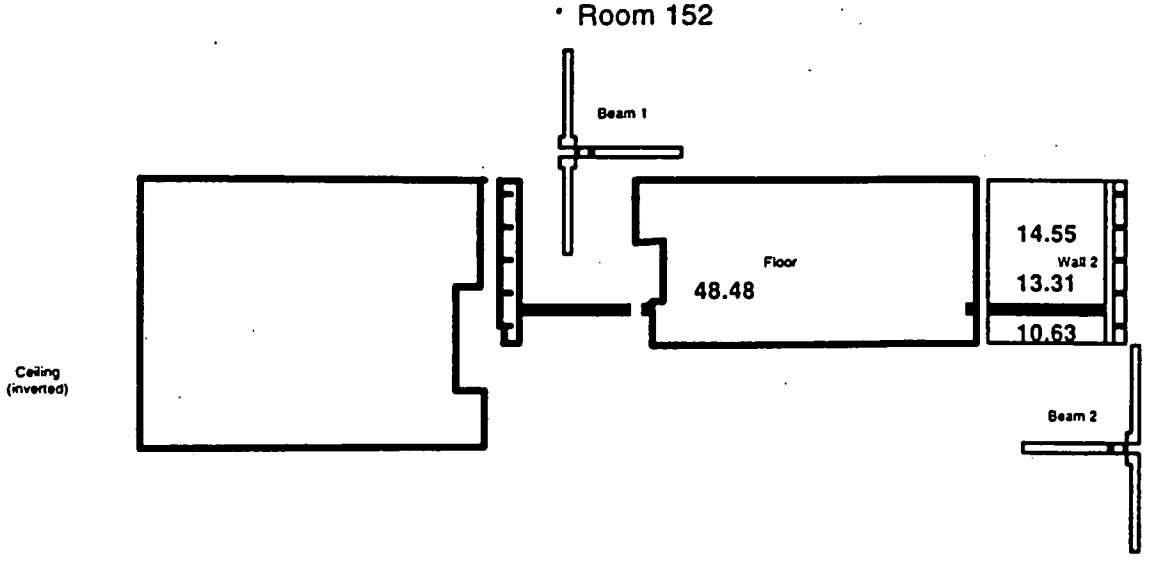
INDEPENDENT VERIFICATION FOR THE BUILDING 779 CLUSTER
SURVEY UNIT SAMPLE PLAN

Posting Plot: Surface Media Samples, Uranium

SURVEY UNIT 779-23 MAP 1 OF 1



All values "gross" activity in units of dpm/100 cm2

Figure 5–3 (continued). Posting Plot—Surface Media Samples, Uranium Series Activity

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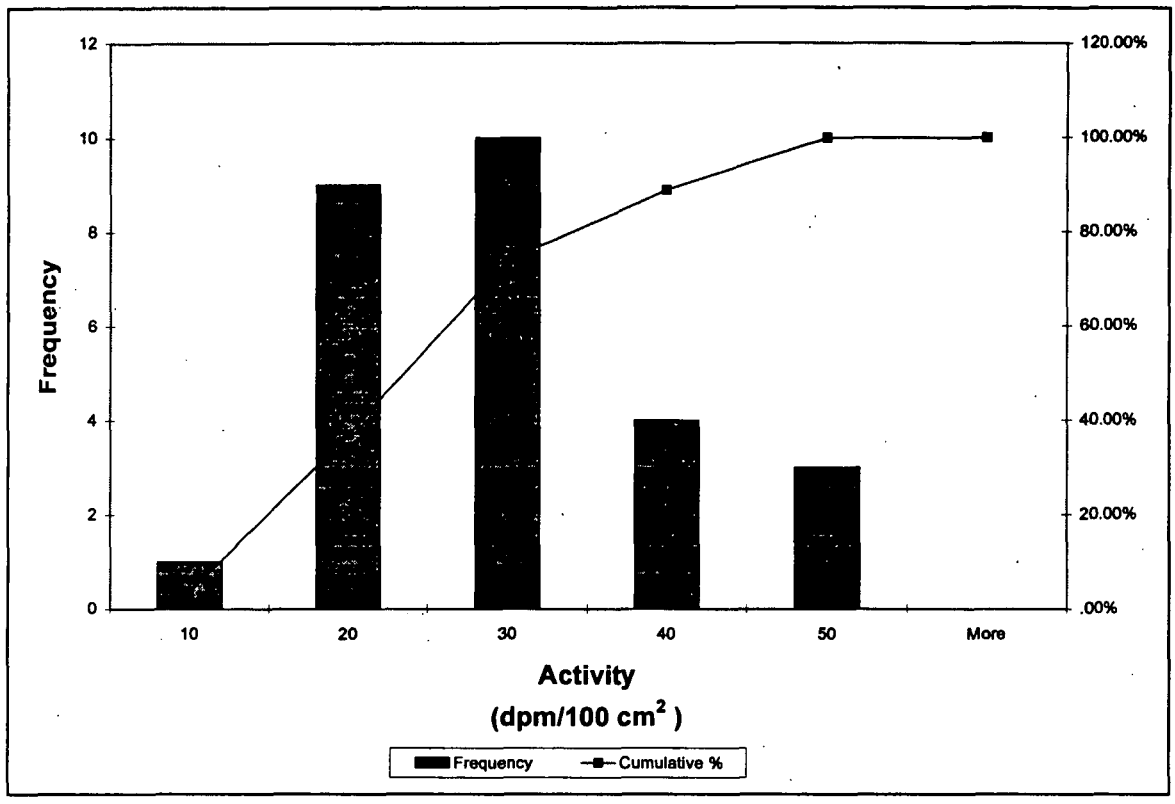

Figure 5–4. Histogram—Instrument Background Measurements, 779–21

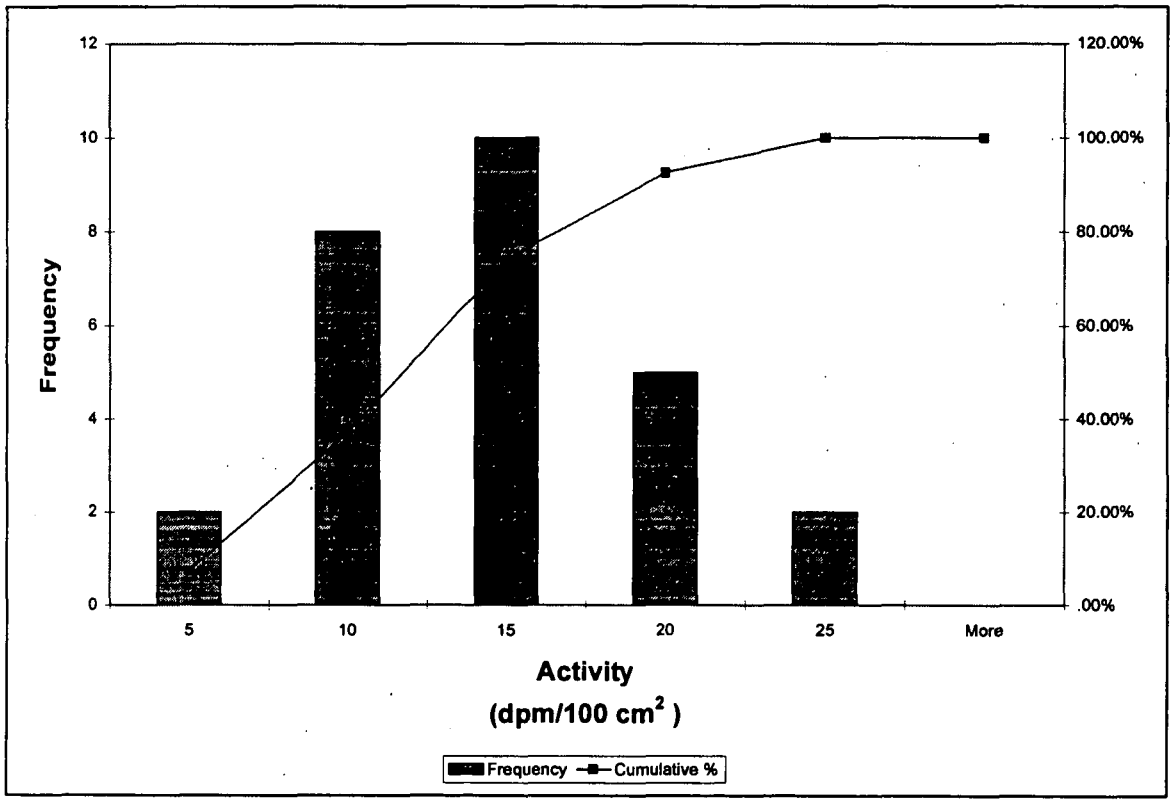

Figure 5–4 (continued). Histogram—Instrument Background Measurements, 779–23

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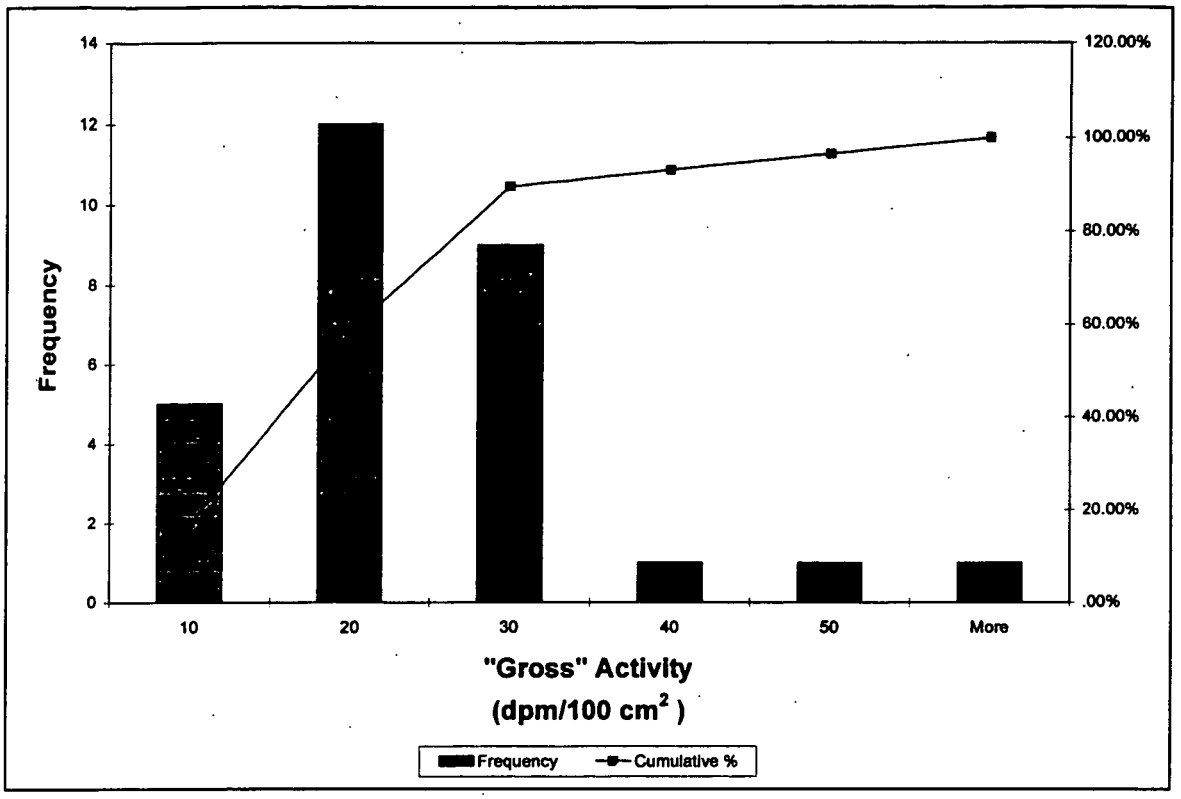

Figure 5–5. Histogram—Direct Static Surface Contamination Measurements, 779–21

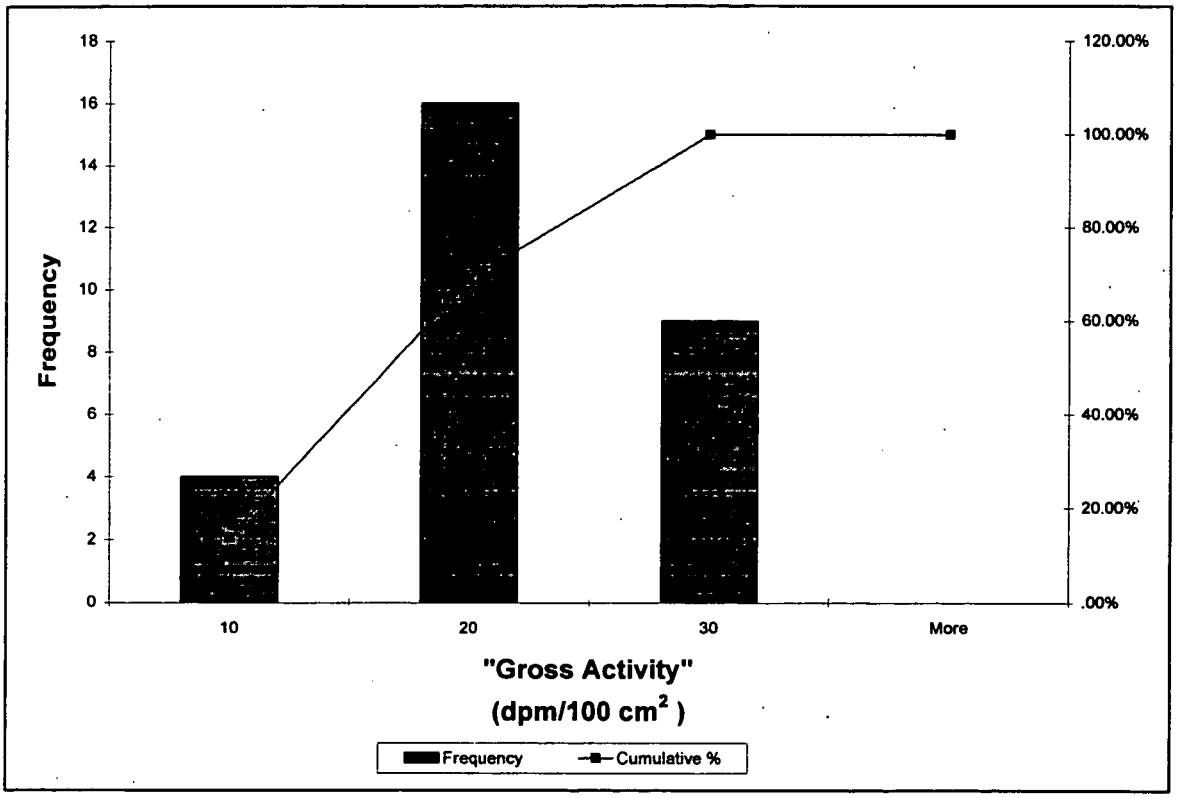

Figure 5–5 (continued). Histogram—Direct Static Surface Contamination Measurements, 779–23

10

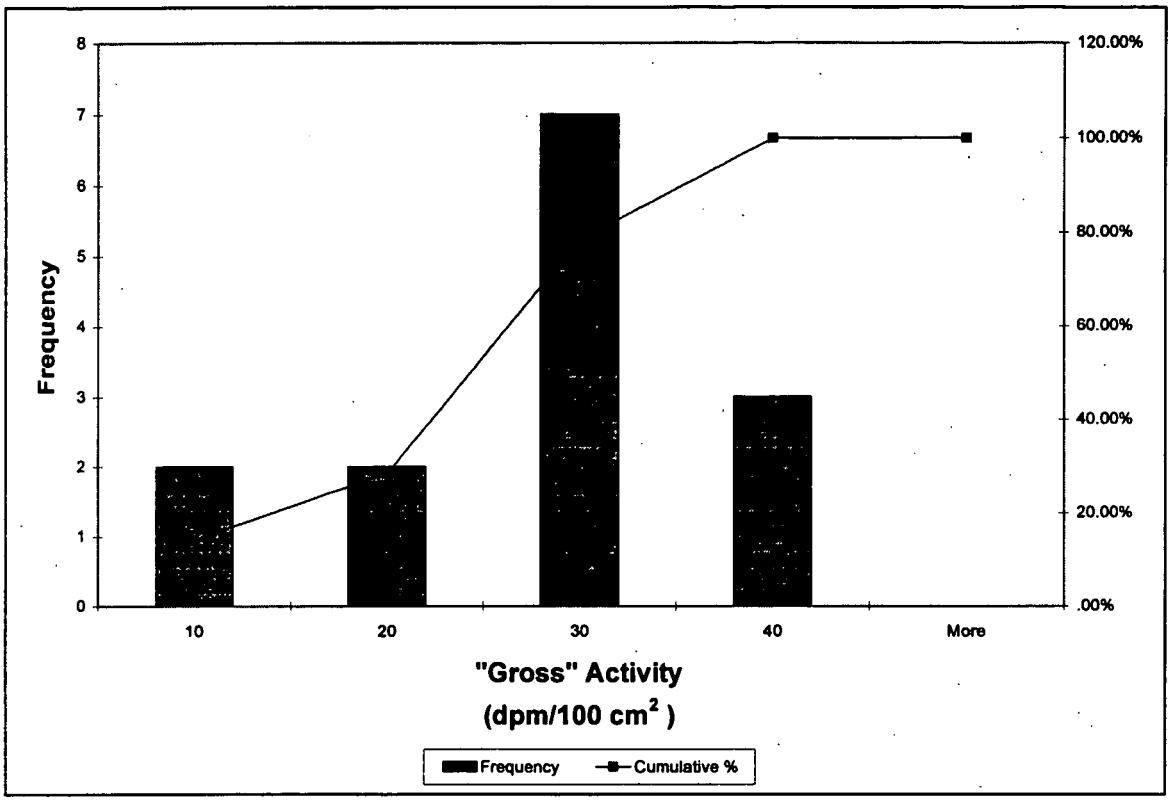

Figure 5–6. Histogram—Post Surface Media Sampling Direct Static Surface Measurements, 779–21

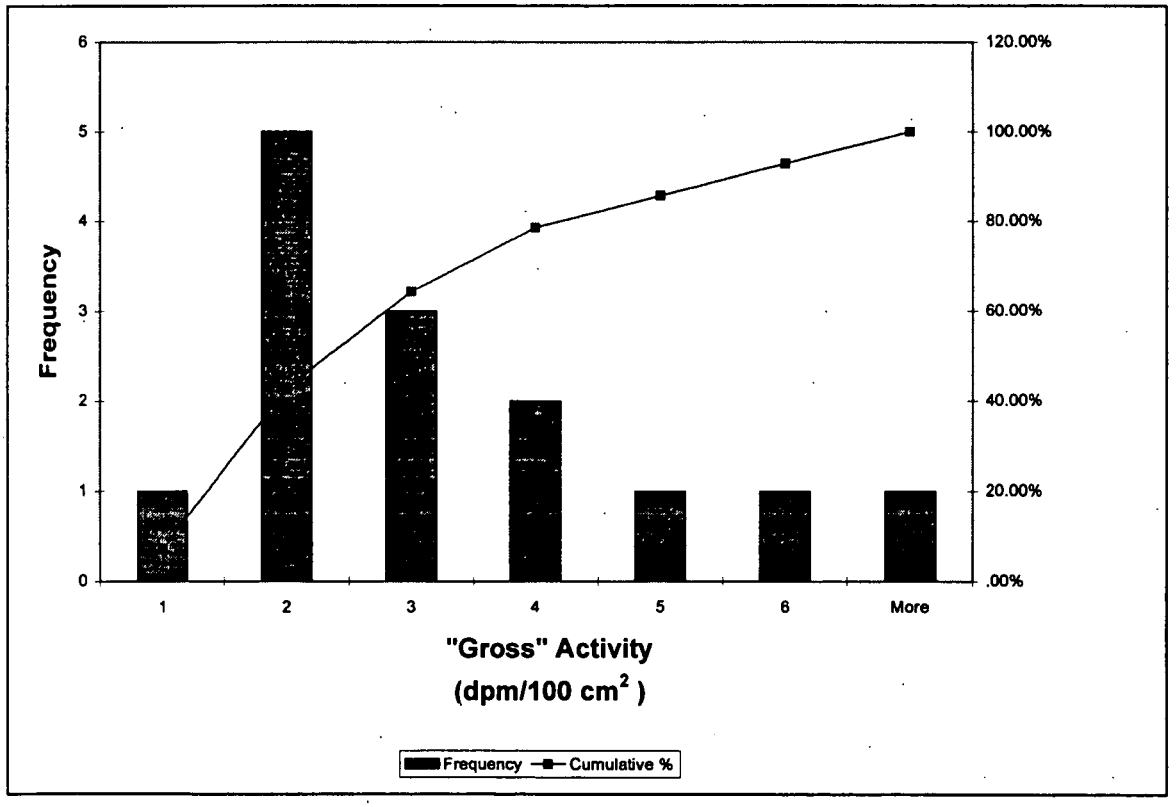

Figure 5–7. Histogram—Post Surface Media Samples, Transuranic Activity, 779–21

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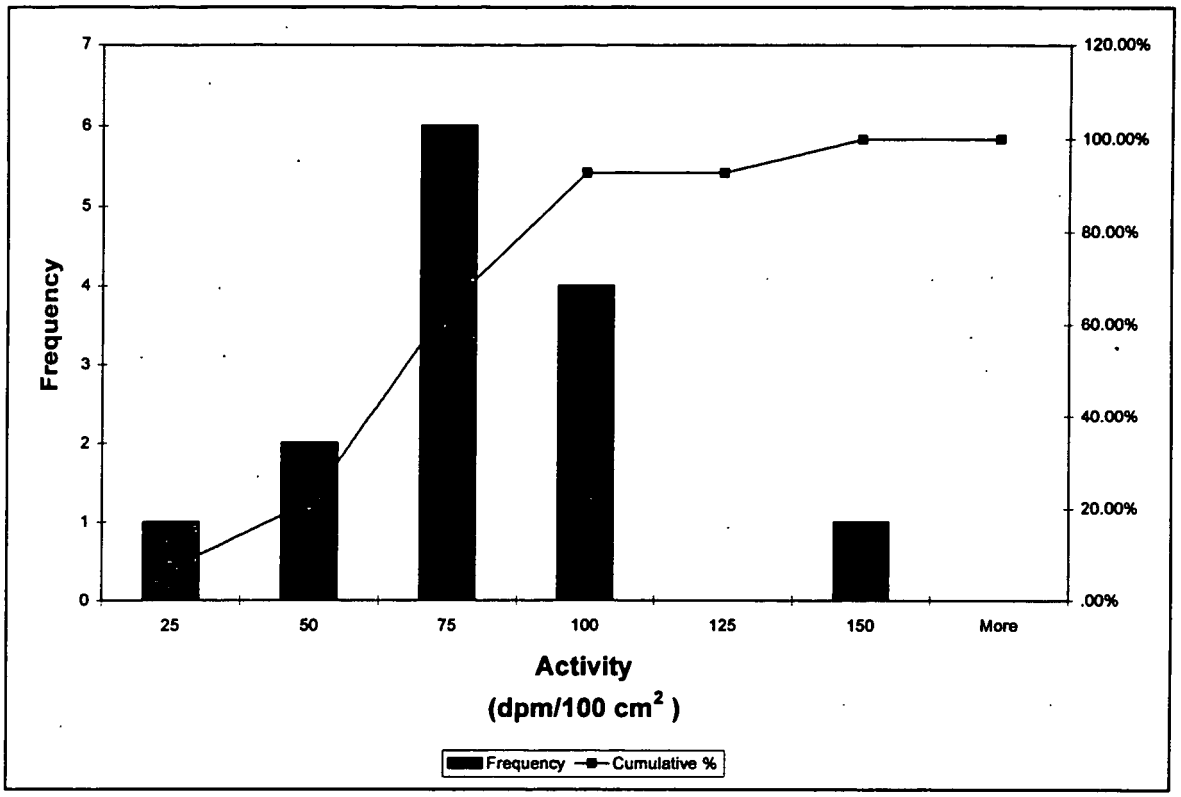

Figure 5–8. Histogram—Post Surface Media Samples, Uranium Series Activity, 779–21

All but two of the histograms provide evidence of a relatively symmetric or normal distribution in the data set with most data clustered around a non-discrete central concentration, which is substantially below the applicable DCGL. Two show evidence of a slightly left shifted skewness, which is typical of environmental radioactivity data. The histograms support the general conclusion that the data distributions of most data sets are best estimated by the normal distribution.

5.3 High-Low Graphs—Data Variability Graphics

A key element in the evaluation of the sampling and survey data is the variation within the data set. As the data variability increases, the ability of the risk manager to confidently make decisions about the true state of radiological contamination in the survey unit or building in relation to the applicable DCGL and null hypothesis decreases. When variability is small (or excessively large) relative to the difference between the mean and the DCGL, the risk managers can be confident in the decisions made using the data set provided. When evaluating data variability, it is important to know, first, that the data set contains a sufficiently large sample population (number of measurements). Retrospective power curves, demonstrating the "power" of the sign test to reject the null hypothesis with the actual sample size collected, are presented in Section 8.0. High-Low graphs are simple presentations showing the range between the upper and lower 95 percent confidence intervals about the geometric mean. Figures 5–9, 5–10, and 5–11 depict the variability observed in each type of data analyzed.

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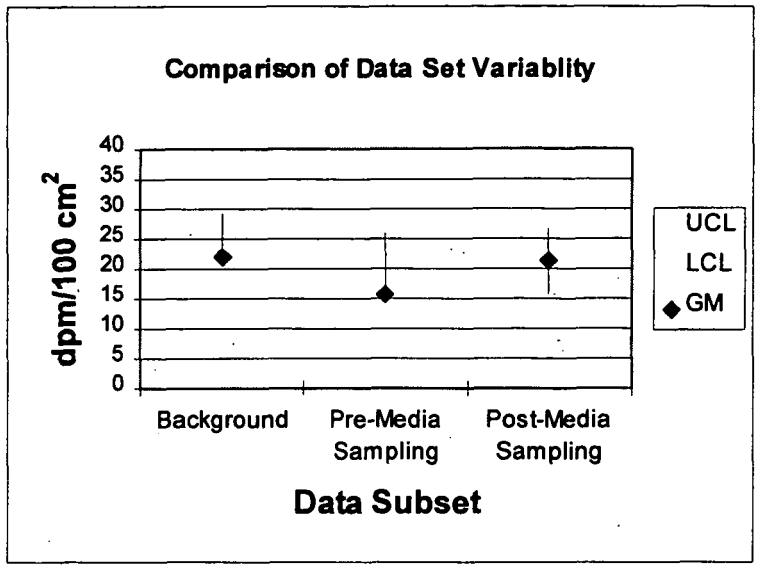

Figure 5–9. High-Low Graphs—Direct Static Surface Measurements, 779–21

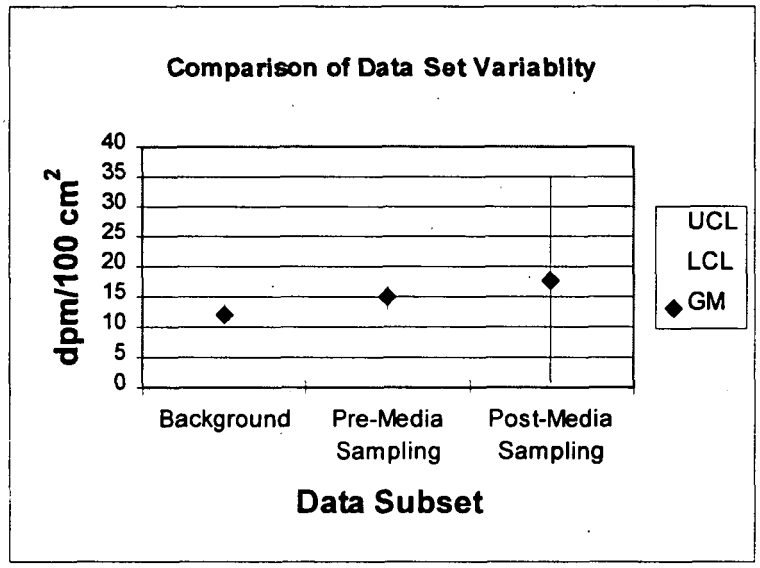

Figure 5–9 (continued). High-Low Graphs—Direct Static Surface Measurements, 779–23

73

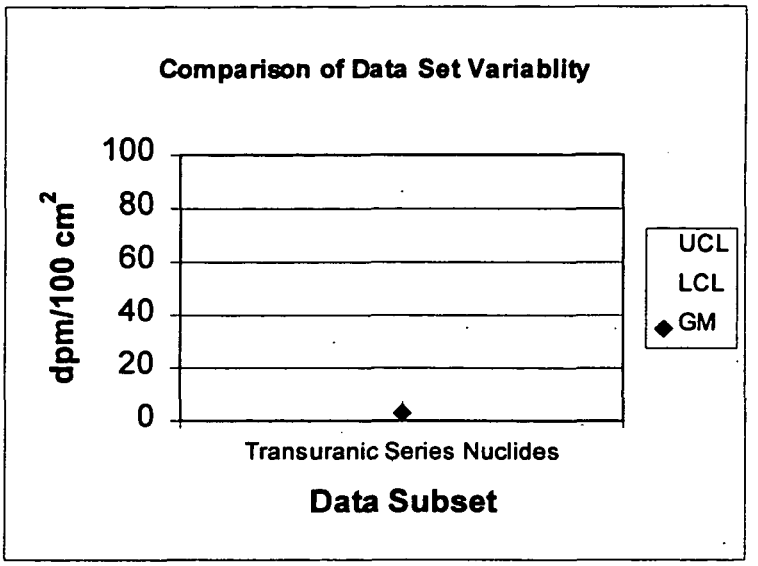

Figure 5–10. High-Low Graphs—Surface Media Samples, Transuranic Activity, 779–21

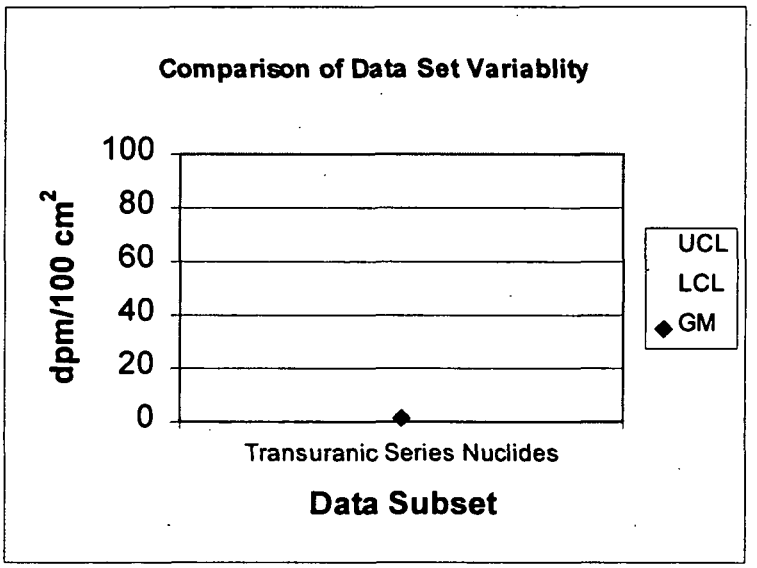

Figure 5–10 (continued). High-Low Graphs—Surface Media Samples, Transuranic Activity, 779–23

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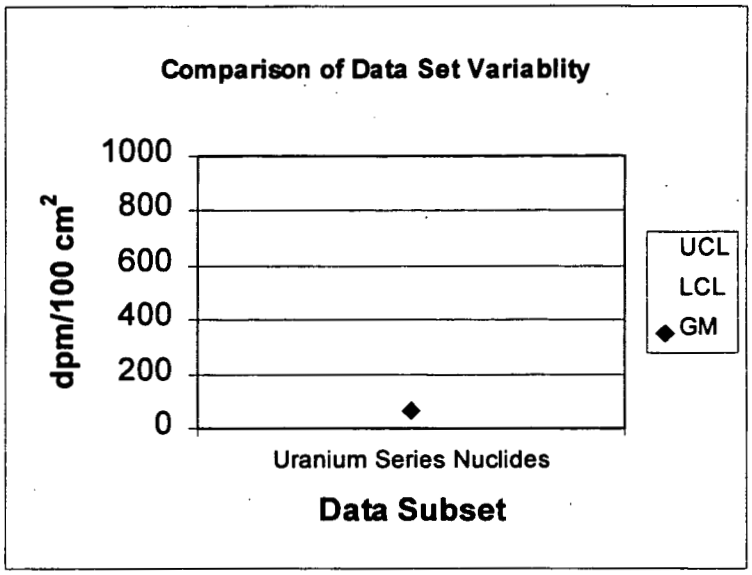

Figure 5–11. High-Low Graphs—Surface Media Samples, Uranium Series Activity, 779–21

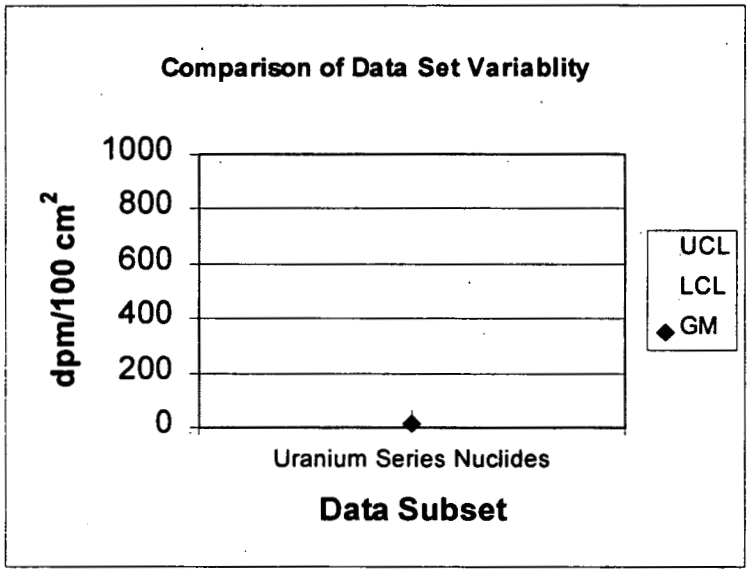

Figure 5–11 (continued): High-Low Graphs—Surface Media Samples, Uranium Series Activity, 779–23

The pattern of a comparatively low central tendency, and small measure of data variability in each of the data sets presented provide substantial evidence that the estimates of the true mean residual radioactive concentrations presented are below the DCGLs. No DCGL is included in the 95 percent confidence intervals about the mean. The lack of significant variability in any of the data sets is also indicative of a lack of discretely distributed activity (supporting the conclusions of the posting plots above) and excellent precision in the analytical methods employed in the sampling and measurements processes. By presenting the three data sets made with the same instruments and procedures (background, direct static measurements, and post-surface media sampling direct static measurements), it is also evident that they report essentially equivalent

measures of activity. In other words, the best estimates of surface activity as measured by direct surface emission are statistically indistinguishable from background. The larger range between the upper and lower 95 percent confidence intervals about the arithmetic mean displayed in the Post-Media Sampling data set for survey unit 779–23 (Figure 5–9) is the result of an extremely small data set.

Other visual presentations of the data are possible and may have been indicated if the data sets available were less robust than they actually are. However, the graphic treatment of the data presented here and in other sections is sufficient to enable the risk managers and decision maker to make confident determinations respecting the data.

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6.0 Quality Control Sampling Results and Analysis

An important aspect of any sampling plan is the effort made to assure the quality of data collected. The independent verification process as a whole is a quality assurance method in itself. Thus, it was critical to assure the quality of all of the independent verification data through quality checks and controls, calibrations, training, and qualification of laboratories and services used. The objective of independent verification for the Building 779 Cluster final status radiological surveys, added an element of quality assurance to the design of the sampling evolution. In addition to designing quality checks and controls into the independent verification sampling, the IVC provided for QC checks to assess the quality of the Contractor's data.

The IV SAP distinguished these two principal QC objectives in the design of the sampling plan. Stage I QC sampling was designed to assess the quality of the data collected by the Contractor. Stage II QC sampling was designed to assess the quality of the data collected by the IVC. In each case where QC samples were used, either for Stage I or Stage II sampling, the samples were maintained under chain-of-custody control from the time they were prepared until they were introduced to either the Contractor's or IVC's sample batch. Tamper seals and locked storage were employed when samples were not in the physical custody of the IVC's Field Team Leader.

The IV SAP specifies QC sampling to be performed over the duration of the Final Status Survey performance for all survey units in the Building 779 Cluster rather than for each specific building. This report, specific to Annex A, does not contain every element of QC data planned for the cluster of buildings as a whole. The costs associated with implementing separate QC sampling for each building in the 779 Cluster was determined to be prohibitive and unnecessary. Instead, a cumulative assessment and presentation of QC data will be presented with each successive Independent Verification Report of the Contractor's Final Status Survey.

This section of the report presents the QC data collected and measures employed to assure that quality objectives in the design of the sampling plan were achieved. Section 7.0 assesses the overall data quality against the published or industry accepted data quality indicators.

6.1 Stage I—Independent Quality Control of the Contractor's Sampling

6.1.1 Smear Samples

The IVC provided smear samples to the Contractor for measurement and analysis by the Contractor's selected instrumentation and methods. An unopened package of smear sample media was obtained from the Contractor prior to the start of the independent verification of Annex A. The IVC assigned a series of these as "blanks" and spiked a second series of smears with three different concentrations of an alpha emitting transuranic nuclide (one which is part of the nuclide mix identified as a contaminant of concern for the 779 Cluster).

The spikes were not certified as containing traceable concentrations of the nuclide added. Thus, the spikes do not provide a measure of accuracy directly. Accuracy is established for the instrument measuring the activity on the smears by the RFETS (or contract laboratory, if used) calibration and analysis procedures. Instead, the spikes serve to provide a comparison between the results achieved by the Contractor and those achieved by the IVC.

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The blank smears test the ability of the counting instrument used to distinguish between background and added activity as well as the ability of the counting technician and sample handling process to prevent cross-contamination.

The IVC introduced seven blank smears and six spiked smears into the Contractor's smear sampling batch during this portion of the final status survey. The QC samples were packaged and identified exactly as the Contractor's procedure dictated. Because the Contractor used the same technician to collect and analyze the smear samples they collected, it was not possible to present a double blind set of QC samples. He would know when samples other than those he personally collected were introduced. They were presented as a single blind set of QC samples. The Contractor's counting technician was not aware of the objective of the samples, nor the fact that some were blanks and some were spikes.

The blank smears were prepared by wiping a clean, unaffected, and uncontaminated surface. Each was then packaged individually, assigned a unique QC sample number, and physically controlled to ensure custody and integrity. The spiked smears were prepared by pipetting liquid standard concentrations onto a smear filter disc.

Spiked smears were prepared with three different quantities of radioactivity to provide a range of gross alpha radioactivity concentrations over the range expected to be encountered in the Final Status Survey. This range is necessarily small and near zero for a Final Status Survey.

The QC samples provided to the Contractor were measured and reported to the IVC by the Contractor and the GJO Analytical Laboratory (Appendix F). Table 6–1 provides a crosswalk between the IVC and Contractor assigned sample numbers and presents a summary of the results obtained by the Contractor and the GJO Analytical Laboratory which establishes a cumulative cross comparison as a measure of the relative accuracy of the instruments and methods employed. To provide greater statistical power than can be achieved with just a few measurements, Table 6–1 includes the results from survey units 729–01, 779–04, 779–17, 779–21, and 779–23 for a cumulative comparison. Each subsequent report will include the results from the previously completed survey units.

From Table 6–1, it is seen that all but one of the twenty blank smears returned results indicating no detectable radioactivity or activity less than the reported MDA. As reported in the IVC Sampling and Survey Report, Building 729 (DOE 1999), sample #2C was identified by the Contractor as having 4.5 dpm/100 cm^2.

Each of the 21 spiked smear samples yielded measurable radioactivity. The 21 spiked activities were differentiated from one another in the Contractor's assay. Yet, sample #6C, #13C, and #16C were reported to have activity below the MDA for the method. As reported in the IVC Sampling and Survey Report, Building 729 (DOE 1999b), this might be caused by too short of a counting time (background, sample, or both) to adequately distinguish between background and low-level activity. Smear #6C and #13C were spiked to the lowest concentration of the three and were expected to return the lowest measurement of activity among the three. Likewise, the highest spiked activity returned the highest measurement of activity among the three. Another possible explanation for the lower than expected result on these smear samples is in the method used to prepare the spiked samples. As mentioned earlier, a liquid standard containing an alpha

Table 6–1. Results of the Contractor's Assay of QC Smear Samples Provided by the IVC

IVC Sample ID#	Contractor Assigned Sample ID#	Sample Type	Contractor Reported MDA (dpm)	IVC Reported MDA (dpm)	Contractor Reported Results (dpm)	IVC Reported Results (dpm)
NED428	1C	Blank	4.1	[a]	0.0	[a]
NED429	2C	Blank	4.1	[a]	4.5	[a]
NED430	3C	Blank	4.1	[a]	0.0	[a]
NDL431	4C	Blank	10.3	[a]	0.3	[a]
NED432	5C	Blank	8.5	[a]	-0.6	[a]
NDL289	6C	Spike	4.1	[a]	1.5	[a]
NDL290	7C	Spike	8.5	5.3	9.9	24.1
NDL291	8C	Spike	4.1	[a]	28.5	[a]
NDL292	9C	Spike	8.5	5.4	30.9	54.8
NDL293	10C	Spike	4.1	[a]	30.9	[a]
NDL294	12C	Spike	10.3	5.5	52.9	96.5
259740	42C	Blank	8.5	4.9	-0.6	1.1
259741	43C	Blank	8.5	4.9	-0.6	0.3
259742	44C	Blank	8.5	4.9	-0.6	0.3
259743	45C	Blank	7.5	4.8	0.9	1.1
259744	46C	Blank	7.5	4.9	0.9	0.3
259745	47C	Blank	7.5	4.9	-0.6	0.3
259746	48C	Blank	7.5	4.9	0.9	0.3
259747	49C	Blank	7.5	4.9	0.9	-0.4
259748	50C	Blank	8.8	4.9	0.0	0.3
259749	66C	Blank	8.8	4.9	0.0	0.3
259750	67C	Blank	8.8	4.9	0.0	0.3
259751	68C	Blank	8.8	4.9	0.0	0.3
259752	69C	Blank	8.8	5.0	1.5	-0.5
259753	70C	Blank	8.8	4.9	1.5	0.3
259754	81C	Blank	8.8	4.9	1.5	1.9
259770	13C	Spike	8.5	4.9	6.9	7.3
259771	14C	Spike	8.5	5.0	12.9	12.0
259772	15C	Spike	7.5	4.9	8.4	12.8
259773	16C	Spike	7.5	5.0	3.9	20.6
259774	17C	Spike	7.5	5.0	12.9	12.8
259775	18C	Spike	8.5	5.0	23.4	31.5
259776	19C	Spike	10.3	5.1	27.3	38.4
259777	20C	Spike	8.8	5.0	19.7	36.9
259778	21C	Spike	8.8	5.0	34.8	32.2
259779	22C	Spike	8.8	5.0	30.3	26.8
259780	28C	Spike	10.3	5.2	73.9	96.8
259781	29C	Spike	10.3	5.2	84.4	96.1
259782	30C	Spike	8.8	5.4	87.9	87.4
259783	26C	Spike	8.8	5.3	75.8	94.5
259784	27C	Spike	8.8	5.3	77.3	76.5

[a]Smear samples were disposed of by the Contractor before being counted by the GJO Analytical Laboratory.

The Contractor counted the smears with an Eberline model SAC-4 alpha smear counters (serial #1069, 1406, and 814). The measured background was 0.2, 0.4, and 0.3 cpm, respectively. The efficiency was established at 33.3 percent.

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emitting transuranic nuclide was pipetted onto the smear and then allowed to dry. It is likely that a significant fraction of the total activity deposited migrated to a depth in the smear matrix that the activity was attenuated by the sample media itself.

6.1.2 Surface Media Samples

A total of 23 Stage I and 14 Stage II surface media QC samples have been analyzed for a cumulative comparison. Surface media QC samples were made in duplicate (one to be introduced in the Contractor's sample batch and the other in the IVC's sample batch). Before being introduced by either the Contractor or IVC, they are analyzed by the GJO Analytical Laboratory. A comparison of results between the initial count by the GJO Analytical Laboratory, the Contractor's Laboratory, and the GJO Analytical Laboratory when the QC sample was recounted when introduced with the IVC sample batch is presented in Table 6–2. The remaining twelve Stage II surface media samples will be introduced during the IV of the remaining survey units for the 779 Cluster.

Table 6–2. Results of the Contractor's Assay of QC Surface Media Samples Provided by the IVC

Surface Media Sample		Am-241	Pu-238	Pu-239/240	U-234	U-235	U238
		pCi/g					
GJO Lab ID#	259851	0.01	0.02	0.03	0.56	0.07	0.53
IVC ID#	MED0000213	0.01	0.01	0.02	0.55	0.04	0.56
Contractor ID#	99A9022-019	0.12	[a]	0.13	0.68	0.14	0.39
GJO Lab ID#	259852	0.03	0.03	0.02	0.81	0.05	0.77
IVC ID#	MED0000162	0.03	0.02	0.02	0.88	0.06	0.75
Contractor ID#	99A8940-019	0.04	[a]	0.05	0.59	0.03	0.80
GJO Lab ID#	259853	0.24	0.01	0.51	2.07	0.09	2.04
IVC ID#	MED0000163	0.29	0.02	0.49	2.26	0.13	2.12
Contractor ID#	99A8940-020	0.28	[a]	0.69	1.78	0.19	2.14
GJO Lab ID#	259854	0.30	0.01	0.46	0.71	0.04	0.76
IVC ID#	MED0000214	0.30	0.01	0.35	0.62	0.04	0.66
Contractor ID#	99A9009-020	0.09	[a]	0.54	0.41	-0.01	0.38
GJO Lab ID#	259855	0.18	0.04	0.37	0.53	0.04	0.54
IVC ID#							
Contractor ID#	99A9009-019	0.28	[a]	0.35	0.28	-0.01	0.33
GJO Lab ID#	259856	0.21	0.02	0.34	0.99	0.05	0.86
IVC ID#							
Contractor ID#	99A9460-021	0.20	[a]	0.36	0.69	0.02	1.08
GJO Lab ID#	259857	0.31	0.01	0.43	0.99	0.08	0.89
IVC ID#	MED0000200	0.18	0.02	0.33	0.88	0.05	0.90
Contractor ID#	99A9460-022	0.16	[a]	0.26	0.80	-0.01	0.76
GJO Lab ID#	259858	0.83	0.02	1.40	1.31	0.08	1.30
IVC ID#	MED0000180	0.78	0.02	1.43	1.56	0.06	1.34
Contractor ID#	99A9460-023	0.63	[a]	1.16	1.03	0.09	1.04

Surface Media Sample		Am-241	Pu-238	Pu-239/240	U-234	U-235	U238
		pCi/g					
GJO Lab ID#	259859	0.82	0.02	1.66	1.40	0.05	1.33
IVC ID#	MED0000189	0.91	0.02	1.70	1.34	0.06	1.34
Contractor ID#	99A9460-024	0.83	[a]	1.74	1.56	0.06	1.30
GJO Lab ID#	259860	0.55	0.02	1.23	0.83	0.07	0.68
IVC ID#	MED0000215	1.37	0.02	1.11	0.71	0.04	0.72
Contractor ID#	99A9460-025	0.72	[a]	0.92	0.57	-0.01	0.44
GJO Lab ID#	259861	1.12	0.01	2.36	1.02	0.06	1.03
IVC ID#	MED0000164	1.21	0.01	1.97	0.95	0.04	0.95
Contractor ID#	99A9460-026	0.80	[a]	2.21	0.67	0.05	0.62
GJO Lab ID#	259862	0.49	0.03	0.78	1.42	0.07	1.18
IVC ID#	MED0000216	0.60	0.03	1.05	1.67	0.11	1.62
Contractor ID#	99A9460-027	0.29	[a]	0.53	1.17	0.03	1.05
GJO Lab ID#	259863	1.00	0.08	1.50	0.91	0.10	1.04
IVC ID#	MED0000217	1.33	0.02	2.40	0.83	0.08	0.78
Contractor ID#	99A9460-028	1.08	[a]	2.31	0.57	0.02	0.58
GJO Lab ID#	259864	1.71	0.04	3.08	0.58	0.10	0.47
IVC ID#	MED0000165	1.65	0.01	2.99	0.58	0.04	0.56
Contractor ID#	99A9460-029	1.66	[a]	3.41	0.52	0.03	0.32
GJO Lab ID#	259865	0.20	0.03	0.66	1.40	0.13	1.03
IVC ID#							
Contractor ID#	99A9460-030	0.76	[a]	1.20	0.88	-0.00	0.84
GJO Lab ID#	259866	1.27	0.04	2.60	0.59	0.09	0.38
IVC ID#							
Contractor ID#	99R0317-016	1.10	[a]	1.72	0.68	0.06	0.65
GJO Lab ID#	259867	1.15	0.05	2.46	1.63	0.11	1.64
IVC ID#							
Contractor ID#	99R0317-017	0.80	[a]	2.61	1.52	0.24	1.27
GJO Lab ID#	259868	1.17	0.02	3.28	0.64	0.08	0.64
IVC ID#	MED0000166	0.69	0.02	1.69	0.53	0.04	0.49
Contractor ID#	99R0317-021	6.90	[a]	14.2	2.41	0.16	2.30
GJO Lab ID#	259869	3.39	0.04	5.27	0.56	0.07	0.61
IVC ID#							
Contractor ID#	99R0317-022	14.2	[a]	22.2	2.50	0.19	2.42
GJO Lab ID#	259870	4.02	0.04	8.59	1.63	0.11	1.60
IVC ID#							
Contractor ID#	99R0317-018	0.75	[a]	1.32	0.57	0.16	0.75

Surface Media Sample		Am-241	Pu-238	Pu-239/240	U-234	U-235	U238
		pCi/g					
GJO Lab ID#	259871	8.73	0.05	16.32	2.02	0.09	1.84
IVC ID#							
Contractor ID#	99R0317-019	3.11	[a]	6.01	0.45	0.03	0.67
GJO Lab ID#	259872	14.48	0.04	28.93	2.44	0.10	2.28
IVC ID#	MED0000218	7.30	0.01	12.92	1.93	0.11	1.86
Contractor ID#	99R0317-020	5.03	[a]	[a]	1.41	0.32	1.77
GJO Lab ID#	259873	3.90	0.06	6.62	1.58	0.10	1.65
IVC ID#							
Contractor ID#	99A9022-020	5.02	[a]	8.28	1.14	0.76	1.83
[a]The Contractor did not analyze for this radionuclide.							

6.1.3 Direct Surface Emission Measurements

The Contractor and the IVC chose to utilize the same response check source to test the response of instruments used to make direct surface emission measurements (Table 6–3). This enabled the comparison of routine instrument response checks using the same isotope, geometry, and activity. Three instrument systems were employed to make direct surface emission measurements during the Final Status Survey of Annex A. The Contractor employed a subcontractor, Millennium Services, who used a proprietary system (SCM/SIMS) developed by Shonka Research Associates to perform the scan surveys. The SCM is fundamentally a gas proportional counter and the SIMS is the survey information management software. The Contractor also used a NE Electra with a DP-6 dual phosphor scintillation probe to make direct static surface measurements for comparison with the $DCGL_W$. The IVC used the Eberline model E-600 multi-purpose survey instrument with a HP-100 gas proportional probe.

Table 6–3. Comparison of Response of Instruments used to Make Direct Surface Measurements

Parameter	Millennium SCM/SIMS	NE Electra w/ DP-6	EberlineE-600 w/HP-100
Number of Measurements	20	20	20
2π Source Surface Emission Rate	1604	1604	1604
Mean Activity Observed	1315	1261	1302
Standard Deviation	280	83	53
Coefficient of Variation	0.22	0.07	0.04

6.2 Stage II—Quality Control of the Independent Verification Sampling

Stage II QC sampling is associated specifically with the IVC's field sampling and serve to establish confidence in the independent verification sampling results rather than correlate them with the Contractor's results. Again, not every category of QC measure planned for has been completed to this point.

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6.2.1 Smear Samples

The IVC provided smear samples to the GJO Analytical Laboratory for measurement and analysis. Smear sample media was reserved by the IVC prior to the start of the independent verification of Annex A. A series of these were assigned as "blanks" and a second series of smears was spiked with three different concentrations of an alpha emitting transuranic isotope of the nuclide mix identified as a contaminant of concern for the 779 Cluster.

As with the spikes prepared for the Contractor, the spikes were not certified as containing traceable concentrations of the nuclide added. Thus, the spikes do not provide a direct measure of accuracy. Instead, the spikes serve to provide a measure of confidence in the laboratory's ability to detect radioactivity and to establish a basis for subsequent comparison between the results achieved by the Contractor and those achieved by the IVC.

The IVC introduced two blank and six spiked smears into the smear sampling batch during the independent verification survey of survey units 779–21 and 779–23 in Annex A. The entire batch of smears was then provided to the GJO Analytical Laboratory. The QC samples were packaged and identified exactly as those samples collected in the survey unit and were not distinguishable to the analyst. Because the IVC used an independent laboratory to assay smears, and because the technician collecting the field smears was not involved with preparing, handling, or counting smears, it was possible to present the QC samples along with the field samples as a double blind set.

The blank smears were prepared by wiping a clean, unaffected, and uncontaminated surface. They were then packaged individually, assigned a unique QC sample number, and physically controlled to ensure custody and integrity. The spiked smears were prepared by pipetting liquid standard concentrations onto a smear filter disc.

Spiked smears were prepared with three different quantities of radioactivity to provide a range of gross alpha radioactivity concentrations over the range expected to be encountered in the Independent verification of the Final Status Survey. The range was, again, small and near zero.

The QC samples provided to the IVC's laboratory were measured and reported to the IVC (Appendix F). Table 6–4 provides a crosswalk between the IVC and GJO Analytical Laboratory assigned sample numbers and presents a summary of the cumulative results obtained by the laboratory.

From Table 6–4 it is seen that each blank smear returned results indicating no detectable radioactivity in excess of the method detection limit. Each spiked smear sample yielded measurable radioactivity. They were differentiated from one another and the lowest result corresponded to the smear with the lowest spiked concentration while the highest result corresponded to the smear with the highest spiked concentration.

Again, no statement can be made about the accuracy of the results reported by the IVC's laboratory subcontractor but results were in line with those expected. The fact that the GJO Analytical Laboratory apparently used longer counting times than did the Contractor when measuring smears adds weight to the possibility that insufficient counting time may be at the root of the disparity in the results on QC smear samples reported by the Contractor.

Table 6–4. Results of the GJO Analytical Laboratory Assay of QC Smear Samples Provided by the IVC

IVC QC Sample ID#	IVC Transfer Sample ID#	Laboratory Assigned Sample ID#	Sample Type	Reported Results (Gross α, dpm)[a]	
				MDA	Measured Activity
NDL 290	SMR0000260	263395	Spike	5.33	24.05
NDL 292	SMR0000261	263396	Spike	5.41	54.84
NDL 294	SMR0000262	263397	Spike	5.49	96.51
NDL 295	SMR0000593	258235	Spike	5.17	5.68
NDL 296	SMR0000168	261284	Spike	4.88	5.00
NDL 297	SMR0000592	258234	Spike	5.19	15.81
NDL 298	SMR0000169	261285	Spike	5.00	18.98
NDL 299	SMR0000591	258233	Spike	5.35	53.92
NDL 300	SMR0000170	261286	Spike	5.11	41.54
SMR0000594	SMR0000594	258236	Blank	5.13	0[b]
SMR0000595	SMR0000595	258237	Blank	5.17	0[b]
SMR0000596	SMR0000596	258238	Blank	5.11	0[b]
259725	SMR0000167	261283	Blank	4.88	0[b]
259726	SMR0000166	261282	Blank	4.91	0[b]
259727	SMR0000165	261281	Blank	4.91	0[b]
259728	SMR0000591	263362	Blank	5.30	0.49
259729	SMR0000592	263363	Blank	5.34	0[b]
259738	SMR0000599	261638	Blank	4.91	0[b]
259755	SMR0000164	261280	Spike	4.88	5.77
259756	SMR0000598	261639	Spike	4.97	7.30
259757	SMR0000597	261640	Spike	4.91	6.55
259758	SMR0000596	261641	Spike	4.91	7.33
259761	SMR0000163	261279	Spike	4.86	23.71
259763	SMR0000593	263364	Spike	5.39	25.85
259764	SMR0000594	263365	Spike	5.46	41.23
259765	SMR0000595	263361	Spike	5.39	35.82
259769	SMR0000162	261278	Spike	5.13	56.34

[a]The analytical report presented results in pCi per sample. The results have been converted to dpm for presentation in this table. Since the smears were collected over a 100 cm^2 area, the results in dpm are equivalent to dpm/100 cm^2.

[b]The laboratory formally reported values as less than the detection limit (<MDA) but provided the raw supporting data in the complete analytical report. These blank QC samples resulted in a negative net count rate.

The GJO Analytical Laboratory counted the smears with a Canberra low background automated scaler, model 2404 smear counter. The measured background was 0.097 cpm over 60 minutes. Sample count time was 6 minutes. The alpha efficiency was established at 21.39 percent.

As reported in the IVC Sampling and Survey Report, Building 729 (DOE 1999b) several smear samples submitted to the GJO Analytical Laboratory and to the Contractor were disposed of by the laboratories before they could be collected and provided to the other laboratory for a cross comparison of laboratory measurements. To remedy this situation, measured sets of QC samples (one for the Contractor and the other for the IVC) were prepared by the GJO Analytical Laboratory and are being introduced to the Contractor's and IVC's sampling protocol. This provides a cumulative cross comparison of the relative accuracy of the instruments and methods employed to assay smears.

Aside from the QC measures interjected by the IVC blind to the laboratory, the independent verification sampling benefits from the internal QC applied to the measurement process within the laboratory. Three measurement QCs are employed for each batch of smears. The laboratory inserts a preparation blank (PB), a laboratory control sample (LCS) and a continuing calibration

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verification (CCV) for each batch of 21 smears. In this case, because each batch was larger than 21 smears, four sets of laboratory initiated QC measurements were made. Table 6–5 summarizes the internal QC measurements made for the smears from survey units 779–21 and 779–23.

Table 6–5. Results of the IV Laboratory Internal QC Measurements for Smear Samples

QC Sample Type	Expected Results	MDA	Measured Activity
	(Gross α, dpm)		
Preparation Blank	<MDA	5.33	0.49
Preparation Blank	<MDA	5.31	1.39
Preparation Blank	<MDA	5.33	-0.42
Preparation Blank	<MDA	5.33	-0.42
Laboratory Control Sample	475	7.53	432
Laboratory Control Sample	475	7.55	466
Laboratory Control Sample	475	7.53	454
Laboratory Control Sample	475	7.50	453
Continuing Calibration Verification	2220	16.83	2307
Continuing Calibration Verification	2220	16.81	2353
Continuing Calibration Verification	2220	16.74	2242
Continuing Calibration Verification	2220	16.96	2321
The analytical report presented results in pCi per sample. The results have been converted to dpm for presentation in this table. Since the smears were collected over a 100 cm^2 area, the results in dpm are equivalent to dpm/100 cm^2.			

The internal QC data presented in Table 6–5 shows excellent agreement with the results expected.

6.2.2 Surface Media Samples

Stage II QC samples for the surface media sample sets are presented in Table 6–2. In addition to the Stage II QC samples, the IVC's laboratory performed internal QC measurements to assess the quality of the data produced. Three measurement QCs were employed for each of the three element groups (Am, Pu, U) processed for each survey unit. The laboratory inserted one PB, an LCS, and processed a duplicate of one randomly selected field sample for each sample batch. In all, there were seven PB, seven LCS, and two duplicate measurements made. Table 6–6 summarizes the PB QC measurements made. Table 6–7 summarizes the LCS measurements and Table 6–8 presents the duplicate sample measurements. Table 6–8 summarizes the cumulative paired duplicate measurement results collected from Survey Units 729–01, 779–04, 779–17, 779–21, and 779–23. A regression analysis was performed to assess the comparability between the first and duplicate measurements and is graphically presented in Figure 6–1.

The Internal QC data presented in Tables 6–5, 6–6, and 6–7 provide substantial indication that the data quality achieved in the surface media sample analysis is excellent.

Table 6–6. Results of the IV Laboratory Internal Blank QC Measurements for Surface Media Samples

Preparation Blank QC Sample (PB)	Expected Results	MDA	Measured Activity
	dpm/sample		
Am-241	<MDA	0.03	0.01
Am-241	<MDA	0.02	0.02[a]
Am-241	<MDA	0.02	0.01
Pu-238	<MDA	0.03	0.01
Pu-238	<MDA	0.03	-0.001
Pu-239/240	<MDA	0.01	0.03
Pu-239/240	<MDA	0.03	0.003
U-234	<MDA	0.05	0.03
U-234	<MDA	0.05	0.02
U-235	<MDA	0.08	0.003
U-235	<MDA	0.07	-0.01
U-238	<MDA	0.05	0.03
U-238	<MDA	0.05	-0.004

[a]The error in the reported result includes the MDA for the measurement.

Table 6–7. Results of the IV Laboratory Internal LCS QC Measurements for Surface Media Samples

Laboratory Control QC Sample (LCS)	Expected Results	MDA	Measured Activity
	pCi/mL (Am and Pu)		pCi/L (U)
Am-241	4.74	0.02	5.03
Am-241	4.74	0.02	4.87
Am-241	4.74	0.07	4.71
Pu-238	10.67	0.02	10.16
Pu-238	10.67	0.03	11.35
Pu-239/240	10.5	0.05	11.29
Pu-239/240	10.5	0.06	11.40
U-234	16.6	0.12	16.17
U-234	16.6	0.11	16.14
U-235	0.77	0.15	0.74
U-235	0.77	0.13	0.72
U-238	16.6	0.12	16.93
U-238	16.6	0.11	15.39

The units reported for the LCS measurements are different from those used in the rest of the analytical report. The selection of units of pCi/mL and pCi/L was based on convenience since the known value of the standard used is reported in pCi/mL and pCi/L. The function and utility of the LCS sample (comparing a measurement result with a known standard) are not compromised by using units other than those used to report sample results.

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Table 6–8. Results of the IV Laboratory Internal Duplicate QC Measurements for Surface Media Samples

Duplicate QC Samples (D)	Measured Activity (dpm/sample)			
Lab Sample ID#	263398	263398D	263410	263410D
Am-241	2.02[a]	1.49[a]	6.28[a]	7.28[a]
Pu-238	0.14[a]	0.02[a]	0.50[a]	1.56[a]
Pu-239/240	1.28	2.01[a]	27.58	49.05
U-234	67.91	70.77	32.44	31.40
U-235	2.38	5.44	1.45	1.92
U-238	70.53	75.03	33.88	31.39

[a]Either the reported value is less than the MDA for the analysis or the error in the reported result includes the MDA. In this case, reproducibility between duplicate samples is not achievable with high confidence since relative error is high at sample concentrations near the MDA. That the duplicate samples yield results which are consistently at or near the MDA for the analysis provides evidence, in a qualitative sense, that duplicate measurements are comparable.

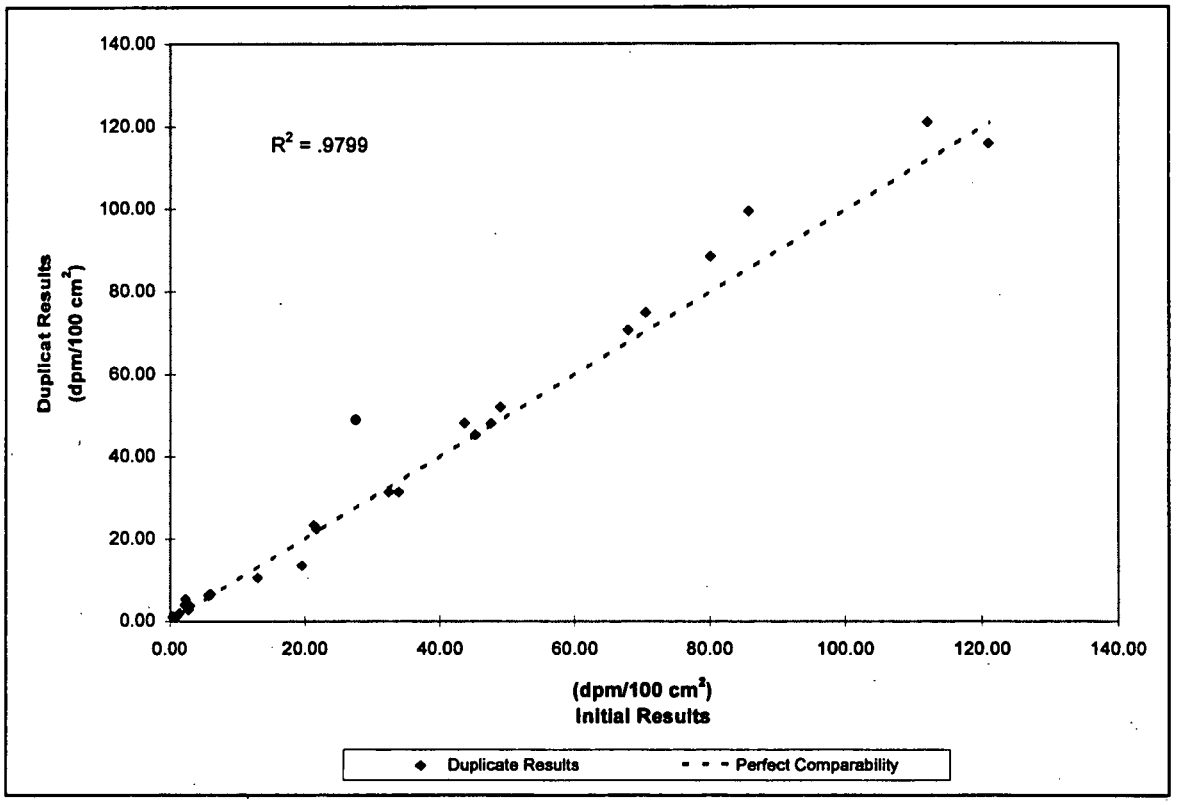

Figure 6–1. Comparison of Duplicate Alpha Isotopic Sample Analysis Results Linear Regression Fit Plot

6.2.3 Direct Static Measurements

Two sets of data collected by the IVC are pertinent to the assessment of direct static surface measurement data quality. They are replicate field measurement data and instrument response check data.

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6.2.3.1 Replicate Field Measurements

The second of the two data sets contains the replicate measurements periodically made over the duration of the sampling period. Four replicate measurements were made in survey unit 779–21 and five were made in survey unit 779–23. Table 6–9 summarizes the cumulative paired replicate measurement results collected from survey units 729–01, 779–04, 779–17, 779–21, and 779–23. A regression analysis was performed to assess the comparability between the initial and replicate measurements and is graphically presented in Figure 6–2.

Table 6–9. Results of Replicate Direct Static Surface QC Measurements

Sample Location	Measured Activity(dpm/100 cm^2)	
	Initial Measurement	Replicate Measurement
IVP0000104	11.5	10.9
IVP0000111	7.5	8.1
IVP0000118	26.0	19.6
IVP0000119	5.0	5.0
IVP0000122	6.0	6.3
IVP0000125	27.2	29.2
IVP0000128	12.1	14.9
IVP0000129	30.2	26.4
IVP0000135	13.2	13.1
IVP0000136	7.0	13.8
IVP0000149	21.1	14.0
IVP0000152	20.5	17.0
IVP0000153	34.4	20.6
IVP0000155	10.6	10.8
IVP0000159	16.1	16.1
IVP0000176	38.5	32.1
IVP0000182	19.3	3.2
IVP0000187	12.8	22.4
IVP0000194	22.4	22.4
IVP0000206	16.60	16.60
IVP0000212	20.70	29.00
IVP0000218	10.60	13.90
IVP0000226	41.40	16.60
IVP0000236	20.50	27.50
IVP0000242	14.30	11.10
IVP0000248	13.70	20.50
IVP0000254	10.60	10.50
IVP0000259	17.70	7.59

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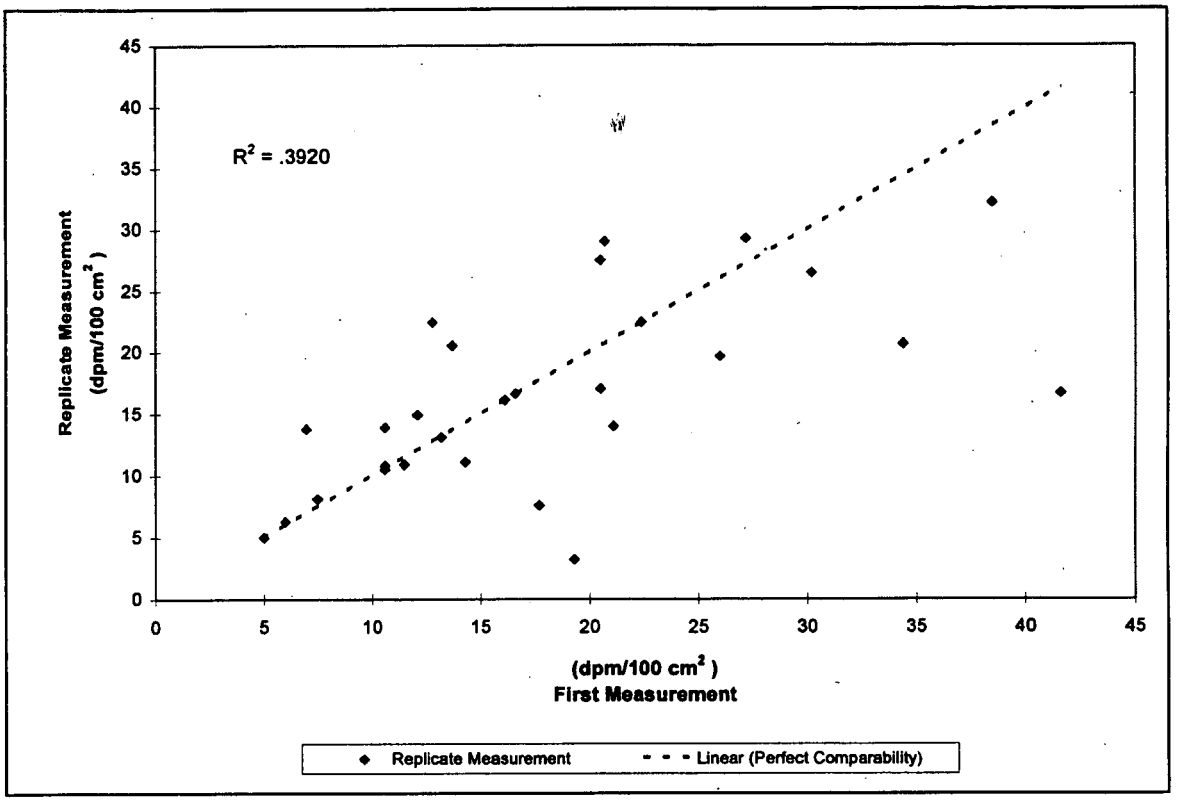

Figure 6–2. Comparison Between Replicate Direct Static Measurements Linear Regression Fit Plot

6.2.3.2 Instrument Response Check Data

The first of the two data sets used to present the quality of direct static surface measurements is the response of the instruments (E600 with a HP-100 probe) to a planar source with a known amount of radioactivity. The source used was the same source used by the Contractor. It is an anodized surface source containing 2,398 dpm of Pu-239 radioactivity. The source was manufactured and certified to be NIST traceable by AEA Technology and assigned a unique ID# GM-785 (see copy of manufacturer's certification in Appendix B).

Prior to initiating a survey each day, periodically (≈every 2 hours), and at the end of a survey each day, the survey instrument in use was used to make a measurement on the known concentration source. The data sheets are provided for the two probes used by the IVC during the independent verification of survey units 779–21 and 779–23 (Appendix D). A total of 57 response check measurements were made with the probes during the survey period.

A control chart is provided for each probe (Figures 6–3, 6–4, and 6–5) to graphically portray the steadfastness of the instrument's responses to the source over the sampling period. Notable is the relatively tight band within which the response checks fall. No degradation of the instrument response was observed over the period it was used indicating that the 2 hour maximum use constraint on a fresh counting gas charge is adequate and might provide justification for a longer allowable period between purge and charge cycles.

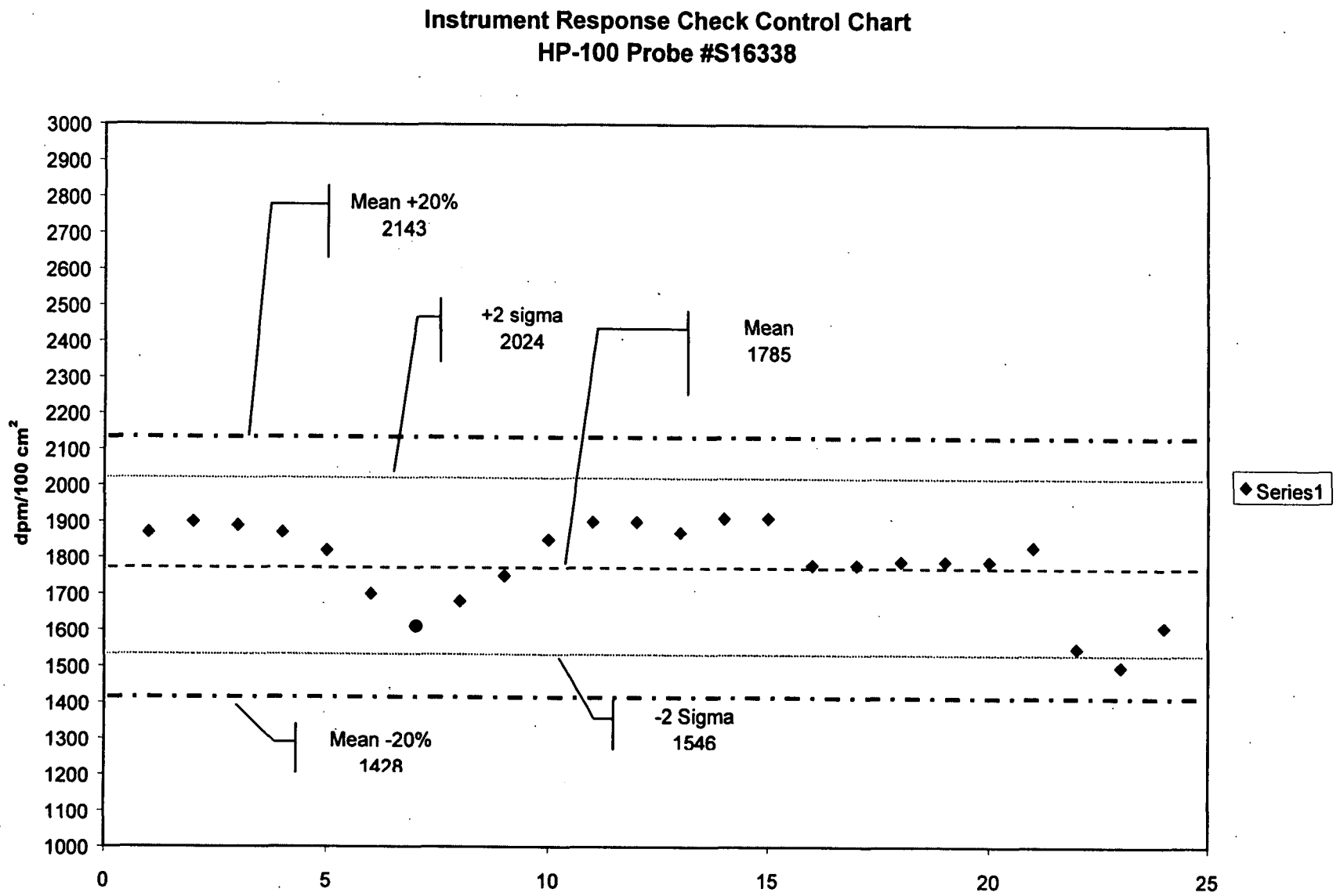

Figure 6–3. Instrument Response Check Control Chart, Survey Unit 779–21
HP-100 Probe #S16338

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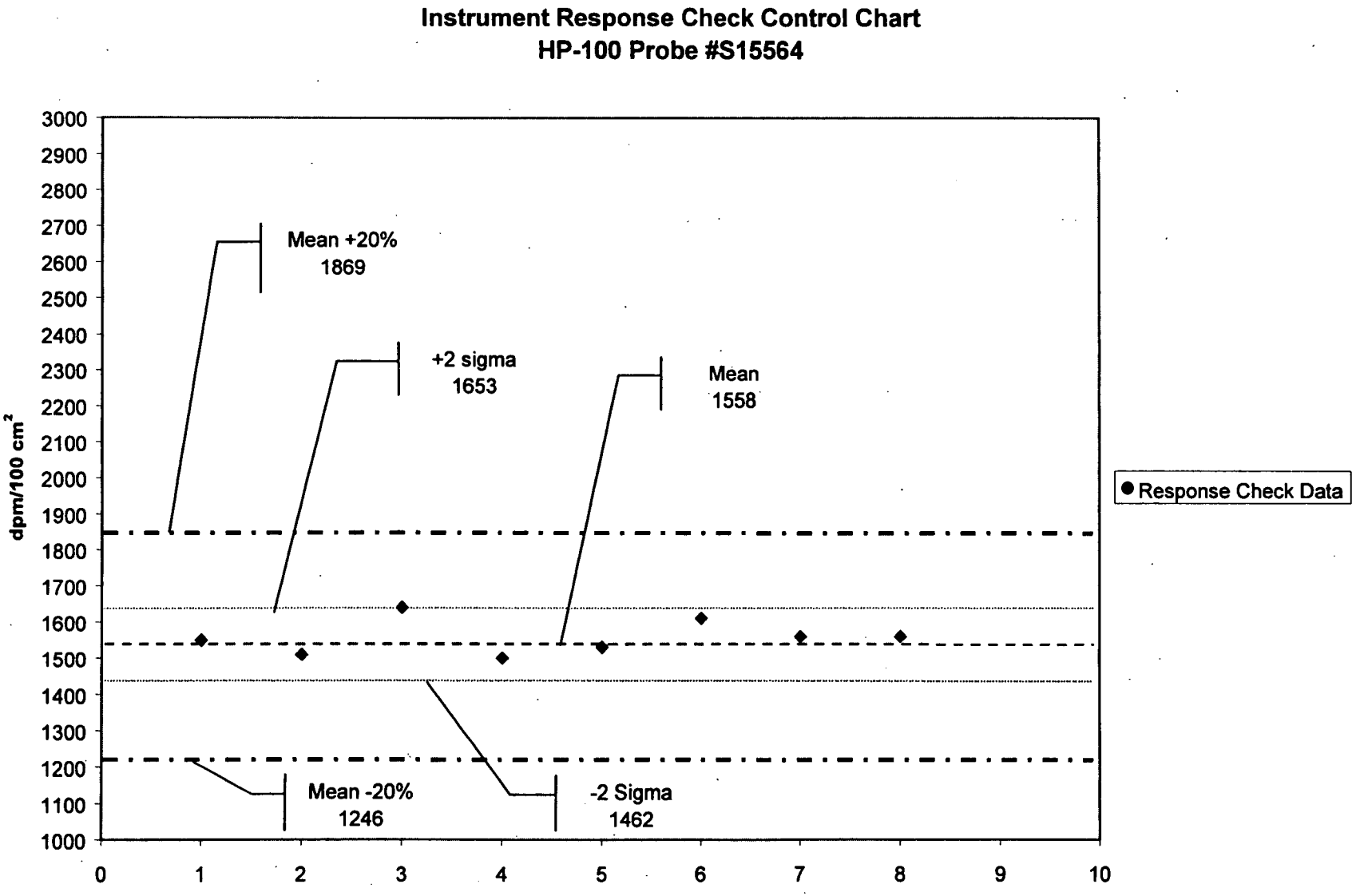

Figure 6–4. Instrument Response Check Control Chart, Survey Unit 779–21
HP-100 Probe #S15564

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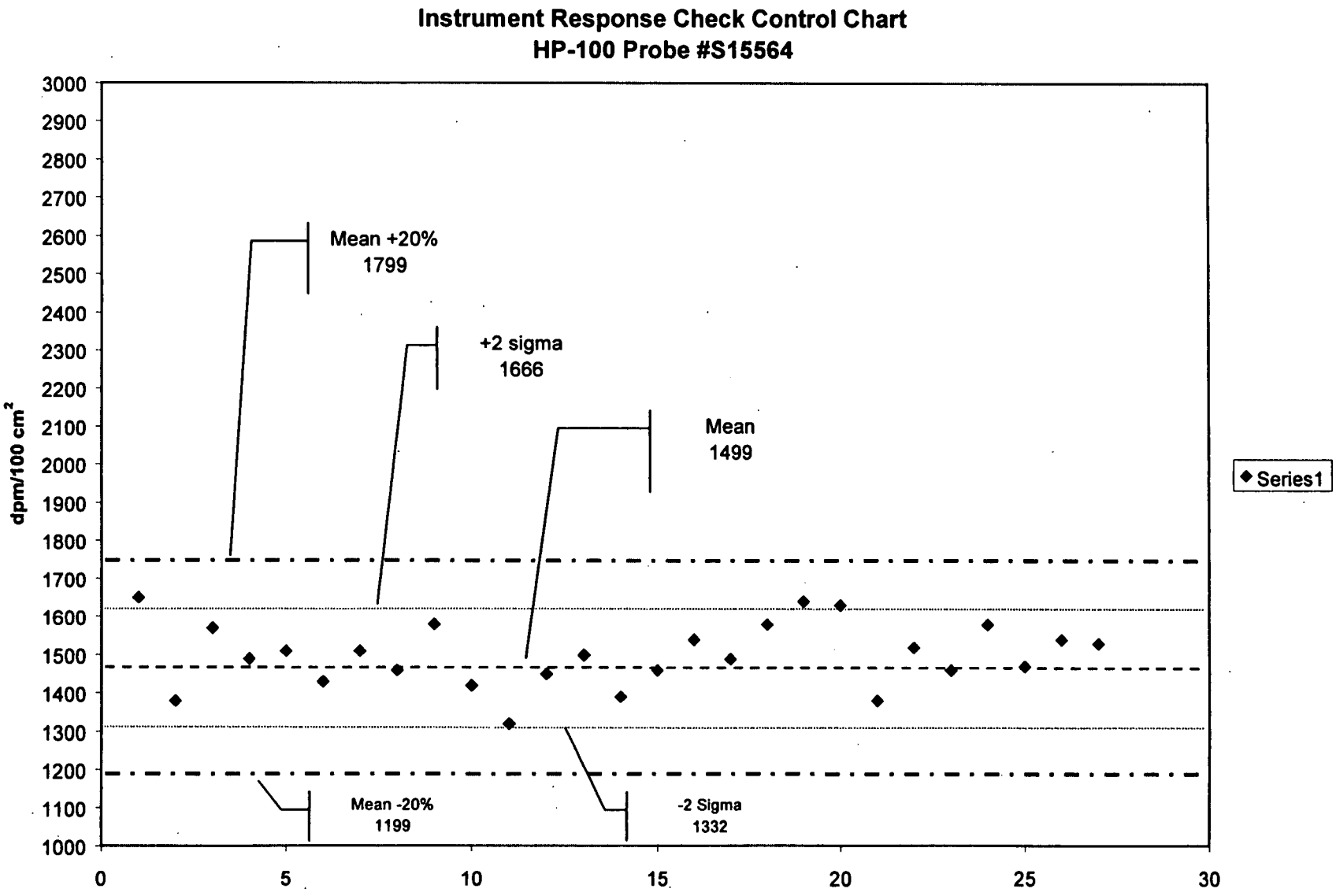

Figure 6–5. Instrument Response Check Control Chart, Survey Unit 779–23 HP-100 Probe #S15564

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7.0 Data Quality Analysis

The purpose of this data quality analysis (DQA) is to evaluate the data collected from the field in light of its intended use in decision making. Decision makers should obtain an understanding of the verity of the data used in the verification process from reading this section. The DQA uses guidance from *MARSSIM* (EPA 1997), *Guidance for Data Useability in Risk Assessment* (EPA 1992), information from the IV SAP (DOE 1999a), and professional judgement.

7.1 Detection Limit Adequacy

Each of the three measurement methods used to assess the residual radioactive contamination in Annex A have measurement sensitivities which limit the ability of the measurement to detect and quantify radioactivity. A key concern and design element of the SAP was to assure that sufficiently low detection sensitivities were achieved. Assumptions had to be made about the environment and response of the instrumentation and preparation methods in order to estimate the detection sensitivity before the fact. Now that the measurements have actually been made, assessment of the actual detection sensitivity achieved is possible. Section 6.0 presented data which demonstrated that the detection sensitivities achieved were adequate to identify and quantify radioactivity at a fraction of the applicable limit or DCGL. The target detection sensitivity planned for in the SAP was ≈50 percent of the applicable DCGL. Method detection limits obtained in both the field measurements and the laboratory measurements used were adequate to compare to the associated DCGL as indicated in Table 7–1, and met or exceeded the data quality target for measurement sensitivity.

Table 7–1. Adequacy of Independent Verification Measurement Detection Limits

Measurement	Analytical Method	DCGL Benchmark (dpm/100 cm^2)	Detection Sensitivity Achieved (dpm/100 cm^2)	
			779–21	779–23
Average removable surface contamination concentration	Smear counting	20	≈5	≈5
Average transuranic surface contamination concentration as measured by direct surface emission.	90 Second Direct Static Surface Emission Count	100	52[a]	40[a]
Maximum transuranic surface contamination concentration as measured by direct surface emission.		300		
Average surface transuranic contamination concentration in and beneath surface coatings as measured by surface media sampling.	Alpha Spectroscopy	100	≈2	≈2
Maximum surface transuranic contamination concentration in and beneath surface coatings as measured by surface media sampling.		300		
Average surface uranium contamination concentration in and beneath surface coatings as measured by surface media sampling.	Alpha Spectroscopy	5000	≈4	≈4
Maximum surface uranium contamination concentration in and beneath surface coatings as measured by surface media sampling.		15,000		

[a]The detection sensitivity reported is net MDA. The adjusted gross MDA is equal to the MDA + background (76 dpm/100 cm^2 and 52 dpm/100 cm^2 respectively).

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If detection limits had exceeded the DCGL metrics, then declarations based on measurements made using that method could not have been substantiated. As evidenced by comparing the decision limits as represented by the DCGLs with the MDA associated with the measurement method employed in assessing the residual contamination in Annex A, each detection limit obtained was more than adequate to detect, observe, and make risk management decisions with confidence.

7.2 Sample Size and Statistical Power

According to the SAP, sample sizes were specified to ensure a false positive error rate (alpha error) and a false negative error rate (beta error) of no greater than 5 percent when measurement data sets were compared to the DCGL. For each sample media set—direct surface emission measurements, smears, and surface media samples—a sample size of 29 (allowing for a 20 percent contingency) was specified in the IV SAP (DOE 1999a). In the field, 58 direct surface emission measurements, 58 smears, and 18 surface media samples were actually collected from designated locations in Annex A. Only four sample locations in survey unit 779–23 met the criteria for sampling. The SAP does not adequately address a situation where the entire survey unit is stripped of all surface coatings and all direct static measurements are less than the critical detection level of 22 dpm/100 cm^2. The IVC determined that the Revised Sample Location Selection Protocol outlined in the SAP was not practical in this situation and made the decision not to take additional media samples.

Based on the results of each of the data sets, retrospective power curves were developed. Figures 7–1 through 7–4 illustrate the power of the sign test to conclude whether the null hypothesis should be rejected by measuring the probability that a survey unit meets the DCGL (except for surface media samples for survey unit 779–23). Values of both error types (Type I and Type II) can be derived from the power curve at any possible concentration of residual contaminant. Type-I errors (falsely concluding that the DCGL is not exceeded when it actually is exceeded) are those that concern the risk manager and decision maker most. The actual and critical sample size (N) are both presented for each of the four data sets evaluated. The retrospective power curve is calculated using the actual sample size obtained. The boundary of the gray region represents the concentrations between which there is insufficient power at the prescribed alpha and beta error rate, given the sample size obtained and the variability observed in the data set. Process knowledge of the technique used by the Contractor to remove contamination from the surface area of the concrete and direct static surface measurements (all well below the DCGLs) are used to demonstrate the small probability of remaining contamination exceeding the DCGLs.

Inspection of Figure 7–1 illustrates that the Type-I error rate drops below 5 percent (the error rate is 1-Power) when the true mean surface contamination concentration is at the DCGL of 100 dpm/100 cm^2, the sample size is 29, and the standard deviation is 14.45 dpm/100 cm^2 (the actual standard deviation). Alternately, the power to reject the null hypothesis when the mean surface contamination concentration is as high as 85 dpm/100 cm^2 is 95 percent. The critical sample size required to provide the power necessary to meet the sampling objectives outlined in the SAP was determined to be 19. The actual sample size (29) was much higher than that required, thus the actual power was much higher than required by the sample design. Note that the estimate of the central tendency, the geometric mean, is plotted against the power curve. This concentration is significantly less than the concentration at which the power begins to wane (the

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lower boundary of the gray region). The power to reject the null hypothesis at the observed mean concentration in the survey unit is effectively 100 percent.

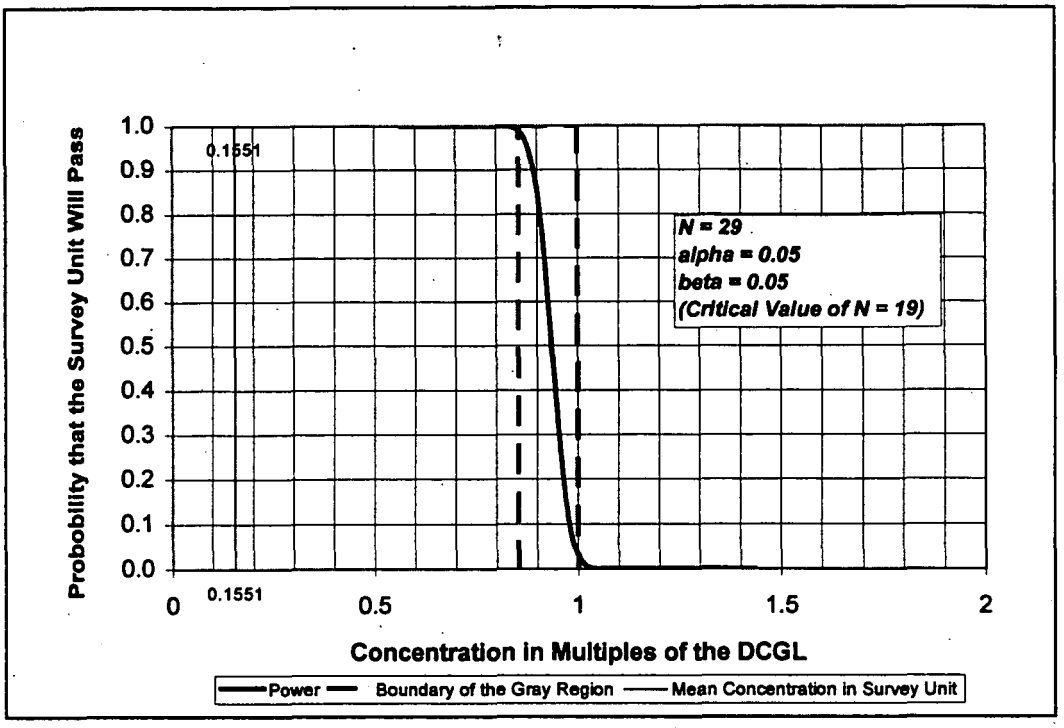

Figure 7–1. Retrospective Power of the Sign Test Direct Static Surface Measurements, 779–21

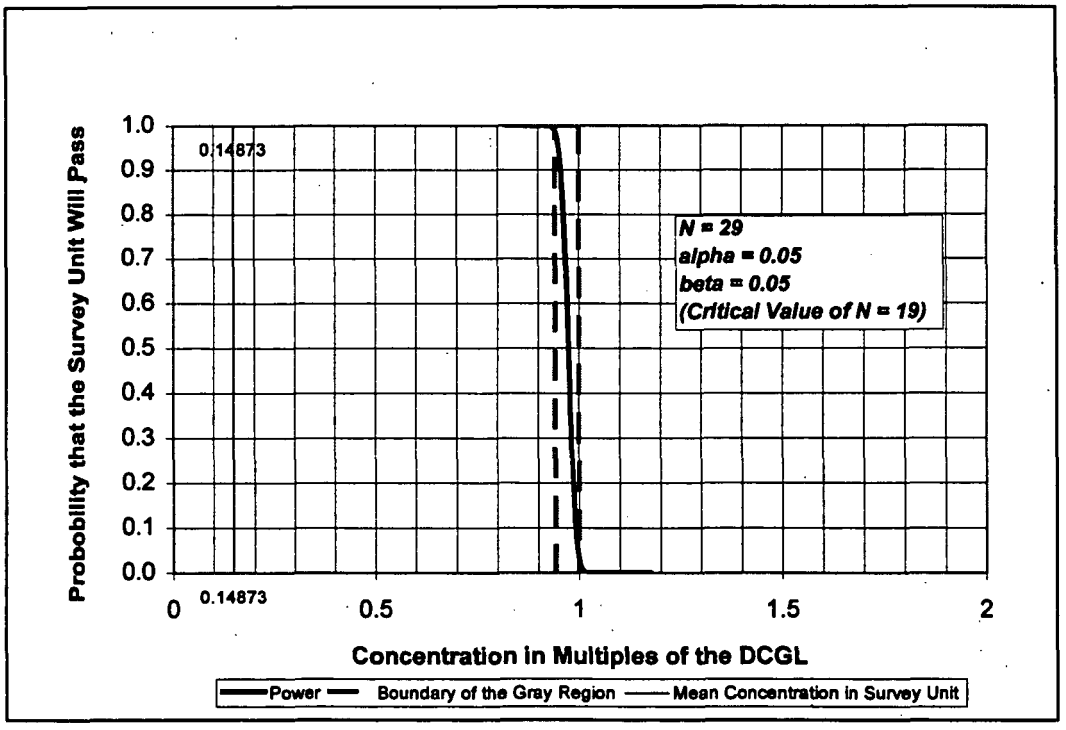

Figure 7–1 (continued). Retrospective Power of the Sign Test Direct Static Surface Measurements, 779–23

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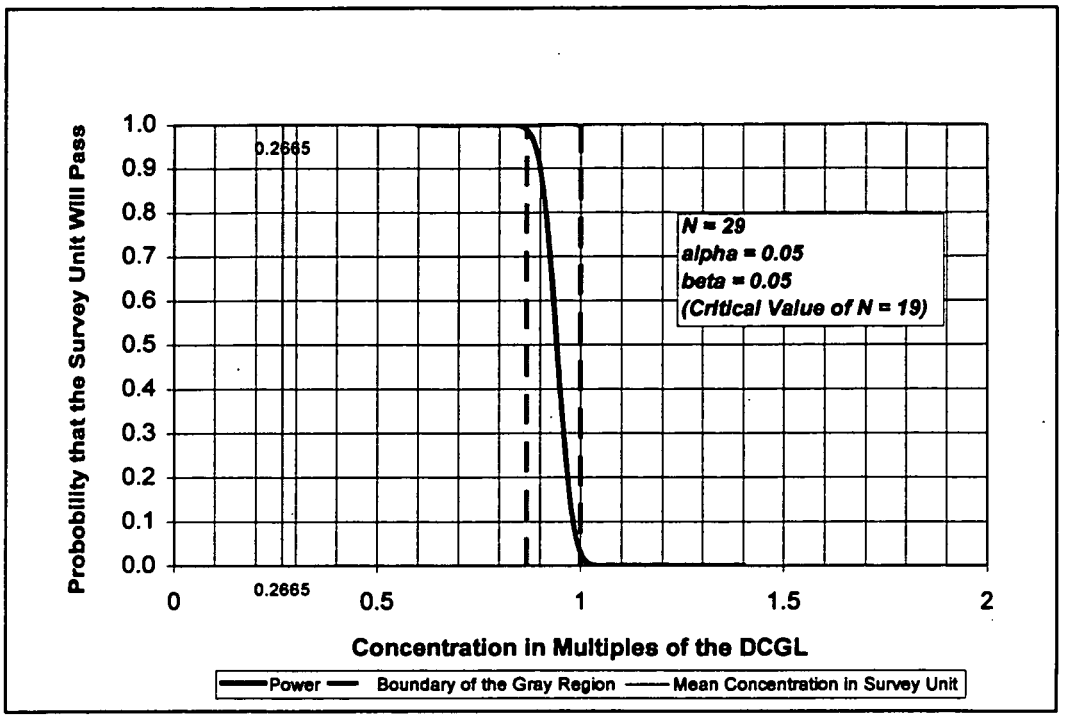

Figure 7–2. Retrospective Power of the Sign Test Smear Sample Measurements, 779–21 and 779–23

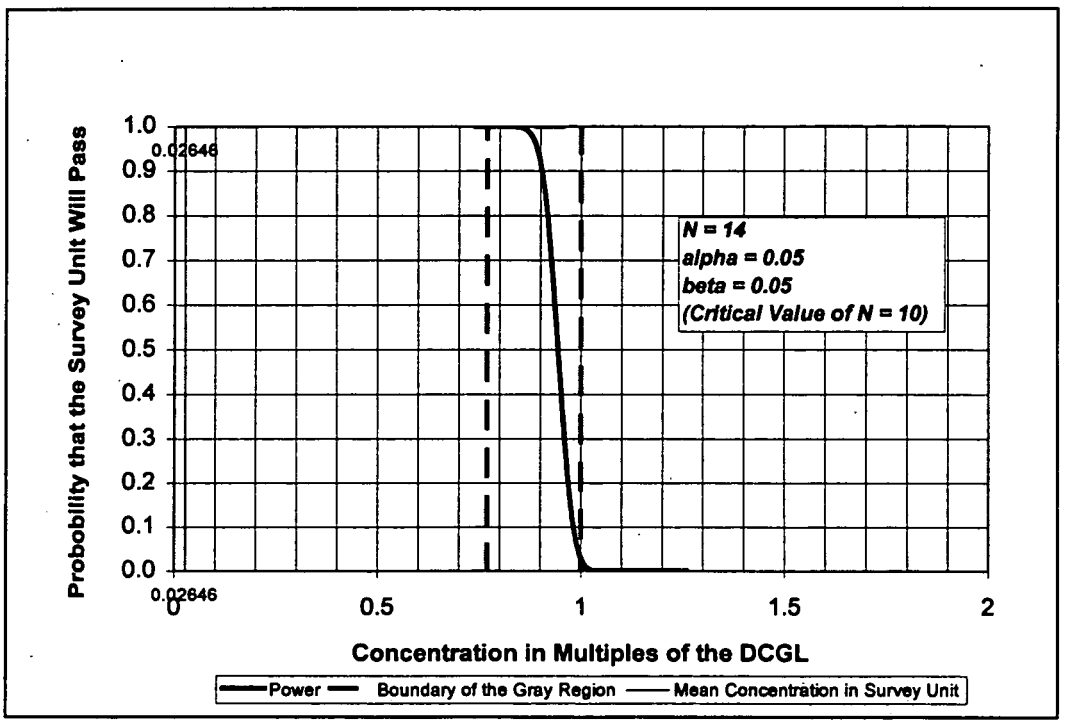

Figure 7–3. Retrospective Power of the Sign Test Surface Media Samples/Transuranic Activity, 779–21

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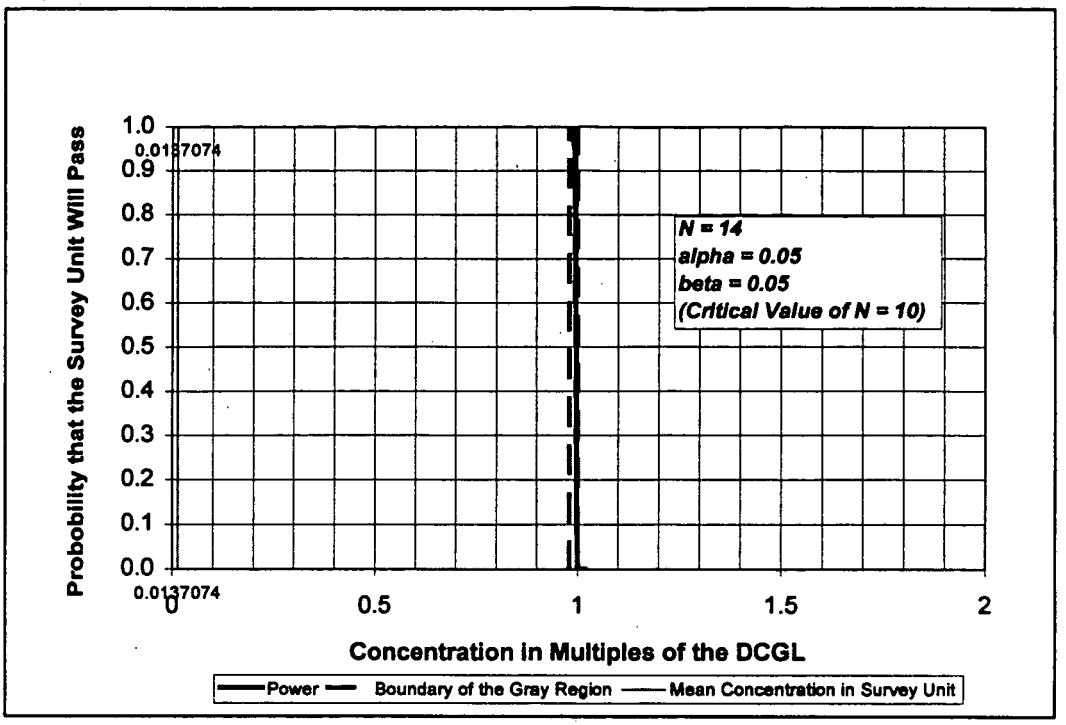

Figure 7–4. Retrospective Power of the Sign Test
Surface Media Samples/Uranium Series Activity, 779–21

The same results are observed in Figures 7–2 through 7–4. Rigorous statistical tests of the data sets are not justified since it is known that every data point comprising each of the data sets was less than the applicable DCGL. When this occurs, the sign test will always conclude that the null hypothesis should be rejected, provided that a sufficient number of measurements have been included in the data set (i.e., actual sample size is greater than or equal to the critical sample size). Thus, risk managers can be assured that the data collected is sufficiently robust to decide that the residual surface contamination concentration in the survey units measured is below the DCGL.

7.3 Measurement Uncertainty and Data Quality Indicators

As discussed in the IV SAP (DOE 1999a), measurement uncertainty stems from two sources: field sampling variation, and instrument/laboratory measurement variation. Of the two sources, field sampling variation was noted as the greatest contributor to overall uncertainty because of the inherent logistics of sample collection and the one-of-a-kind aspect of sampling the building. The field measurement methods used in the building survey were standard Health Physics instrument techniques and were governed by approved procedures used in the field sampling process. Laboratory procedures were also utilized by the GJO Analytical Laboratory to assess the radioactivity associated with both smear samples and surface media samples. Surface media samples were weighed prior to sample preparation to minimize error due to sample mass loss during sample preparation. An additional control feature utilized to minimize variability and error in the surface media samples was to homogenize the sample by grinding the surface veneer material removed to a fine powder. In this way, any aliquot of the sample selected for analysis could be confidently expected to yield comparable results.

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As discussed in the SAP (DOE 1999a), an important activity in determining the usability of the data based on sampling is assessing the effectiveness of the sampling program (EPA 1998, EPA 1992). Data Quality Indicators (DQIs) were identified as guidelines for the DQA process to provide quantitative and qualitative measures of overall data quality and usability. For comparative purposes, Table 7–2 repeats the target DQIs from the IV SAP and summarizes the post-sampling data quality assessment.

Inspection of Table 7–2 indicates that the DQIs are achieved and the data is regarded as having sufficient quality to be useable for verification of the DCGL and for assessing the results and conclusions obtained by the Contractor.

7.4 Overall Quality Assurance and Quality Control

Based on the forgoing analysis and observed practices in the field, it is apparent that overall project QA/QC goals were obtained. The key technical features of the project included:

The DCGL derivation and SAP development processes were performed in accordance with EPA guidance for DQOs (EPA 1997 and EPA 1993).

Field operations were conducted in accordance with the SAP. Modifications to the sample locations which were either inaccessible or involved appreciable personnel safety hazards were made in accordance with the approved sample relocation procedure outlined in the SAP.

Data analysis was conducted as prescribed by the SAP and in general agreement with EPA guidance (EPA 1997 and EPA 1992).

There were no significant problems or incidents that would compromise the findings. The data collected from the building survey is regarded as useable.

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Table 7–2. Target Data Quality Indicators and Findings

DQI	Quality Objective (DOE 1999)	Significance	Action/Remark	Finding
Completeness	90 percent completeness	Less than complete data set could decrease confidence in supporting information.	Fifty-eight direct surface emission measurements of the 58 scheduled for the survey units were obtained (100 percent).	DQI accepted.
			Fifty-eight smear samples of the 58 scheduled for the survey units were collected (100 percent).	DQI accepted.
			Fourteen of the potential 29 surface media samples were collected (48 percent) in survey unit 779–21 and four were collected in survey unit 779–23 (14 percent). No other sample location met the inclusion criteria for sampling. More than 95% of the survey units were hydrolased and stripped of surface coatings. It was determined impractical to find alternate locations and additional samples were not collected. An assessment of the *a posteriori* power provided by the surface media sample data set provides evidence that the sample size of 14 for survey unit 779–21 is sufficient to be considered complete. Although the sample size of four for survey unit 779–23 is determined to be insufficient, the data set for direct static measurements provides sufficient evidence that residual contamination in and beneath the surface is less than the DCGL.	DQI accepted.
Comparability	1) Comparability between instrument efficiencies (~ ±10 percent) 2) Common or equivalent sampling procedure used. 3) Professional judgement and field observations.	Affects ability to combine data sets produced using different sampling and/or analytical methods.	No measurement data sets were combined for the independent verification of the Final Status Survey of Annex A. Consistent methods, both sampling and analytical, were used throughout the sampling and survey process.	DQI accepted.
Representativeness	Sample allocation approach followed to ensure unbiased sample location selection and spatial distribution of the sampling locations.	Non-representativeness increases or decreases Type I error depending on the bias and results in the need to collect additional samples to improve representativeness.	Sample allocation used in the field strictly followed the approach outlined in the SAP. Three of the 58 sample locations selected at random had to be relocated for personnel safety or location accessibility reasons. Each of these were relocated using the relocation protocol outlined and approved in the SAP and maintained the spatial and unbiased objectives of the sample allocation objective. Each of the 58 sample locations was selected without prior knowledge and is unbiased. The sample locations selected meet the intent of the SAP design and are considered representative of conditions in the building. There are no analytical or measurement effects (e.g., holding times or compositing effects) affecting representativeness.	DQI accepted.

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Table 7–2 (continued). Target Data Quality Indicators and Findings

DQI	Quality Objective (DOE 1999)	Significance	Action/Remark	Finding
Precision	Field and laboratory processes will be governed by procedures. Replicate and split samples are used to assess variability as an indicator of precision. < 10% difference between replicate and split samples. Overall r^2 of ≈ 0.75 or better on paired data sets. Standard error of the regression estimate (SSE ±10%).	Lack of precision affects the accuracy or confidence in the accuracy of the reported results.	All sampling, field measurement, and laboratory analysis processes were controlled by approved written procedures. Replicate direct static surface measurements made in the field showed poor precision at the low count rates encountered at most sample locations (most were below the detection limit for the method). Regression analysis on the paired data yielded a regression coefficient of determination of 0.39 and a standard error estimate of 6.15%. The target r^2 of ≈ 0.75 indicated in the SAP was established with the assumption that residual contamination would be greater than background and will be changed to reflect actual field conditions at or near background. Field instrument response checks and laboratory control standards and continuing calibration verification measurements demonstrated the precision of the laboratory analytical methods showing less than 10% error when control samples were measured more than once. Caution must be exercised when attempting to measure precision on replicate measurements with activity near and below the detection limit. Statistical variability at near zero activity limits the likelihood that measurements results will be precise even when sampling and analytical methods are in fact precise and suitable at concentrations approaching the DCGL. Overall sampling variability is another measure of precision. Quantitative metrics describing measurement precision are all acceptable. CV's range from 0.42 to 0.97 and the CI_{95} for each data set was more than 50% below the applicable DCGL.	DQI accepted.
Accuracy	Field and laboratory processes will be governed by procedures. Response to samples containing known amounts of radioactivity should be within ±10%. QC Blank samples should return results below detection limit. QC spike samples should return results indicating the presence of the radioactivity of interest.	Accuracy is affected by bias and precision. A lack of accuracy can affect Type I and Type II errors depending on the bias.	All procedures were implemented. Spikes and Blanks returned expected results. Responses to samples (or sources) containing known amounts of radioactivity were consistently within ±10% for every analytical measurement method used. Field responses to a low-level source containing a known amount of radioactivity were consistently within the acceptable range of ± 20%. As shown above, precision was acceptable	DQI accepted.

CV = Coefficient of Variation CI = Confidence Interval r^2 = Coefficient of determination

8.0 Summary and Conclusions

8.1 Independent Verification Sampling and Survey

On the basis of the analysis presented in Sections 3.0 through 7.0 of this report, the IVC has demonstrated that the Annex A survey units selected for independent verification (779–21 and 779–23) have met each of the compliance benchmarks, or DCGLs. These results show that residual surface radiological contamination is well below the agreed upon benchmarks for the Building 779 Cluster Decontamination and Decommissioning Project applicable to Annex A. Table 8–1 provides a summary review of the DCGLs compared to the appropriate compliance parameter. The independent verification sampling and survey results are highly reliable and consistent with the field sampling and survey design. No unexpected results or trends are evident in the data. The sampling and survey results determined that residual radiological contamination in Annex A is very minimal and, for the most part, barely above background levels. Thus, the IVC concludes that the null hypothesis for survey units 779–21 and 779–23 (that residual radiological surface contamination exists in concentrations above the DCGLs) should be rejected.

Table 8–1. Comparison of Annex A DCGLs to Observed Compliance Parameters

Metric	Surface Radioactivity (dpm/100 cm^2)					Pass/Fail
	DCGL	Actual				
		(UCL_{95})		Maximum		
		779–21	779–23	779–21	779–23	
Mean surface contamination as measured by direct surface emission	100	25.8	17.1			Pass
Maximum surface contamination as measured by direct surface emission	300			78.6	24.7	Pass
Mean removable surface contamination	20	<5.33	<5.33			Pass
Mean total transuranic surface contamination on and beneath a surface with a surface coating as measured by surface media sample	100	7.2	2.3			Pass
Maximum total transuranic surface contamination on and beneath a surface with a surface coating as measured by surface media sample	300			34.4	1.7	Pass
Mean total uranium series surface contamination on and beneath a surface with a surface coating as measured by surface media sample	5000	86.5	66.4			Pass
Maximum total uranium series surface contamination on and beneath a surface with a surface coating as measured by surface media sample	15,000			141	48.5	Pass

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8.2 Independent Review of the Contractor's Final Status Survey Report and Conclusions

The IVC has completed a comprehensive review of the Contractor's Closeout Radiological Survey Report for Building 779, Annex A (RMRS 1999c) and concurs with the conclusion reached by the Contractor—that each survey unit in Annex A met the applicable DCGLs and that the building should be released from further radiological controls.

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9.0 References

Rocky Mountain Remediation Services, L.L.C. 1999a. *Closeout Radiological Survey Plan For the 779 Cluster*, RF/RMRS-97-123.UN, Revision 2, Golden, Colorado, December.

——, 1999b. *779 Cluster Final Survey Breakdown Structure*, Revision 0, Golden, Colorado, May.

——, 1999c. *Closeout Radiological Survey Report For Building 779*, Annex A, RF/RMRS-99-431.UN, Revision 0, Golden, Colorado, November.

——, 1998. *Statement of Work for 779 Closure Project Independent Verification Support*, prepared by Safe Sites of Colorado, L.L.C., and Rocky Mountain Remediation Services, L.L.C. for the U.S. Department of Energy Rocky Flats Field Office, Golden, Colorado, October.

——, 1997. *Decommissioning Operations Plan For The 779 Cluster Interim Measure/Interim Remedial Action*, RF/RMRS-97-085.UN, Revision 0, Golden, Colorado, October.

U.S. Department of Energy, 1999a. *Independent Verification Sampling and Analysis Plan for Building 779 Cluster*, prepared by MACTEC-ERS for the U.S. Department of Energy, Grand Junction and Rocky Flats Operations Offices, Colorado.

——, 1999b, *Sampling and Survey Report, Evaluation and Interpretation of the Residual Radiological Surface Contamination Sampling Results, Building 729,* prepared by MACTEC-ERS for the U.S. Department of Energy, Grand Junction and Rocky Flats Operations Offices, Colorado.

U.S. Environmental Protection Agency, 1998. *Guidance for Data Quality Assessment—Practical Methods for Data Analysis*, EPA QA/G-9, EPA/600/R-96/084, Office of Research and Development, Washington, DC.

——, 1997. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, EPA 402-R-97-016, Office of Air and Radiation, Washington, DC.

——, 1994. *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, EPA/600/R-96/055, Office of Research and Development, Washington, DC.

——, 1993. *Data Quality Objectives Process for Superfund*, EPA 540-R-93-071, Office of Solid Waste and Emergency Response, Washington, DC.

——, 1992. *Guidance for Data Usability in Risk Assessment*, PB 9285.7-09A, Office of Emergency and Remedial Response, Washington, DC.

——, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, EPA/540/G-89/004, Office of Emergency and Remedial Response, Washington, DC.

U.S. Nuclear Regulatory Commission, 1997. *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*, NUREG-1507, Office of Nuclear Regulatory Research, Washington, DC.

U.S. Nuclear Regulatory Commission, 1995. *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*, Draft Report for Comment, NUREG-1505, Office of Nuclear Regulatory Research, Washington, D.C.

——, 1992. *Manual for Conducting Radiological Surveys in Support of License Termination*, Draft Report for Comment, NUREG/CR-5849, Office of Nuclear Regulatory Research, Washington, D.C.

WASTREN-GJ, (updated continually). *Handbook of Analytical and Sample-Preparation Procedures, Volumes I, II, and III*, U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado.

Appendix A

Random Selection Data

Random Selection Program to Select Survey Units for IV

Five survey units are to be selected for this building.

CTRL - ALT - F9 to recalculate

Random Number Selected =	***185***
Random Number Selected =	***131***
Random Number Selected =	***218***
Random Number Selected =	***105***
Random Number Selected =	***28***

Building 779 228

Survey Unit ID#		**Class (1, 2, 3)**	**Weighting**			
779-01	(interior)	2	3	1	779-01	31
779-02	(exterior walls)	2	3	2	779-01	32
779-03	(exterior roof)	2	3	3	779-01	33
779-04		2	3	4	779-02	34
779-05		2	3	5	779-02	35
779-06		2	3	6	779-02	36
779-07		2	3	7	779-03	37
779-08		2	3	8	779-03	38
779-09		2	3	9	779-03	39
779-10		3	1	10	779-04	40
779-11		2	3	11	779-04	41
779-12		3	1	12	779-04	42
779-13		2	3	13	779-05	43
779-14		3	1	14	779-05	44
779-15		2	3	15	779-05	45
779-16		2	3	16	779-06	46
779-17		2	3	17	779-06	47
779-18		2	3	18	779-06	48
779-19		1	6	19	779-07	49
779-20		1	6	20	779-07	50
779-21		1	6	21	779-07	51
779-22		1	6	22	779-08	52
779-23		1	6	23	779-08	53
779-24		1	6	24	779-08	54
779-25		1	6	25	779-09	55
779-26		1	6	26	779-09	56
779-27		1	6	27	779-09	57
779-28		1	6	* 28	779-10	58
779-29		1	6	29	779-11	59
779-30		1	6	30	779-11	60
779-31		1	6			
779-32		1	6			
779-33		1	6			
779-34		1	6			
779-35		1	6			
779-36		1	6			

* survey unit changed to 779-17 by Contractor

P Hamilton
A. Hamilton 10/18/99

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779-37	1	6
779-38	2	3
779-39	2	3
779-40	1	6
779-41	1	6
779-42	2	3
779-43	1	6
779-44	1	6
779-45	2	3
779-46	1	6
779-47	1	6
779-48	1	6
779-49	1	6
779-50	1	6

A Samilpa
A. Samilpa 10/18/99

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779-11	61	779-21	91	779-26	121	779-31	151	779-36
779-12	62	779-21	92	779-26	122	779-31	152	779-36
779-13	63	779-21	93	779-26	123	779-31	153	779-36
779-13	64	779-21	94	779-26	124	779-31	154	779-36
779-13	65	779-21	95	779-26	125	779-31	155	779-36
779-14	66	779-21	96	779-26	126	779-31	156	779-36
779-15	67	779-22	97	779-27	127	779-32	157	779-37
779-15	68	779-22	98	779-27	128	779-32	158	779-37
779-15	69	779-22	99	779-27	129	779-32	159	779-37
779-16	70	779-22	100	779-27	*** 130	779-32	160	779-37
779-16	71	779-22	101	779-27	131	779-32	161	779-37
779-16	72	779-22	102	779-27	132	779-32	162	779-37
779-17	73	779-23	103	779-28	133	779-33	163	779-38
779-17	74	779-23	** 104	779-28	134	779-33	164	779-38
779-17	75	779-23	105	779-28	135	779-33	165	779-38
779-18	76	779-23	106	779-28	136	779-33	166	779-39
779-18	77	779-23	107	779-28	137	779-33	167	779-39
779-18	78	779-23	108	779-28	138	779-33	168	779-39
779-19	79	779-24	109	779-29	139	779-34	169	779-40
779-19	80	779-24	110	779-29	140	779-34	170	779-40
779-19	81	779-24	111	779-29	141	779-34	171	779-40
779-19	82	779-24	112	779-29	142	779-34	172	779-40
779-19	83	779-24	113	779-29	143	779-34	173	779-40
779-19	84	779-24	114	779-29	144	779-34	174	779-40
779-20	85	779-25	115	779-30	145	779-35	175	779-41
779-20	86	779-25	116	779-30	146	779-35	176	779-41
779-20	87	779-25	117	779-30	147	779-35	177	779-41
779-20	88	779-25	118	779-30	148	779-35	178	779-41
779-20	89	779-25	119	779-30	149	779-35	179	779-41
779-20	90	779-25	120	779-30	150	779-35	180	779-41

** survey unit changed to 779-21 by Contractor.
*** survey unit changed to 779-23 by Contractor.

A. Hamilton
A. Samilton 10/18/99

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181	779-42	211	779-48
182	779-42	212	779-48
183	779-42	213	779-48
**** 184	779-43	214	779-48
185	779-43	215	779-48
186	779-43	216	779-48
187	779-43	**** 217	779-49
188	779-43	218	779-49
189	779-43	219	779-49
190	779-44	220	779-49
191	779-44	221	779-49
192	779-44	222	779-49
193	779-44	223	779-50
194	779-44	224	779-50
195	779-44	225	779-50
196	779-45	226	779-50
197	779-45	227	779-50
198	779-45	228	779-50
199	779-46		
200	779-46		
201	779-46		
202	779-46		
203	779-46		
204	779-46		
205	779-47		
206	779-47		
207	779-47		
208	779-47		
209	779-47		
210	779-47		

**** survey unit changed to 779-35 by Contractor.
**** survey unit changed to 779-04 by Contractor.

A. Samilgan

A. Samilgan 10/18/99

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Random Selection Program to Select Survey Start Point

Random Start Number Selected = 53

CTRL - ALT - F9 to recalculate

Building #	**779**
Survey Unit ID#	**779-21**
Class (1, 2, 3)	**1**
# of Potential Sample Locations	**188**
Total Number of Samples Required	**29**
Sample Frequency	**6.5**

Random Selection Program to Select Survey Start Point

Random Start Number Selected = 5

CTRL - ALT - F9 to recalculate

Building #	**779**
Survey Unit ID#	**779-23**
Class (1, 2, 3)	**1**
# of Potential Sample Locations	**65**
Total Number of Samples Required	**29**
Sample Frequency	**2**

///

Appendix B

Manufacturer's Certification

AEA Technology
QSA Inc.
40 North Avenue
Burlington, MA 01803
Telephone (781) 272-2000
Telephone (800) 815-1383
Facsimile (781) 273-2216

CERTIFICATE OF CONFORMANCE

TO: MACTEC-ERS, LLC
For the U.S. DoE
2597 B-3/4 Road
Grand Junction, CO 81503

This is to certify that the items listed below, which were ordered against purchase order number 21764, meet AEA Technology QSA Inc's catalogue specifications and that they comply with the requirements specified in the purchase order. AEA Technology QSA Inc certifies that all materials were produced and controlled in accordance with our documented Quality Assurance Program.

Item No.	Quantity	Product Code	Description	Serial No.
1	1	PIR07012	Pu-239 Anodized aluminum source, AD-100x150mm, OD-120x170mm, NIST traceable*, Overall uncertainty +/-6% at 95% confidence level	GM-785

*Calibration test records are on file in our measurement laboratory and are available for contractor's review, if required.

Ross Jones
Technical Sales Manager

13th April 1999

DEUTSCHER KALIBRIERDIENST **DKD**

Kalibrierlaboratorium für Meßgrößen der Radioaktivität
Calibration laboratory for measurements of radioactivity

AKKREDITIERT DURCH DIE
PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB)

AEA Technology QSA GmbH
Postfach 58 42 Gieselweg 1
D-38049 Braunschweig D-38110 Braunschweig

Tel. +49 (0) 5307 932-0
Fax +49 (0) 5307 932-194

Source no. GM 785

05872
DKD-K-06501
99-03

Kalibrierzeichen
Calibration mark

Kalibrierschein
Calibration Certificate

Gegenstand *Object*	**Alpha Wide Area Reference Source**
Hersteller *Manufacturer*	**AEA Technology QSA GmbH**
Typ *Type*	**PIR07012**
Strahler-Nr. *Source number*	**GM 785**
Auftraggeber *Customer*	**AEA Technology QSA, Inc. USA-Burlington, MA 01803**
Auftragsnummer *Order No.*	**110746**
Anzahl der Seiten des Kalibrierscheines *Number of pages of the certificate*	**2**
Referenzdatum *Reference date*	**23 February 1999**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Der Deutsche Kalibrierdienst ist Unterzeichner des multilateralen Übereinkommens der European cooperation for Accreditation of Laboratories (EAL) zur gegenseitigen Anerkennung der Kalibrierscheine.

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).

The Deutscher Kalibrierdienst is signatory to the multilateral agreement of the European cooperation for Accreditation of Laboratories (EAL) for the mutual recognition of calibration certificates.

The user is obliged to have the object recalibrated at appropriate intervals.

Stempel *Seal*	Datum *Date*	Leiter des Kalibrierlaboratoriums *Head of the calibration laboratory*	Stellvertreter *Deputy*	Bearbeiter *Person in charge*
Deutscher Kalibrierdienst DKD-K-06501	1 March 1999	Dr. Thieme	Schott	Linke / Schott / Schüler

Appendix C

Analytical Laboratory Reports
Requisition Number 16821
Requisition Number 16822

ANALYTICAL REPORT

TO: JEFF LIVELY

PROJECT: 342303001

DATE: Monday, November 8, 1999

REQUISITION(S): 16821

PREPARED BY:

GRAND JUNCTION OFFICE ANALYTICAL LABORATORY
2597 B 3/4 ROAD
GRAND JUNCTION, COLORADO 81503
(970-248-6165)

ANALYTICAL REPORT INDEX

This report is the final data package for Requisition 16821 generated by the Analytical Laboratory for the Rocky Flats IVP project. It is the official record, and requestors are responsible for proper record-keeping in compliance with project requirements.

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Analytical Data Summary and Quality Control Summary

Section II
Radiochemical Supporting Documentation

Section III
Receiving Documentation

ANALYTICAL SUMMARY

This report contains the results for sixty-six smear samples received on October 29, 1999, under Project No. 342303001 and Requisition No. 16821.

On page 14 of Section II, the analyst notes that the envelope for sample SMR0000591 (lab ID 263362) was received empty and the envelope for sample SMR0000592 (lab ID 263363) contained two smears. Since the samples appeared to be control blanks, the analyst chose to count one as sample 263362 and the other as sample 263263. The results for both samples were below detectable levels. After counting, the smears were returned to the envelope in which they were received.

The determination of gross alpha activity was done by gas proportional counting according to the Grand Junction Office Analytical Laboratory Standard Operating Procedure (SOP) RC-8. Duplicate analysis results were obtained by counting the same sample twice.

All applicable laboratory quality control parameters were met.

RELEASE OF THE DATA CONTAINED IN THIS REPORT HAS BEEN AUTHORIZED BY THE LABORATORY MANAGER OR THE MANAGER'S DESIGNEE

for BBC 11-9-99
LABORATORY MANAGER DATE

11/9/99
PREPARED BY DATE

SAMPLE CROSS REFERENCE V2.05

GRAND JUNCTION OFFICE ANALYTICAL LABORATORY

REQUISITION(S): 16821

CUSTOMER ID	TICKET	LAB ID	CUSTOMER ID	TICKET	LAB ID
1VP0000201	SMR0000201	263332	SMR0000247	SMR0000247	263382
1VP0000202	SMR0000202	263333	SMR0000248	SMR0000248	263383
1VP0000203	SMR0000203	263334	SMR0000249	SMR0000249	263384
1VP0000204	SMR0000204	263335	SMR0000250	SMR0000250	263385
1VP0000205	SMR0000205	263336	SMR0000251	SMR0000251	263386
1VP0000206	SMR0000206	263337	SMR0000252	SMR0000252	263387
1VP0000207	SMR0000207	263338	SMR0000253	SMR0000253	263388
1VP0000208	SMR0000208	263339	SMR0000254	SMR0000254	263389
1VP0000209	SMR0000209	263340	SMR0000255	SMR0000255	263390
1VP0000210	SMR0000210	263341	SMR0000256	SMR0000256	263391
1VP0000211	SMR0000211	263342	SMR0000257	SMR0000257	263392
1VP0000212	SMR0000212	263343	SMR0000258	SMR0000258	263393
1VP0000213	SMR0000213	263344	SMR0000259	SMR0000259	263394
1VP0000214	SMR0000214	263345	SMR0000260	SMR0000260	263395
1VP0000215	SMR0000215	263346	SMR0000261	SMR0000261	263396
1VP0000216	SMR0000216	263347	SMR0000262	SMR0000262	263397
1VP0000217	SMR0000217	263348			
1VP0000218	SMR0000218	263349			
1VP0000219	SMR0000219	263350			
1VP0000220	SMR0000220	263351			
1VP0000221	SMR0000221	263352			
1VP0000222	SMR0000222	263353			
1VP0000223	SMR0000223	263354			
1VP0000224	SMR0000224	263355			
1VP0000225	SMR0000225	263356			
1VP0000226	SMR0000226	263357			
1VP0000227	SMR0000227	263358			
1VP0000228	SMR0000228	263359			
1VP0000229	SMR0000229	263360			
1VP0000594	SMR0000594	263361			
1VP0000591	SMR0000591	263362			
1VP0000592	SMR0000592	263363			
1VP0000593	SMR0000593	263364			
1VP0000595	SMR0000595	263365			
SMR0000231	SMR0000231	263366			
SMR0000232	SMR0000232	263367			
SMR0000233	SMR0000233	263368			
SMR0000234	SMR0000234	263369			
SMR0000235	SMR0000235	263370			
SMR0000236	SMR0000236	263371			
SMR0000237	SMR0000237	263372			
SMR0000238	SMR0000238	263373			
SMR0000239	SMR0000239	263374			
SMR0000240	SMR0000240	263375			
SMR0000241	SMR0000241	263376			
SMR0000242	SMR0000242	263377			
SMR0000243	SMR0000243	263378			
SMR0000244	SMR0000244	263379			
SMR0000245	SMR0000245	263380			
SMR0000246	SMR0000246	263381			

(SECTION I)

ANALYTICAL DATA SUMMARY

This section contains 73 pages, not including this page.

.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000201
Ticket ID: SMR0000201

Date: November 8, 1999
Lab ID: 263332

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/03/99	RC-8 R03

Grand Junction Office Analytical Laboratory

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000202
Ticket ID: SMR0000202

Date: November 8, 1999
Lab ID: 263333

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/03/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000203
Ticket ID: SMR0000203

Date: November 8, 1999
Lab ID: 263334

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.89	NA	DPM/SA	11/03/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000204
Ticket ID: SMR0000204

Date: November 8, 1999
Lab ID: 263335

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/03/99	RC-8 R03

.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000205
Ticket ID: SMR0000205

Date: November 8, 1999
Lab ID: 263336

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/03/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000206
Ticket ID: SMR0000206

Date: November 8, 1999
Lab ID: 263337

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/03/99	RC-8 R03

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000207
Ticket ID: SMR0000207

Date: November 8, 1999
Lab ID: 263338

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/03/99	RC-8 R03

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000208
Ticket ID: SMR0000208

Date: November 8, 1999
Lab ID: 263339

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.35	NA	DPM/SA	11/03/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/03/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000209
Ticket ID: SMR0000209

Date: November 8, 1999
Lab ID: 263340

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000210
Ticket ID: SMR0000210

Date: November 8, 1999
Lab ID: 263341

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000211
Ticket ID: SMR0000211

Date: November 8, 1999
Lab ID: 263342

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.31	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000212
Ticket ID: SMR0000212

Date: November 8, 1999
Lab ID: 263343

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000213
Ticket ID: SMR0000213

Date: November 8, 1999
Lab ID: 263344

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000214
Ticket ID: SMR0000214

Date: November 8, 1999
Lab ID: 263345

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.89	NA	DPM/SA	11/04/99	RC-8 R03

1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000215
Ticket ID: SMR0000215

Date: November 8, 1999
Lab ID: 263346

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.31	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000216
Ticket ID: SMR0000216

Date: November 8, 1999
Lab ID: 263347

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000217
Ticket ID: SMR0000217

Date: November 8, 1999
Lab ID: 263348

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000218
Ticket ID: SMR0000218

Date: November 8, 1999
Lab ID: 263349

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000219
Ticket ID: SMR0000219

Date: November 8, 1999
Lab ID: 263350

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS

(SECTION I)

Customer ID: 1VP0000220
Ticket ID: SMR0000220

Date: November 8, 1999
Lab ID: 263351

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 5, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.36	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.89	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000221
Ticket ID: SMR0000221

Date: November 8, 1999
Lab ID: 263352

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000222
Ticket ID: SMR0000222

Date: November 8, 1999
Lab ID: 263353

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.89	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000223
Ticket ID: SMR0000223

Date: November 8, 1999
Lab ID: 263354

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.89	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000224
Ticket ID: SMR0000224

Date: November 8, 1999
Lab ID: 263355

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS

(SECTION I)

Customer ID: 1VP0000225
Ticket ID: SMR0000225

Date: November 8, 1999
Lab ID: 263356

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000226
Ticket ID: SMR0000226

Date: November 8, 1999
Lab ID: 263357

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

.05

ANALYTICAL RESULTS (SECTION II)

Customer ID: 1VP0000227
Ticket ID: SMR0000227

Date: November 8, 1999
Lab ID: 263358

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000228
Ticket ID: SMR0000228

Date: November 8, 1999
Lab ID: 263359

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000229
Ticket ID: SMR0000229

Date: November 8, 1999
Lab ID: 263360

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.31	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000594
Ticket ID: SMR0000594

Date: November 8, 1999
Lab ID: 263361

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	35.82	11.34	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<12.59	NA	DPM/SA	11/04/99	RC-8 R03

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000591
Ticket ID: SMR0000591

Date: November 8, 1999
Lab ID: 263362

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.30	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000592
Ticket ID: SMR0000592

Date: November 8, 1999
Lab ID: 263363

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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1.05

ANALYTICAL RESULTS (SECTION II)

Customer ID: 1VP0000593
Ticket ID: SMR0000593

Date: November 8, 1999
Lab ID: 263364

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	25.85	9.67	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<11.64	NA	DPM/SA	11/04/99	RC-8 R03

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: 1VP0000595
Ticket ID: SMR0000595

Date: November 8, 1999
Lab ID: 263365

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	41.23	12.16	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<13.08	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000231
Ticket ID: SMR0000231

Date: November 8, 1999
Lab ID: 263366

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000232
Ticket ID: SMR0000232

Date: November 8, 1999
Lab ID: 263367

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000233
Ticket ID: SMR0000233

Date: November 8, 1999
Lab ID: 263368

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000234
Ticket ID: SMR0000234

Date: November 8, 1999
Lab ID: 263369

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000235
Ticket ID: SMR0000235

Date: November 8, 1999
Lab ID: 263370

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000236
Ticket ID: SMR0000236

Date: November 8, 1999
Lab ID: 263371

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000237
Ticket ID: SMR0000237

Date: November 8, 1999
Lab ID: 263372

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000238
Ticket ID: SMR0000238

Date: November 8, 1999
Lab ID: 263373

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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71.05

ANALYTICAL RESULTS

(SECTION I)

Customer ID: SMR0000239
Ticket ID: SMR0000239

Date: November 8, 1999
Lab ID: 263374

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000240
Ticket ID: SMR0000240

Date: November 8, 1999
Lab ID: 263375

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000241
Ticket ID: SMR0000241

Date: November 8, 1999
Lab ID: 263376

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000242
Ticket ID: SMR0000242

Date: November 8, 1999
Lab ID: 263377

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000243
Ticket ID: SMR0000243

Date: November 8, 1999
Lab ID: 263378

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000244
Ticket ID: SMR0000244

Date: November 8, 1999
Lab ID: 263379

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000245
Ticket ID: SMR0000245

Date: November 8, 1999
Lab ID: 263380

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

/1.05

ANALYTICAL RESULTS

(SECTION I)

Customer ID: SMR0000246
Ticket ID: SMR0000246

Date: November 8, 1999
Lab ID: 263381

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000247
Ticket ID: SMR0000247

Date: November 8, 1999
Lab ID: 263382

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.31	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000248
Ticket ID: SMR0000248

Date: November 8, 1999
Lab ID: 263383

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000249
Ticket ID: SMR0000249

Date: November 8, 1999
Lab ID: 263384

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000250
Ticket ID: SMR0000250

Date: November 8, 1999
Lab ID: 263385

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.32	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000251
Ticket ID: SMR0000251

Date: November 8, 1999
Lab ID: 263386

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.35	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.76	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000252
Ticket ID: SMR0000252

Date: November 8, 1999
Lab ID: 263387

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

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ANALYTICAL RESULTS

'SECTION I)

Customer ID: SMR0000253
Ticket ID: SMR0000253

Date: November 8, 1999
Lab ID: 263388

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.33	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

V1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000254
Ticket ID: SMR0000254

Date: November 8, 1999
Lab ID: 263389

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.36	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000255
Ticket ID: SMR0000255

Date: November 8, 1999
Lab ID: 263390

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

Grand Junction Office Analytical Laboratory

'1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000256
Ticket ID: SMR0000256

Date: November 8, 1999
Lab ID: 263391

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

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ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000257
Ticket ID: SMR0000257

Date: November 8, 1999
Lab ID: 263392

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.31	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.50	NA	DPM/SA	11/04/99	RC-8 R03

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000258
Ticket ID: SMR0000258

Date: November 8, 1999
Lab ID: 263393

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000259
Ticket ID: SMR0000259

Date: November 8, 1999
Lab ID: 263394

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<5.34	NA	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<8.63	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000260
Ticket ID: SMR0000260

Date: November 8, 1999
Lab ID: 263395

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	24.05	9.33	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<11.45	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: SMR0000261
Ticket ID: SMR0000261

Date: November 8, 1999
Lab ID: 263396

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	54.84	14.00	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<14.21	NA	DPM/SA	11/04/99	RC-8 R03

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Grand Junction Office Analytical Laboratory

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ANALYTICAL RESULTS

(SECTION I)

Customer ID: SMR0000262
Ticket ID: SMR0000262

Date: November 8, 1999
Lab ID: 263397

Requestor: J. LIVELY
Sample Matrix: SMEAR
Project Number: 342303001

Case: 16821
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	96.51	18.59	DPM/SA	11/04/99	RC-8 R03
Gross Beta	<17.17	NA	DPM/SA	11/04/99	RC-8 R03

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(SECTION I)

QUALITY CONTROL SUMMARY

LCS QC REPORT (SECTION I) V1.02

Lab Name: GJO Analytical Laboratory CASE: 16821

Analyte	Date	Result	Known Value	Units	Acceptance Low	Acceptance High
Gross Alpha	11/03/99	194.56	214	pCi/SA	171.20	256.80
Gross Alpha	11/04/99	210.07	214	pCi/SA	171.20	256.80
Gross Alpha	11/04/99	204.36	214	pCi/SA	171.20	256.80
Gross Alpha	11/04/99	203.95	214	pCi/SA	171.20	256.80
Gross Beta	11/03/99	226.55	230	pCi/SA	184.00	276.00
Gross Beta	11/04/99	226.45	230	pCi/SA	184.00	276.00
Gross Beta	11/04/99	224.91	230	pCi/SA	184.00	276.00
Gross Beta	11/04/99	221.76	230	pCi/SA	184.00	276.00

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory CASE: 16821

SAMPLE: 263332 (SECTION I)

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Gross Alpha	11/03/99			0.22	-0.42	DPM/SA	640.00
Gross Beta	11/03/99			0.89	-1.18	DPM/SA	1427.59

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16821

SAMPLE: 263348

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Gross Alpha	11/04/99			0.63	0.48	DPM/SA	-27.03
Gross Beta	11/04/99			-0.35	2.65	DPM/SA	260.87

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16821

SAMPLE: 263364

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Gross Alpha	11/04/99			11.64	27.66	DPM/SA	81.53
Gross Beta	11/04/99			2.28	2.83	DPM/SA	21.53

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16821

SAMPLE: 263380

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Gross Alpha	11/04/99			-0.19	1.40	DPM/SA	262.81
Gross Beta	11/04/99			0.36	-0.78	DPM/SA	542.86

COMMENTS:

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BLANKS QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16821

Analyte	Date	Calibration Blanks Result	Units	Result	Units	Prep Blank Result	Units
Gross Alpha	11/03/99					0.22	pCi/SA
Gross Alpha	11/04/99					-0.19	pCi/SA
Gross Beta	11/03/99					0.60	pCi/SA
Gross Beta	11/04/99					0.65	pCi/SA

COMMENTS:

(SECTION II)

RADIOCHEMICAL

SUPPORTING DOCUMENTATION

Requisition No. 16821

The following section contains the analytical supporting documentation for the radiochemical analyses performed on this request. Commonly used laboratory codes in this section include:

PROCEDURE:

RC-8: Gross Alpha/Beta Analysis

QUALITY CONTROL PREFIXES

PB:	Blank
LCS:	Laboratory Control Sample
CCV:	Continuing Calibration Verification

This section contains 41 pages numbered 1 through 41.

Determination of Gross Alpha & Gross Beta

Worklist ID: 99116163

Chemist ID: G40349 — 11-04-99

Req #	Sample ID	#	Alpha Results: Activity (pCi/SA)	Alpha: Uncert. +/-	Alpha: MDA	Alpha: Gross Counts	Alpha: Net Counts	Alpha: Reference Date	Beta Results: Activity (pCi/SA)	Beta: Uncert. +/-	Beta: MDA	Beta: Gross Counts	Beta: Net Counts	Beta: Reference Date	Count Time (min.)	Start Count Date	Start Count Time
	PB	1	0.22	0.97	2.40	1	0.5	11/03/99	0.60	2.02	3.89	7	2.0	11/03/99	6.0	11/03/99	22:46
	LCS	2	194.56	18.23	3.39	478	476.6	11/03/99	226.55	24.08	22.35	585	489.1	07/06/81	6.0	11/03/99	22:52
16821	263332	3	0.22	0.97	2.40	1	0.5	11/03/99	0.89	2.10	3.89	8	3.0	11/03/99	6.0	11/03/99	22:59
16821	263332D	4	-0.19	0.54	2.39	0	-0.5	11/03/99	-0.53	1.63	3.83	3	-1.8	11/03/99	6.0	11/03/99	23:09
16821	263333	5	0.63	1.26	2.41	2	1.5	11/03/99	1.14	2.19	3.95	9	3.8	11/03/99	6.0	11/03/99	23:16
16821	263334	6	1.03	1.49	2.40	3	2.5	11/03/99	0.78	2.13	4.00	8	2.6	11/03/99	6.0	11/03/99	23:22
16821	263335	7	0.22	0.97	2.40	1	0.5	11/03/99	0.60	2.02	3.89	7	2.0	11/03/99	6.0	11/03/99	23:28
16821	263336	8	0.63	1.26	2.40	2	1.5	11/03/99	0.84	2.11	3.95	8	2.8	11/03/99	6.0	11/03/99	23:35
16821	263337	9	0.63	1.26	2.40	2	1.5	11/03/99	0.54	2.03	3.95	7	1.8	11/03/99	6.0	11/03/99	23:41
16821	263338	10	-0.19	0.54	2.40	0	-0.5	11/03/99	0.06	1.82	3.83	5	0.2	11/03/99	6.0	11/03/99	23:47
16821	263339	11	0.22	0.97	2.41	1	0.5	11/02/99	1.49	2.25	3.89	10	5.0	11/02/99	6.0	11/03/99	23:54
16821	263340	12	0.22	0.97	2.40	1	0.5	11/03/99	0.60	2.02	3.89	7	2.0	11/03/99	6.0	11/04/99	00:00
16821	263341	13	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.24	1.73	3.83	4	-0.8	11/04/99	6.0	11/04/99	00:07
16821	263342	14	0.63	1.25	2.39	2	1.5	11/04/99	-0.65	1.66	3.95	3	-2.2	11/04/99	6.0	11/04/99	00:13
16821	263343	15	0.22	0.97	2.40	1	0.5	11/04/99	0.30	1.93	3.89	6	1.0	11/04/99	6.0	11/04/99	00:19
16821	263344	16	0.22	0.97	2.40	1	0.5	11/04/99	0.60	2.02	3.89	7	2.0	11/04/99	6.0	11/04/99	00:26
16821	263345	17	1.04	1.49	2.40	3	2.5	11/04/99	0.19	1.96	4.00	6	0.6	11/04/99	6.0	11/04/99	00:32
16821	263346	18	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.53	1.63	3.83	3	-1.8	11/04/99	6.0	11/04/99	00:38
16821	263347	19	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	00:45
	CCV	20	1039.40	49.09	7.58	2498	2487.0	04/01/85	2049.19	69.53	37.52	6198	5717.1	02/01/92	6.0	11/04/99	00:51
		21															
		22															
		23															
		24															
		25															
		26															
		27															
		28															
		29															
		30															
		31															
		32															

Sample prep. procedure: RC8 R03
Analysis procedure: RC-8 R03
Date of sample prep.: 11/03/99

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Calibration Data

	Alpha	Beta
Efficiency:	0.1839	0.2528
RSD (%):	2.06	1.50
N:	6	6
**Uncertainty (%):	2.00	1.49
Background CPM:	0.077	0.81
Count time of background (min):	60.0	60.0
Halflife for decay correction(y):	432.7	28.6
Crosstalk (%):	0.17	19.06

** Uncertainty of the calibration standard activity.

Uncertainty is calculated with 1.96 sigma.
MDA is Minimal Detectable Activity.

CCV is #10 calibration
CCV α recovery
$= \frac{1039}{1000} = 103.9\%$
CCV β recovery
$= \frac{2049}{2010} = 101.9\%$

Calculations by: GABAF v1

Supervisor Review: 11/5/99
Q.C. Review: 11/5/99
SP 11/8/99

CHECKED

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		Alpha results in pCi			Alpha results in dpm			Beta results in pCi			Beta results in dpm		
		Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA	Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA
263332	3	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263332D	4	-0.19	0.54	2.39	-0.42	1.20	5.31	-0.53	1.63	3.83	-1.18	3.61	8.50
263333	5	0.63	1.26	2.41	1.39	2.79	5.34	1.14	2.19	3.95	2.52	4.87	8.76
263334	6	1.03	1.49	2.40	2.30	3.31	5.34	0.78	2.13	4.00	1.74	4.72	8.89
263335	7	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263336	8	0.63	1.26	2.40	1.39	2.79	5.34	0.84	2.11	3.95	1.86	4.69	8.76
263337	9	0.63	1.26	2.40	1.39	2.79	5.33	0.54	2.03	3.95	1.20	4.51	8.76
263338	10	-0.19	0.54	2.40	-0.42	1.21	5.32	0.06	1.82	3.83	0.13	4.04	8.50
263339	11	0.22	0.97	2.41	0.48	2.15	5.35	1.49	2.25	3.89	3.31	5.00	8.63
263340	12	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263341	13	-0.19	0.54	2.39	-0.42	1.21	5.32	-0.24	1.73	3.83	-0.52	3.83	8.50
263342	14	0.63	1.25	2.39	1.40	2.79	5.31	-0.65	1.66	3.95	-1.44	3.70	8.76
263343	15	0.22	0.97	2.40	0.49	2.15	5.33	0.30	1.93	3.89	0.67	4.28	8.63
263344	16	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263345	17	1.04	1.49	2.40	2.30	3.31	5.33	0.19	1.96	4.00	0.42	4.36	8.89
263346	18	-0.19	0.54	2.39	-0.42	1.20	5.31	-0.53	1.63	3.83	-1.18	3.61	8.50
263347	19	-0.19	0.55	2.40	-0.42	1.21	5.33	0.36	1.91	3.83	0.79	4.25	8.50

Values in dpm were calculated by multiplying pCi values by 2.22

(SECTION II)

Gross Alpha & Gross Beta

(SECTION II)

3

Worklist ID: 99116163
Instrument: CAN2404
Sample Type: SWIPE

Chemist: Stephen L. Bu 11/3/99

#	Req #	Sample ID		Control Acceptance Range	Comments
1		PB			
2		LCS **		ALPHA: 169.2 - 245.1; BETA: 187.0 - 253.0	
3	16821	263332			
4	16821	263332D			The duplicate was created by simply counting the same sample twice.
5	16821	2623333			
6	16821	2623334			
7	16821	2623335			
8	16821	2623336			
9	16821	2623337			
10	16821	2623338			
11	16821	2623339			
12	16821	2623340			
13	16821	2623341			
14	16821	2623342			
15	16821	2623343			
16	16821	2623344			
17	16821	2623345			
18	16821	2623346			
19	16821	2623347			
20		CCV 3 RRB 11-3-99		ALPHA: 900 - 1100; BETA: 1809 - 2211	
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

Additional Comments:

Sample Prep Procedure: RC8 R03
Analysis Procedure: RC-8 R03

Date of sample prep: 11-03-1999

** LCS = 5.0 mL of LCSWR24, known values: alpha 214, beta 230.

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WORKLIST99116163

PROGRAM NAME: GRB1

SAMPLE #:3. COLLECT TIME:6.00 PB
22:52:18,11-03-1999

ALPHA RESULT: .27 +/- 0 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- 0

BETA RESULT: 1.56 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- 0

SAMPLE #:4. COLLECT TIME:6.00 LCS
22:58:40,11-03-1999

ALPHA RESULT: 130.02 +/- 0 pCi
ALPHA GROSS COUNT: 478.
ALPHA NET COUNT: 79.66 +/- 0

BETA RESULT: 131.10 pCi
BETA GROSS COUNT: 585.
BETA NET COUNT: 97.50 +/- 0

SAMPLE #:5. COLLECT TIME:6.00 263332
23:05:02,11-03-1999

ALPHA RESULT: .27 +/- 0 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- 0

BETA RESULT: 1.79 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.33 +/- 0

PROGRAM NAME: GRB2

SAMPLE #:5. COLLECT TIME:6.00 263332-D
23:15:43,11-03-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.49 pCi
BETA GROSS COUNT: 3.
BETA NET COUNT: .50 +/- .57

SAMPLE #:6. COLLECT TIME:6.00 263333
23:22:05,11-03-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 4.40 pCi
BETA GROSS COUNT: 9.
BETA NET COUNT: 1.47 +/- 1.00

SAMPLE #:7. COLLECT TIME:6.00 263334
23:28:27,11-03-1999

ALPHA RESULT: 1.81 +/- 2.09 pCi
ALPHA GROSS COUNT: 3.
ALPHA NET COUNT: .50 +/- .57

BETA RESULT: 3.87 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.29 +/- .94

SAMPLE #:8. COLLECT TIME:6.00 263335
23:34:49,11-03-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:9. COLLECT TIME:6.00 263336
23:41:12,11-03-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.90 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.30 +/- .94

SAMPLE #:10. COLLECT TIME:6.00 263337
23:47:34,11-03-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.41 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.14 +/- .88

SAMPLE #:11. COLLECT TIME:6.00 263338
23:53:56,11-03-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.48 pCi
BETA GROSS COUNT: 5.
BETA NET COUNT: .83 +/- .74

SAMPLE #:12. COLLECT TIME:6.00 263339
00:00:18,11-03-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 4.93 pCi
BETA GROSS COUNT: 10.
BETA NET COUNT: 1.65 +/- 1.05

SAMPLE #:13. COLLECT TIME:6.00 263340
00:06:40,11-03-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:14. COLLECT TIME:6.00 263341
00:13:02,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.99 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .66 +/- .66

SAMPLE #:15. COLLECT TIME:6.00 263342
00:19:24,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 1.42 pCi
BETA GROSS COUNT: 3.
BETA NET COUNT: .47 +/- .57

SAMPLE #:16. COLLECT TIME:6.00 263343
00:25:46,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 2.94 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: .98 +/- .81

SAMPLE #:17. COLLECT TIME:6.00 263344
00:32:08,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:18. COLLECT TIME:6.00 263345
00:38:30,11-04-1999

ALPHA RESULT: 1.81 +/- 2.09 pCi
ALPHA GROSS COUNT: 3.
ALPHA NET COUNT: .50 +/- .57

BETA RESULT: 2.87 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: .96 +/- .81

SAMPLE #:19. COLLECT TIME:6.00 263346
00:44:52,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.49 pCi
BETA GROSS COUNT: 3.
BETA NET COUNT: .50 +/- .57

SAMPLE #:20. COLLECT TIME:6.00 263347
00:51:14,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.98 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- .81

SAMPLE #:21. COLLECT TIME:6.00 CCV
00:57:36,11-04-1999

ALPHA RESULT: 1508.45 +/- 60.36 pCi
ALPHA GROSS COUNT: 2498.
ALPHA NET COUNT: 416.33 +/- 16.66

BETA RESULT: 2994.10 pCi
BETA GROSS COUNT: 6198.
BETA NET COUNT: 1003.02 +/- 26.26

Alpha & Beta Efficiency Calibration

(SECTION II)

Instrument: **CAN2404**

Chemist: 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	Am-241	Isotope(s):	Sr-90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	12/15/92	Reference Date:	02/01/92
Half-life:	432.7 years	Half-life:	28.6 years

Alpha Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Alpha Standard Activity (pCi)	Efficiency
1	1.00	24823	24713.6	989.0	0.1876
2	1.00	24849	24739.4	989.0	0.1878
3	1.00	23633	23527.6	989.0	0.1786
4	1.00	24224	24116.4	989.0	0.1831
5	1.00	23897	23790.0	989.0	0.1806
6	1.00	24571	24463.0	989.0	0.1857
7					
8					
9					
10					
				Average =	**0.1839**
				% RSD =	2.06
				N =	6

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Beta into Alpha: 0.17 %

Beta Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Beta Standard Activity (pCi)	Efficiency
1	1.00	61708	56928.8	1665.4	0.2566
2	1.00	61811	57026.8	1665.4	0.2571
3	1.00	59313	54760.6	1665.4	0.2469
4	1.00	60619	55953.9	1665.4	0.2522
5	1.00	60276	55673.3	1665.4	0.2510
6	1.00	60875	56143.8	1665.4	0.2531
7					
8					
9					
10					
				Average =	**0.2528**
				% RSD =	1.50
				N =	6

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Alpha into Beta: 19.06 %

Calculations by Excel: GABAF v1

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	~~Am-241~~	Isotope(s):	Sr.90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	2-15-92	Reference Date:	2/1/92
Half-life:	432.7 years	Half-life:	28.6 years

#	Aliquot Size (mL)	Alpha Gross Counts	Beta Gross Counts	Comments
1	1.00	24823	~~24713~~ 61708	IRB 11.4.99
2	"	24849	61811	
3	"	23633	59313	
4	"	24224	60619	
5	"	23897	60276	
6	"	24571	60875	
7				
8				
9				
10				

Alpha

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Beta into Alpha: 0.17 %

Beta

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Alpha into Beta: 19.06 %

Additional Comments:

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Determination of Gross Alpha & Gross Beta

Worklist ID: 99116164

Chemist ID: G40349 — 11-04-99

Req #	Sample ID	#	Alpha Results: Activity (pCi/SA)	Alpha: Uncert. +/-	Alpha: MDA	Alpha: Gross Counts	Alpha: Net Counts	Alpha: Reference Date	Beta Results: Activity (pCi/SA)	Beta: Uncert. +/-	Beta: MDA	Beta: Gross Counts	Beta: Net Counts	Beta: Reference Date	Count Time (min.)	Start Count Date	Start Count Time
	PB	1	0.63	1.26	2.39	2	1.5	11/04/99	-0.35	1.76	3.95	4	-1.2	11/04/99	6.0	11/04/99	10:26
	LCS	2	210.07	19.00	3.40	516	514.5	11/04/99	226.45	24.33	23.13	592	488.9	07/06/81	6.0	11/04/99	10:32
16821	263348	3	0.63	1.26	2.39	2	1.5	11/04/99	-0.35	1.76	3.95	4	-1.2	11/04/99	6.0	11/04/99	10:39
16821	263348D	4	0.22	0.97	2.41	1	0.5	11/04/99	1.19	2.18	3.89	9	4.0	11/04/99	6.0	11/04/99	10:50
16821	263349	5	0.22	0.97	2.40	1	0.5	11/04/99	0.60	2.02	3.89	7	2.0	11/04/99	6.0	11/04/99	10:56
16821	263350	6	0.63	1.26	2.40	2	1.5	11/04/99	0.54	2.03	3.95	7	1.8	11/04/99	6.0	11/04/99	11:02
16821	263351	7	1.03	1.49	2.41	3	2.5	11/04/99	1.97	2.43	4.00	12	6.6	11/04/99	6.0	11/04/99	11:09
16821	263352	8	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.24	1.73	3.83	4	-0.8	11/04/99	6.0	11/04/99	11:15
16821	263353	9	1.04	1.49	2.40	3	2.5	11/04/99	-0.11	1.87	4.00	5	-0.4	11/04/99	6.0	11/04/99	11:21
16821	263354	10	1.03	1.49	2.40	3	2.5	11/04/99	0.78	2.13	4.00	8	2.6	11/04/99	6.0	11/04/99	11:28
16821	263355	11	0.63	1.26	2.40	2	1.5	11/04/99	0.84	2.11	3.95	8	2.8	11/04/99	6.0	11/04/99	11:34
16821	263356	12	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	11:40
16821	263357	13	0.63	1.26	2.40	2	1.5	11/04/99	0.54	2.03	3.95	7	1.8	11/04/99	6.0	11/04/99	11:47
16821	263358	14	0.22	0.97	2.39	1	0.5	11/04/99	-0.29	1.74	3.89	4	-1.0	11/04/99	6.0	11/04/99	11:53
16821	263359	15	0.63	1.26	2.40	2	1.5	11/04/99	0.54	2.03	3.95	7	1.8	11/04/99	6.0	11/04/99	12:00
16821	263360	16	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.83	1.52	3.83	2	-2.8	11/04/99	6.0	11/04/99	12:06
16821	263361	17	16.13	5.11	2.43	40	39.5	11/04/99	1.66	3.21	5.67	18	5.6	11/04/99	6.0	11/04/99	12:12
16821	* 263362	18	0.22	0.97	2.39	1	0.5	11/04/99	-1.18	1.42	3.89	1	-4.0	11/04/99	6.0	11/04/99	12:19
16821	* 263363	19	-0.19	0.55	2.41	0	-0.5	11/04/99	1.25	2.16	3.83	9	4.2	11/04/99	6.0	11/04/99	12:25
	CCV	20	1060.30	49.73	7.57	2548	2537.0	04/01/85	2043.34	69.48	37.88	6191	5700.6	02/01/92	6.0	11/04/99	12:31
		21															
		22															
		23															
		24															
		25															
		26															
		27															
	*See attached comments.	28															
		29															
		30															
		31															
		32															

Sample prep. procedure: RC8 R03
Analysis procedure: RC-8 R03
Date of sample prep.: 11/04/99

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Calibration Data

	Alpha	Beta
Efficiency:	0.1839	0.2528
RSD (%):	2.06	1.50
N:	6	6
**Uncertainty (%):	2.00	1.49
Background CPM:	0.077	0.81
Count time of background (min):	60.0	60.0
Halflife for decay correction(y):	432.7	28.6
Crosstalk (%):	0.17	19.06

** Uncertainty of the calibration standard activity.

Uncertainty is calculated with 1.96 sigma.
MDA is Minimal Detectable Activity.

CCV is #1 of calibration.

CCV α recovery
$= \frac{1060}{1000} = 106.0\%$

CCV β recovery
$= \frac{2043}{2010} = 101.6\%$

Calculations by: GABAF v1

Supervisor Review: 11/5/99

Q.C. Review: S.E. Ball 11/5/99
SR 11/9/99

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ORIGINAL

		Alpha results in pCi			Alpha results in dpm			Beta results in pCi			Beta results in dpm		
		Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA	Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA
263348	3	0.63	1.26	2.39	1.40	2.79	5.32	-0.35	1.76	3.95	-0.78	3.91	8.76
263348D	4	0.22	0.97	2.41	0.48	2.15	5.34	1.19	2.18	3.89	2.65	4.83	8.63
263349	5	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263350	6	0.63	1.26	2.40	1.39	2.79	5.33	0.54	2.03	3.95	1.20	4.51	8.76
263351	7	1.03	1.49	2.41	2.29	3.31	5.36	1.97	2.43	4.00	4.37	5.39	8.89
263352	8	-0.19	0.54	2.39	-0.42	1.21	5.32	-0.24	1.73	3.83	-0.52	3.83	8.50
263353	9	1.04	1.49	2.40	2.30	3.31	5.32	-0.11	1.87	4.00	-0.24	4.16	8.89
263354	10	1.03	1.49	2.40	2.30	3.31	5.34	0.78	2.13	4.00	1.74	4.72	8.89
263355	11	0.63	1.26	2.40	1.39	2.79	5.34	0.84	2.11	3.95	1.86	4.69	8.76
263356	12	-0.19	0.55	2.40	-0.42	1.21	5.33	0.36	1.91	3.83	0.79	4.25	8.50
263357	13	0.63	1.26	2.40	1.39	2.79	5.33	0.54	2.03	3.95	1.20	4.51	8.76
263358	14	0.22	0.97	2.39	0.49	2.15	5.32	-0.29	1.74	3.89	-0.65	3.87	8.63
263359	15	0.63	1.26	2.40	1.39	2.79	5.33	0.54	2.03	3.95	1.20	4.51	8.76
263360	16	-0.19	0.54	2.39	-0.41	1.20	5.31	-0.83	1.52	3.83	-1.84	3.37	8.50
263361	17	16.13	5.11	2.43	35.82	11.34	5.39	1.66	3.21	5.67	3.68	7.13	12.59
263362	18	0.22	0.97	2.39	0.49	2.14	5.30	-1.18	1.42	3.89	-2.63	3.16	8.63
263363	19	-0.19	0.55	2.41	-0.43	1.22	5.34	1.25	2.16	3.83	2.77	4.80	8.50

Values in dpm were calculated by multiplying pCi values by 2.22

(SECTION II)

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Gross Alpha & Gross Beta

(SECTION II) 13

Worklist ID: 99116164
Instrument: CAN2404
Sample Type: SWIPE

Chemist: [signature] 11/4/99

#	Req #	Sample ID		Control Acceptance Range	Comments
1		PB			
2		LCS **		ALPHA: 169.2 - 245.1; BETA: 187.0 - 253.0	
3	16821	263348			
4	16821	263348D			The duplicate was created by simply counting the same sample twice.
5	16821	263349			
6	16821	263350			
7	16821	263351			
8	16821	263352			
9	16821	263353			
10	16821	263354			
11	16821	263355			
12	16821	263356			
13	16821	263357			
14	16821	263358			
15	16821	263359			
16	16821	263360			
17	16821	263361			
18	16821	263362	*		Envelope was empty!!
19	16821	263363	*		Envelope contained 2 swipes!!
20		CCV		ALPHA: 900 - 1100; BETA: 1809 - 2211	
21					
22					
23					
24					
25			*	See attached comments.	
26					
27					
28					
29					
30					
31					
32					

Additional Comments:

Sample Prep Procedure: RC8 R03
Analysis Procedure: RC-8 R03

Date of sample prep: 11-04-1999

** LCS = 5.0 mL of LCSWR24, known values: alpha 214, beta 230.

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Actual Conditions:

Req. No.: 16821
Worklist ID: 99116164
Analysis: SWIPE

The paper envelope for sample 263362 was received EMPTY and the envelope for sample 263363 was received containing two smears. It appeared that both of these smears were control blanks, so I chose one to count as sample 263362 (labeling the glassine envelope as #1) and one to count as sample 263363 (labeling the glassine envelope as #2). The samples were counted and the results for both were below detectable levels. After counting, both smears were returned to the paper envelope in which they were received.

GRB 11/4/99
Gretchen Baer, analyst

Note: Jeff is out of town from 11/3 to 11/22.

WORKLIST 99116164

PROGRAM NAME: GRB3

SAMPLE #:3. COLLECT TIME:6.00 PB
10:32:35,11-04-1999

ALPHA RESULT: .54 +/- 0 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- 0

BETA RESULT: .89 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .66 +/- 0

SAMPLE #:4. COLLECT TIME:6.00 LCS
10:38:57,11-04-1999

ALPHA RESULT: 140.35 +/- 0 pCi
ALPHA GROSS COUNT: 516.
ALPHA NET COUNT: 86.00 +/- 0

BETA RESULT: 132.66 pCi
BETA GROSS COUNT: 592.
BETA NET COUNT: 98.66 +/- 0

SAMPLE #:5. COLLECT TIME:6.00 263348
10:45:19,11-04-1999

ALPHA RESULT: .54 +/- 0 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- 0

BETA RESULT: .89 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .66 +/- 0

PROGRAM NAME: GRB4

SAMPLE #:5. COLLECT TIME:6.00 263348-D
10:56:01,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 4.44 pCi
BETA GROSS COUNT: 9.
BETA NET COUNT: 1.48 +/- 1.00

SAMPLE #:6. COLLECT TIME:6.00 263349
11:02:23,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:7. COLLECT TIME:6.00 263350
11:08:45,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.41 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.14 +/- .88

SAMPLE #:8. COLLECT TIME:6.00 263351
11:15:08,11-04-1999

ALPHA RESULT: 1.81 +/- 2.09 pCi
ALPHA GROSS COUNT: 3.
ALPHA NET COUNT: .50 +/- .57

BETA RESULT: 5.86 pCi
BETA GROSS COUNT: 12.
BETA NET COUNT: 1.96 +/- 1.15

SAMPLE #:9. COLLECT TIME:6.00 263352
11:21:30,11-04-1999

210

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.99 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .66 +/- .66

SAMPLE #:10. COLLECT TIME:6.00 263353
11:27:52,11-04-1999

ALPHA RESULT: 1.81 +/- 2.09 pCi
ALPHA GROSS COUNT: 3.
ALPHA NET COUNT: .50 +/- .57

BETA RESULT: 2.38 pCi
BETA GROSS COUNT: 5.
BETA NET COUNT: .79 +/- .74

SAMPLE #:11. COLLECT TIME:6.00 263354
11:34:14,11-04-1999

ALPHA RESULT: 1.81 +/- 2.09 pCi
ALPHA GROSS COUNT: 3.
ALPHA NET COUNT: .50 +/- .57

BETA RESULT: 3.87 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.29 +/- .94

SAMPLE #:12. COLLECT TIME:6.00 263355
11:40:36,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.90 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.30 +/- .94

SAMPLE #:13. COLLECT TIME:6.00 263356
11:46:59,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.98 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- .81

SAMPLE #:14. COLLECT TIME:6.00 263357
11:53:20,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.41 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.14 +/- .88

SAMPLE #:15. COLLECT TIME:6.00 263358
11:59:42,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 1.95 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .65 +/- .66

SAMPLE #:16. COLLECT TIME:6.00 263359
12:06:04,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 3.41 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.14 +/- .88

SAMPLE #:17. COLLECT TIME:6.00 263360
12:12:26,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: .99 pCi
BETA GROSS COUNT: 2.
BETA NET COUNT: .33 +/- .47

SAMPLE #:18. COLLECT TIME:6.00 263361
12:18:49,11-04-1999

ALPHA RESULT: 24.15 +/- 7.63 pCi
ALPHA GROSS COUNT: 40.
ALPHA NET COUNT: 6.66 +/- 2.10

BETA RESULT: 7.52 pCi
BETA GROSS COUNT: 18.
BETA NET COUNT: 2.52 +/- 1.42

SAMPLE #:19. COLLECT TIME:6.00 263362
12:25:11,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: .46 pCi
BETA GROSS COUNT: 1.
BETA NET COUNT: .15 +/- .33

SAMPLE #:20. COLLECT TIME:6.00 263363
12:31:33,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 4.47 pCi
BETA GROSS COUNT: 9.
BETA NET COUNT: 1.50 +/- 1.00

SAMPLE #:21. COLLECT TIME:6.00 CCV
12:37:56,11-04-1999

ALPHA RESULT: 1538.64 +/- 60.96 pCi
ALPHA GROSS COUNT: 2548.
ALPHA NET COUNT: 424.66 +/- 16.82

BETA RESULT: 2988.82 pCi
BETA GROSS COUNT: 6191.
BETA NET COUNT: 1001.25 +/- 26.25

Alpha & Beta Efficiency Calibration

Instrument: **CAN2404**

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	Am-241	Isotope(s):	Sr-90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	12/15/92	Reference Date:	02/01/92
Half-life:	432.7 years	Half-life:	28.6 years

Alpha Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Alpha Standard Activity (pCi)	Efficiency
1	1.00	24823	24713.6	989.0	0.1876
2	1.00	24849	24739.4	989.0	0.1878
3	1.00	23633	23527.6	989.0	0.1786
4	1.00	24224	24116.4	989.0	0.1831
5	1.00	23897	23790.0	989.0	0.1806
6	1.00	24571	24463.0	989.0	0.1857
7					
8					
9					
10					
				Average =	0.1839
				% RSD =	2.06
				N =	6

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Beta into Alpha: 0.17 %

Beta Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Beta Standard Activity (pCi)	Efficiency
1	1.00	61708	56928.8	1665.4	0.2566
2	1.00	61811	57026.8	1665.4	0.2571
3	1.00	59313	54760.6	1665.4	0.2469
4	1.00	60619	55953.9	1665.4	0.2522
5	1.00	60276	55673.3	1665.4	0.2510
6	1.00	60875	56143.8	1665.4	0.2531
7					
8					
9					
10					
				Average =	0.2528
				% RSD =	1.50
				N =	6

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Alpha into Beta: 19.06 %

Calculations by Excel: GABAF v1

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	~~Am-241~~	Isotope(s):	Sr.90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	2-15-92	Reference Date:	2/1/92
Half-life:	432.7 years	Half-life:	28.6 years

#	Aliquot Size (mL)	Alpha Gross Counts	Beta Gross Counts	Comments
1	1.00	24823	~~247136~~ 61708 JRB 11.4.99	
2	"	24849	61811	
3	"	23633	59313	
4	"	24224	60619	
5	"	23897	60276	
6	↓	24571	60875	
7				
8				
9				
10				

Alpha

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Beta into Alpha: 0.17 %

Beta

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Alpha into Beta: 19.06 %

Additional Comments:

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Determination of Gross Alpha & Gross Beta

Worklist ID: 99116165

Chemist ID: GA0349 Kristen K. Ba 11-04-99

Req #	Sample ID	#	Alpha Results: Activity (pCi/SA)	Alpha: Uncert. +/-	Alpha: MDA	Alpha: Gross Counts	Alpha: Net Counts	Alpha: Reference Date	Beta Results: Activity (pCi/SA)	Beta: Uncert. +/-	Beta: MDA	Beta: Gross Counts	Beta: Net Counts	Beta: Reference Date	Count Time (min.)	Start Count Date	Start Count Time
	PB	1	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	14:38
	LCS	2	204.36	18.72	3.39	502	500.6	11/04/99	224.91	24.17	22.85	586	485.5	07/06/81	6.0	11/04/99	14:45
16821	263364	3	11.64	4.36	2.43	29	28.5	11/04/99	2.28	3.10	5.24	18	7.7	11/04/99	6.0	11/04/99	14:51
16821	263364D	4	12.46	4.50	2.42	31	30.5	11/04/99	1.28	2.95	5.32	15	4.3	11/04/99	6.0	11/04/99	15:02
16821	263365	5	18.57	5.48	2.46	46	45.5	11/04/99	5.18	3.89	5.89	31	17.4	11/04/99	6.0	11/04/99	15:08
16821	263366	6	0.22	0.97	2.40	1	0.5	11/04/99	0.89	2.10	3.89	8	3.0	11/04/99	6.0	11/04/99	15:15
16821	263367	7	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	15:21
16821	263368	8	-0.19	0.55	2.40	0	-0.5	11/04/99	0.95	2.08	3.83	8	3.2	11/04/99	6.0	11/04/99	15:27
16821	263369	9	0.22	0.97	2.40	1	0.5	11/04/99	0.89	2.10	3.89	8	3.0	11/04/99	6.0	11/04/99	15:34
16821	263370	10	-0.19	0.55	2.41	0	-0.5	11/04/99	1.25	2.16	3.83	9	4.2	11/04/99	6.0	11/04/99	15:40
16821	263371	11	0.22	0.97	2.40	1	0.5	11/04/99	0.60	2.02	3.89	7	2.0	11/04/99	6.0	11/04/99	15:46
16821	263372	12	0.22	0.97	2.40	1	0.5	11/04/99	0.00	1.84	3.89	5	0.0	11/04/99	6.0	11/04/99	15:53
16821	263373	13	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	15:59
16821	263374	14	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	16:06
16821	263375	15	0.22	0.97	2.40	1	0.5	11/04/99	0.60	2.02	3.89	7	2.0	11/04/99	6.0	11/04/99	16:12
16821	263376	16	-0.19	0.55	2.40	0	-0.5	11/04/99	0.95	2.08	3.83	8	3.2	11/04/99	6.0	11/04/99	16:18
16821	263377	17	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	16:25
16821	263378	18	0.22	0.97	2.40	1	0.5	11/04/99	0.00	1.84	3.89	5	0.0	11/04/99	6.0	11/04/99	16:31
16821	263379	19	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	16:37
	CCV	20	1010.19	48.19	7.54	2428	2417.1	04/01/85	2028.98	69.02	37.01	6128	5660.4	02/01/92	6.0	11/04/99	16:44
		21															
		22															
		23															
		24															
		25															
		26															
		27															
		28															
		29															
		30															
		31															
		32															

Sample prep. procedure: RC8 R03
Analysis procedure: RC-8 R03
Date of sample prep.: 11/04/99

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Calibration Data

	Alpha	Beta
Efficiency:	0.1839	0.2528
RSD (%):	2.06	1.50
N:	6	6
**Uncertainty (%):	2.00	1.49
Background CPM:	0.077	0.81
Count time of background (min):	60.0	60.0
Halflife for decay correction(y):	432.7	28.6
Crosstalk (%):	0.17	19.06

** Uncertainty of the calibration standard activity.

Uncertainty is calculated with 1.96 sigma.
MDA is Minimal Detectable Activity.

CCV is #1 of calibration
CCV α recovery
$= \frac{1010.}{1000} = 101.0\%$

CCV β recovery
$= \frac{2029}{2010} = 100.9\%$

Calculations by: GABAF v1

Supervisor Review: AKOD 11-5-99

Q.C. Review: S.E. Ball 11/5/99

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ORIGINAL

		Alpha results in pCi			Alpha results in dpm			Beta results in pCi			Beta results in dpm		
		Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA	Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA
263364	3	11.64	4.36	2.43	25.85	9.67	5.39	2.28	3.10	5.24	5.06	6.88	11.64
263364D	4	12.46	4.50	2.42	27.66	9.99	5.37	1.28	2.95	5.32	2.83	6.55	11.82
263365	5	18.57	5.48	2.46	41.23	12.16	5.46	5.18	3.89	5.89	11.50	8.63	13.08
263366	6	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263367	7	-0.19	0.55	2.40	-0.42	1.21	5.33	0.36	1.91	3.83	0.79	4.25	8.50
263368	8	-0.19	0.55	2.40	-0.42	1.21	5.34	0.95	2.08	3.83	2.11	4.62	8.50
263369	9	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263370	10	-0.19	0.55	2.41	-0.43	1.22	5.34	1.25	2.16	3.83	2.77	4.80	8.50
263371	11	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263372	12	0.22	0.97	2.40	0.49	2.15	5.32	0.00	1.84	3.89	0.01	4.08	8.63
263373	13	-0.19	0.55	2.40	-0.42	1.21	5.33	0.65	2.00	3.83	1.45	4.44	8.50
263374	14	-0.19	0.55	2.40	-0.42	1.21	5.33	0.65	2.00	3.83	1.45	4.44	8.50
263375	15	0.22	0.97	2.40	0.48	2.15	5.33	0.60	2.02	3.89	1.33	4.47	8.63
263376	16	-0.19	0.55	2.40	-0.42	1.21	5.34	0.95	2.08	3.83	2.11	4.62	8.50
263377	17	-0.19	0.55	2.40	-0.42	1.21	5.33	0.36	1.91	3.83	0.79	4.25	8.50
263378	18	0.22	0.97	2.40	0.49	2.15	5.32	0.00	1.84	3.89	0.01	4.08	8.63
263379	19	-0.19	0.55	2.40	-0.42	1.21	5.33	0.65	2.00	3.83	1.45	4.44	8.50

Values in dpm were calculated by multiplying pCi values by 2.22

Gross Alpha & Gross Beta

(SECTION II 24

Worklist ID: 99116165
Instrument: CAN2404
Sample Type: SWIPE

Chemist: [signature] 11/4/99

#	Req #	Sample ID		Control Acceptance Range	Comments
1		PB			
2		LCS **		ALPHA: 169.2 - 245.1; BETA: 187.0 - 253.0	
3	16821	263364			
4	16821	263364D			The duplicate was created by simply counting the same sample twice.
5	16821	263365			
6	16821	263366			
7	16821	263367			
8	16821	263368			
9	16821	263369			
10	16821	263370			
11	16821	263371			
12	16821	263372			
13	16821	263373			
14	16821	263374			
15	16821	263375			
16	16821	263376			
17	16821	263377			
18	16821	263378			
19	16821	263379			
20		CCV		ALPHA: 900 - 1100; BETA: 1809 - 2211	
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

Additional Comments:

Sample Prep Procedure: RC8 R03
Analysis Procedure: RC-8 R03

Date of sample prep: 11-04-1999

** LCS = 5.0 mL of LCSWR24, known values: alpha 214, beta 230.

WORKLIST 99116165

PROGRAM NAME: GRB1

SAMPLE #:3. COLLECT TIME:6.00 PB
14:44:57,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.34 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- 0

SAMPLE #:4. COLLECT TIME:6.00 LCS
14:51:19,11-04-1999

ALPHA RESULT: 136.54 +/- 0 pCi
ALPHA GROSS COUNT: 502.
ALPHA NET COUNT: 83.66 +/- 0

BETA RESULT: 131.32 pCi
BETA GROSS COUNT: 586.
BETA NET COUNT: 97.66 +/- 0

SAMPLE #:5. COLLECT TIME:6.00 263364
14:57:42,11-04-1999

ALPHA RESULT: 7.88 +/- 0 pCi
ALPHA GROSS COUNT: 29.
ALPHA NET COUNT: 4.83 +/- 0

BETA RESULT: 4.03 pCi
BETA GROSS COUNT: 18.
BETA NET COUNT: 3.00 +/- 0

PROGRAM NAME: GRB2

SAMPLE #:5. COLLECT TIME:6.00 263364.D
15:08:24,11-04-1999

ALPHA RESULT: 18.71 +/- 6.72 pCi
ALPHA GROSS COUNT: 31.
ALPHA NET COUNT: 5.16 +/- 1.85

BETA RESULT: 6.35 pCi
BETA GROSS COUNT: 15.
BETA NET COUNT: 2.12 +/- 1.29

SAMPLE #:6. COLLECT TIME:6.00 263365
15:14:46,11-04-1999

ALPHA RESULT: 27.77 +/- 8.19 pCi
ALPHA GROSS COUNT: 46.
ALPHA NET COUNT: 7.66 +/- 2.26

BETA RESULT: 13.77 pCi
BETA GROSS COUNT: 31.
BETA NET COUNT: 4.61 +/- 1.86

SAMPLE #:7. COLLECT TIME:6.00 263366
15:21:08,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.94 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.32 +/- .94

SAMPLE #:8. COLLECT TIME:6.00 263367
15:27:30,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.98 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- .81

SAMPLE #:9. COLLECT TIME:6.00 263368
15:33:52,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.98 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.33 +/- .94

SAMPLE #:10. COLLECT TIME:6.00 263369
15:40:14,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.94 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.32 +/- .94

SAMPLE #:11. COLLECT TIME:6.00 263370
15:46:36,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 4.47 pCi
BETA GROSS COUNT: 9.
BETA NET COUNT: 1.50 +/- 1.00

SAMPLE #:12. COLLECT TIME:6.00 263371
15:52:58,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:13. COLLECT TIME:6.00 263372
15:59:21,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 2.45 pCi
BETA GROSS COUNT: 5.
BETA NET COUNT: .82 +/- .74

SAMPLE #:14. COLLECT TIME:6.00 263373
16:05:43,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.48 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- .88

SAMPLE #:15. COLLECT TIME:6.00 263374
16:12:05,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.48 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- .88

SAMPLE #:16. COLLECT TIME:6.00 263375
16:18:27,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.44 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.15 +/- .88

SAMPLE #:17. COLLECT TIME:6.00 263376
16:24:49,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.98 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.33 +/- .94

SAMPLE #:18. COLLECT TIME:6.00 263377
16:31:11,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.98 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- .81

SAMPLE #:19. COLLECT TIME:6.00 263378
16:37:33,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 2.45 pCi
BETA GROSS COUNT: 5.
BETA NET COUNT: .82 +/- .74

SAMPLE #:20. COLLECT TIME:6.00 263379
16:43:56,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.48 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- .88

SAMPLE #:21. COLLECT TIME:6.00 CCV
16:50:19,11-04-1999

ALPHA RESULT: 1466.18 +/- 59.51 pCi
ALPHA GROSS COUNT: 2428.
ALPHA NET COUNT: 404.66 +/- 16.42

BETA RESULT: 2962.28 pCi
BETA GROSS COUNT: 6128.
BETA NET COUNT: 992.36 +/- 26.12

Instrument: **CAN2404**

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	Am-241	Isotope(s):	Sr-90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	12/15/92	Reference Date:	02/01/92
Half-life:	432.7 years	Half-life:	28.6 years

Alpha Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Alpha Standard Activity (pCi)	Efficiency
1	1.00	24823	24713.6	989.0	0.1876
2	1.00	24849	24739.4	989.0	0.1878
3	1.00	23633	23527.6	989.0	0.1786
4	1.00	24224	24116.4	989.0	0.1831
5	1.00	23897	23790.0	989.0	0.1806
6	1.00	24571	24463.0	989.0	0.1857
7					
8					
9					
10					
				Average =	0.1839
				% RSD =	2.06
				N =	6

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Beta into Alpha: 0.17 %

Beta Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Beta Standard Activity (pCi)	Efficiency
1	1.00	61708	56928.8	1665.4	0.2566
2	1.00	61811	57026.8	1665.4	0.2571
3	1.00	59313	54760.6	1665.4	0.2469
4	1.00	60619	55953.9	1665.4	0.2522
5	1.00	60276	55673.3	1665.4	0.2510
6	1.00	60875	56143.8	1665.4	0.2531
7					
8					
9					
10					
				Average =	0.2528
				% RSD =	1.50
				N =	6

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Alpha into Beta: 19.06 %

Calculations by Excel: GABAF v1

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	~~Am-241~~	Isotope(s):	Sr.90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	2-15-92	Reference Date:	2/1/92
Half-life:	432.7 years	Half-life:	28.6 years

#	Aliquot Size (mL)	Alpha Gross Counts	Beta Gross Counts	Comments
1	1.00	24823	~~24713~~ 61708 JRB 11.4.99	
2		24849	61811	
3		23633	59313	
4		24224	60619	
5		23897	60276	
6	↓	24571	60875	
7				
8				
9				
10				

Alpha

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Beta into Alpha: 0.17 %

Beta

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Alpha into Beta: 19.06 %

Additional Comments:

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Determination of Gross Alpha & Gross Beta

Worklist ID: 99116166

Chemist ID: G40349 — Gustavo K. Bar — 11-05-99

Req #	Sample ID	#	Alpha Results: Activity (pCi/SA)	Alpha: Uncert. +/-	Alpha: MDA	Alpha: Gross Counts	Alpha: Net Counts	Alpha: Reference Date	Beta Results: Activity (pCi/SA)	Beta: Uncert. +/-	Beta: MDA	Beta: Gross Counts	Beta: Net Counts	Beta: Reference Date	Count Time (min.)	Start Count Date	Start Count Time
	PB	1	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	18:02
	LCS	2	203.95	18.70	3.38	501	499.6	11/04/99	221.76	24.04	22.83	579	478.7	07/06/81	6.0	11/04/99	18:09
16821	263380	3	-0.19	0.55	2.40	0	-0.5	11/04/99	0.36	1.91	3.83	6	1.2	11/04/99	6.0	11/04/99	18:15
16821	263380D	4	0.63	1.26	2.39	2	1.5	11/04/99	-0.35	1.76	3.95	4	-1.2	11/04/99	6.0	11/04/99	18:26
16821	263381	5	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	18:32
16821	263382	6	0.22	0.97	2.39	1	0.5	11/04/99	-0.59	1.64	3.89	3	-2.0	11/04/99	6.0	11/04/99	18:38
16821	263383	7	0.63	1.26	2.40	2	1.5	11/04/99	0.24	1.95	3.95	6	0.8	11/04/99	6.0	11/04/99	18:45
16821	263384	8	-0.19	0.54	2.40	0	-0.5	11/04/99	0.06	1.82	3.83	5	0.2	11/04/99	6.0	11/04/99	18:51
16821	263385	9	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.24	1.73	3.83	4	-0.8	11/04/99	6.0	11/04/99	18:58
16821	263386	10	0.62	1.26	2.41	2	1.5	11/04/99	1.43	2.27	3.95	10	4.8	11/04/99	6.0	11/04/99	19:04
16821	263387	11	0.22	0.97	2.40	1	0.5	11/04/99	0.89	2.10	3.89	8	3.0	11/04/99	6.0	11/04/99	19:10
16821	263388	12	-0.19	0.55	2.40	0	-0.5	11/04/99	0.65	2.00	3.83	7	2.2	11/04/99	6.0	11/04/99	19:17
16821	263389	13	-0.19	0.55	2.42	0	-0.5	11/04/99	2.44	2.46	3.83	13	8.2	11/04/99	6.0	11/04/99	19:23
16821	263390	14	-0.19	0.55	2.40	0	-0.5	11/04/99	0.95	2.08	3.83	8	3.2	11/04/99	6.0	11/04/99	19:29
16821	263391	15	0.22	0.97	2.40	1	0.5	11/04/99	0.89	2.10	3.89	8	3.0	11/04/99	6.0	11/04/99	19:36
16821	263392	16	-0.19	0.54	2.39	0	-0.5	11/04/99	-0.83	1.52	3.83	2	-2.8	11/04/99	6.0	11/04/99	19:42
16821	263393	17	0.22	0.97	2.40	1	0.5	11/04/99	0.89	2.10	3.89	8	3.0	11/04/99	6.0	11/04/99	19:48
16821	263394	18	0.22	0.97	2.41	1	0.5	11/04/99	1.19	2.18	3.89	9	4.0	11/04/99	6.0	11/04/99	19:55
16821	263395	19	10.83	4.20	2.40	27	26.5	11/04/99	-1.17	2.32	5.16	6	-3.9	11/04/99	6.0	11/04/99	20:01
16821	263396	20	24.70	6.31	2.44	61	60.5	11/04/99	1.95	3.65	6.40	23	6.6	11/04/99	6.0	11/04/99	20:08
16821	263397	21	43.47	8.37	2.47	107	106.5	11/04/99	3.80	4.63	7.74	38	12.8	11/04/99	6.0	11/04/99	20:14
	CCV	22	1045.57	49.28	7.64	2513	2501.8	04/01/85	2097.03	70.54	37.63	6334	5850.2	02/01/92	6.0	11/04/99	20:20
		23															
		24															
		25															
		26															
		27															
		28															
		29															
		30															
		31															
		32															

Sample prep. procedure: RC8 R03
Analysis procedure: RC-8 R03
Date of sample prep.: 11/04/99

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

Calibration Data

	Alpha	Beta
Efficiency:	0.1839	0.2528
RSD (%):	2.06	1.50
N:	6	6
**Uncertainty (%):	2.00	1.49
Background CPM:	0.077	0.81
Count time of background (min):	60.0	60.0
Halflife for decay correction(y):	432.7	28.6
Crosstalk (%):	0.17	19.06

** Uncertainty of the calibration standard activity.

Uncertainty is calculated with 1.96 sigma.
MDA is Minimal Detectable Activity.

CCV is #1 of calibration

CCV α recovery
$= \frac{1046}{1000} = 104.6\%$

CCV β recovery
$= \frac{2097}{2010} = 104.3\%$

Calculations by: GABAF v1

Supervisor Review: O'COAP 11-5-99

Q.C. Review: S.E. Ball 11/5/99

SECTION III

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		Alpha results in pCi			Alpha results in dpm			Beta results in pCi			Beta results in dpm		
		Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA	Activity (pCi/SA)	Uncert. +/-	MDA	Activity (dpm/SA)	Uncert. +/-	MDA
263380	3	-0.19	0.55	2.40	-0.42	1.21	5.33	0.36	1.91	3.83	0.79	4.25	8.50
263380D	4	0.63	1.26	2.39	1.40	2.79	5.32	-0.35	1.76	3.95	-0.78	3.91	8.76
263381	5	-0.19	0.55	2.40	-0.42	1.21	5.33	0.65	2.00	3.83	1.45	4.44	8.50
263382	6	0.22	0.97	2.39	0.49	2.15	5.31	-0.59	1.64	3.89	-1.31	3.65	8.63
263383	7	0.63	1.26	2.40	1.39	2.79	5.33	0.24	1.95	3.95	0.54	4.32	8.76
263384	8	-0.19	0.54	2.40	-0.42	1.21	5.32	0.06	1.82	3.83	0.13	4.04	8.50
263385	9	-0.19	0.54	2.39	-0.42	1.21	5.32	-0.24	1.73	3.83	-0.52	3.83	8.50
263386	10	0.62	1.26	2.41	1.39	2.79	5.35	1.43	2.27	3.95	3.18	5.03	8.76
263387	11	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263388	12	-0.19	0.55	2.40	-0.42	1.21	5.33	0.65	2.00	3.83	1.45	4.44	8.50
263389	13	-0.19	0.55	2.42	-0.43	1.23	5.36	2.44	2.46	3.83	5.41	5.45	8.50
263390	14	-0.19	0.55	2.40	-0.42	1.21	5.34	0.95	2.08	3.83	2.11	4.62	8.50
263391	15	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263392	16	-0.19	0.54	2.39	-0.41	1.20	5.31	-0.83	1.52	3.83	-1.84	3.37	8.50
263393	17	0.22	0.97	2.40	0.48	2.15	5.34	0.89	2.10	3.89	1.99	4.66	8.63
263394	18	0.22	0.97	2.41	0.48	2.15	5.34	1.19	2.18	3.89	2.65	4.83	8.63
263395	19	10.83	4.20	2.40	24.05	9.33	5.33	-1.17	2.32	5.16	-2.60	5.16	11.45
263396	20	24.70	6.31	2.44	54.84	14.00	5.41	1.95	3.65	6.40	4.34	8.11	14.21
263397	21	43.47	8.37	2.47	96.51	18.59	5.49	3.80	4.63	7.74	8.45	10.27	17.17

Values in dpm were calculated by multiplying pCi values by 2.22

(SECTION II)

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Gross Alpha & Gross Beta

(SECTION II) 34

Worklist ID: 99116166
Instrument: CAN2404
Sample Type: SWIPE

Chemist: Gretchen R. Bar 11/4/99

#	Req #	Sample ID		Control Acceptance Range	Comments
1		PB			
2		LCS **		ALPHA: 169.2 - 245.1; BETA: 187.0 - 253.0	
3	16821	263380			
4	16821	263380D			The duplicate was created by simply counting the same sample twice.
5	16821	263381			
6	16821	263382			
7	16821	263383			
8	16821	263384			
9	16821	263385			
10	16821	263386			
11	16821	263387			
12	16821	263388			
13	16821	263389			
14	16821	263390			
15	16821	263391			
16	16821	263392			
17	16821	263393			
18	16821	263394			
19	16821	263395			
20	16821	263396			
21	16821	263397			
22		CCV		ALPHA: 900 - 1100; BETA: 1809 - 2211	
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

Additional Comments:

Sample Prep Procedure: RC8 R03
Analysis Procedure: RC-8 R03

Date of sample prep: 11-04-1999

** LCS = 5.0 mL of LCSWR24, known values: alpha 214, beta 230.

WORKLIST 99116166

PROGRAM NAME: GRB3

SAMPLE #:3. COLLECT TIME:6.00 PB
18:08:43,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.56 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- 0

SAMPLE #:4. COLLECT TIME:6.00 LCS
18:15:05,11-04-1999

ALPHA RESULT: 136.27 +/- 0 pCi
ALPHA GROSS COUNT: 501.
ALPHA NET COUNT: 83.50 +/- 0

BETA RESULT: 129.75 pCi
BETA GROSS COUNT: 579.
BETA NET COUNT: 96.50 +/- 0

SAMPLE #:5. COLLECT TIME:6.00 263380
18:21:27,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.34 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: 1.00 +/- 0

PROGRAM NAME: GRB4

SAMPLE #:5. COLLECT TIME:6.00 263380-D
18:32:09,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 1.91 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .64 +/- .66

SAMPLE #:6. COLLECT TIME:6.00 263381
18:38:32,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.48 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- .88

SAMPLE #:7. COLLECT TIME:6.00 263382
18:44:54,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 1.45 pCi
BETA GROSS COUNT: 3.
BETA NET COUNT: .48 +/- .57

SAMPLE #:8. COLLECT TIME:6.00 263383
18:51:16,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 2.91 pCi
BETA GROSS COUNT: 6.
BETA NET COUNT: .97 +/- .81

SAMPLE #:9. COLLECT TIME:6.00 263384
18:57:38,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 2.48 pCi
BETA GROSS COUNT: 5.
BETA NET COUNT: .83 +/- .74

SAMPLE #:10. COLLECT TIME:6.00 263385
19:04:00,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 1.99 pCi
BETA GROSS COUNT: 4.
BETA NET COUNT: .66 +/- .66

SAMPLE #:11. COLLECT TIME:6.00 263386
19:10:22,11-04-1999

ALPHA RESULT: 1.20 +/- 1.70 pCi
ALPHA GROSS COUNT: 2.
ALPHA NET COUNT: .33 +/- .47

BETA RESULT: 4.90 pCi
BETA GROSS COUNT: 10.
BETA NET COUNT: 1.64 +/- 1.05

SAMPLE #:12. COLLECT TIME:6.00 263387
19:16:44,11-04-1999

ALPHA RESULT: .60 +/- 1.20 pCi
ALPHA GROSS COUNT: 1.
ALPHA NET COUNT: .16 +/- .33

BETA RESULT: 3.94 pCi
BETA GROSS COUNT: 8.
BETA NET COUNT: 1.32 +/- .94

SAMPLE #:13. COLLECT TIME:6.00 263388
19:23:06,11-04-1999

ALPHA RESULT: 0 +/- 0 pCi
ALPHA GROSS COUNT: 0
ALPHA NET COUNT: 0 +/- 0

BETA RESULT: 3.48 pCi
BETA GROSS COUNT: 7.
BETA NET COUNT: 1.16 +/- .88

SAMPLE #:14. COLLECT TIME:6.00 263389
19:29:29,11-04-1999

Alpha & Beta Efficiency Calibration

Instrument: **CAN2404**

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	Am-241	Isotope(s):	Sr-90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	12/15/92	Reference Date:	02/01/92
Half-life:	432.7 years	Half-life:	28.6 years

Alpha Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Alpha Standard Activity (pCi)	Efficiency
1	1.00	24823	24713.6	989.0	0.1876
2	1.00	24849	24739.4	989.0	0.1878
3	1.00	23633	23527.6	989.0	0.1786
4	1.00	24224	24116.4	989.0	0.1831
5	1.00	23897	23790.0	989.0	0.1806
6	1.00	24571	24463.0	989.0	0.1857
7					
8					
9					
10					
				Average =	0.1839
				% RSD =	2.06
				N =	6

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Beta into Alpha: 0.17 %

Beta Efficiency Calibration:

#	Aliquot Size (mL)	Gross Counts	Net Counts	Beta Standard Activity (pCi)	Efficiency
1	1.00	61708	56928.8	1665.4	0.2566
2	1.00	61811	57026.8	1665.4	0.2571
3	1.00	59313	54760.6	1665.4	0.2469
4	1.00	60619	55953.9	1665.4	0.2522
5	1.00	60276	55673.3	1665.4	0.2510
6	1.00	60875	56143.8	1665.4	0.2531
7					
8					
9					
10					
				Average =	0.2528
				% RSD =	1.50
				N =	6

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/03/99
Crosstalk of Alpha into Beta: 19.06 %

Calculations by Excel: GABAF v1

Chemist: [signature] 11/4/99

Alpha Standard		Beta Standard	
Isotope(s):	Am-241	Isotope(s):	Sr-90/Y-90
ID:	82-49-1	ID:	82-22-4
Standard Activity:	1000.0 pCi/mL	Standard Activity:	2010.0 pCi/mL
Standard Uncertainty:	2.00 %	Standard Uncertainty:	1.49 %
Reference Date:	2-15-92	Reference Date:	2/1/92
Half-life:	432.7 years	Half-life:	28.6 years

#	Aliquot Size (mL)	Alpha Gross Counts	Beta Gross Counts	Comments
1	1.00	24823	~~24713~~ 61708	JRB 11.4.99
2		24849	61811	
3		23633	59313	
4		24224	60619	
5		23897	60276	
6	↓	24571	60875	
7				
8				
9				
10				

Alpha

Alpha Background CPM: 0.077
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Beta into Alpha: 0.17 %

Beta

Beta Background CPM: 0.81
Count time: 60 min
Date Samples Counted: 11/3/99
Crosstalk of Alpha into Beta: 19.06 %

Additional Comments:

Instrument Conditions
Instrument: CAN2404
High Voltage: 1525

SECTION III

RECEIVING DOCUMENTATION INDEX

Requisition No. 16821

RECEIVING DOCUMENTATION:	FROM	TO
·Sample Log-in Sheet	1	2
·Request for Analytical Services	3	
·Chain of Sample Custody	4	9
·Lab Sample Tracking Record	10	

Grand Junction Office Analytical Laboratory

SECTION III

1

Sample Login Sheet

Received by (Print Name): Shelley Kaufman

Received by (Signature): Shelley Kaufman

Requisition/Case #: 16821

Page 1 of 2 V2.08

Login date: NOV 4 99

Requestor: JEFF LIVELY

Project number: 342303001

1. Custody Seal(s):
   Shipping Container: Absent/Intact/Broken
   Sample Container: Absent/Intact/Broken

2. Custody Seal No(s): NA

3. Chain of Custody Recs: Present/Absent

4. Traffic Rpt, Pack Lst, Analytical Req.: Present/Absent

5. Freight Bill: Airbill/Sticker Present/Absent

6. Freight Bill No(s).: hand delivered

7. Sample Tags: Present/Absent

8. Sample Labels on Chain of Cust.: Listed/Not listed

9. Does information on custody records, traffic reports & sample labels agree?: Yes/No

10. Shipping Cont. Temp.: NA
    and Condition good

11. Sample pH: Accept/Not Accept
    Not Applicable

--------Analysis Requested - Data Due ----------

Test	Due Date
1	SWIPE-12NOV99

No.	Ticket	Customer ID	Lab #	ST	Date Sampled	Condition Received	Date Rec'd
1	SMR0000201	1VP0000201	263332	SM	05OCT99	GOOD	29OCT99
2	SMR0000202	1VP0000202	263333	SM	05OCT99	GOOD	29OCT99
3	SMR0000203	1VP0000203	263334	SM	05OCT99	GOOD	29OCT99
4	SMR0000204	1VP0000204	263335	SM	05OCT99	GOOD	29OCT99
5	SMR0000205	1VP0000205	263336	SM	05OCT99	GOOD	29OCT99
6	SMR0000206	1VP0000206	263337	SM	05OCT99	GOOD	29OCT99
7	SMR0000207	1VP0000207	263338	SM	05OCT99	GOOD	29OCT99
8	SMR0000208	1VP0000208	263339	SM	05OCT99	GOOD	29OCT99
9	SMR0000209	1VP0000209	263340	SM	05OCT99	GOOD	29OCT99
10	SMR0000210	1VP0000210	263341	SM	05OCT99	GOOD	29OCT99
11	SMR0000211	1VP0000211	263342	SM	05OCT99	GOOD	29OCT99
12	SMR0000212	1VP0000212	263343	SM	05OCT99	GOOD	29OCT99
13	SMR0000213	1VP0000213	263344	SM	05OCT99	GOOD	29OCT99
14	SMR0000214	1VP0000214	263345	SM	05OCT99	GOOD	29OCT99
15	SMR0000215	1VP0000215	263346	SM	05OCT99	GOOD	29OCT99
16	SMR0000216	1VP0000216	263347	SM	05OCT99	GOOD	29OCT99
17	SMR0000217	1VP0000217	263348	SM	05OCT99	GOOD	29OCT99
18	SMR0000218	1VP0000218	263349	SM	05OCT99	GOOD	29OCT99
19	SMR0000219	1VP0000219	263350	SM	05OCT99	GOOD	29OCT99
20	SMR0000220	1VP0000220	263351	SM	05OCT99	GOOD	29OCT99
21	SMR0000221	1VP0000221	263352	SM	~~05OCT99~~ 06Oct99	GOOD	29OCT99
22	SMR0000222	1VP0000222	263353	SM	05OCT99	GOOD	29OCT99
23	SMR0000223	1VP0000223	263354	SM	05OCT99	GOOD	29OCT99
24	SMR0000224	1VP0000224	263355	SM	05OCT99	GOOD	29OCT99
25	SMR0000225	1VP0000225	263356	SM	05OCT99	GOOD	29OCT99
26	SMR0000226	1VP0000226	263357	SM	05OCT99	GOOD	29OCT99
27	SMR0000227	1VP0000227	263358	SM	05OCT99	GOOD	29OCT99
28	SMR0000228	1VP0000228	263359	SM	05OCT99	GOOD	29OCT99
29	SMR0000229	1VP0000229	263360	SM	05OCT99	GOOD	29OCT99
30	SMR0000594	1VP0000594	263361	SM	05OCT99	GOOD	29OCT99
31	SMR0000591	1VP0000591	263362	SM	05OCT99	GOOD	29OCT99
32	SMR0000592	1VP0000592	263363	SM	05OCT99	GOOD	29OCT99
33	SMR0000593	1VP0000593	263364	SM	05OCT99	GOOD	29OCT99
34	SMR0000595	1VP0000595	263365	SM	05OCT99	GOOD	29OCT99
35	SMR0000231	SMR0000231	263366	SM	27OCT99	GOOD	29OCT99
36	SMR0000232	SMR0000232	263367	SM	27OCT99	GOOD	29OCT99
37	SMR0000233	SMR0000233	263368	SM	27OCT99	GOOD	29OCT99
38	SMR0000234	SMR0000234	263369	SM	27OCT99	GOOD	29OCT99
39	SMR0000235	SMR0000235	263370	SM	27OCT99	GOOD	29OCT99
40	SMR0000236	SMR0000236	263371	SM	27OCT99	GOOD	29OCT99
41	SMR0000237	SMR0000237	263372	SM	27OCT99	GOOD	29OCT99
42	SMR0000238	SMR0000238	263373	SM	27OCT99	GOOD	29OCT99
43	SMR0000239	SMR0000239	263374	SM	27OCT99	GOOD	29OCT99
44	SMR0000240	SMR0000240	263375	SM	27OCT99	GOOD	29OCT99
45	SMR0000241	SMR0000241	263376	SM	27OCT99	GOOD	29OCT99
46	SMR0000242	SMR0000242	263377	SM	27OCT99	GOOD	29OCT99
47	SMR0000243	SMR0000243	263378	SM	27OCT99	GOOD	29OCT99
48	SMR0000244	SMR0000244	263379	SM	27OCT99	GOOD	29OCT99
49	SMR0000245	SMR0000245	263380	SM	27OCT99	GOOD	29OCT99
50	SMR0000246	SMR0000246	263381	SM	27OCT99	GOOD	29OCT99
51	SMR0000247	SMR0000247	263382	SM	27OCT99	GOOD	29OCT99
52	SMR0000248	SMR0000248	263383	SM	27OCT99	GOOD	29OCT99
53	SMR0000249	SMR0000249	263384	SM	27OCT99	GOOD	29OCT99
54	SMR0000250	SMR0000250	263385	SM	27OCT99	GOOD	29OCT99
55	SMR0000251	SMR0000251	263386	SM	27OCT99	GOOD	29OCT99
56	SMR0000252	SMR0000252	263387	SM	27OCT99	GOOD	29OCT99
57	SMR0000253	SMR0000253	263388	SM	27OCT99	GOOD	29OCT99
58	SMR0000254	SMR0000254	263389	SM	27OCT99	GOOD	29OCT99
59	SMR0000255	SMR0000255	263390	SM	27OCT99	GOOD	29OCT99
60	SMR0000256	SMR0000256	263391	SM	27OCT99	GOOD	29OCT99
61	SMR0000257	SMR0000257	263392	SM	27OCT99	GOOD	29OCT99
62	SMR0000258	SMR0000258	263393	SM	27OCT99	GOOD	29OCT99
63	SMR0000259	SMR0000259	263394	SM	27OCT99	GOOD	29OCT99

SB 11/1/99

Reviewed by: Sue Lyon

Date: 11/1/99

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Grand Junction Office Analytical Laboratory

Sample Login Sheet

SECTION III

2

Received by (Print Name): _____

Received by (Signature): _____

Page 2 of 2 V2.08

Login date: NOV 4 99

Requisition/Case #: 16821

Requestor: JEFF LIVELY

Project number: 342303001

Seepage 1 of 2

1. Custody Seal(s):
   Shipping Container: Absent/Intact/Broken
   Sample Container: Absent/Intact/Broken

2. Custody Seal No(s): _____

3. Chain of Custody Recs: Present/Absent

4. Traffic Rpt, Pack Lst, Analytical Req: Present/Absent

5. Freight Bill: Airbill/Sticker Present/Absent

6. Freight Bill No(s).: _____

7. Sample Tags: Present/Absent

8. Sample Labels on Chain of Cust.: Listed/Not listed

9. Does information on custody records, traffic reports & sample labels agree?: Yes/No

10. Shipping Cont. Temp.: _____
    and Condition _____

11. Sample pH: Accept/Not Accept Not Applicable

No.	Ticket	Customer ID	Lab #	ST	Date Sampled	Condition Received	Date Rec'd
64	SMR0000260	SMR0000260	263395	SM	27OCT99	GOOD	29OCT99
65	SMR0000261	SMR0000261	263396	SM	27OCT99	GOOD	29OCT99
66	SMR0000262	SMR0000262	263397	SM	27OCT99	GOOD	29OCT99

----------Analysis Requested - Data Due ----------

#	Test-Due Date
1	SWIPE-12NOV99

Reviewed by: Sue Lopata

Date: 11/4/99

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H&S Request for Analytical Service

Final Report to J. Lively

Office/Tech. Bldg 3022, 206A

Project Rocky Flats IVP

Area Building 779 Cluster

Site ID No. Survey Unit 779-21

Number of Samples 34 + 6 6

Requisition No. 16821

Project No. 342303001

Date Submitted 10/28/99

Results Required

* ☐ Immediate: 1 to 16 hours
* ☐ Expedite: up to 48 hours
☑ Normal schedule: 4 to 14 days
☐ Delay acceptable: more than 14 days

* **Justification** _____

Analysis Required

☐ Airborne Silica
☐ Airborne Asbestos
☐ Airborne Radioparticulate
☐ Bulk
☐ Asbestos ☐ Soil ☐ Metals ☐ Water ☐ Other

☐ Elemental (Use Symbol)

☐ As ☐ Ba ☐ Cd ☐ Cr ☐ Pb ☐ Hg ☐ Se ☐ Ag

☐ Isotope (Use Symbol)

☐ Ra-226 ☐ Th-230 ☐ U-Nat ☐ Po-210 ☐ _____ ☐ _____

☑ Other Analysis Gross ALPHA/BETA SMEAR COUNTING

☐ Volatiles ☐ Semi-volatiles ☐ PCBs ☐ pH ☐ Ignitability

Special Instructions Retain samples until determined by Jeff Lively CRDL = 2.5 pCi/sample Please report results in dpm/sample

Sample Disposition: ☑ Return ☐ Store ☐ Destroy

A. Sanchez
H&S Representative Signature and Approval

10/28/99
Date

GJO 1796
4/97

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16821

Grand Junction Office
2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 1 of 3
2. Date 10/7/99

3. Project Name Rocky Flats IVP
4. Site Location Bldg. 779, Survey Unit 779-21
5. Sampler *(print name)* Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Nan. env.	12. Remarks	13. Condition Received
SMRJ000201	10/5/99	1340	IVP0000 201	smear	1		
202		1342	202				
203		1344	203				
204		1346	204				
205		1348	205				
206		1350	206				
207		1352	207				
208		1354	208				
209		1356	209				
210		1358	210				
211		1401	211				
212		1602	212				
213		1605	213				

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/7/99	0945						
Received by *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**
Sue Smith	10/7/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512
5/97

Preparation instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

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SECTION III

16821

Grand Junction Office
2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248-6000

Chain-of-Sample Custody

1. Page 2 of 3
2. Date 10/7/99

3. Project Name Rocky Flats IVP
4. Site Location Bldg. 779, Survey Unit 779-21
5. Sampler (print name) Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Man. Cnr.						12. Remarks	13. Condition Received
SMR000214	10/5/99	1608	IVP000214	smear	1							
215		1610	215									
216		1612	216									
217		1614	217									
218		1620	218									
219		1622	219									
220		1625	220									
221	10/6/99	1540	221									
222		1543	222									
223		1547	223									
224		1549	224									
225		1552	225									
226		1554	226									

14. Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time
Jay Cameron	10/7/99	0945						
Received by (signature)	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**
Sue Hart	10/7/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

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16821

Grand Junction Office
2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 3 of 3
2. Date 10/7/99

3. Project Name Rocky Flats IVP
4. Site Location Bldg. 779, Survey Unit 779-21
5. Sampler *(print name)* Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: man. env.	12. Remarks	13. Condition Received
SMR000227	10/6/99	1558	SMR000227	smear	1		
228		1602	228				
229		1605	229				
594		1606	594				
591		1608	591				
592		1610	592				
593		1612	593				
595		1614	595				

10/7/99

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/6/99	0945						
Received by *(signature)* Sue Post	**Date** 10/6/99	**Time** 0945	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

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1682

Grand Junction Office

2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 1 of 3
2. Date 10/27/99

3. Project Name Rocky Flats IVP
4. Site Location Survey Unit 779-23
5. Sampler *(print name)* Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Man. env.	12. Remarks	13. Condition Received
SMR0000231	10/27/99	N/A	SMR0000231	Smear	1		
232			232				
233			233				
234			234				
235			235				
236			236				
237			237				
238			238				
239			239				
240			240				
241			241				
242			242				
243			243				

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/29/99	0945						
Received by *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**
Sue Tyrat	10/29/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO.1512
5/97

Preparation Instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

SECTION I

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16821

Grand Junction Office

2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 2 of 3
2. Date 10/27/99

3. Project Name Rocky Flats IVP
4. Site Location Survey Unit 779-23
5. Sampler *(print name)* Jay Cameron/K. Thompson

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: mag. env.	12. Remarks	13. Condition Received
SMR0000244	10/27/99	N/A	SMR0000244	Smear	1		
245			245				
246			246				
247			247				
248			248				
249			249				
250			250				
251			251				
252			252				
253			253				
254			254				
255			255				
256			256				

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/29/99	0945						
Received by *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**
Sue Lyon	10/29/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512
5/97

Preparation Instructions on back of form.

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SECTION

16821

Grand Junction Office

2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 3 of 3
2. Date 10/27/99

3. Project Name Rocky Flats IVP
4. Site Location Survey Unit 779-23
5. Sampler (print name) J. Cameron / K. Thompson

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: man. env.						12. Remarks	13. Condition Received
SMR0000257	10/27/99	N/A	SMR0000257	SMEAR	1							
258			258									
259			259									
260			260									
261			261									
262			262									

14. Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time
Joy Cameron	10/29/99	0945						
Received by (signature)	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**
Sue Lynte	10/29/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512
5/97

Preparation Instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

SECTION III

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LAB SAMPLE TRACKING RECORD

REQUISITION 16821 SUBMITTER: 342303001 REQUESTOR: JEFF LIVELY BUILDING 20 RECEIVED 29OCT99

RCVD FROM	RCVD BY	DATE	STORAGE LOCATION	FOR	SAMPLES	CHECKOUT DATE	INIT	CHECKIN DATE	INIT	RETURN LOCATION	TYPE O	TYPE D	TYPE E	TYPE C	DISPOSAL INIT	DISPOSAL DATE	D	C	W
SLC	JD	11/4/99	3F6	SWIPE	263332-263397	11/3	[illegible]	11/5	[illegible]	3F2	X								

TYPE CODES: O=ORIGINAL D=DIGEST E=EXTRACT C=CONSUMED DISPOSAL CODES: D=DISCARD C=CUSTOMER W=WASTE MGT

SAMPLES RETURNED: [illegible] / [illegible] / 11/8/99 SAMPLE DISPOSITION: __ D __ C __ W _____ / _____

To Sample Plant BY TO DATE BY DATE

SECTION III

ANALYTICAL REPORT

TO: JEFF LIVELY

PROJECT: 342303001

DATE: Tuesday, November 16, 1999

REQUISITION(S): 16822

PREPARED BY:

GRAND JUNCTION OFFICE ANALYTICAL LABORATORY
2597 B 3/4 ROAD
GRAND JUNCTION, COLORADO 81503
(970-248-6165)

ANALYTICAL REPORT INDEX

This report is the final data package for Requisition 16822 generated by the Analytical Laboratory for the Rocky Flats IVP project. It is the official record, and requestors are responsible for proper record-keeping in compliance with project requirements.

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Cover Page
Analytical Report Index
Analytical Summary
Sample Cross Reference

Section I
Analytical Data Summary and Quality Control Summary

Section II
Radiochemical Supporting Documentation

Section III
Receiving Documentation

ANALYTICAL SUMMARY

This report contains the results for twenty-four samples of various solids logged in on October 29, 1999, under Project Number 342303001 and Requisition Number 16822.

The samples were submitted for the determination of americium-241, plutonium isotopes, and uranium isotopes.

The samples were analyzed by alpha spectrometry according to the Grand Junction Office Analytical Laboratory Standard Operating Procedure (SOP) RC-19.

All laboratory quality control parameters were met during the course of these analyses.

RELEASE OF THE DATA CONTAINED IN THIS REPORT HAS BEEN AUTHORIZED BY THE LABORATORY MANAGER OR THE MANAGER'S DESIGNEE

Steve Donivan RDC 11-17-99
LABORATORY MANAGER DATE

Susan Lopata 11/17/99
PREPARED BY DATE

SAMPLE CROSS REFERENCE V2.05

GRAND JUNCTION OFFICE ANALYTICAL LABORATORY

REQUISITION(S): 16822

CUSTOMER ID	TICKET	LAB ID
IVP0000201	MED0000201	263398
IVP0000203	MED0000203	263399
IVP0000204	MED0000204	263400
IVP0000205	MED0000205	263401
IVP0000208	MED0000208	263402
IVP0000210	MED0000210	263403
IVP0000211	MED0000211	263404
IVP0000212	MED0000212	263405
IVP0000221	MED0000221	263406
IVP0000222	MED0000222	263407
IVP0000223	MED0000223	263408
IVP0000226	MED0000226	263409
IVP0000227	MED0000227	263410
IVP0000229	MED0000229	263411
IVP0000213	MED0000213	263412
IVP0000214	MED0000214	263413
IVP0000215	MED0000215	263414
IVP0000216	MED0000216	263415
IVP0000217	MED0000217	263416
IVP0000218	MED0000218	263417
IVP0000236	MED0000236	263418
IVP0000240	MED0000240	263419
IVP0000241	MED0000241	263420
IVP0000242	MED0000242	263421

779-21

QC-6

779-23

(SECTION I)

ANALYTICAL DATA SUMMARY

This section contains 31 pages, not including this page.

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000201
Ticket ID: MED0000201

Date: November 16, 1999
Lab ID: 263398

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	2.02	1.1260	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	1.28	0.8937	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.3756	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	70.53	7.3160	dpm/SA	11/08/99	RC-19 R06
Uranium-235	2.38	1.4640	dpm/SA	11/08/99	RC-19 R06
Uranium-234	67.91	7.1580	dpm/SA	11/08/99	RC-19 R06

Grand Junction Office Analytical Laboratory

V1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000203
Ticket ID: MED0000203

Date: November 16, 1999
Lab ID: 263399

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	2.60	0.9587	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	2.90	0.9893	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.6139	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	23.94	3.2520	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<1.6890	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	25.47	3.4250	dpm/SA	11/08/99	RC-19 R06

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Grand Junction Office Analytical Laboratory

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000204
Ticket ID: MED0000204

Date: November 16, 1999
Lab ID: 263400

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	2.92	1.0620	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	1.27	0.7188	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.5823	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	33.51	3.8520	dpm/SA	11/08/99	RC-19 R06
Uranium-235	2.12	1.0190	dpm/SA	11/08/99	RC-19 R06
Uranium-234	33.60	3.8630	dpm/SA	11/08/99	RC-19 R06

Grand Junction Office Analytical Laboratory

71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000205
Ticket ID: MED0000205

Date: November 16, 1999
Lab ID: 263401

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.11	0.8404	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<1.0180	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.3535	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	45.19	5.5630	dpm/SA	11/08/99	RC-19 R06
Uranium-235	2.71	1.7710	dpm/SA	11/08/99	RC-19 R06
Uranium-234	44.40	5.5830	dpm/SA	11/08/99	RC-19 R06

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.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000208
Ticket ID: MED0000208

Date: November 16, 1999
Lab ID: 263402

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.18	0.8381	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	1.13	0.7836	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<1.0700	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	33.00	4.0790	dpm/SA	11/08/99	RC-19 R06
Uranium-235	2.11	1.1430	dpm/SA	11/08/99	RC-19 R06
Uranium-234	30.73	3.9370	dpm/SA	11/08/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000210
Ticket ID: MED0000210

Date: November 16, 1999
Lab ID: 263403

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.4099	0.1986	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	0.8196	0.2758	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.2083	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	0.5601	0.2030	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<0.2261	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	0.5241	0.2103	dpm/SA	11/08/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000211
Ticket ID: MED0000211

Date: November 16, 1999
Lab ID: 263404

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.74	1.1020	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<1.2840	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.8895	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	43.64	5.0510	dpm/SA	11/08/99	RC-19 R06
Uranium-235	1.90	1.2240	dpm/SA	11/08/99	RC-19 R06
Uranium-234	39.80	4.7900	dpm/SA	11/08/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000212
Ticket ID: MED0000212

Date: November 16, 1999
Lab ID: 263405

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	<0.8702	NA	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<1.1180	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<1.0160	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	36.10	4.8800	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<1.5770	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	33.89	4.7500	dpm/SA	11/08/99	RC-19 R06

1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000221
Ticket ID: MED0000221

Date: November 16, 1999
Lab ID: 263406

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.5013	0.5021	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<0.9497	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.2771	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	22.53	3.1140	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<1.2800	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	25.49	3.3410	dpm/SA	11/08/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000222
Ticket ID: MED0000222

Date: November 16, 1999
Lab ID: 263407

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.4786	0.5533	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<1.0750	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<1.3060	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	35.28	4.4340	dpm/SA	11/08/99	RC-19 R06
Uranium-235	3.16	1.5100	dpm/SA	11/08/99	RC-19 R06
Uranium-234	40.67	4.8210	dpm/SA	11/08/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000223
Ticket ID: MED0000223

Date: November 16, 1999
Lab ID: 263408

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	2.42	1.3470	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	<0.9622	NA	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.9622	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	40.26	5.2100	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<2.5920	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	37.24	5.0060	dpm/SA	11/08/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000226
Ticket ID: MED0000226

Date: November 16, 1999
Lab ID: 263409

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.39	0.8819	dpm/SA	11/09/99	RC-19 R06
Pu-239+240	0.7819	0.6282	dpm/SA	11/06/99	RC-19 R06
Plutonium-238	<0.6137	NA	dpm/SA	11/06/99	RC-19 R06
Uranium-238	36.09	4.1730	dpm/SA	11/08/99	RC-19 R06
Uranium-235	<3.0420	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-234	34.57	4.0770	dpm/SA	11/08/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000227
Ticket ID: MED0000227

Date: November 16, 1999
Lab ID: 263410

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	6.28	1.6730	dpm/SA	11/10/99	RC-19 R06
Pu-239+240	27.58	3.4090	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	0.5031	0.4117	dpm/SA	11/08/99	RC-19 R06
Uranium-238	33.88	4.0350	dpm/SA	11/09/99	RC-19 R06
Uranium-235	1.45	1.0000	dpm/SA	11/09/99	RC-19 R06
Uranium-234	32.44	3.9390	dpm/SA	11/09/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000229
Ticket ID: MED0000229

Date: November 16, 1999
Lab ID: 263411

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	<0.3977	NA	dpm/SA	11/10/99	RC-19 R06
Pu-239+240	<0.3744	NA	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	<0.3744	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-238	18.33	2.3500	dpm/SA	11/09/99	RC-19 R06
Uranium-235	<1.1350	NA	dpm/SA	11/09/99	RC-19 R06
Uranium-234	18.33	2.3860	dpm/SA	11/09/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000213
Ticket ID: MED0000213

Date: November 16, 1999
Lab ID: 263412

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.0145	0.0130	pCi/g	11/10/99	RC-19 R06
Pu-239+240	<0.0247	NA	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0072	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	0.5612	0.0819	pCi/g	11/09/99	RC-19 R06
Uranium-235	0.0406	0.0250	pCi/g	11/09/99	RC-19 R06
Uranium-234	0.5519	0.0812	pCi/g	11/09/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000214
Ticket ID: MED0000214

Date: November 16, 1999
Lab ID: 263413

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.3018	0.0682	pCi/g	11/10/99	RC-19 R06
Pu-239+240	0.3531	0.0651	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0073	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	0.6558	0.0878	pCi/g	11/09/99	RC-19 R06
Uranium-235	<0.0478	NA	pCi/g	11/09/99	RC-19 R06
Uranium-234	0.6215	0.0867	pCi/g	11/09/99	RC-19 R06

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ANALYTICAL RESULTS (CORRECTION I)

Customer ID: IVP0000215
Ticket ID: MED0000215

Date: November 16, 1999
Lab ID: 263414

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.37	0.1542	pCi/g	11/10/99	RC-19 R06
Pu-239+240	1.11	0.1246	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0241	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	0.7261	0.0937	pCi/g	11/09/99	RC-19 R06
Uranium-235	0.0420	0.0256	pCi/g	11/09/99	RC-19 R06
Uranium-234	0.7107	0.0932	pCi/g	11/09/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000216
Ticket ID: MED0000216

Date: November 16, 1999
Lab ID: 263415

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.6043	0.0956	pCi/g	11/10/99	RC-19 R06
Pu-239+240	1.05	0.1189	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0251	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	1.62	0.1547	pCi/g	11/09/99	RC-19 R06
Uranium-235	0.1069	0.0390	pCi/g	11/09/99	RC-19 R06
Uranium-234	1.67	0.1585	pCi/g	11/09/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000217
Ticket ID: MED0000217

Date: November 16, 1999
Lab ID: 263416

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.33	0.1489	pCi/g	11/11/99	RC-19 R06
Pu-239+240	2.40	0.2127	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0188	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	0.7782	0.0973	pCi/g	11/09/99	RC-19 R06
Uranium-235	0.0804	0.0344	pCi/g	11/09/99	RC-19 R06
Uranium-234	0.8309	0.1013	pCi/g	11/09/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000218
Ticket ID: MED0000218

Date: November 16, 1999
Lab ID: 263417

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 6, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	7.30	0.4789	pCi/g	11/10/99	RC-19 R06
Pu-239+240	12.92	0.8033	pCi/g	11/08/99	RC-19 R06
Plutonium-238	<0.0171	NA	pCi/g	11/08/99	RC-19 R06
Uranium-238	1.86	0.1721	pCi/g	11/09/99	RC-19 R06
Uranium-235	0.1193	0.0412	pCi/g	11/09/99	RC-19 R06
Uranium-234	1.93	0.1767	pCi/g	11/09/99	RC-19 R06

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Grand Junction Office Analytical Laboratory

1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000236
Ticket ID: MED0000236

Date: November 16, 1999
Lab ID: 263418

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.3189	0.3687	dpm/SA	11/10/99	RC-19 R06
Pu-239+240	<1.0480	NA	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	0.3385	0.3914	dpm/SA	11/08/99	RC-19 R06
Uranium-238	24.87	3.5510	dpm/SA	11/09/99	RC-19 R06
Uranium-235	<1.4830	NA	dpm/SA	11/09/99	RC-19 R06
Uranium-234	22.87	3.3860	dpm/SA	11/09/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000240
Ticket ID: MED0000240

Date: November 16, 1999
Lab ID: 263419

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	1.11	0.4755	dpm/SA	11/15/99	RC-19 R06
Pu-239+240	0.4503	0.2852	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	<0.2918	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-238	6.91	1.1120	dpm/SA	11/10/99	RC-19 R06
Uranium-235	1.02	0.5298	dpm/SA	11/10/99	RC-19 R06
Uranium-234	7.13	1.1540	dpm/SA	11/10/99	RC-19 R06

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1.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000241
Ticket ID: MED0000241

Date: November 16, 1999
Lab ID: 263420

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	<0.3130	NA	dpm/SA	11/15/99	RC-19 R06
Pu-239+240	1.19	0.4264	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	<0.2465	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-238	6.86	1.0200	dpm/SA	11/10/99	RC-19 R06
Uranium-235	<0.3661	NA	dpm/SA	11/10/99	RC-19 R06
Uranium-234	6.26	0.9679	dpm/SA	11/10/99	RC-19 R06

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71.05

ANALYTICAL RESULTS (SECTION I)

Customer ID: IVP0000242
Ticket ID: MED0000242

Date: November 16, 1999
Lab ID: 263421

Requestor: J. LIVELY
Sample Matrix: MISCELLANEOUS
Project Number: 342303001

Case: 16822
Date Received: Oct 29, 1999
Date Collected: Oct 27, 1999

ANALYSIS REQUESTED	RESULTS	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Americium-241	0.3453	0.2448	dpm/SA	11/15/99	RC-19 R06
Pu-239+240	0.2841	0.2283	dpm/SA	11/08/99	RC-19 R06
Plutonium-238	<0.2230	NA	dpm/SA	11/08/99	RC-19 R06
Uranium-238	5.18	1.2780	dpm/SA	11/10/99	RC-19 R06
Uranium-235	<1.0750	NA	dpm/SA	11/10/99	RC-19 R06
Uranium-234	4.91	1.3100	dpm/SA	11/10/99	RC-19 R06

(SECTION I)

QUALITY CONTROL SUMMARY

LCSWR1 QC REPORT (SECTION I) V1.02

Lab Name: GJO Analytical Laboratory CASE: 16822

Analyte	Date	Result	Known Value	Units	Acceptance Low	Acceptance High
Uranium-234	11/08/99	16.17	16.6	pCi/L	14.48	18.04
Uranium-234	11/09/99	16.14	16.6	pCi/L	14.48	18.04
Uranium-235	11/08/99	0.7416	0.77	pCi/L	0.33	1.22
Uranium-235	11/09/99	0.7218	0.77	pCi/L	0.33	1.22
Uranium-238	11/08/99	16.93	16.6	pCi/L	14.59	17.87
Uranium-238	11/09/99	15.39	16.6	pCi/L	14.59	17.87

COMMENTS:

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LCSWR33 QC REPORT (SECTION I) V1.02

Lab Name: GJO Analytical Laboratory CASE: 16822

Analyte	Date	Result	Known Value	Units	Acceptance Low	Acceptance High
Americium-241	11/09/99	5.03	4.74	pCi/mL	4.05	5.18
Americium-241	11/10/99	4.87	4.74	pCi/mL	4.05	5.18
Americium-241	11/15/99	4.71	4.74	pCi/mL	4.05	5.18
Plutonium-238	11/06/99	10.16	10.67	pCi/mL	9.36	11.52
Plutonium-238	11/08/99	11.35	10.67	pCi/mL	9.36	11.52
Pu-239+240	11/06/99	11.29	10.5	pCi/mL	9.57	11.70
Pu-239+240	11/08/99	11.40	10.5	pCi/mL	9.57	11.70

COMMENTS:

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REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16822

SAMPLE: 263398

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Americium-241	11/09/99			2.02	1.49	dpm/SA	-30.20
Plutonium-238	11/06/99			0.1387	0.0226	dpm/SA	-143.96
Pu-239+240	11/06/99			1.28	2.01	dpm/SA	44.38
Uranium-234	11/08/99			67.91	70.77	dpm/SA	4.12
Uranium-235	11/08/99			2.38	5.44	dpm/SA	78.26
Uranium-238	11/08/99			70.53	75.03	dpm/SA	6.18

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16822

SAMPLE: 263410

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Americium-241	11/10/99			6.28	7.28	dpm/SA	14.75
Plutonium-238	11/08/99			0.5031	1.56	dpm/SA	102.46
Pu-239+240	11/08/99			27.58	49.05	dpm/SA	56.04
Uranium-234	11/09/99			32.44	31.40	dpm/SA	-3.26
Uranium-235	11/09/99			1.45	1.92	dpm/SA	27.89
Uranium-238	11/09/99			33.88	31.39	dpm/SA	-7.63

COMMENTS:

REPLICATE SAMPLE QC REPORT V1.02

Lab Name: GJO Analytical Laboratory (SECTION I) CASE: 16822

SAMPLE: 263421

Analyte	Date	Acceptance Low	Acceptance High	Sample Result	Replicat Result	Units	%RPD
Americium-241	11/15/99			0.3453	0.4229	dpm/SA	20.20

COMMENTS:

BLANKS QC REPORT (SECTION I) V1.02

Lab Name: GJO Analytical Laboratory CASE: 16822

Analyte	Date	Calibration Blanks Result	Units	Result	Units	Prep Blank Result	Units
Americium-241	11/09/99					0.0095	dpm/SA
Americium-241	11/10/99					0.0231	dpm/SA
Americium-241	11/15/99					0.0118	dpm/SA
Plutonium-238	11/06/99					0.0063	dpm/SA
Plutonium-238	11/08/99					-0.0007	dpm/SA
Pu-239+240	11/06/99					0.0070	dpm/SA
Pu-239+240	11/08/99					0.0035	dpm/SA
Uranium-234	11/08/99					0.0366	dpm/SA
Uranium-234	11/09/99					0.0179	dpm/SA
Uranium-235	11/08/99					0.0032	dpm/SA
Uranium-235	11/09/99					-0.0120	dpm/SA
Uranium-238	11/08/99					0.0304	dpm/SA
Uranium-238	11/09/99					-0.0040	dpm/SA

COMMENTS:

(SECTION II)

RADIOCHEMICAL SUPPORTING DOCUMENTATION

Requisition Number 16822

The following section contains the analytical supporting documentation for the determination of americium-241, plutonium isotopes, and uranium isotopes. Commonly used laboratory codes in this section include:

PROCEDURES:

RC-19: Alpha Spectrometry

QUALITY CONTROL ABBREVIATIONS:

LCS: Laboratory Control Sample
PB: Preparation Blank

This section contains 193 pages numbered 1 through 193.

Sample Preparation and Analysis Log

(SECTION II)

Sample Type: Various Solids

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116137	Stephen R Bo	10/29/99
		Pu-239/240,Pu-238	99116139		
		U-238, U235, U234	99116141		11/10/99
Counting	RC-19 R06	Am241	99116137		11/10/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		33			
16822	263398	2	0.750 G	Am, Pu, U	0.0355	34	14.606	35.713	21.107
16822	263399	3	0.750 G	Am, Pu, U	0.0553	35	14.530	28.101	13.571
16822	263400	4	0.750 G	Am, Pu, U	0.0481	37	14.534	30.130	15.596
16822	263401	5	0.750 G	Am, Pu, U	0.0308	38	14.648	38.998	24.350
16822	263402	6	0.750 G	Am, Pu, U	0.0384	39	14.640	34.161	19.521
16822	263403	7	0.750 G	Am, Pu, U	0.2214	40	14.704	18.091	3.387
16822	263404	8	0.750 G	Am, Pu, U	0.0342	41	14.531	36.474	21.943
16822	263405	9	0.750 G	Am, Pu, U	0.0322	42	14.431	37.756	23.325
16822	263406	10	0.750 G	Am, Pu, U	0.0448	43	14.697	31.444	16.747
16822	263407	11	0.750 G	Am, Pu, U	0.0347	44	14.543	36.178	21.635
16822	263408	12	0.750 G	Am, Pu, U	0.0342	45	14.537	36.447	21.910
16822	263409	13	0.750 G	Am, Pu, U	0.0456	46	14.696	31.150	16.454
16822	263398D	14	0.750 G	Am, Pu, U	0.0355	47	14.606	35.713	21.107
LCSWR1, LCSWR33		15	0.250 mL	Am, Pu, U		48			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

-Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9.

-Balance # 8 used for weights of samples and their aliquots

-Sample aliquot is the fraction of the total sample taken for analysis

QC'd 11-10-99 Qidong S. Popata 11/11/99

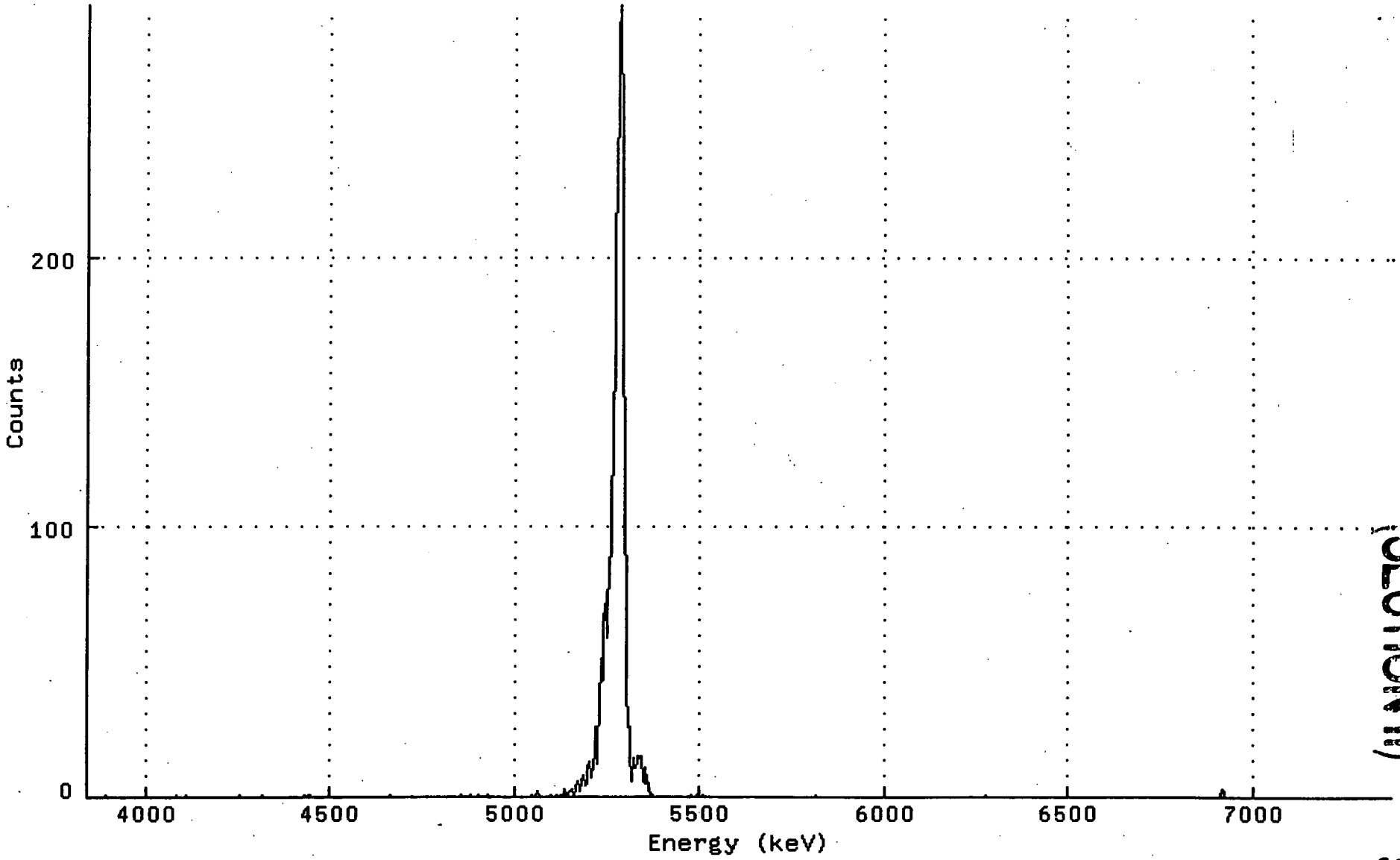
Spectral File: ND_AMS_ARCHIVE_R:R_99116137$PB_AM.CNF

BATCH ID:	99116137	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 1.000E+00	SA
SAMPLE TITLE:		DETECTOR NUMBER:	033
ACQ DATE:	9-NOV-1999 09:28	AVERAGE EFFICIENCY:	27.0%
ELAPSED LIVE TIME:	80006.	RECOVERY:	81.92%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	27.78
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:44	EFF CAL DATE: 3-NOV-1999	11:44
BKG FILENAME:	B_033_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	2.80	1.20	99.9	9.495E-03	1.436E-02	2.646E-02	1.782E-02
AM243	5270.0	3313.40	3.60	99.6	1.127E+01	4.852E-01	3.923E-02	2.422E-02

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.R]R_99116137$PB_AM.CNF;3
Title : 033
Sample Title:
Start Time: 9-NOV-1999 09:28: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83095E+03
Real Time : 0 22:13:26.00 Sample ID : PB Energy Slope : 3.45959E+00
Live Time : 0 22:13:26.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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(SECTION II) 4

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263398_AM.CNF

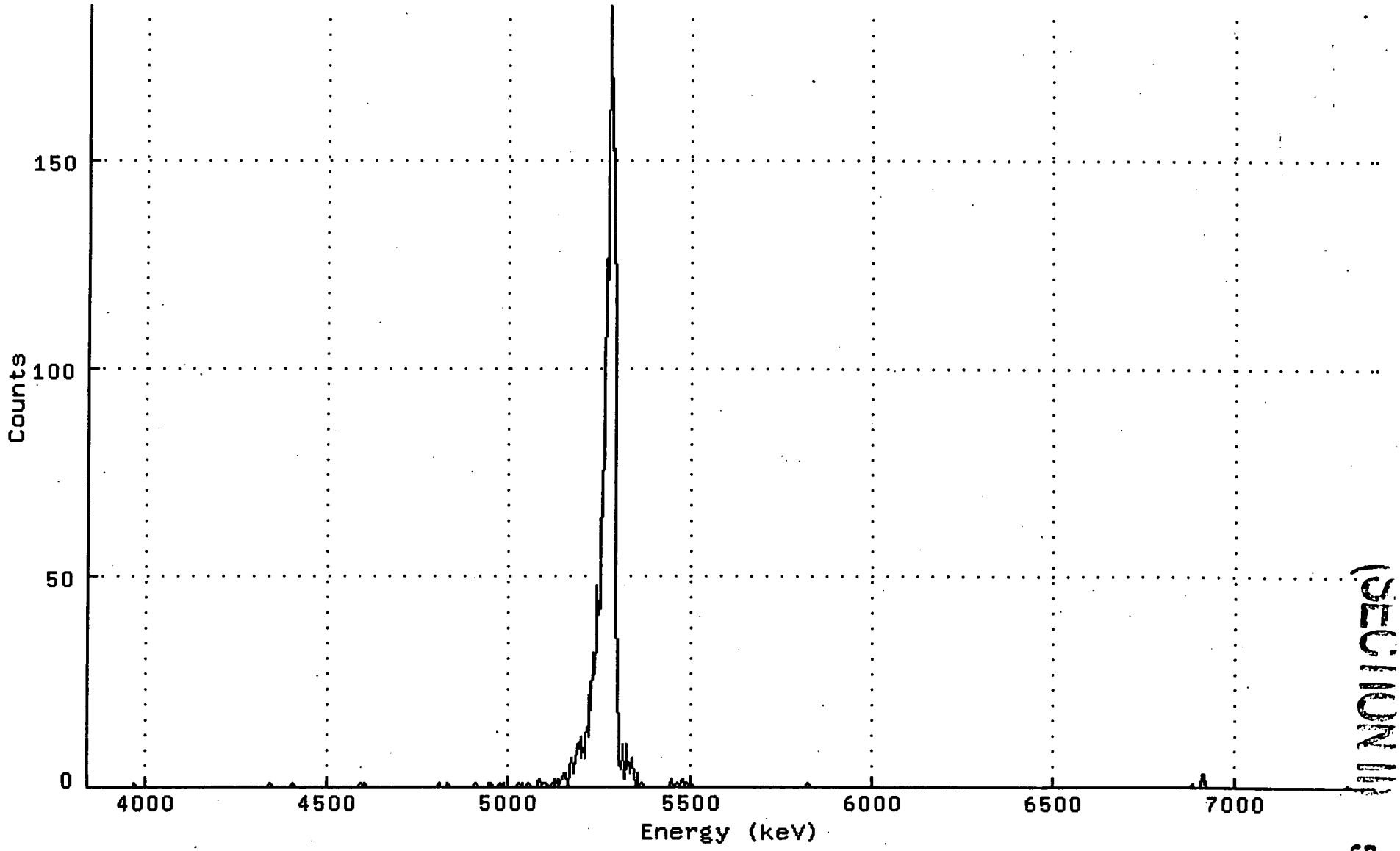
BATCH ID:	99116137	SAMPLE ID:	263398
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.550E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	034
ACQ DATE:	9-NOV-1999 09:29	AVERAGE EFFICIENCY:	22.4%
ELAPSED LIVE TIME:	80008.	RECOVERY:	60.73%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	28.26
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:45	EFF CAL DATE: 3-NOV-1999 11:45	
BKG FILENAME:	B_034_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	13.00	0.00	99.9	2.020E+00	1.126E+00	4.210E-01	4.210E-01
AM243	5270.0	2037.20	2.80	99.6	3.175E+02	1.628E+01	1.635E+00	1.029E+00

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263398_AM.CNF;3
Title : 034
Sample Title:
Start Time: 9-NOV-1999 09:29: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82985E+03
Real Time : 0 22:13:28.00 Sample ID : 263398 Energy Slope : 3.46688E+00
Live Time : 0 22:13:28.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263399_AM.CNF

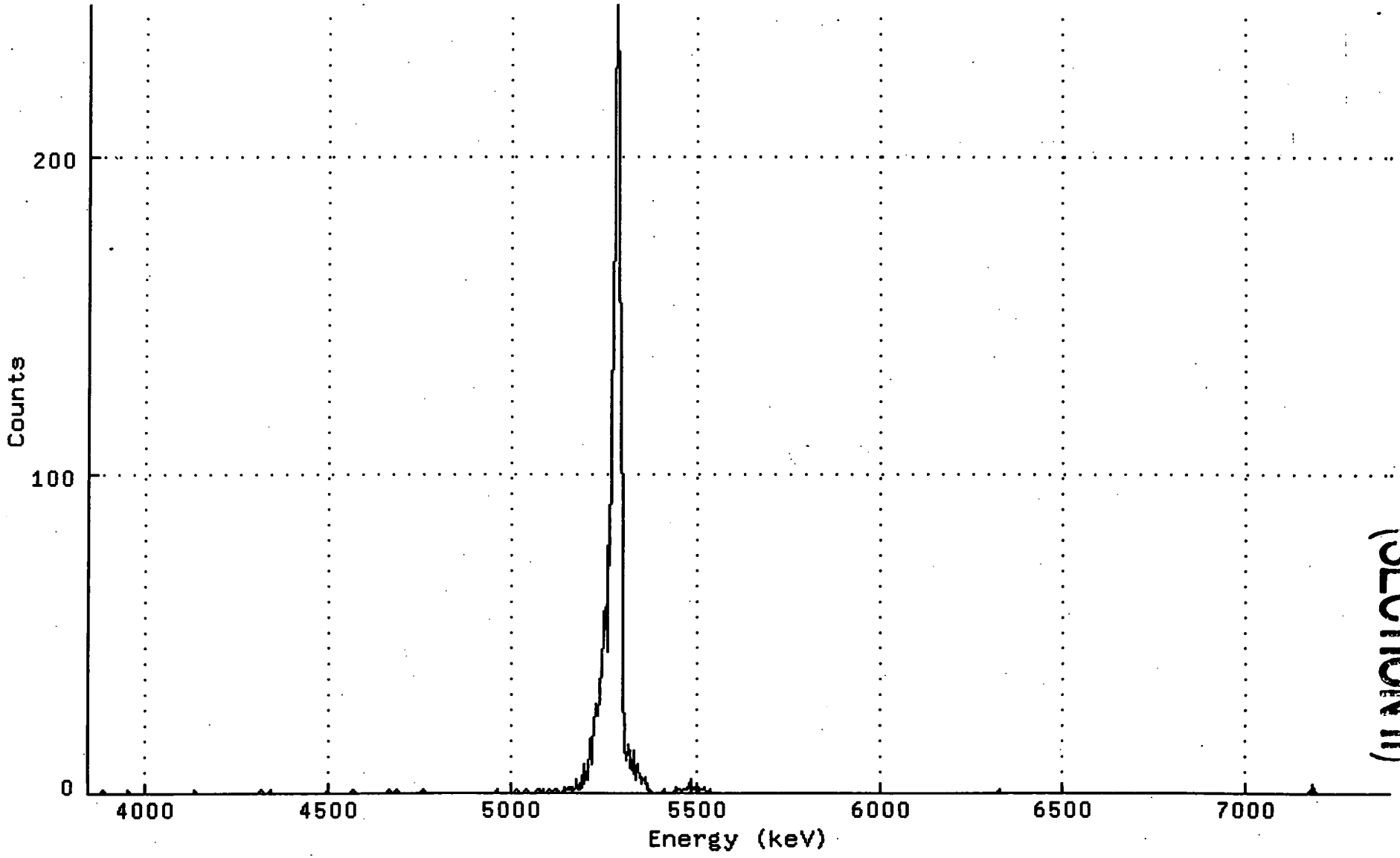
BATCH ID:	99116137	SAMPLE ID:	263399
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	5.530E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	035
ACQ DATE:	9-NOV-1999 09:29	AVERAGE EFFICIENCY:	26.2%
ELAPSED LIVE TIME:	80000.	RECOVERY:	62.00%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	22.92
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:46	EFF CAL DATE:	3-NOV-1999 11:46
BKG FILENAME:	B_035_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	31.20	0.80	99.9	2.602E+00	9.587E-01	5.728E-01	3.994E-01
AM243	5270.0	2436.00	2.00	99.6	2.038E+02	9.732E+00	7.769E-01	5.018E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263399_AM.CNF;3
Title : 035
Sample Title:
Start Time: 9-NOV-1999 09:29: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83373E+03
Real Time : 0 22:13:20.00 Sample ID : 263399 Energy Slope : 3.47115E+00
Live Time : 0 22:13:20.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION II)

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(SECTION II)

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263400_AM.CNF

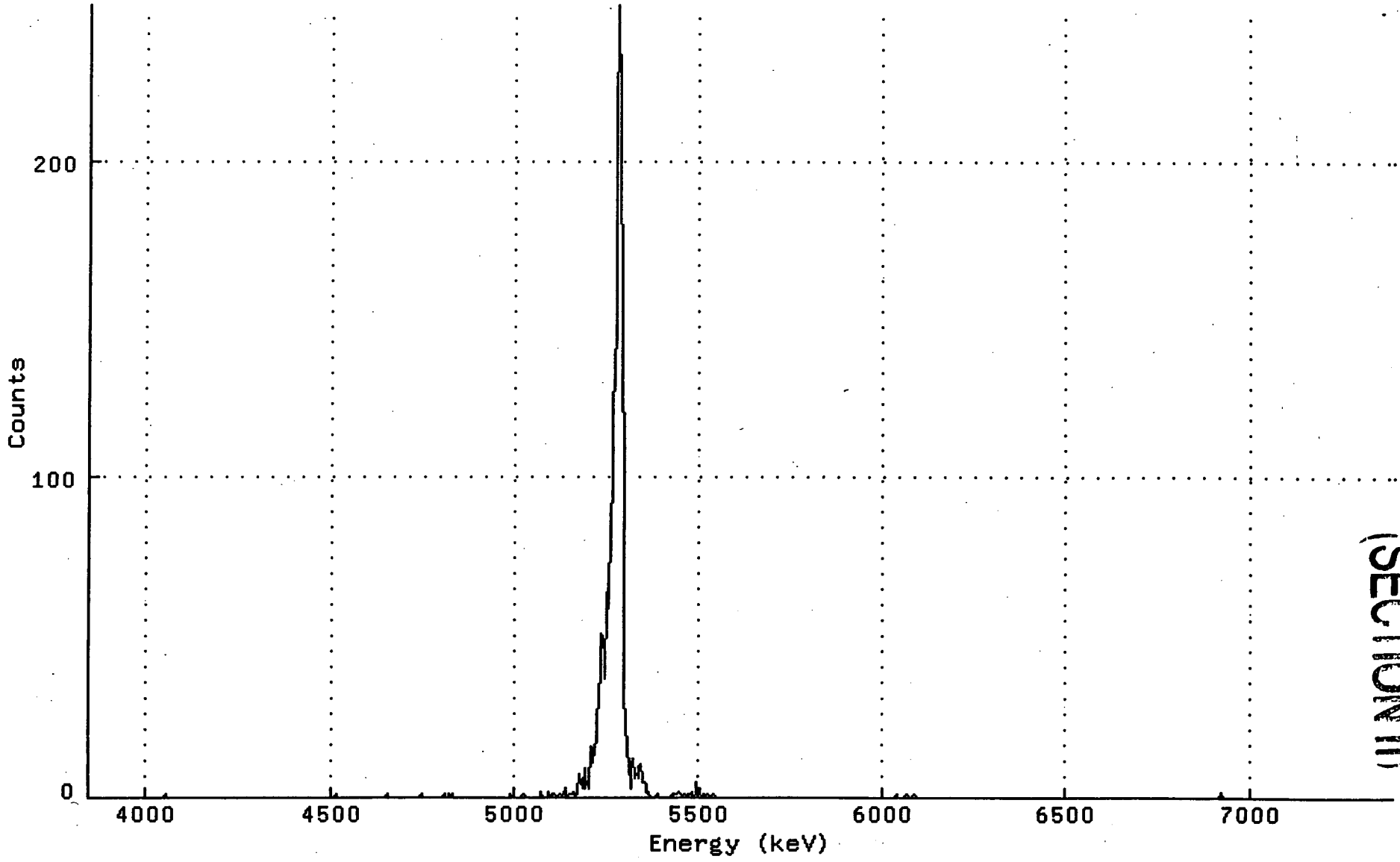
BATCH ID:	99116137	SAMPLE ID:	263400
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.810E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	037
ACQ DATE:	9-NOV-1999 09:29	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80003.	RECOVERY:	71.52%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	24.43
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:50	EFF CAL DATE:	3-NOV-1999 11:50
BKG FILENAME:	B_037_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	31.00	0.00	99.9	2.923E+00	1.062E+00	2.555E-01	2.555E-01
AM243	5270.0	2477.20	2.80	99.6	2.343E+02	1.119E+01	9.923E-01	6.243E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263400_AM.CNF;3
Title : 037
Sample Title:
Start Time: 9-NOV-1999 09:29: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83232E+03
Real Time : 0 22:13:23.00 Sample ID : 263400 Energy Slope : 3.47035E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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(SECTION III)

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263401_AM.CNF

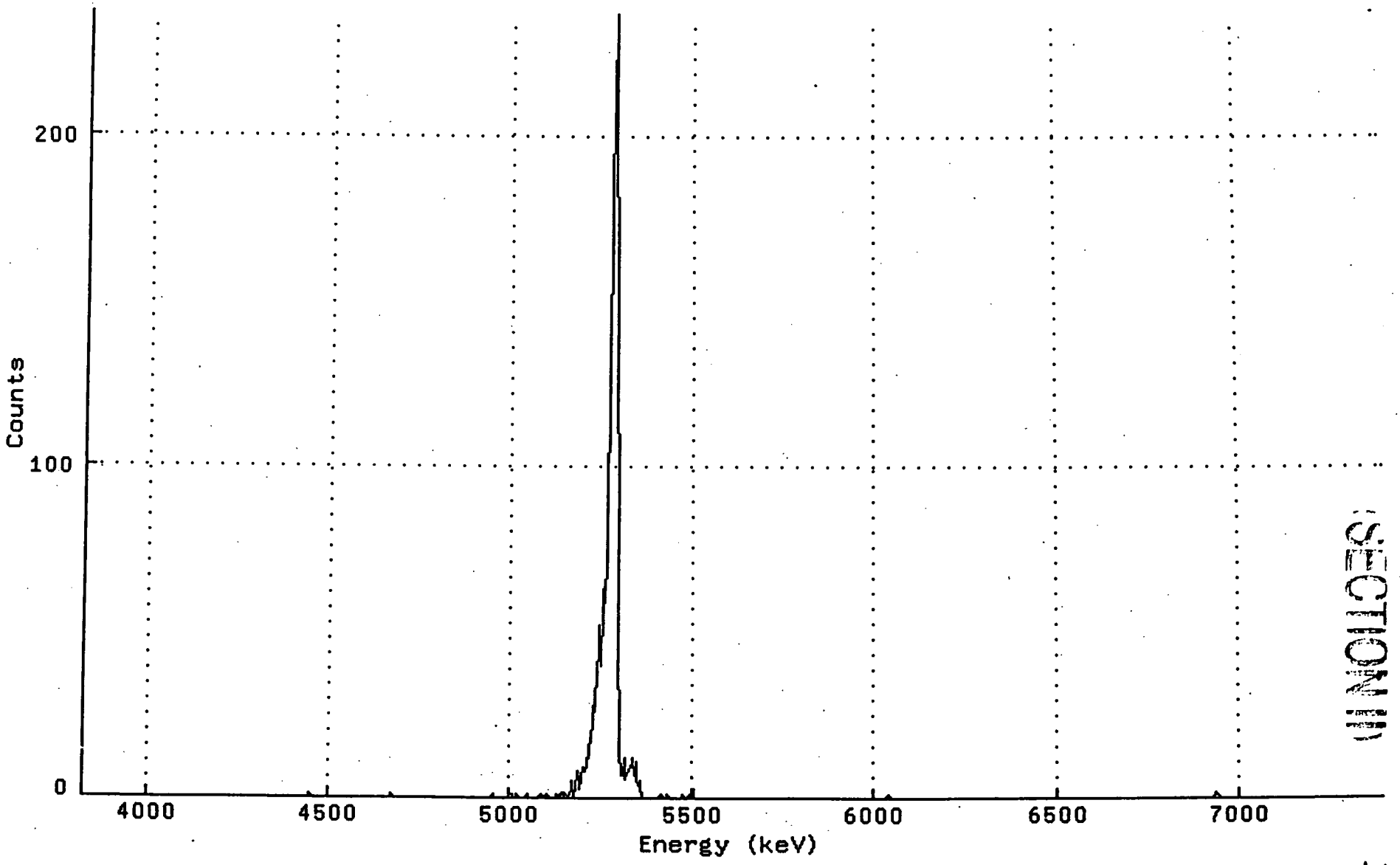
BATCH ID:	99116137	SAMPLE ID:	263401
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.080E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	038
ACQ DATE:	9-NOV-1999 09:30	AVERAGE EFFICIENCY:	22.6%
ELAPSED LIVE TIME:	80006.	RECOVERY:	68.08%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	22.17
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:51	EFF CAL DATE:	3-NOV-1999 11:51
BKG FILENAME:	B_038_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	7.00	0.00	99.9	1.109E+00	8.404E-01	4.292E-01	4.292E-01
AM243	5270.0	2303.20	0.80	99.6	3.659E+02	1.791E+01	1.091E+00	7.609E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263401_AM.CNF;2
Title : 038
Sample Title:
Start Time: 9-NOV-1999 09:30: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.81090E+03
Real Time : 0 22:13:27.00 Sample ID : 263401 Energy Slope : 3.49680E+00
Live Time : 0 22:13:26.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION 11

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Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263402_AM.CNF

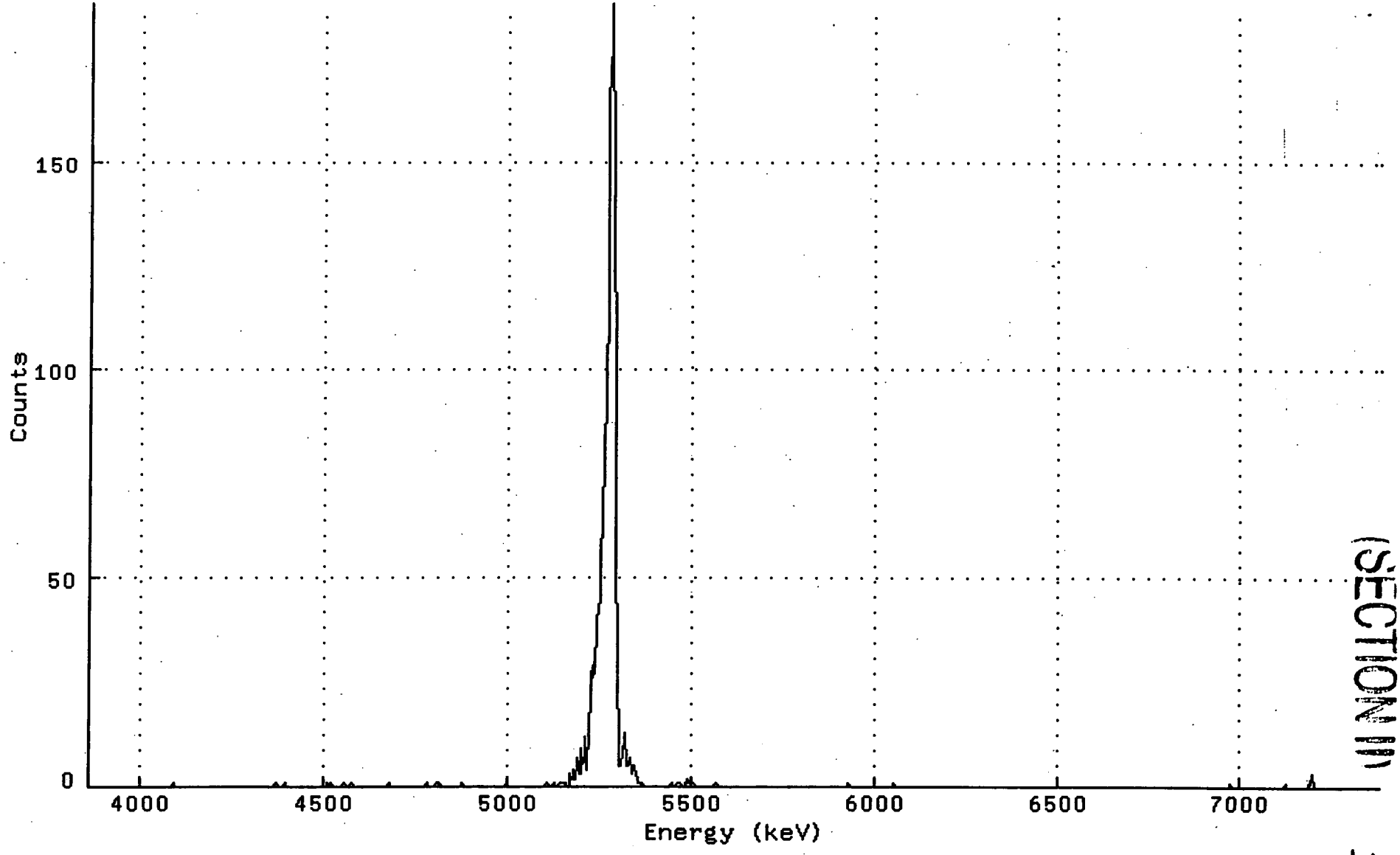
BATCH ID:	99116137	SAMPLE ID:	263402
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.840E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	039
ACQ DATE:	9-NOV-1999 09:30	AVERAGE EFFICIENCY:	22.7%
ELAPSED LIVE TIME:	80001.	RECOVERY:	58.21%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	23.58
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:52	EFF CAL DATE:	3-NOV-1999 11:52
BKG FILENAME:	B_039_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	8.00	0.00	99.9	1.181E+00	8.381E-01	4.001E-01	4.001E-01
AM243	5270.0	1981.40	3.60	99.6	2.935E+02	1.518E+01	1.708E+00	1.055E+00

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263402_AM.CNF;2
Title : 039
Sample Title:
Start Time: 9-NOV-1999 09:30: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.84845E+03
Real Time : 0 22:13:21.00 Sample ID : 263402 Energy Slope : 3.44841E+00
Live Time : 0 22:13:21.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263403_AM.CNF

BATCH ID:	99116137	SAMPLE ID:	263403
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	2.214E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	040
ACQ DATE:	9-NOV-1999 09:30	AVERAGE EFFICIENCY:	23.0%
ELAPSED LIVE TIME:	80002.	RECOVERY:	67.57%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	26.76
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:53	EFF CAL DATE:	3-NOV-1999 11:53
BKG FILENAME:	B_040_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	18.80	1.20	99.9	4.099E-01	1.986E-01	1.701E-01	1.146E-01
AM243	5270.0	2327.40	3.60	99.6	5.091E+01	2.478E+00	2.522E-01	1.558E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

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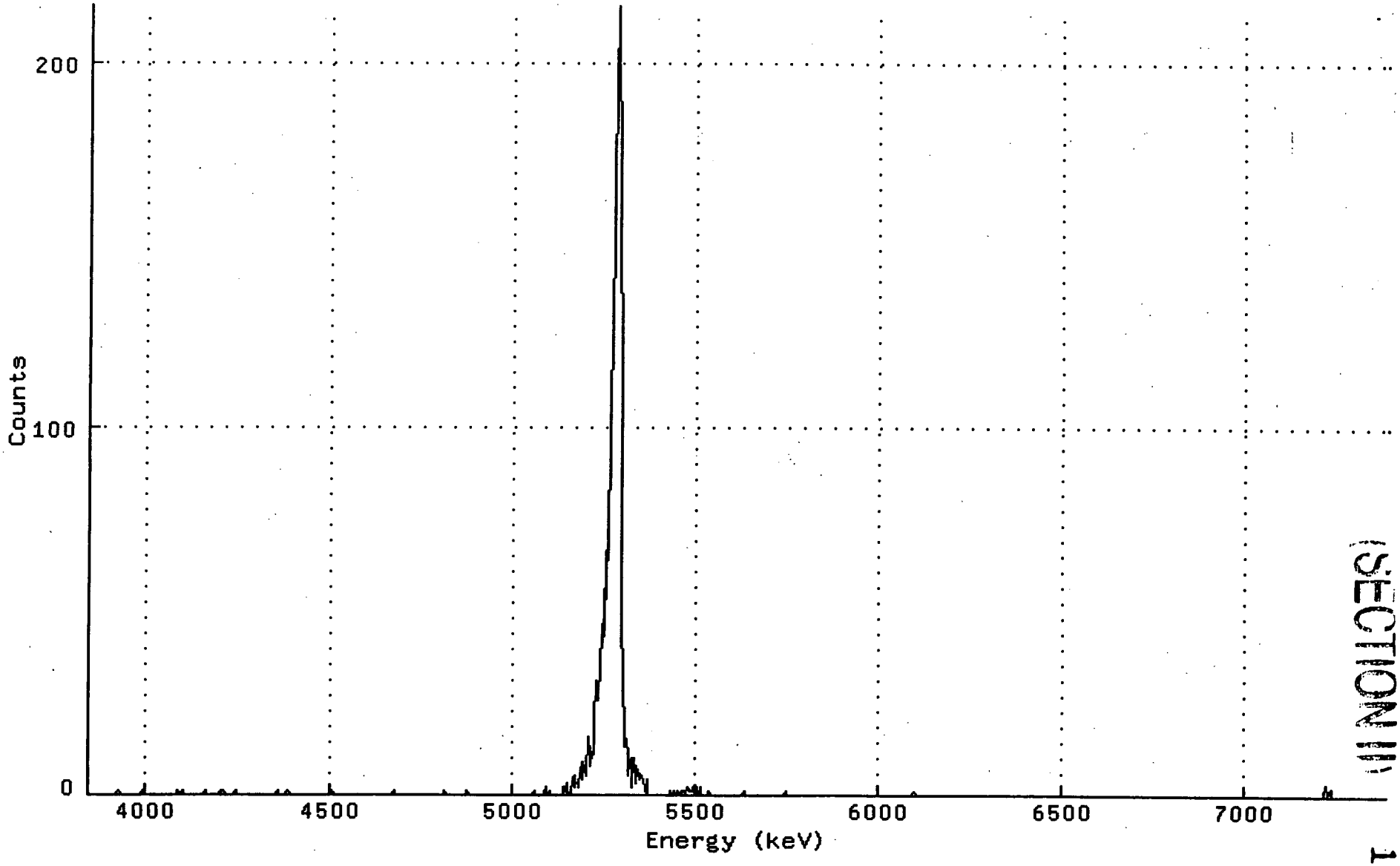
Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263403_AM.CNF;2
Title : 040
Sample Title:
Start Time: 9-NOV-1999 09:30: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83160E+03
Real Time : 0 22:13:22.00 Sample ID : 263403 Energy Slope : 3.46943E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263404_AM.CNF

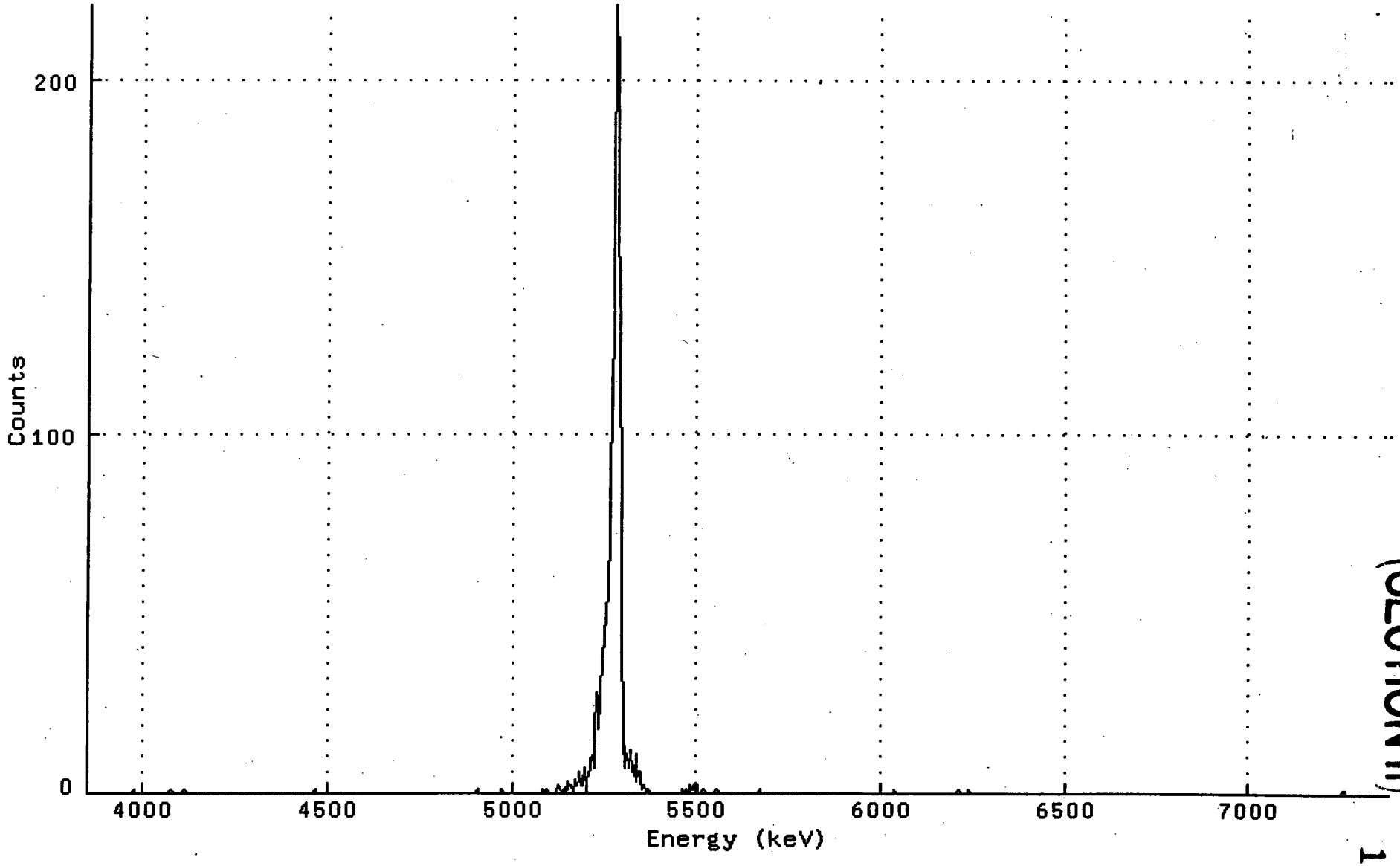
BATCH ID:	99116137	SAMPLE ID:	263404
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.420E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	041
ACQ DATE:	9-NOV-1999 09:30	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80005.	RECOVERY:	59.29%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	22.01
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:55	EFF CAL DATE:	3-NOV-1999 11:55
BKG FILENAME:	B_041_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	10.60	0.40	99.9	1.741E+00	1.102E+00	9.278E-01	6.863E-01
AM243	5270.0	2000.80	3.20	99.6	3.295E+02	1.700E+01	1.816E+00	1.131E+00

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263404_AM.CNF;2
Title : 041
Sample Title:
Start Time: 9-NOV-1999 09:30: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83954E+03
Real Time : 0 22:13:25.00 Sample ID : 263404 Energy Slope : 3.45264E+00
Live Time : 0 22:13:25.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

17

299

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263405_AM.CNF

BATCH ID:	99116137	SAMPLE ID:	263405
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.220E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	042
ACQ DATE:	9-NOV-1999 09:30	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80001.	RECOVERY:	77.08%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	26.37
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:56	EFF CAL DATE: 3-NOV-1999	11:56
BKG FILENAME:	B_042_3NOV99		

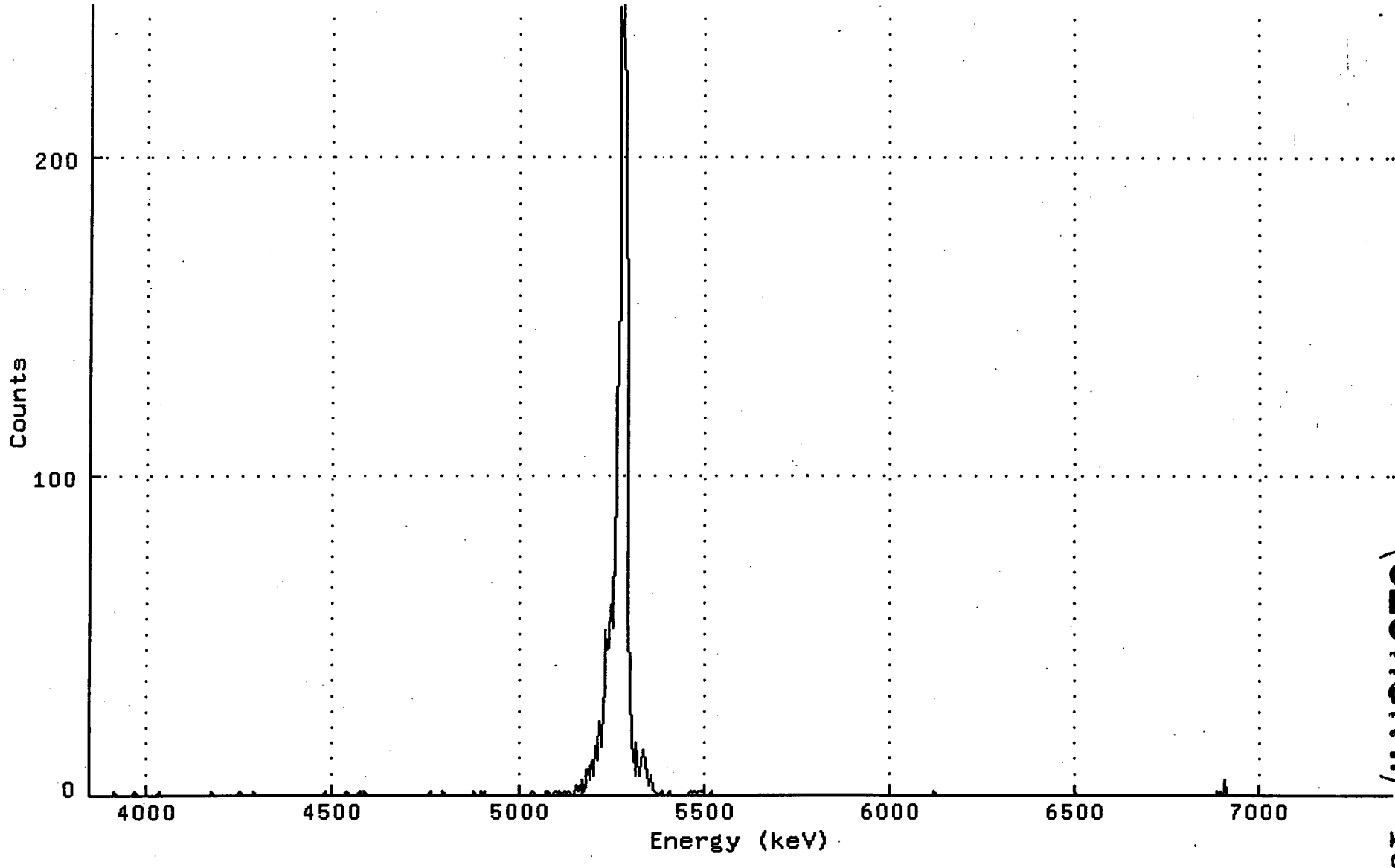
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	6.20	0.80	99.9	7.856E-01	6.868E-01	8.702E-01	6.068E-01
AM243	5270.0	2754.00	2.00	99.6	3.500E+02	1.606E+01	1.180E+00	7.623E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

300

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263405_AM.CNF;1
Title : 042
Sample Title:
Start Time: 9-NOV-1999 09:30: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83381E+03
Real Time : 0 22:13:21.00 Sample ID : 263405 Energy Slope : 3.43728E+00
Live Time : 0 22:13:21.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III) 19

301

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263406_AM.CNF

BATCH ID:	99116137	SAMPLE ID:	263406
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.480E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	043
ACQ DATE:	9-NOV-1999 09:31	AVERAGE EFFICIENCY:	23.6%
ELAPSED LIVE TIME:	80004.	RECOVERY:	56.65%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	24.55
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:57	EFF CAL DATE:	3-NOV-1999 11:57
BKG FILENAME:	B_043_3NOV99		

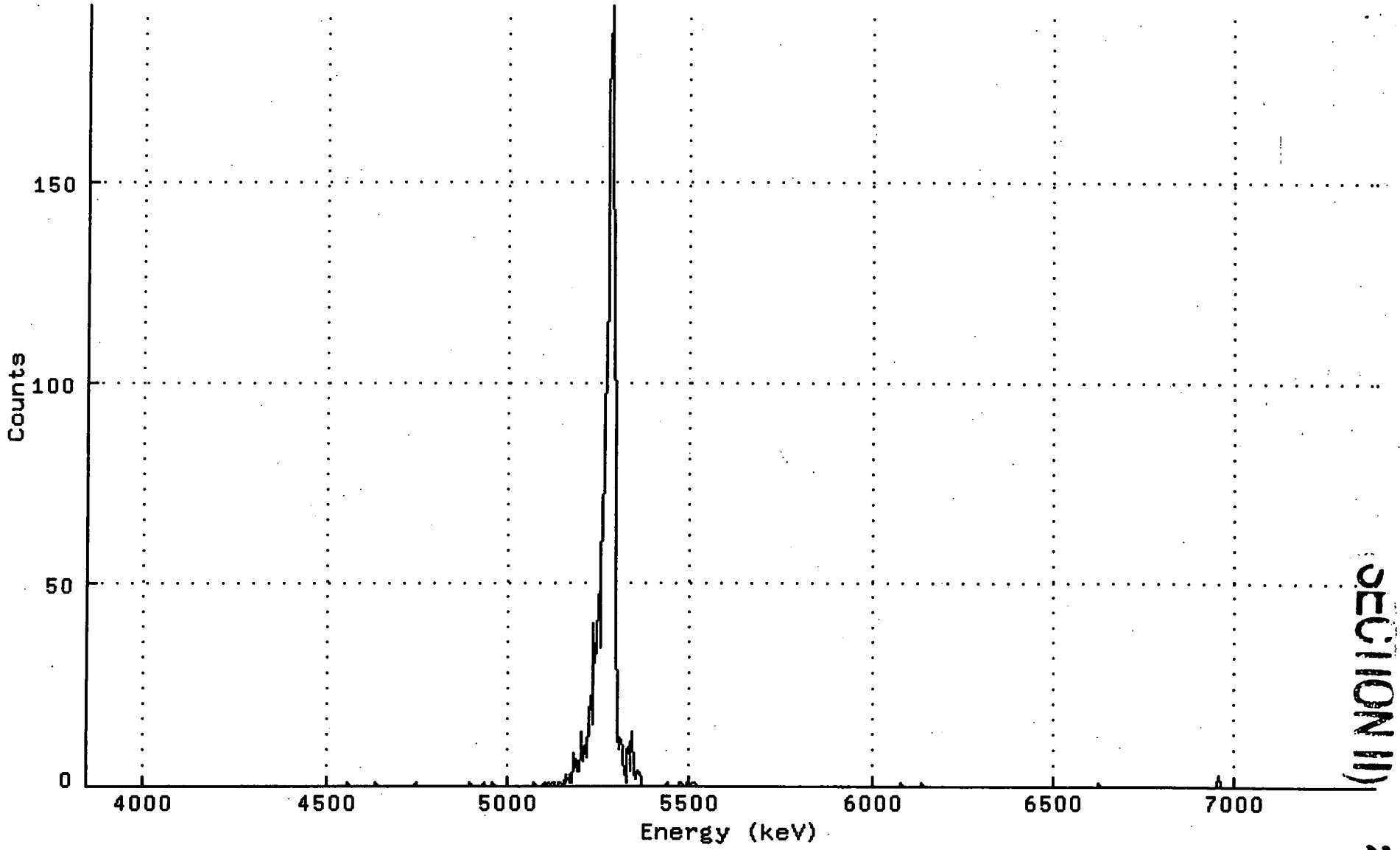
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	4.00	0.00	99.9	5.013E-01	5.021E-01	3.395E-01	3.395E-01
AM243	5270.0	2001.40	1.60	99.6	2.516E+02	1.295E+01	1.080E+00	7.103E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

302

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263406_AM.CNF;1
Title : 043
Sample Title:
Start Time: 9-NOV-1999 09:31: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83251E+03
Real Time : 0 22:13:24.00 Sample ID : 263406 Energy Slope : 3.46621E+00
Live Time : 0 22:13:24.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

303

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263407_AM.CNF

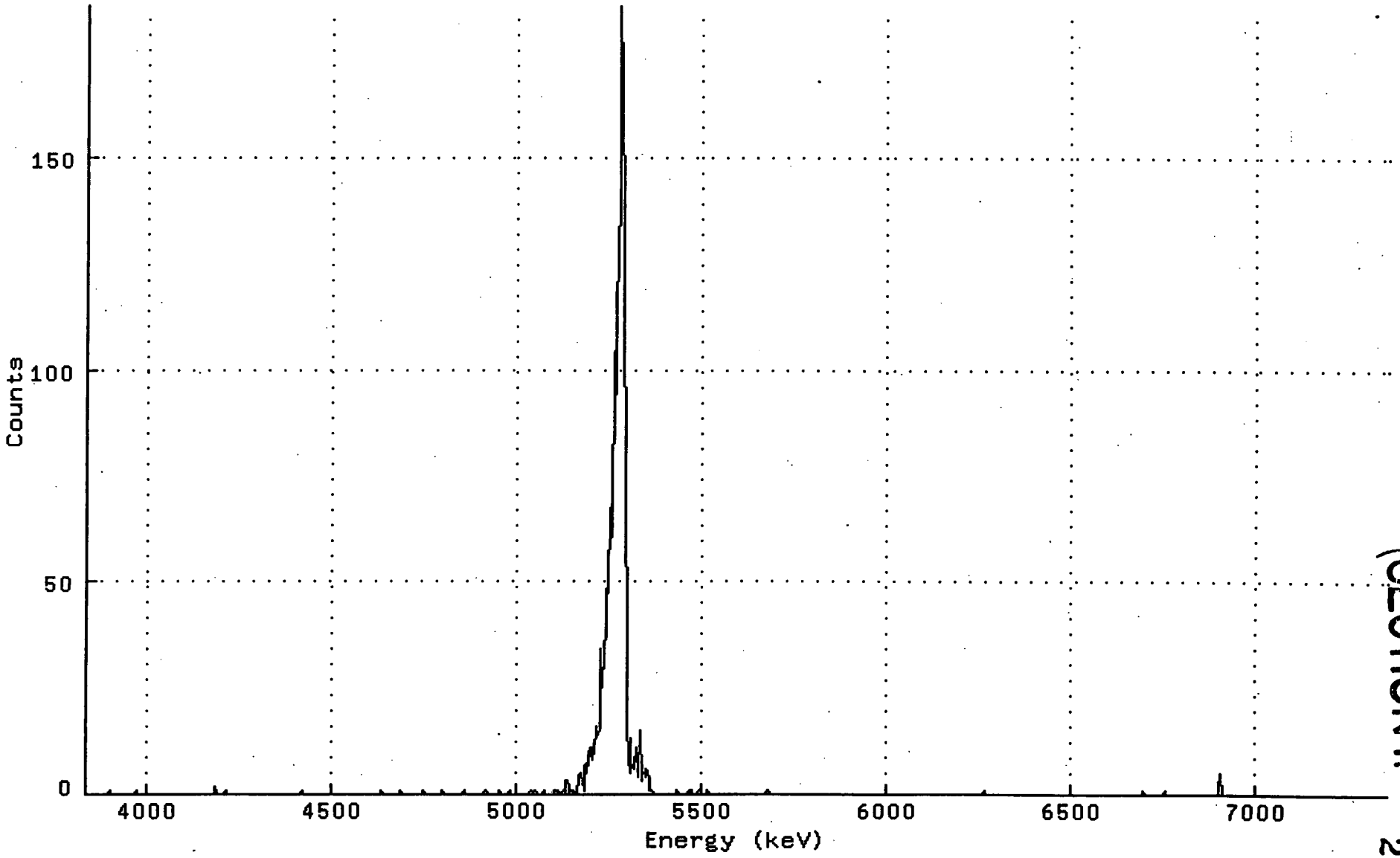
BATCH ID:	99116137	SAMPLE ID:	263407
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.470E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	044
ACQ DATE:	9-NOV-1999 09:31	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80007.	RECOVERY:	56.75%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	30.28
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:59	EFF CAL DATE:	3-NOV-1999 11:59
BKG FILENAME:	B_044_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	3.00	0.00	99.9	4.786E-01	5.533E-01	4.322E-01	4.322E-01
AM243	5270.0	2029.80	1.20	99.6	3.248E+02	1.664E+01	1.249E+00	8.412E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263407_AM.CNF;1
Title : 044
Sample Title:
Start Time: 9-NOV-1999 09:31: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82612E+03
Real Time : 0 22:13:27.00 Sample ID : 263407 Energy Slope : 3.44356E+00
Live Time : 0 22:13:27.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

23

305

SECTION III

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263408_AM.CNF

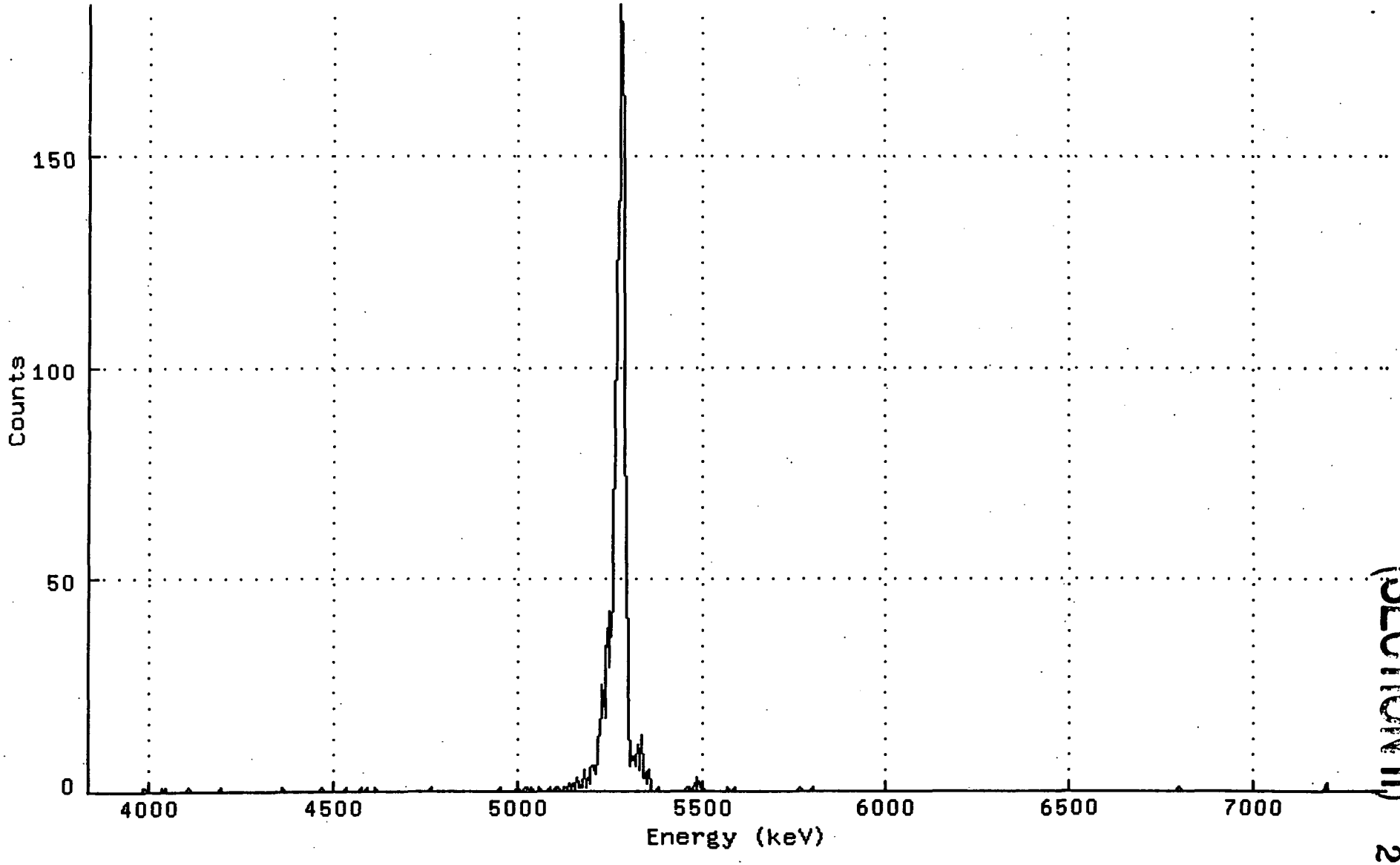
BATCH ID:	99116137	SAMPLE ID:	263408
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.420E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	045
ACQ DATE:	9-NOV-1999 09:31	AVERAGE EFFICIENCY:	23.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	52.50%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	26.58
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:00	EFF CAL DATE:	3-NOV-1999 12:00
BKG FILENAME:	B_045_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	13.60	0.40	99.9	2.421E+00	1.347E+00	1.006E+00	7.440E-01
AM243	5270.0	1845.80	3.20	99.6	3.295E+02	1.753E+01	1.969E+00	1.226E+00

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263408_AM.CNF;1
Title : 045
Sample Title:
Start Time: 9-NOV-1999 09:31: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82237E+03
Real Time : 0 22:13:22.00 Sample ID : 263408 Energy Slope : 3.45302E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III) 25

307

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263409_AM.CNF

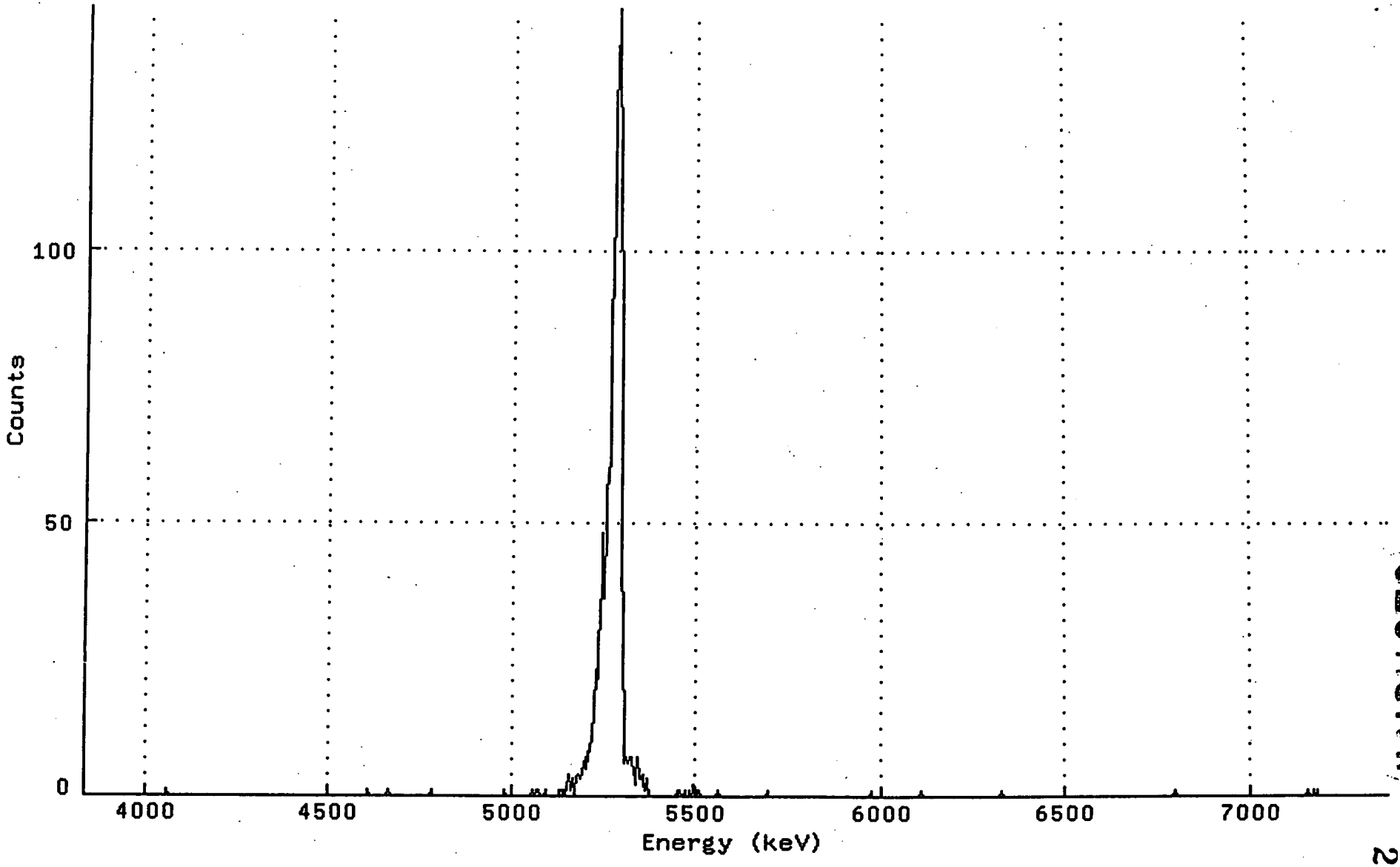
BATCH ID:	99116137	SAMPLE ID:	263409
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.560E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	046
ACQ DATE:	9-NOV-1999 09:31	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80005.	RECOVERY:	51.22%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	30.68
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:02	EFF CAL DATE:	3-NOV-1999 12:02
BKG FILENAME:	B_046_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	10.00	0.00	99.9	1.388E+00	8.819E-01	3.761E-01	3.761E-01
AM243	5270.0	1775.00	2.00	99.6	2.472E+02	1.334E+01	1.293E+00	8.352E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263409_AM.CNF;1
Title : 046
Sample Title:
Start Time: 9-NOV-1999 09:31: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82505E+03
Real Time : 0 22:13:25.00 Sample ID : 263409 Energy Slope : 3.45958E+00
Live Time : 0 22:13:25.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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309

Spectral File: ND_AMS_ARCHIVE_S:S_99116137$263398D_AM.CNF

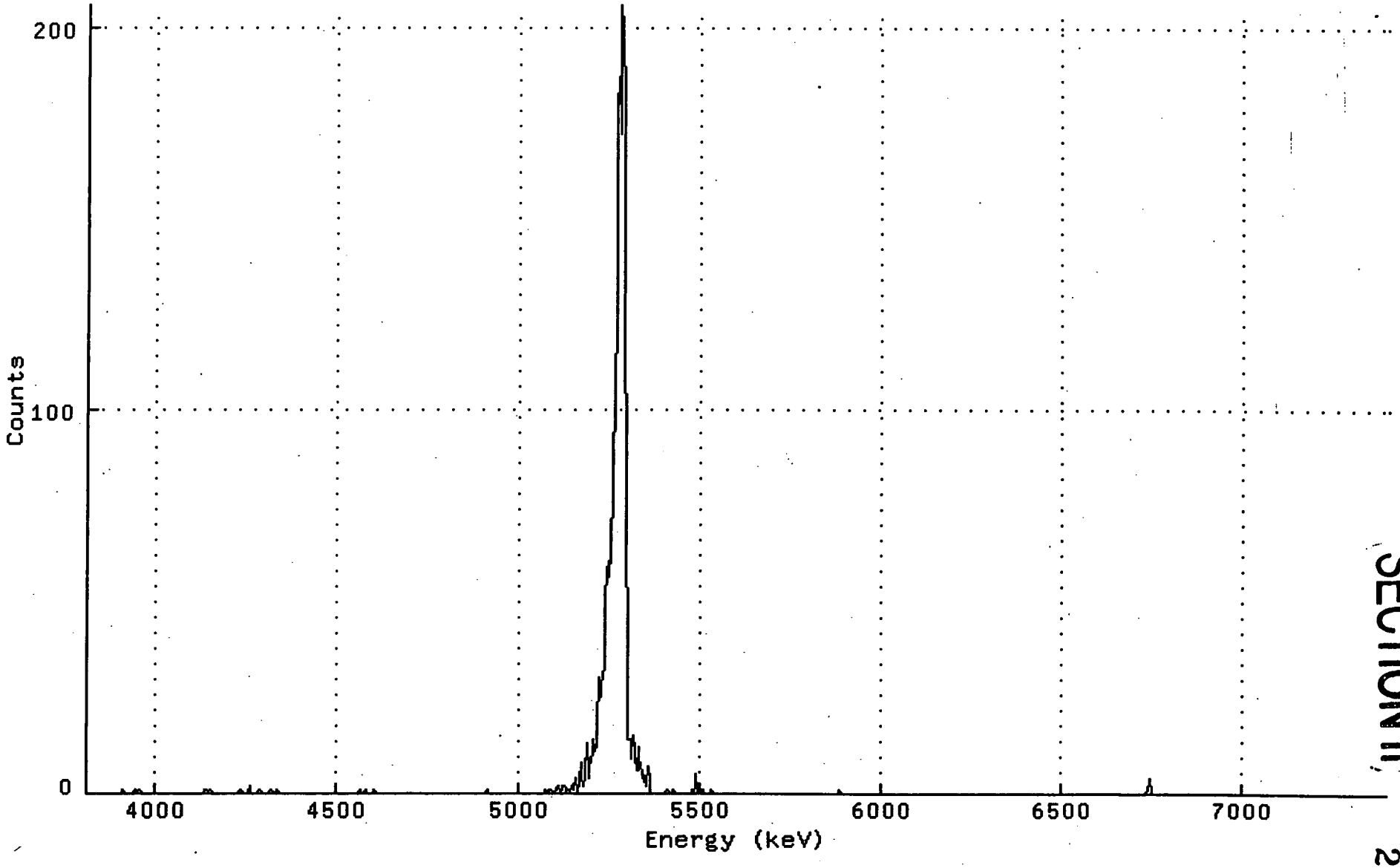
BATCH ID:	99116137	SAMPLE ID:	263398D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.550E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	047
ACQ DATE:	9-NOV-1999 09:32	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	73.25%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	29.40
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:03	EFF CAL DATE:	3-NOV-1999 12:03
BKG FILENAME:	B_047_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	11.60	0.40	99.9	1.488E+00	8.985E-01	7.249E-01	5.363E-01
AM243	5270.0	2466.80	3.20	99.6	3.175E+02	1.517E+01	1.419E+00	8.840E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116137$263398D_AM.CNF;3
Title : 047
Sample Title:
Start Time: 9-NOV-1999 09:32: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.79990E+03
Real Time : 0 22:13:22.00 Sample ID : 263398D Energy Slope : 3.50728E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

311

Spectral File: ND_AMS_ARCHIVE_C:C_99116137$LCSWR33_AM.CNF

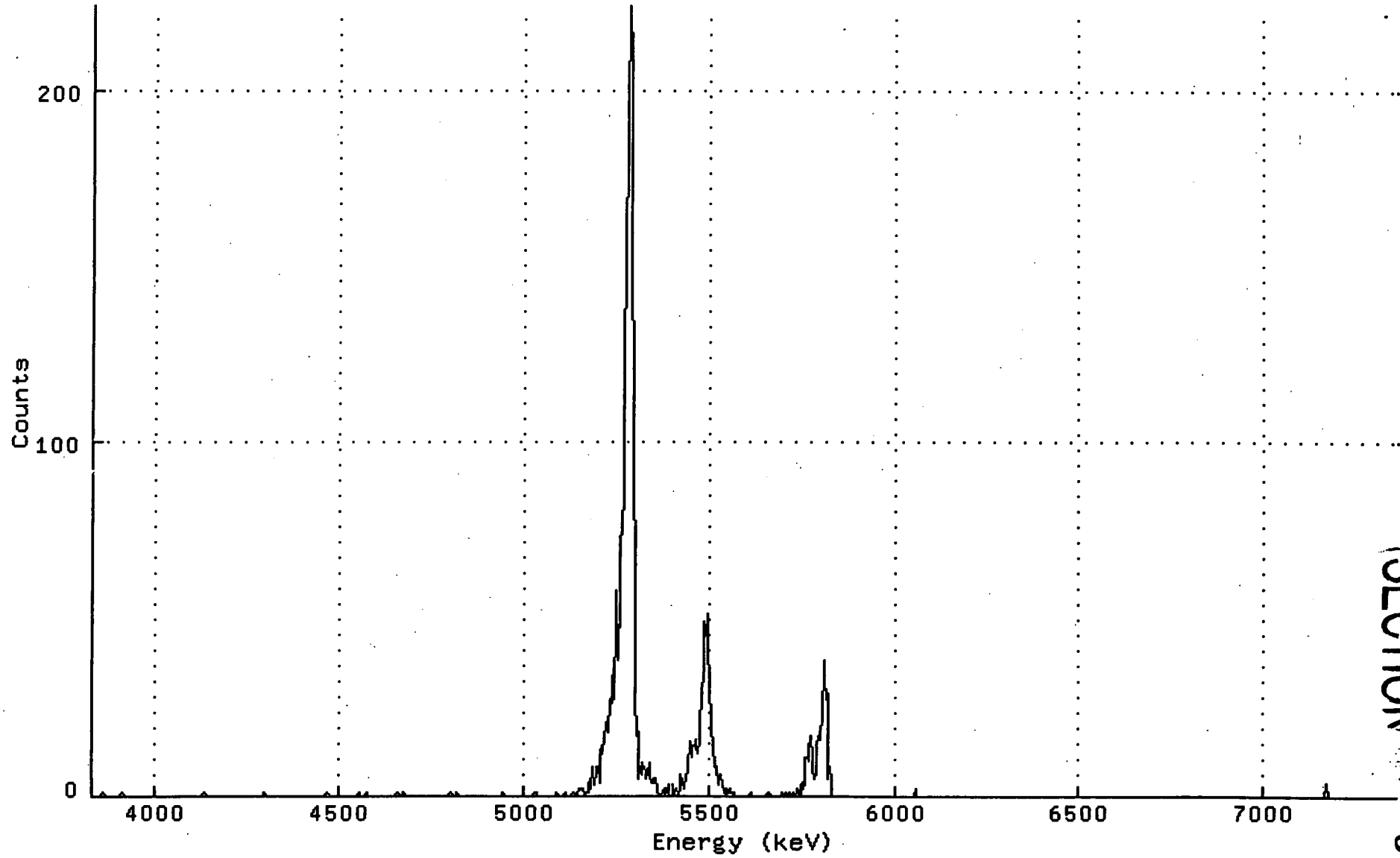
BATCH ID:	99116137	SAMPLE ID:	LCSWR33
SAMPLE DATE:	1-APR-1985 00:00	ALIQUOT:	2.500E-01 mL
SAMPLE TITLE:		DETECTOR NUMBER:	048
ACQ DATE:	9-NOV-1999 09:32	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80003.	RECOVERY:	65.85%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	23.72
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.269	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:05	EFF CAL DATE:	3-NOV-1999 12:05
BKG FILENAME:	B_048_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ mL	TPU/ERROR 2-SIGMA	MDC pCi/ mL	CRIT LEVEL pCi/ mL
AM-241	5479.1	554.00	0.00	99.9	5.033E+00	5.107E-01	2.405E-02	2.405E-02
AM243	5270.0	2277.40	1.60	99.6	2.031E+01	9.980E-01	7.650E-02	5.031E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.C]C_99116137$LCSWR33_AM.CNF;3
Title : 048
Sample Title:
Start Time: 9-NOV-1999 09:32: Sample Time: 1-APR-1985 00:00: Energy Offset: 3.82143E+03
Real Time : 0 22:13:23.00 Sample ID : LCSWR33 Energy Slope : 3.45077E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION 31

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Sample Preparation and Analysis Log

Sample Type: Various Solids

SECTION II)

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116138	Rhonda K Bay	10/29/99
		Pu-239/240,Pu-238	99116140		11/11/99
		U-238, U235, U234	99116142		
Counting	RC-19 R06	Am^{241}	99116138		11/11/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		33			
16822	263410	2	0.750 G	Am, Pu, U	0.0486	34	14.664	30.104	15.440
16822	263411	3	0.750 G	Am, Pu, U	0.0769	35	14.710	24.468	9.758
16822	263412	4	0.750 G	Am, Pu, U		37		26.438	
16822	263413	5	0.750 G	Am, Pu, U		38		27.291	
16822	263414	6	0.750 G	Am, Pu, U		39		26.277	
16822	263415	7	0.750 G	Am, Pu, U		40		28.476	
16822	263416	8	0.750 G	Am, Pu, U Recount.		41		24.352	
16822	263417	9	0.750 G	Am, Pu, U		42		17.645	
16822	263418	10	0.750 G	Am, Pu, U	0.0499	43	14.469	29.512	15.043
16822	263419	11	0.750 G	Am, Pu, U *	0.1436	44	14.434	19.657	5.223
16822	263420	12	0.750 G	Am, Pu, U *	0.1426	45	14.546	19.806	5.260
16822	263421	13	0.750 G	Am, Pu, U *	0.1451	46	14.578	19.747	5.169
16822	263410D	14	0.750 G	Am, Pu, U	0.0486	47	14.664	30.104	15.440
LCSWR1, LCSWR33		15	0.250 mL	Am, Pu, U		48			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

* Chemical recovery < 30% - will be Reanalyzed.

Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9.

-Balance # 8 used for weights of samples and their aliquots

Sample aliquot is the fraction of the total sample taken for analysis

OK DAD 11-1-99

Qidby S. Spata 11/11/99

Spectral File: ND_AMS_ARCHIVE_R:R_99116138$PB_AM.CNF

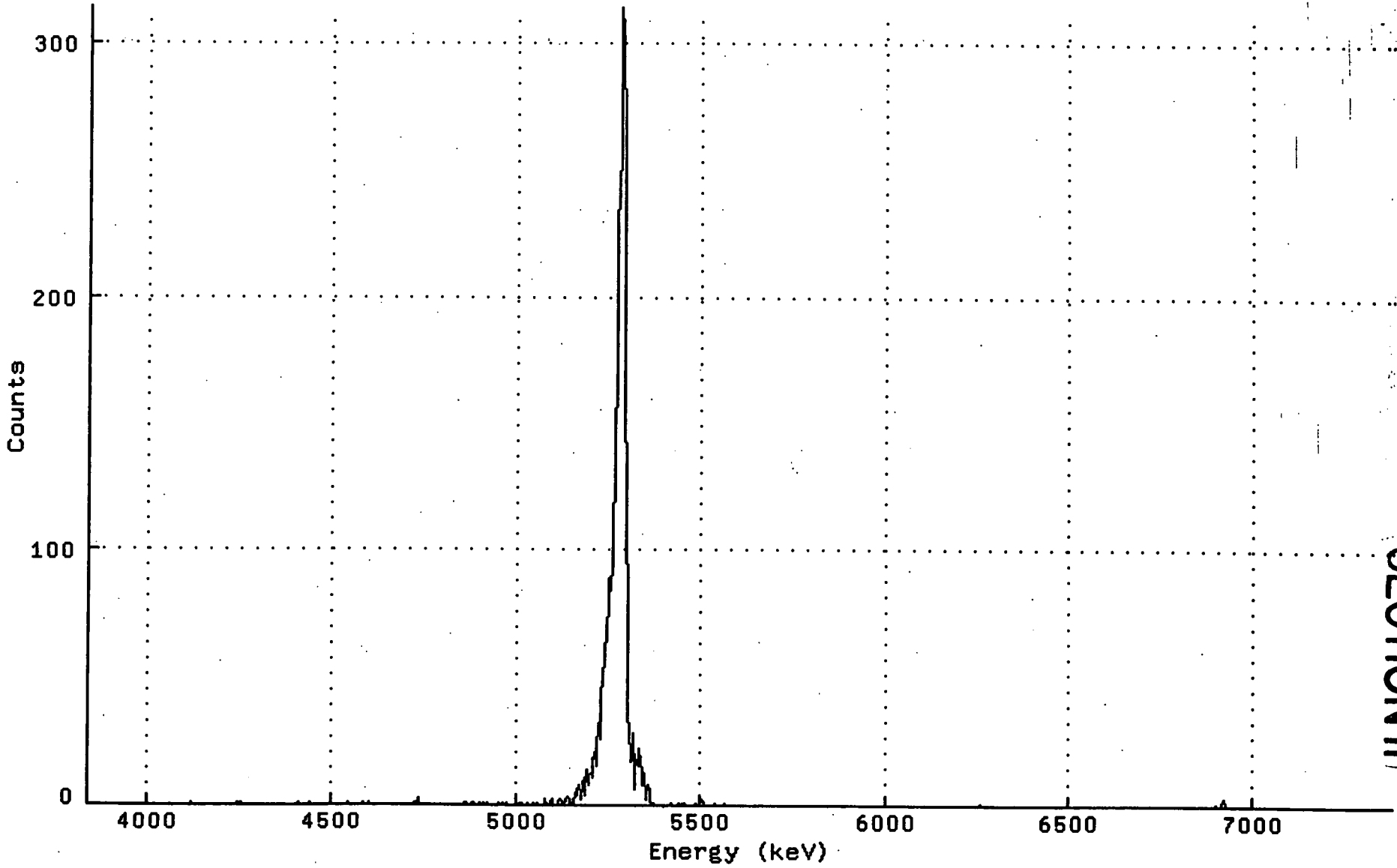
BATCH ID:	99116138	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	1.000E+00 SA
SAMPLE TITLE:		DETECTOR NUMBER:	033
ACQ DATE:	10-NOV-1999 09:54	AVERAGE EFFICIENCY:	27.0%
ELAPSED LIVE TIME:	80004.	RECOVERY:	86.55%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	25.83
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:44	EFF CAL DATE:	3-NOV-1999 11:44
BKG FILENAME:	B_033_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	7.20	0.80	99.9	2.311E-02	1.855E-02	2.205E-02	1.537E-02
AM243	5270.0	3500.40	3.60	99.6	1.127E+01	4.766E-01	3.713E-02	2.293E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.R]R_99116138$PB_AM.CNF;4
Title : 033
Sample Title:
Start Time: 10-NOV-1999 09:54 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83095E+03
Real Time : 0 22:13:24.00 Sample ID : PB Energy Slope : 3.45959E+00
Live Time : 0 22:13:24.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

316

Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263410_AM.CNF

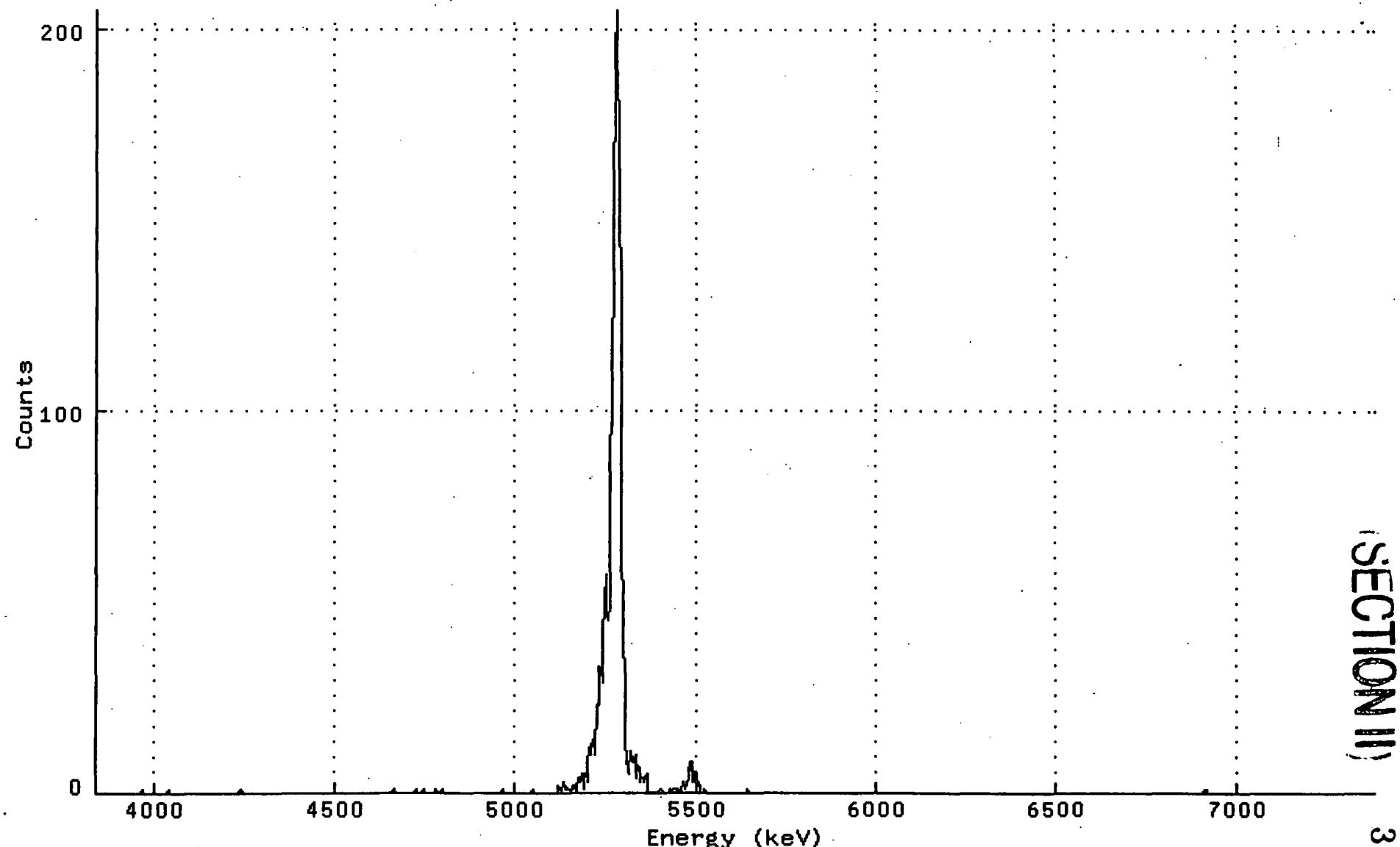
BATCH ID:	99116138	SAMPLE ID:	263410
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	034
ACQ DATE:	10-NOV-1999 09:54	AVERAGE EFFICIENCY:	22.4%
ELAPSED LIVE TIME:	80001.	RECOVERY:	64.76%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	25.01
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:45	EFF CAL DATE:	3-NOV-1999 11:45
BKG FILENAME:	B_034_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	59.00	0.00	99.9	6.280E+00	1.673E+00	2.884E-01	2.884E-01
AM243	5270.0	2172.20	2.80	99.6	2.319E+02	1.161E+01	1.120E+00	7.046E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263410_AM.CNF;3
Title : 034
Sample Title:
Start Time: 10-NOV-1999 09:54 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82985E+03
Real Time : 0 22:13:22.00 Sample ID : 263410 Energy Slope : 3.46688E+00
Live Time : 0 22:13:21.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

318

Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263411_AM.CNF

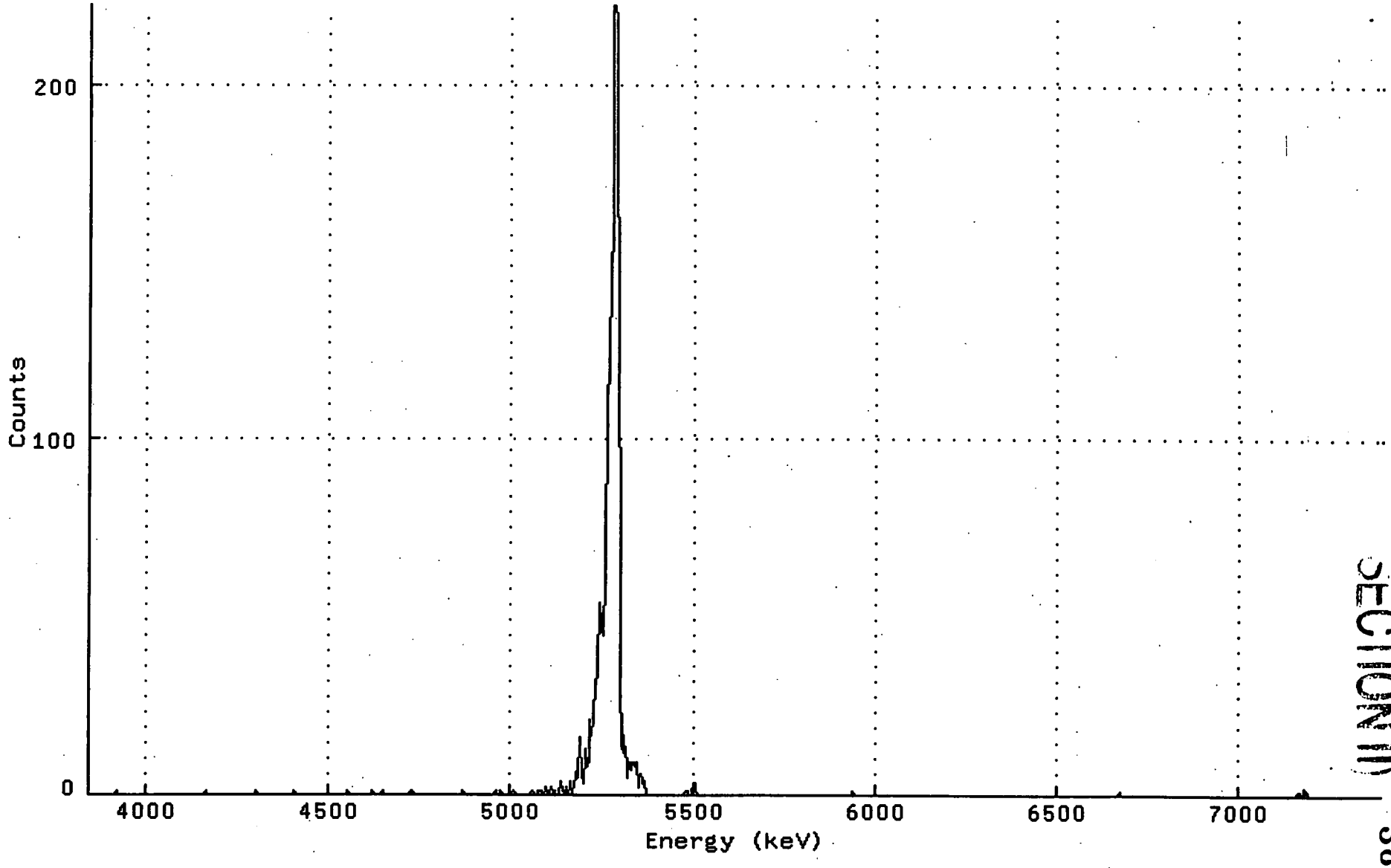
BATCH ID:	99116138	SAMPLE ID:	263411
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 7.690E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	035
ACQ DATE:	10-NOV-1999 09:54	AVERAGE EFFICIENCY:	26.2%
ELAPSED LIVE TIME:	80003.	RECOVERY:	64.21%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	30.40
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:46	EFF CAL DATE:	3-NOV-1999 11:46
BKG FILENAME:	B_035_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	1.20	0.80	99.9	6.949E-02	1.765E-01	3.977E-01	2.773E-01
AM243	5270.0	2523.00	2.00	99.6	1.466E+02	6.911E+00	5.394E-01	3.484E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263411_AM.CNF;3
Title : 035
Sample Title:
Start Time: 10-NOV-1999 09:54 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83373E+03
Real Time : 0 22:13:23.00 Sample ID : 263411 Energy Slope : 3.47115E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263412_AM.CNF

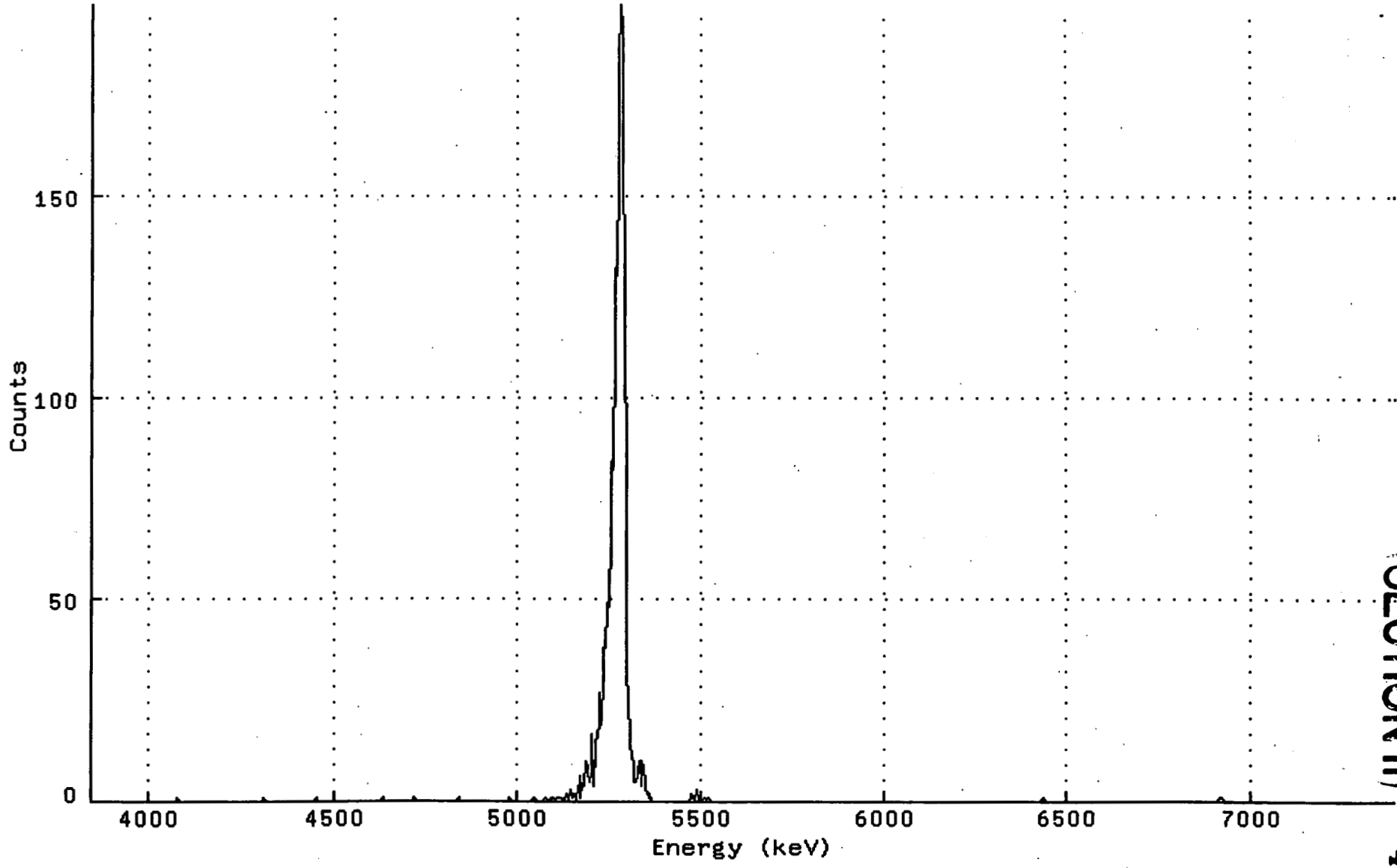
BATCH ID:	99116138	SAMPLE ID:	263412
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	037
ACQ DATE:	10-NOV-1999 09:56	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80001.	RECOVERY:	67.13%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	31.08
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:50	EFF CAL DATE:	3-NOV-1999 11:50
BKG FILENAME:	B_037_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/ g
AM-241	5479.1	5.00	0.00	99.9	1.451E-02	1.300E-02	7.864E-03	7.864E-03
AM243	5270.0	2325.20	2.80	99.6	6.769E+00	3.306E-01	3.054E-02	1.921E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263412_AM.CNF;3
Title : 037
Sample Title:
Start Time: 10-NOV-1999 09:56 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83232E+03
Real Time : 0 22:13:22.00 Sample ID : 263412 Energy Slope : 3.47035E+00
Live Time : 0 22:13:21.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263413_AM.CNF

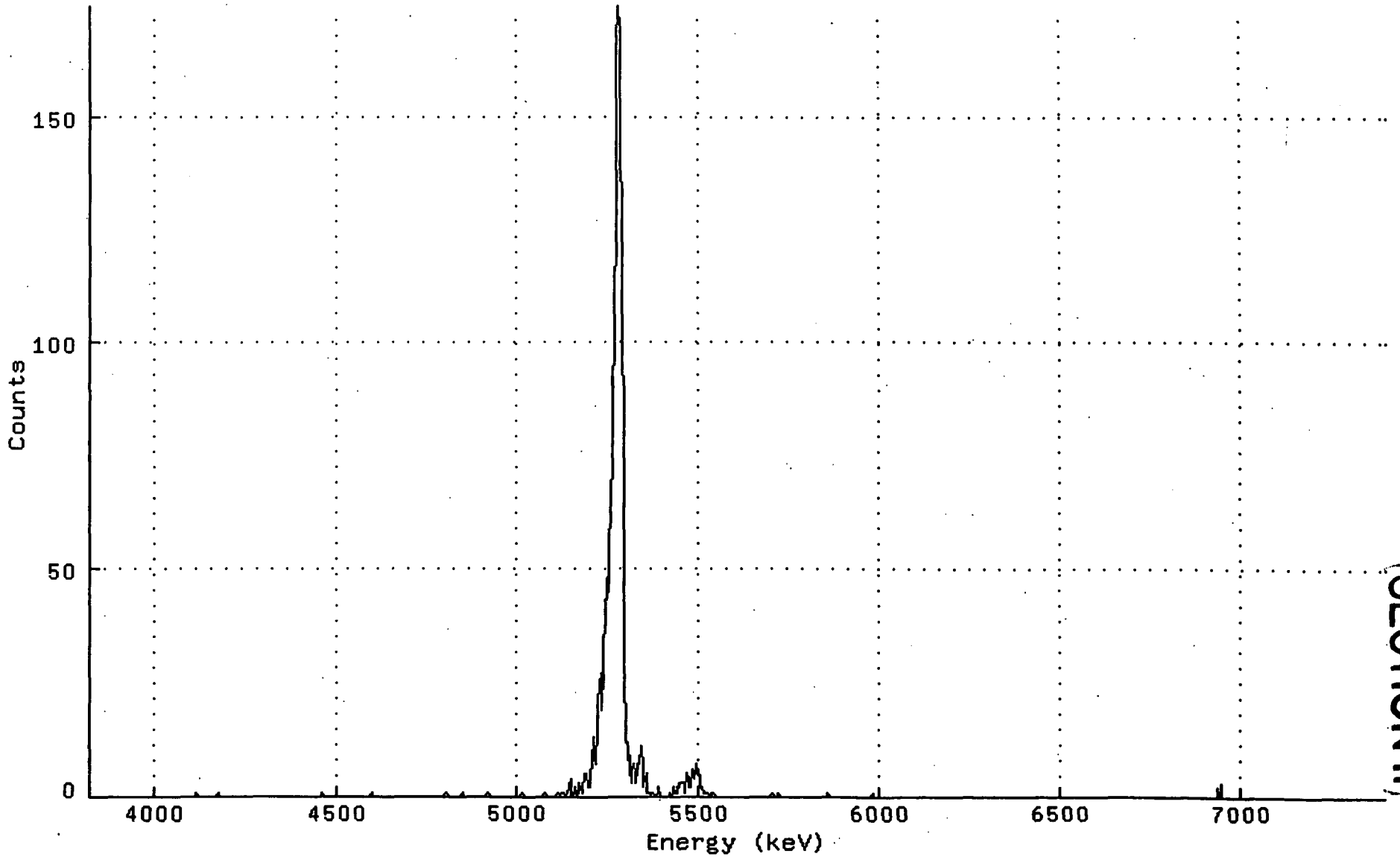
BATCH ID:	99116138	SAMPLE ID:	263413
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	038
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	22.6%
ELAPSED LIVE TIME:	80003.	RECOVERY:	55.52%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	25.54
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:51	EFF CAL DATE:	3-NOV-1999 11:51
BKG FILENAME:	B_038_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/g
AM-241	5479.1	84.00	0.00	99.9	3.018E-01	6.820E-02	9.735E-03	9.735E-03
AM243	5270.0	1878.20	0.80	99.6	6.769E+00	3.574E-01	2.476E-02	1.726E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263413_AM.CNF;3
Title : 038
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.81090E+03
Real Time : 0 22:13:23.00 Sample ID : 263413 Energy Slope : 3.49680E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263414_AM.CNF

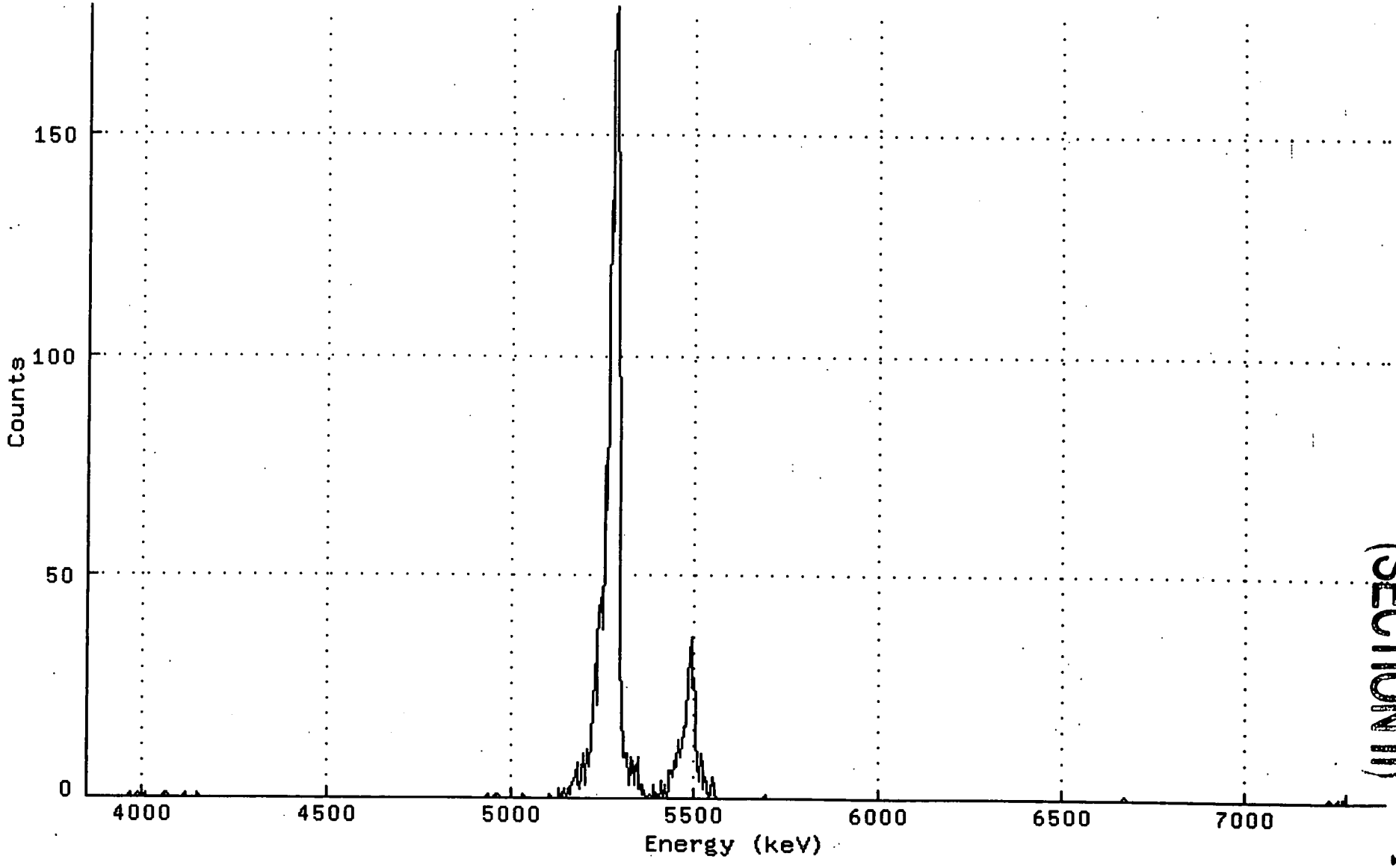
BATCH ID:	99116138	SAMPLE ID:	263414
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	041
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	62.06%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	30.17
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:55	EFF CAL DATE:	3-NOV-1999 11:55
BKG FILENAME:	B_041_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/g
AM-241	5479.1	425.20	0.80	99.9	1.370E+00	1.542E-01	2.213E-02	1.543E-02
AM243	5270.0	2094.20	2.80	99.6	6.769E+00	3.432E-01	3.391E-02	2.133E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263414_AM.CNF;4
Title : 041
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83954E+03
Real Time : 0 22:13:22.00 Sample ID : 263414 Energy Slope : 3.45264E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263415_AM.CNF

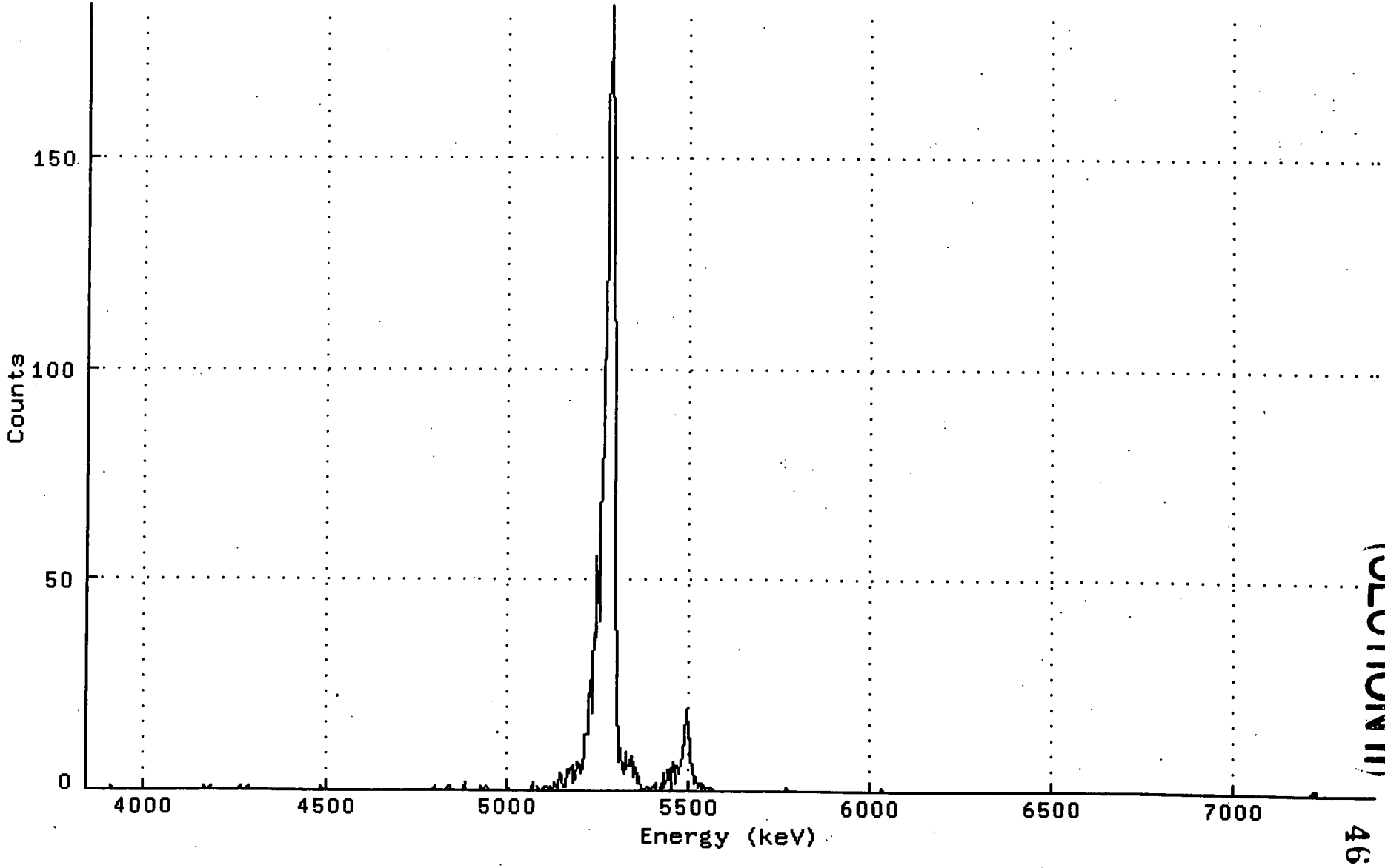
BATCH ID:	99116138	SAMPLE ID:	263415
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	040
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	23.0%
ELAPSED LIVE TIME:	80005.	RECOVERY:	60.69%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	27.99
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:53	EFF CAL DATE:	3-NOV-1999 11:53
BKG FILENAME:	B_040_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/g
AM-241	5479.1	187.20	2.80	99.9	6.043E-01	9.561E-02	3.386E-02	2.130E-02
AM243	5270.0	2090.40	3.60	99.6	6.769E+00	3.428E-01	3.734E-02	2.306E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263415_AM.CNF;3
Title : 040
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83160E+03
Real Time : 0 22:13:26.00 Sample ID : 263415 Energy Slope : 3.46943E+00
Live Time : 0 22:13:25.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263416_AM.CNF

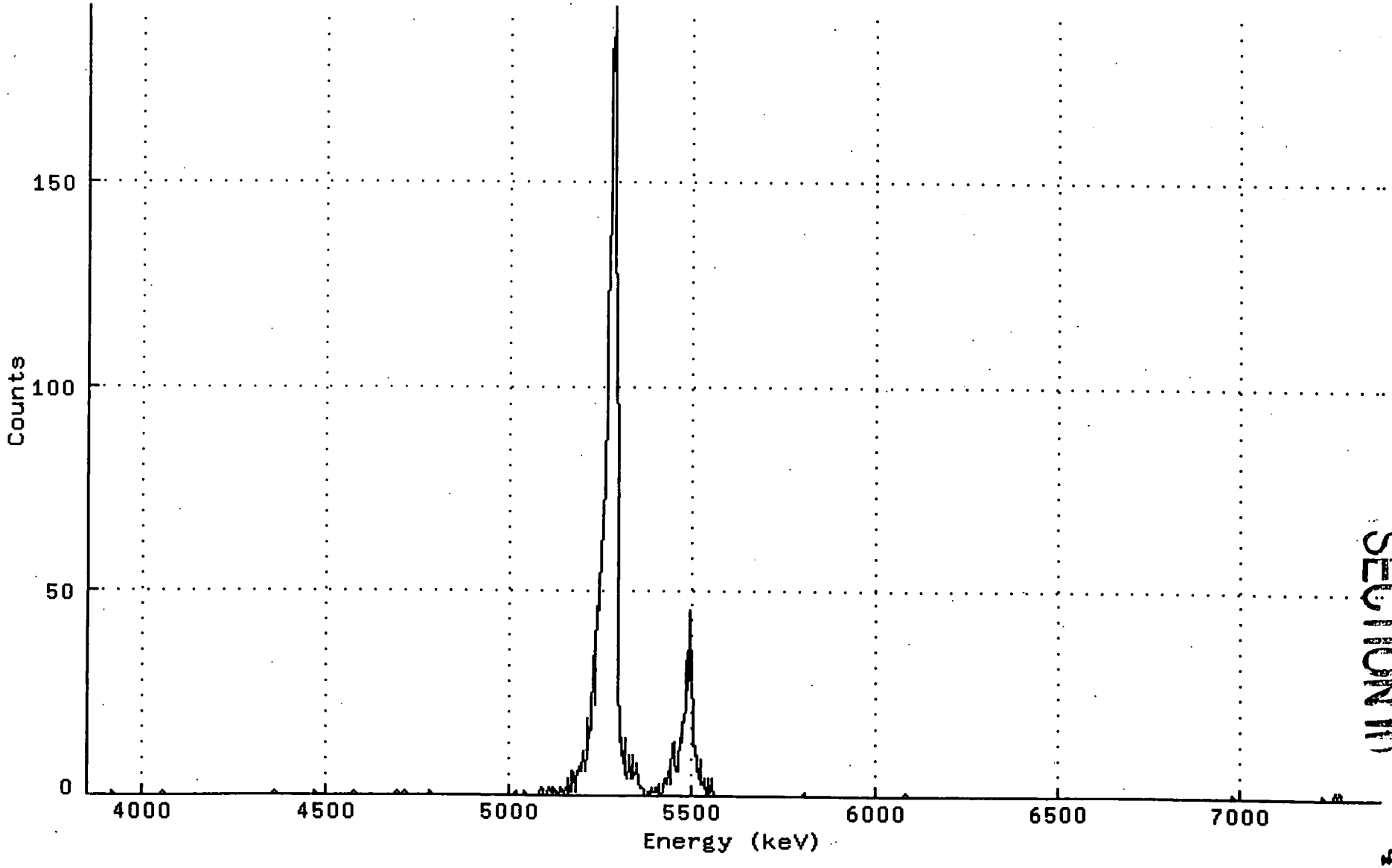
BATCH ID:	99116138	SAMPLE ID:	263416
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	041
ACQ DATE:	11-NOV-1999 11:53	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	64.18%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	28.56
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:55	EFF CAL DATE:	3-NOV-1999 11:55
BKG FILENAME:	B_041_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/g
AM-241	5479.1	426.20	0.80	99.9	1.328E+00	1.489E-01	2.140E-02	1.492E-02
AM243	5270.0	2165.60	2.40	99.6	6.769E+00	3.389E-01	3.099E-02	1.973E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263416_AM.CNF;1
Title : 041
Sample Title:
Start Time: 11-NOV-1999 11:53 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83954E+03
Real Time : 0 22:13:22.00 Sample ID : 263416 Energy Slope : 3.45264E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263417_AM.CNF

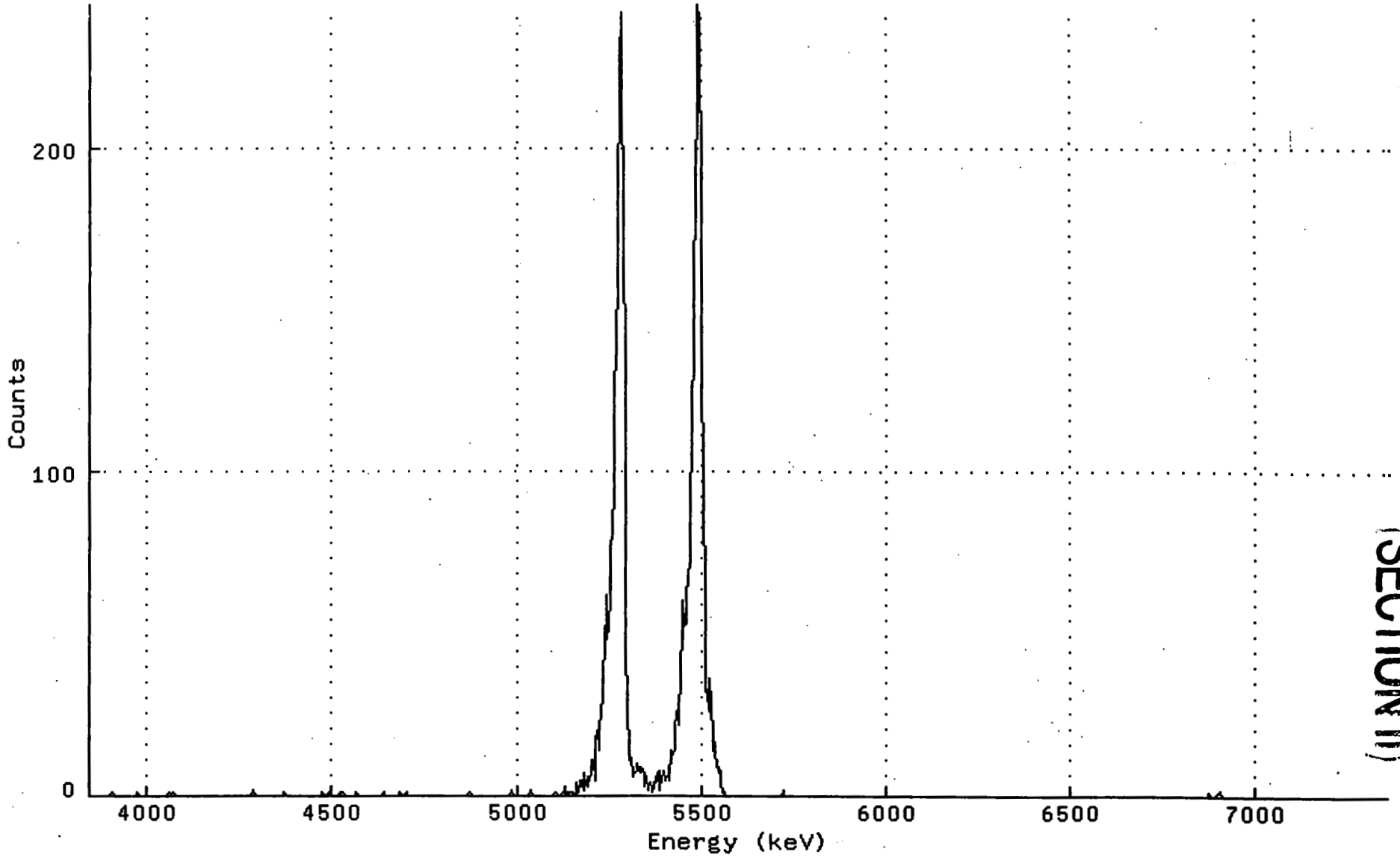
BATCH ID:	99116138	SAMPLE ID:	263417
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	042
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80000.	RECOVERY:	71.85%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	27.56
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:56	EFF CAL DATE:	3-NOV-1999 11:56
BKG FILENAME:	B_042_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/g
AM-241	5479.1	2777.80	1.20	99.9	7.303E+00	4.789E-01	2.051E-02	1.382E-02
AM243	5270.0	2567.00	2.00	99.6	6.769E+00	3.182E-01	2.449E-02	1.582E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263417_AM.CNF;3
Title : 042
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83381E+03
Real Time : 0 22:13:20.00 Sample ID : 263417 Energy Slope : 3.43728E+00
Live Time : 0 22:13:20.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263418_AM.CNF

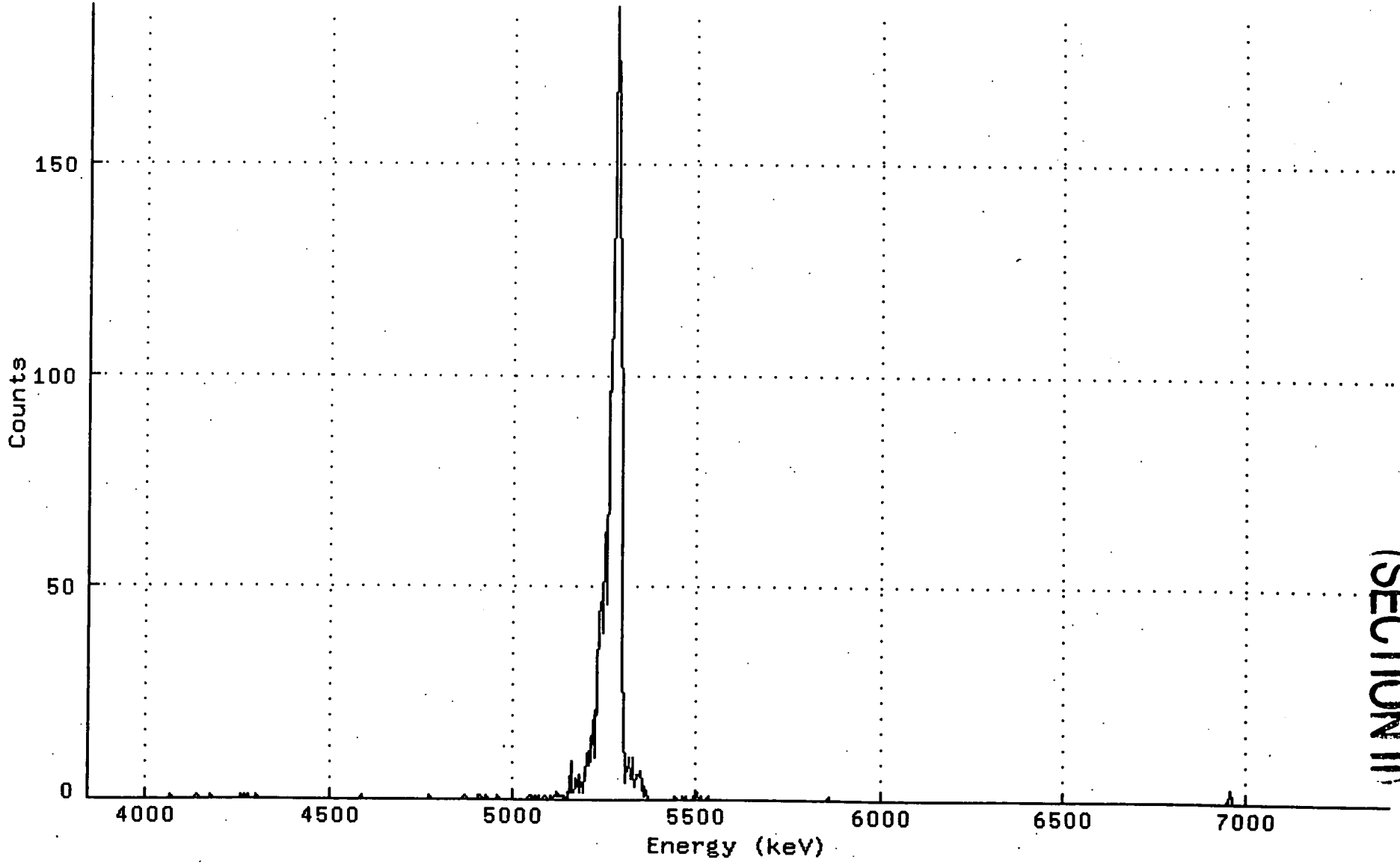
BATCH ID:	99116138	SAMPLE ID:	263418
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT: 4.990E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	043
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	23.6%
ELAPSED LIVE TIME:	80002.	RECOVERY:	59.95%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	32.38
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:57	EFF CAL DATE:	3-NOV-1999 11:57
BKG FILENAME:	B_043_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	3.00	0.00	99.9	3.189E-01	3.687E-01	2.881E-01	2.881E-01
AM243	5270.0	2118.00	2.00	99.6	2.259E+02	1.138E+01	9.903E-01	6.396E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263418_AM.CNF;3
Title : 043
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.83251E+03
Real Time : 0 22:13:22.00 Sample ID : 263418 Energy Slope : 3.46621E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



(SECTION III)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116138$263410D_AM.CNF

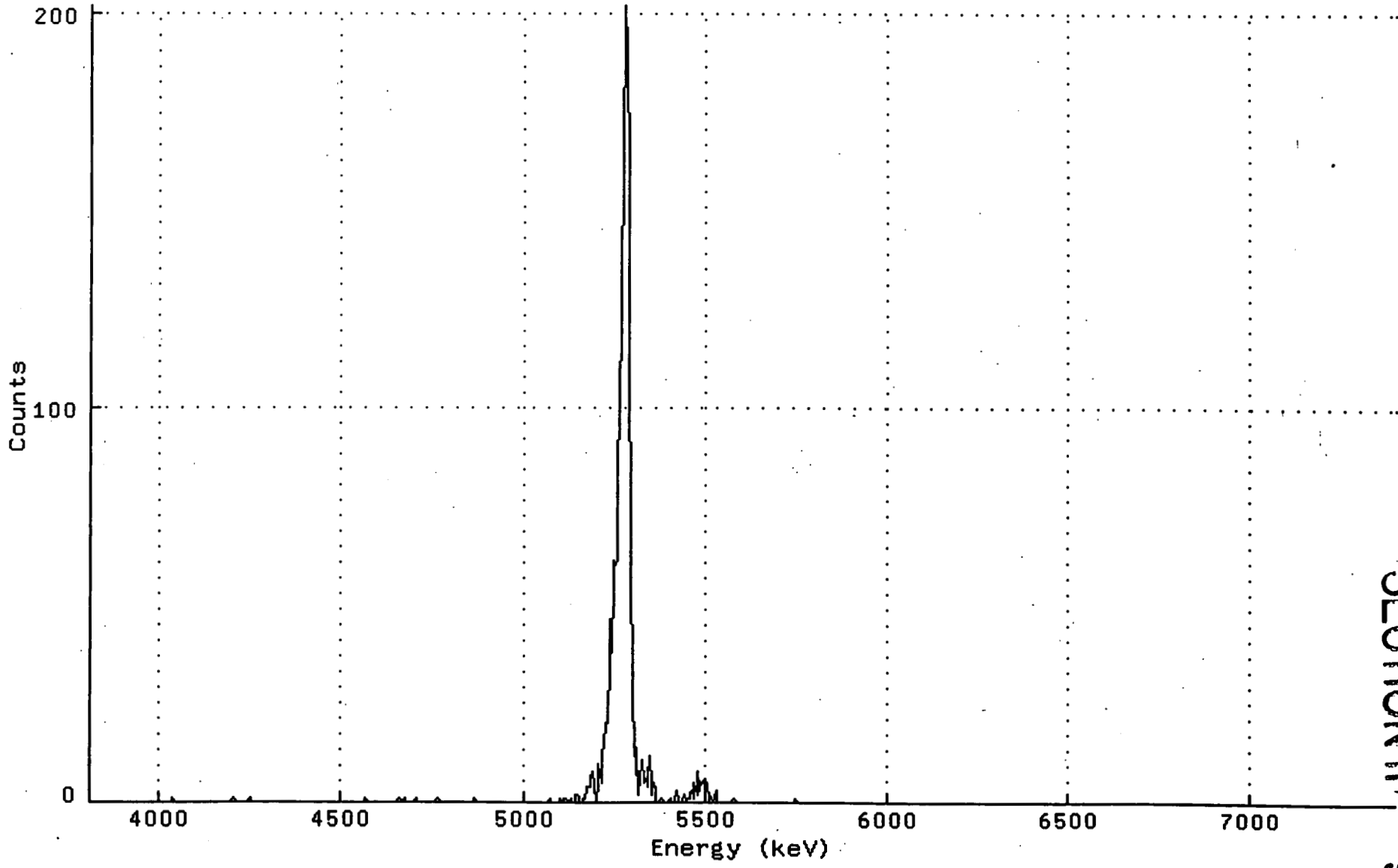
BATCH ID:	99116138	SAMPLE ID:	263410D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	047
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80003.	RECOVERY:	65.24%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	29.81
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:03	EFF CAL DATE:	3-NOV-1999 12:03
BKG FILENAME:	B_047_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	69.20	0.80	99.9	7.281E+00	1.811E+00	7.227E-01	5.039E-01
AM243	5270.0	2197.20	2.80	99.6	2.319E+02	1.155E+01	1.107E+00	6.966E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116138$263410D_AM.CNF;3
Title : 047
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.79990E+03
Real Time : 0 22:13:23.00 Sample ID : 263410D Energy Slope : 3.50728E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

Spectral File: ND_AMS_ARCHIVE_C:C_99116138$LCSWR33_AM.CNF

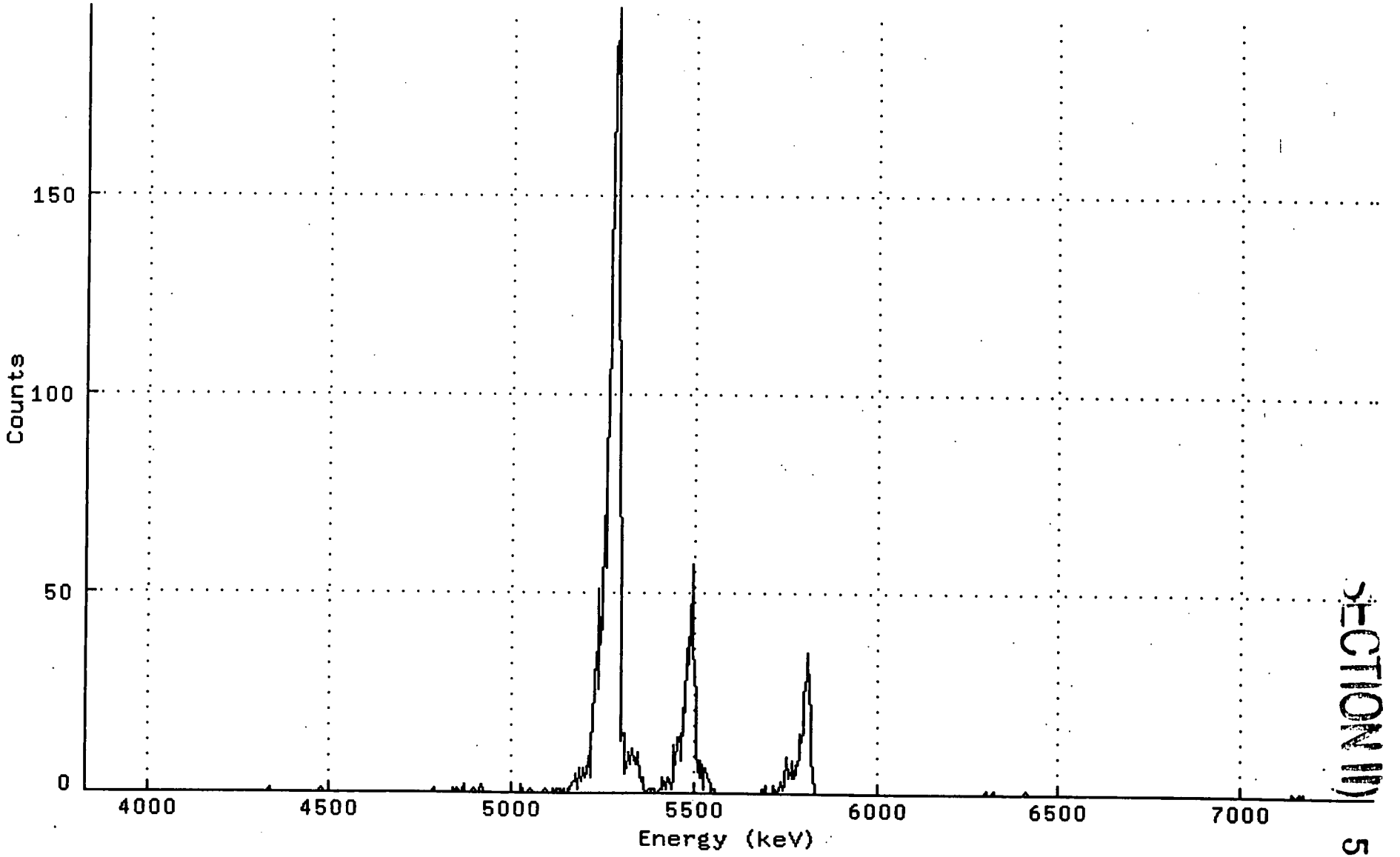
BATCH ID:	99116138	SAMPLE ID:	LCSWR33
SAMPLE DATE:	1-APR-1985 00:00	ALIQUOT:	2.500E-01 mL
SAMPLE TITLE:		DETECTOR NUMBER:	048
ACQ DATE:	10-NOV-1999 09:55	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80004.	RECOVERY:	64.43%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	31.35
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.269	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:05	EFF CAL DATE:	3-NOV-1999 12:05
BKG FILENAME:	B_048_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ mL	TPU/ERROR 2-SIGMA	MDC pCi/ mL	CRIT LEVEL pCi/ mL
AM-241	5479.1	524.00	0.00	99.9	4.866E+00	5.044E-01	2.458E-02	2.458E-02
AM243	5270.0	2228.40	1.60	99.6	2.031E+01	1.006E+00	7.818E-02	5.142E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.C]C_99116138$LCSWR33_AM.CNF;4
Title : 048
Sample Title:
Start Time: 10-NOV-1999 09:55 Sample Time: 1-APR-1985 00:00: Energy Offset: 3.82143E+03
Real Time : 0 22:13:24.00 Sample ID : LCSWR33 Energy Slope : 3.45077E+00
Live Time : 0 22:13:24.00 Sample Type: AM Energy Quad : 0.00000E+00



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Sample Preparation and Analysis Log

(SECTION II) 57

Sample Type: Various Solids

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19R06 *	Am-241	99116315		11/15/99
Counting	RC-19R06	Am-241	99116315		11/15/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08

Req	Sample ID	#	Sample Size	Comments (Detector #)	Sample Aliquot	Tare Weight(g)	Sample & Container(g)	Total Sample Size(g)
	PB	1	1 SA	33				
16810	263419	2	0.500 G	34	0.0957	14.434	19.657	5.223
16810	263420	3	0.500 G	35	0.0951	14.546	19.806	5.260
16810	263421	4	0.500 G	37	0.0967	14.578	19.747	5.169
16810	263421D	5	0.500 G	38	0.0967	14.578	19.747	5.169
22	LCSWR33	6	0.250 mL	39				
		7						
SPo 11/14/99		8						
		9						
		10						
		11						
		12						
		13						
		14						
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		29						
		30						

Comments and Actual conditions:

-Start of digestion: 11/11/99

-Automatic pipets calibrated in accord with QC-6 on balance # 18

-Samples weighed on balance # 8

*After sample dissolution, a Barium Sulfate preconcentration was done followed by a carbonate conversion (Both done as stated in RC-19 R06)

-Sample aliquot is the fraction of the total sample taken for analysis

OK DAO 11/16/99 Qiuhong S. Sport 11/16/99

Spectral File: ND_AMS_ARCHIVE_R:R_99116315$PB_AM.CNF

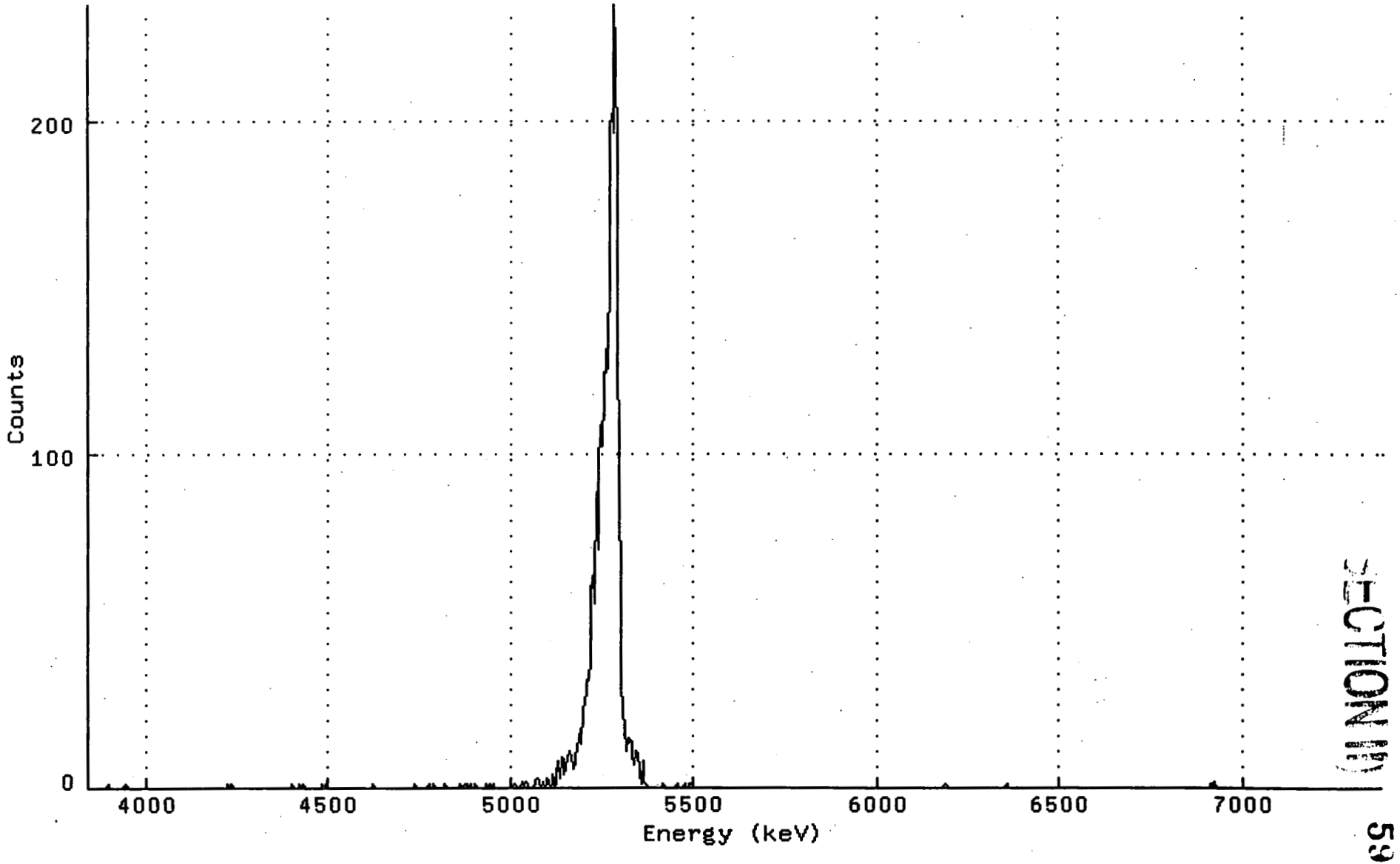
BATCH ID:	99116315	SAMPLE ID:	PB
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.000E+00 SA
SAMPLE TITLE:		DETECTOR NUMBER:	033
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	27.0%
ELAPSED LIVE TIME:	80004.	RECOVERY:	89.35%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	39.36
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:44	EFF CAL DATE:	3-NOV-1999 11:44
BKG FILENAME:	B_033_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
AM-241	5479.1	3.80	1.20	99.9	1.181E-02	1.457E-02	2.426E-02	1.634E-02
AM243	5270.0	3614.00	4.00	99.6	1.127E+01	4.718E-01	3.745E-02	2.295E-02

340

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.R]R_99116315$PB_AM.CNF;2
Title : 033
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.83095E+03
Real Time : 0 22:13:24.00 Sample ID : PB Energy Slope : 3.45959E+00
Live Time : 0 22:13:24.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION 59

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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
16-NOV-1999 11:28:30

SECTION III

Spectral File: ND_AMS_ARCHIVE_S:S_99116315$263419_AM.CNF

BATCH ID:	99116315	SAMPLE ID:	263419
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	9.570E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	034
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	22.4%
ELAPSED LIVE TIME:	80000.	RECOVERY:	69.63%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	55.38
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:45	EFF CAL DATE:	3-NOV-1999 11:45
BKG FILENAME:	B_034_3NOV99		

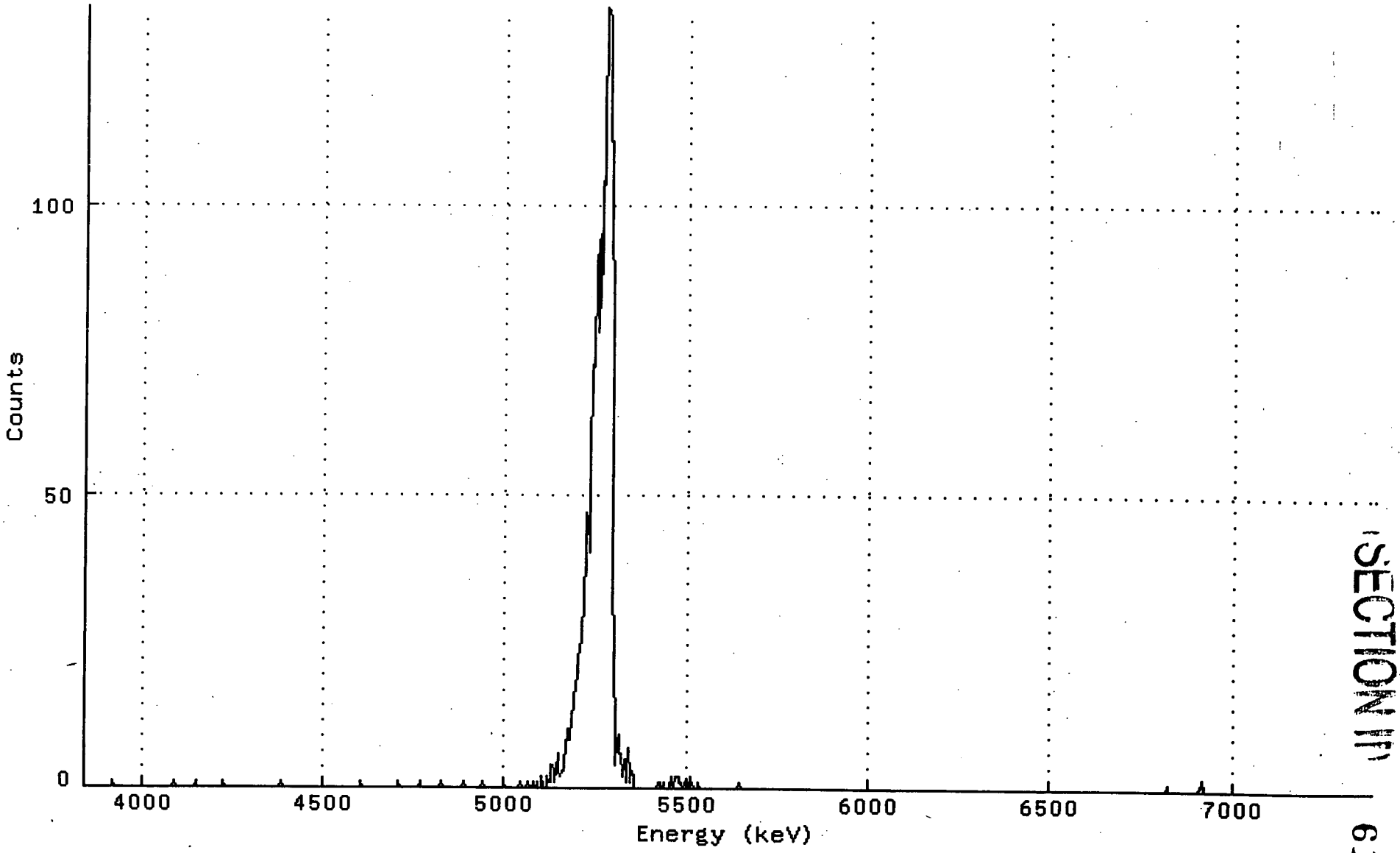
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	22.00	0.00	99.9	1.106E+00	4.755E-01	1.362E-01	1.362E-01
AM243	5270.0	2335.60	2.40	99.6	1.178E+02	5.742E+00	4.999E-01	3.183E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

342

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116315$263419_AM.CNF;1
Title : 034
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.82985E+03
Real Time : 0 22:13:21.00 Sample ID : 263419 Energy Slope : 3.46688E+00
Live Time : 0 22:13:20.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

61

343

Spectral File: ND_AMS_ARCHIVE_S:S_99116315$263420_AM.CNF

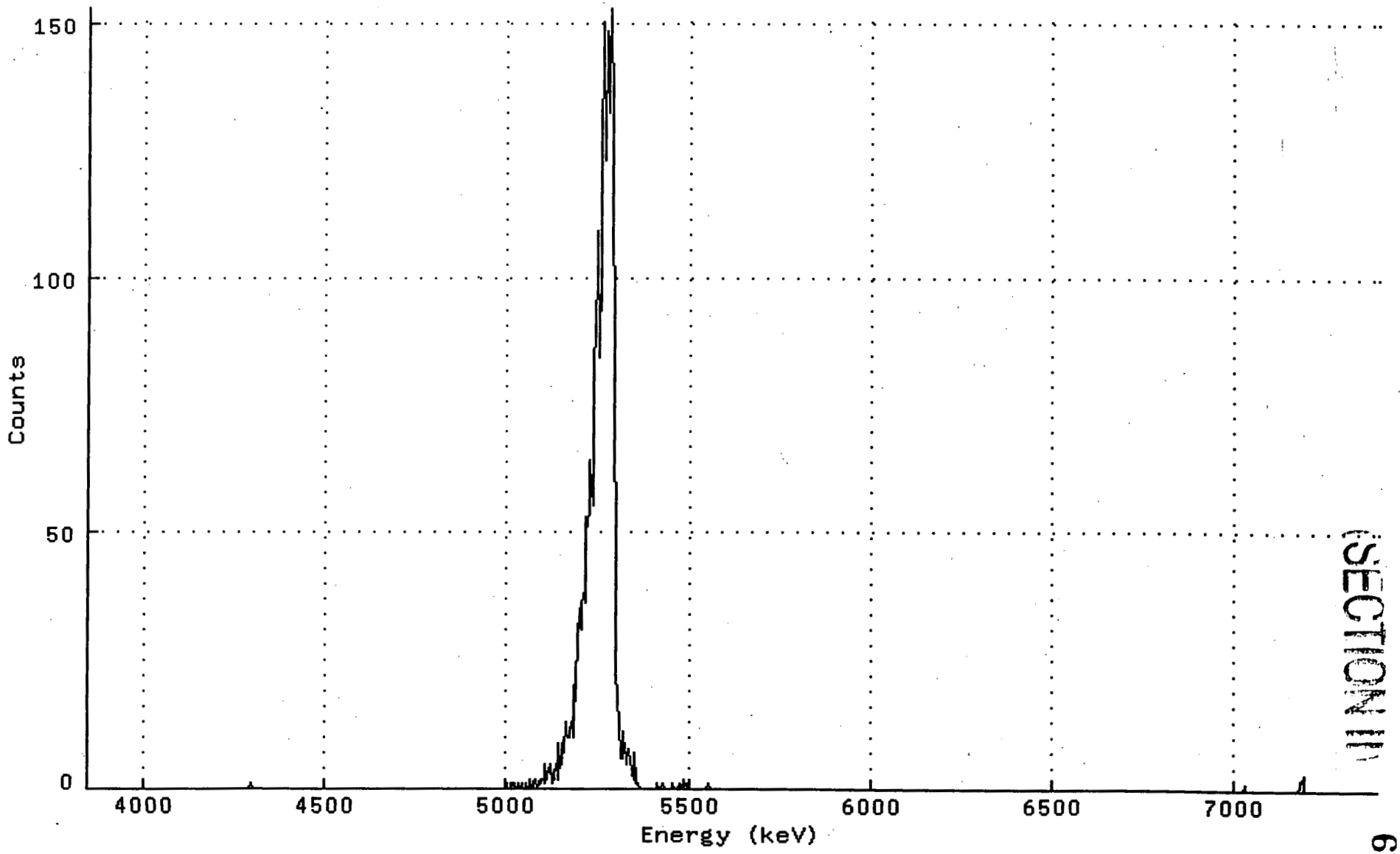
BATCH ID:	99116315	SAMPLE ID:	263420
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT: 9.510E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	035
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	26.2%
ELAPSED LIVE TIME:	80004.	RECOVERY:	74.95%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	56.45
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:46	EFF CAL DATE:	3-NOV-1999 11:46
BKG FILENAME:	B_035_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
AM-241	5479.1	6.80	1.20	99.9	2.728E-01	2.341E-01	3.130E-01	2.109E-01
AM243	5270.0	2945.00	2.00	99.6	1.185E+02	5.295E+00	3.737E-01	2.414E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116315$263420_AM.CNF;1
Title : 035
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.83373E+03
Real Time : 0 22:13:24.00 Sample ID : 263420 Energy Slope : 3.47115E+00
Live Time : 0 22:13:24.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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345

Spectral File: ND_AMS_ARCHIVE_S:S_99116315$263421_AM.CNF

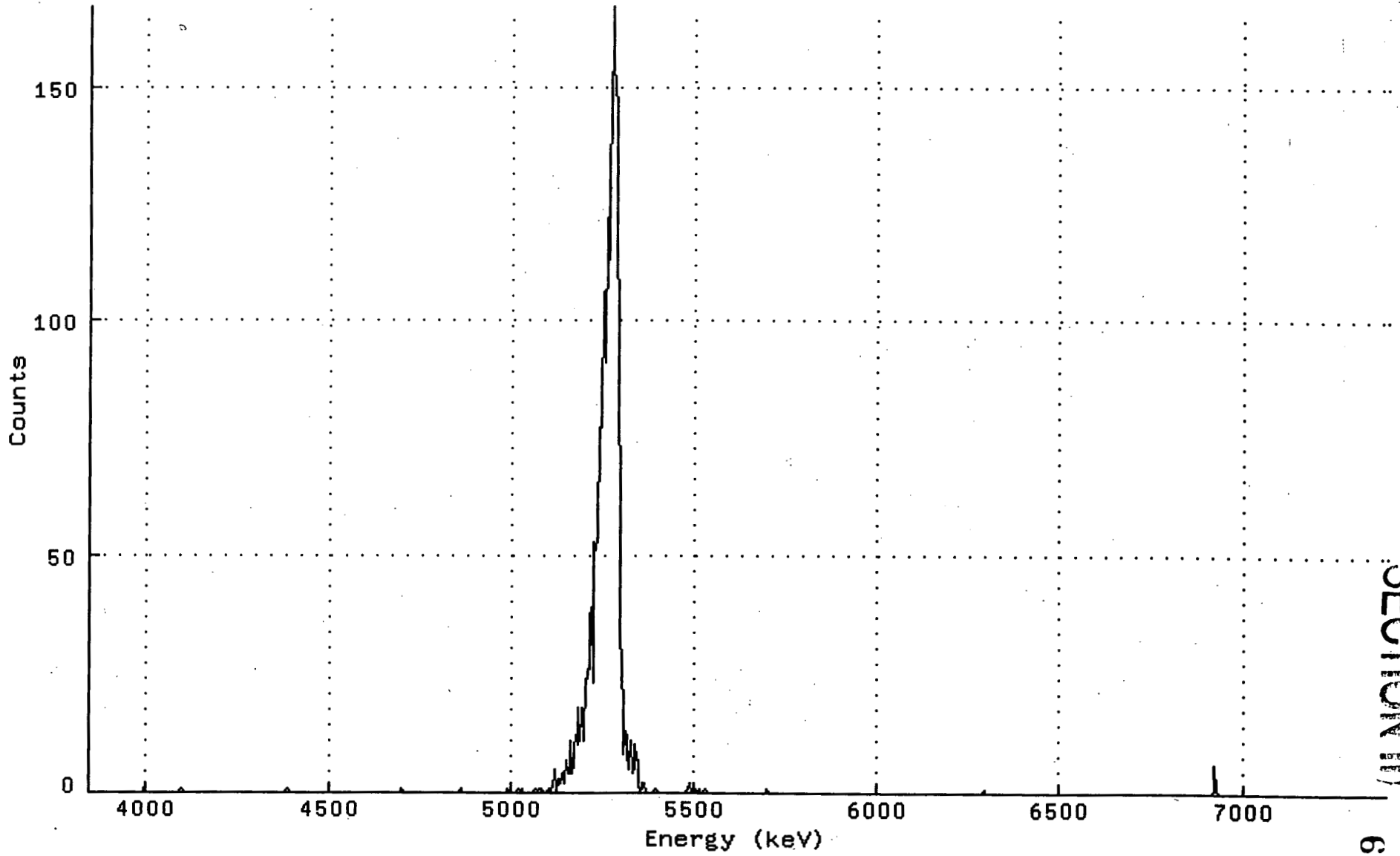
BATCH ID:	99116315	SAMPLE ID:	263421
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT: 9.670E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	037
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80002.	RECOVERY:	77.73%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	44.69
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:50	EFF CAL DATE:	3-NOV-1999 11:50
BKG FILENAME:	B_037_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
AM-241	5479.1	8.00	0.00	99.9	3.453E-01	2.448E-01	1.169E-01	1.169E-01
AM243	5270.0	2692.20	2.80	99.6	1.165E+02	5.404E+00	4.542E-01	2.857E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116315$263421_AM.CNF;1
Title : 037
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.83232E+03
Real Time : 0 22:13:22.00 Sample ID : 263421 Energy Slope : 3.47035E+00
Live Time : 0 22:13:22.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION (1)

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Spectral File: ND_AMS_ARCHIVE_S:S_99116315$263421D_AM.CNF

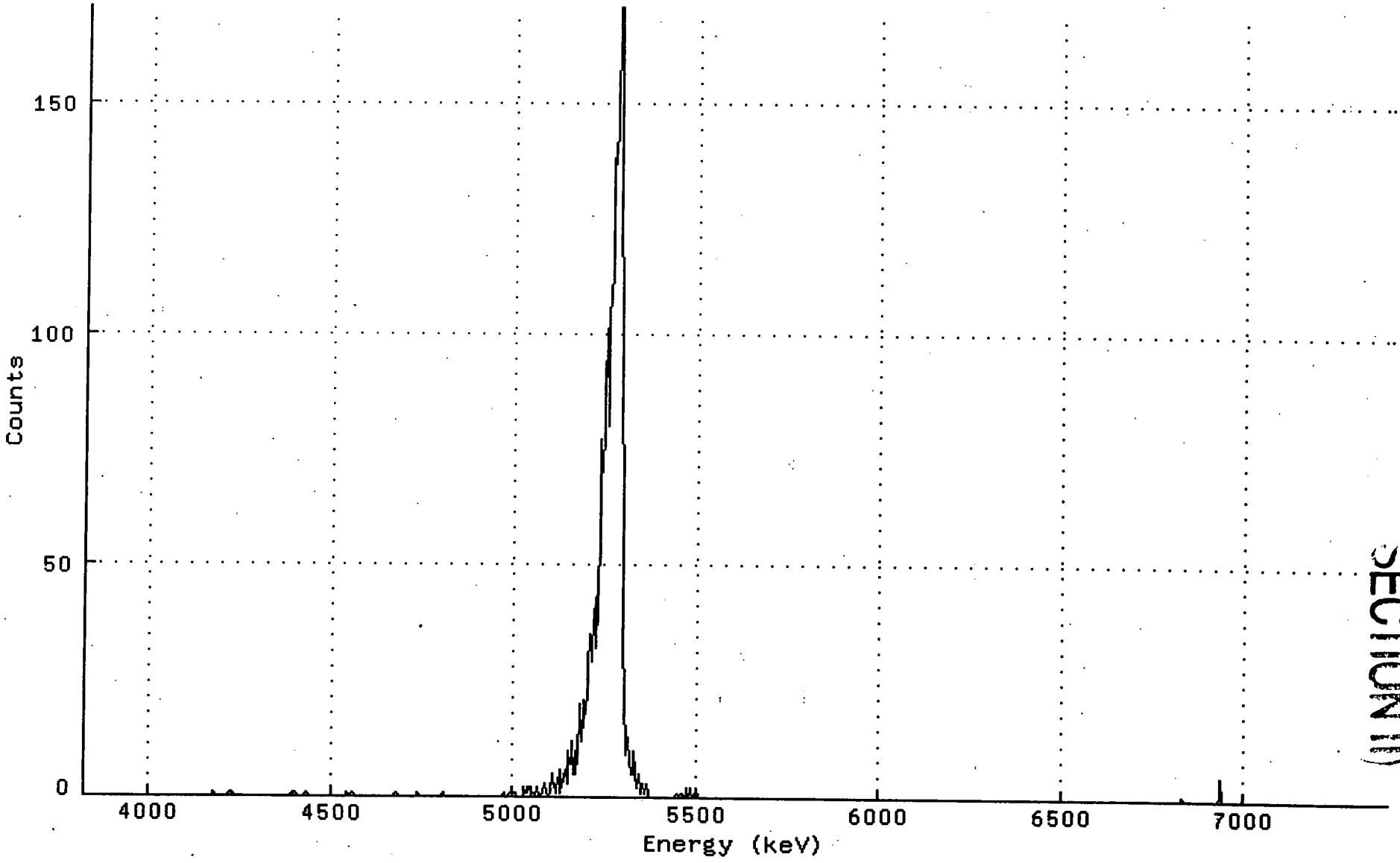
BATCH ID:	99116315	SAMPLE ID:	263421D
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	9.670E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	038
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	22.6%
ELAPSED LIVE TIME:	80003.	RECOVERY:	81.21%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	45.93
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	11.270	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:51	EFF CAL DATE:	3-NOV-1999 11:51
BKG FILENAME:	B_038_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
AM-241	5479.1	10.00	0.00	99.9	4.229E-01	2.684E-01	1.146E-01	1.146E-01
AM243	5270.0	2747.20	0.80	99.6	1.165E+02	5.358E+00	2.914E-01	2.032E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116315$263421D_AM.CNF;1
Title : 038
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.81090E+03
Real Time : 0 22:13:23.00 Sample ID : 263421D Energy Slope : 3.49680E+00
Live Time : 0 22:13:23.00 Sample Type: AM Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_C:C_99116315$LCSWR33_AM.CNF

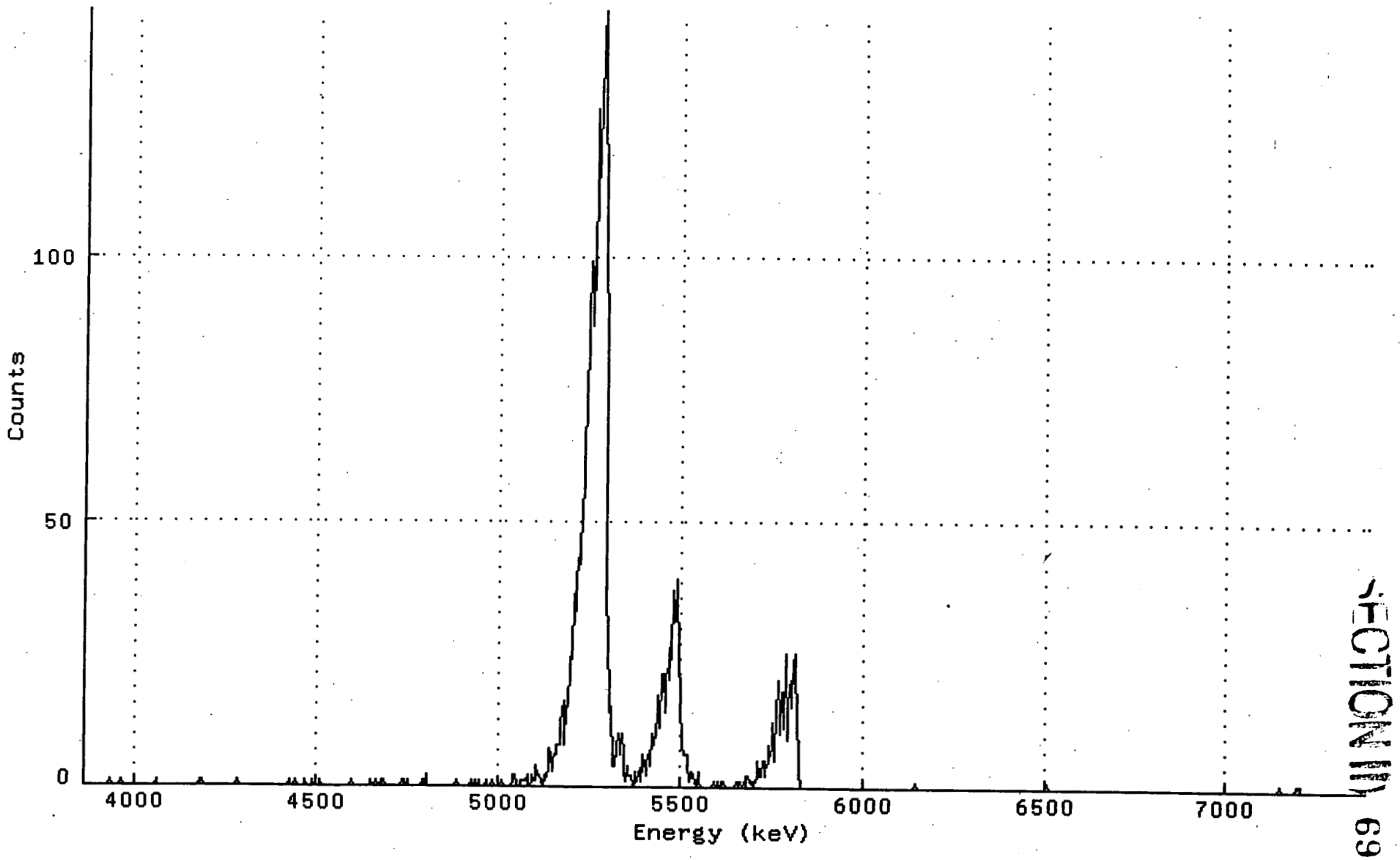
BATCH ID:	99116315	SAMPLE ID:	LCSWR33
SAMPLE DATE:	1-APR-1985 00:00	ALIQUOT:	2.500E-01 mL
SAMPLE TITLE:		DETECTOR NUMBER:	039
ACQ DATE:	15-NOV-1999 13:05	AVERAGE EFFICIENCY:	22.7%
ELAPSED LIVE TIME:	80000.	RECOVERY:	77.42%
TRACER ID:	AM243_82-76-2	TRACER FWHM (kev):	54.45
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	11.269	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:52	EFF CAL DATE:	3-NOV-1999 11:52
BKG FILENAME:	B_039_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ mL	TPU/ERROR 2-SIGMA	MDC pCi/ mL	CRIT LEVEL pCi/ m
AM-241	5479.1	599.00	2.00	99.9	4.710E+00	4.599E-01	7.132E-02	4.607E-02
AM243	5270.0	2631.60	2.40	99.6	2.031E+01	9.468E-01	7.639E-02	4.863E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.C]C_99116315$LCSWR33_AM.CNF;2
Title : 039
Sample Title:
Start Time: 15-NOV-1999 13:05 Sample Time: 1-APR-1985 00:00: Energy Offset: 3.84845E+03
Real Time : 0 22:13:20.00 Sample ID : LCSWR33 Energy Slope : 3.44841E+00
Live Time : 0 22:13:20.00 Sample Type: AM Energy Quad : 0.00000E+00



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Sample Preparation and Analysis Log

Sample Type: Various Solids

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116137		10/29/99
		Pu-239/240,Pu-238	99116139		
		U-238, U235, U234	99116141		11/8/99
Counting	RC-19 R06	Pu 150	99116139		11/10/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		33			
16822	263398	2	0.750 G	Am, Pu, U	0.0355	34	14.606	35.713	21.107
16822	263399	3	0.750 G	Am, Pu, U	0.0553	35	14.530	28.101	13.571
16822	263400	4	0.750 G	Am, Pu, U	0.0481	37	14.534	30.130	15.596
16822	263401	5	0.750 G	Am, Pu, U	0.0308	38	14.648	38.998	24.350
16822	263402	6	0.750 G	Am, Pu, U	0.0384	39	14.640	34.161	19.521
16822	263403	7	0.750 G	Am, Pu, U	0.2214	40	14.704	18.091	3.387
16822	263404	8	0.750 G	Am, Pu, U	0.0342	41	14.531	36.474	21.943
16822	263405	9	0.750 G	Am, Pu, U	0.0322	42	14.431	37.756	23.325
16822	263406	10	0.750 G	Am, Pu, U	0.0448	43	14.697	31.444	16.747
16822	263407	11	0.750 G	Am, Pu, U	0.0347	44	14.543	36.178	21.635
16822	263408	12	0.750 G	Am, Pu, U	0.0342	45	14.537	36.447	21.910
16822	263409	13	0.750 G	Am, Pu, U	0.0456	46	14.696	31.150	16.454
16822	263398D	14	0.750 G	Am, Pu, U	0.0355	47	14.606	35.713	21.107
LCSWR1,	LCSWR33	15	0.250 mL	Am, Pu, U		48			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

-Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9.

-Balance # 8 used for weights of samples and their aliquots

-Sample aliquot is the fraction of the total sample taken for analysis

OK DP 11-10-99

Qidhy S. Hyatt 11/10/99

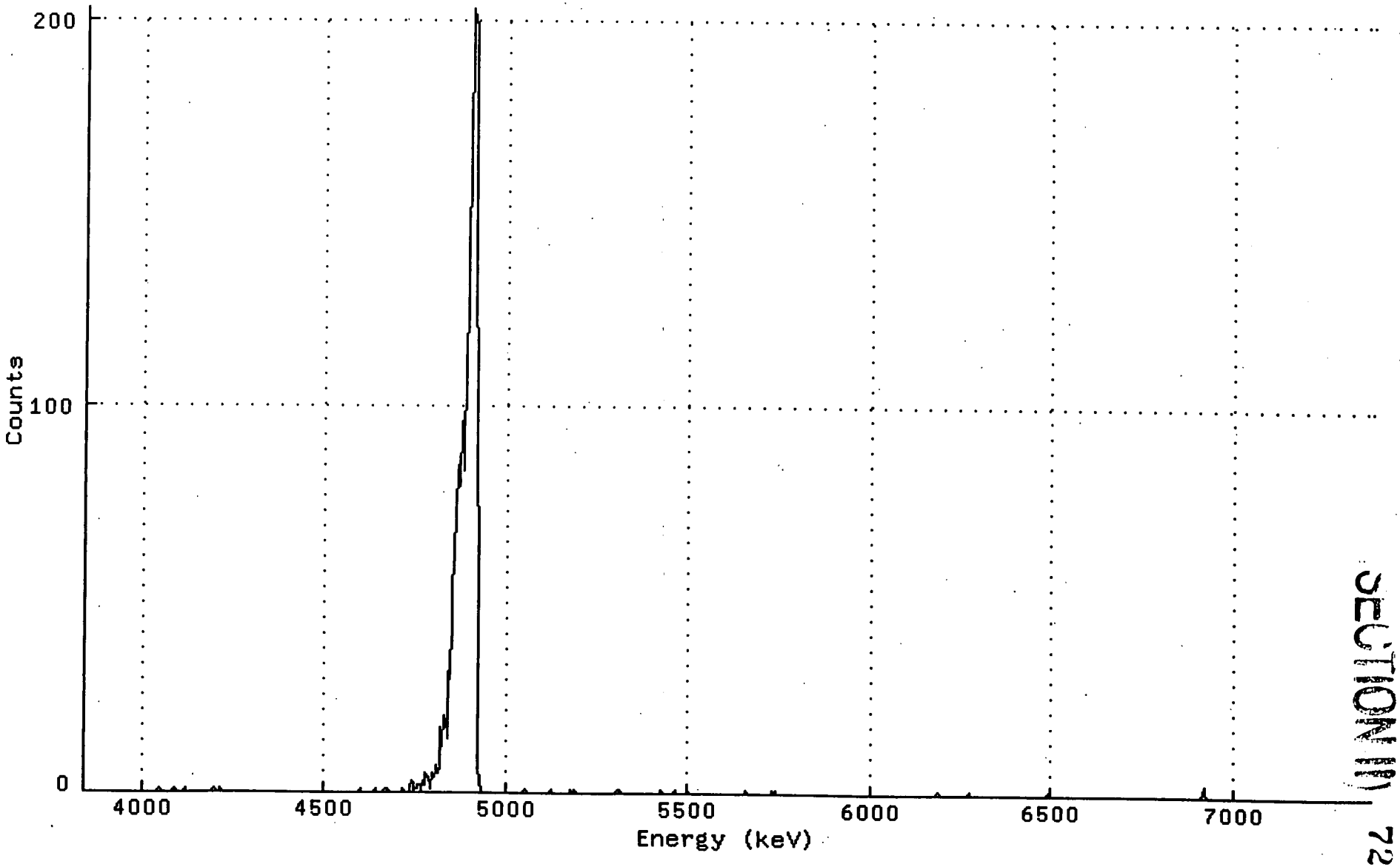
Spectral File: ND_AMS_ARCHIVE_R:R_99116139$PB_PU.CNF

BATCH ID:	99116139	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 1.000E+00	SA
SAMPLE TITLE:		DETECTOR NUMBER:	033
ACQ DATE:	6-NOV-1999 08:58	AVERAGE EFFICIENCY:	27.0%
ELAPSED LIVE TIME:	80004.	RECOVERY:	79.55%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	32.13
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:44	EFF CAL DATE: 3-NOV-1999	11:44
BKG FILENAME:	B_033_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/	SA	TPU/ERROR 2-SIGMA	MDC dpm/	SA	CRIT LEVEL dpm/	SA
PU-238	5487.1	1.80	1.20	99.9	6.291E-03		1.304E-02	2.726E-02		1.836E-02	
PU-239	5147.7	2.00	2.00	99.9	6.986E-03		1.531E-02	3.244E-02		2.095E-02	
PU242	4890.7	2657.20	0.80	100.4	9.235E+00		4.282E-01	2.387E-02		1.665E-02	

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.R]R_99116139$PB_PU.CNF;3
Title : 033
Sample Title:
Start Time: 6-NOV-1999 08:58: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83095E+03
Real Time : 0 22:13:24.00 Sample ID : PB Energy Slope : 3.45959E+00
Live Time : 0 22:13:24.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263398_PU.CNF

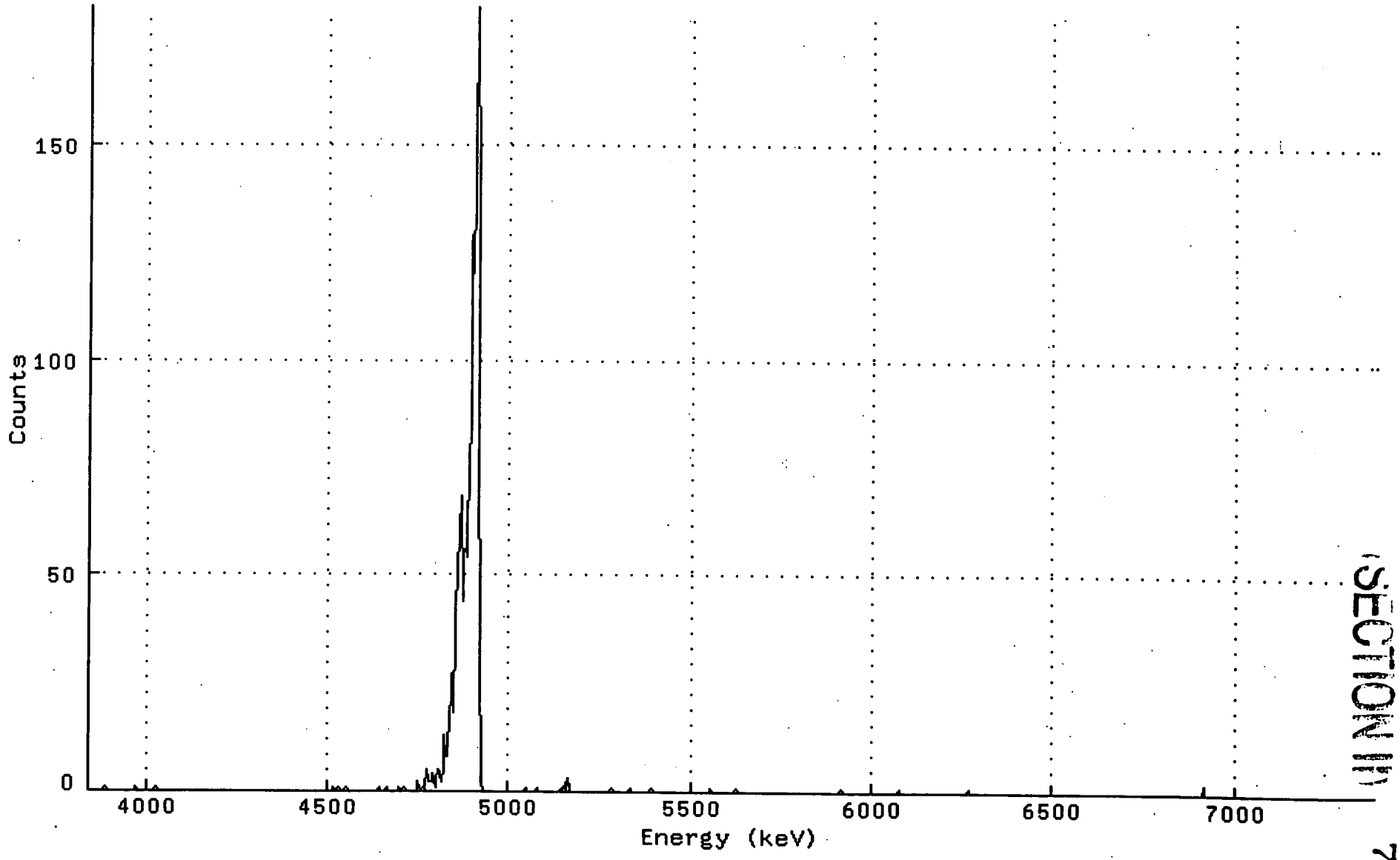
BATCH ID:	99116139	SAMPLE ID:	263398
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.550E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	034
ACQ DATE:	6-NOV-1999 09:00	AVERAGE EFFICIENCY:	22.4%
ELAPSED LIVE TIME:	80002.	RECOVERY:	68.09%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	24.10
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:45	EFF CAL DATE:	3-NOV-1999 11:45
BKG FILENAME:	B_034_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	1.00	0.00	99.9	1.387E-01	2.775E-01	3.756E-01	3.756E-01
PU-239	5147.7	9.20	0.80	99.9	1.275E+00	8.937E-01	9.521E-01	6.639E-01
PU242	4890.7	1886.20	0.80	100.4	2.601E+02	1.373E+01	9.474E-01	6.606E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263398_PU.CNF;2
Title : 034
Sample Title:
Start Time: 6-NOV-1999 09:00: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82985E+03
Real Time : 0 22:13:22.00 Sample ID : 263398 Energy Slope : 3.46688E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263399_PU.CNF

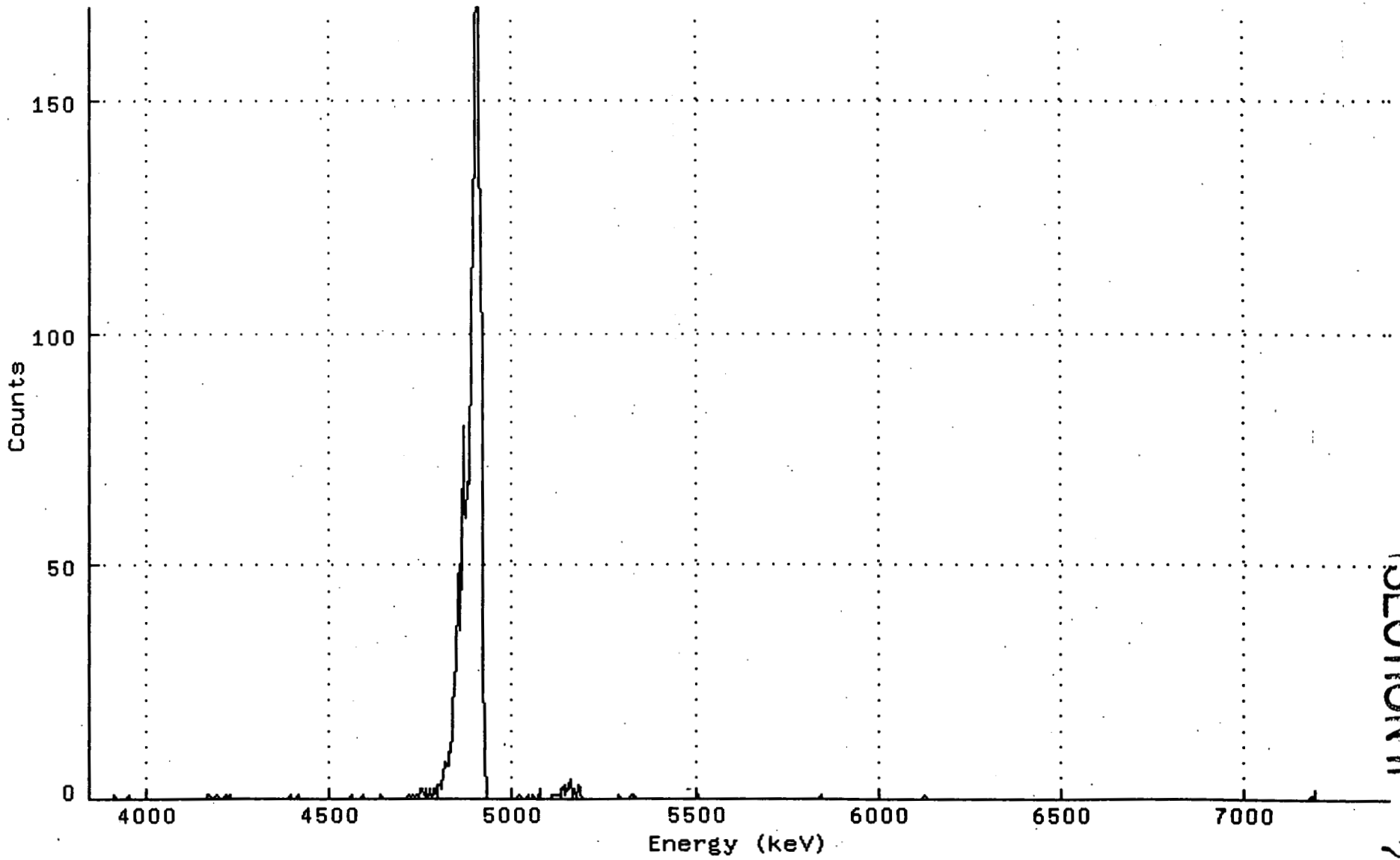
BATCH ID:	99116139	SAMPLE ID:	263399
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	5.530E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	035
ACQ DATE:	6-NOV-1999 08:58	AVERAGE EFFICIENCY:	26.2%
ELAPSED LIVE TIME:	80006.	RECOVERY:	65.75%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	32.41
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:46	EFF CAL DATE:	3-NOV-1999 11:46
BKG FILENAME:	B_035_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	-0.20	1.20	99.9	-1.575E-02	1.915E-01	6.139E-01	4.135E-01
PU-239	5147.7	36.80	1.20	99.9	2.895E+00	9.893E-01	6.139E-01	4.135E-01
PU242	4890.7	2133.60	0.40	100.4	1.670E+02	8.369E+00	4.423E-01	3.272E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263399_PU.CNF;2
Title : 035
Sample Title:
Start Time: 6-NOV-1999 08:58: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83373E+03
Real Time : 0 22:13:26.00 Sample ID : 263399 Energy Slope : 3.47115E+00
Live Time : 0 22:13:26.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263400_PU.CNF

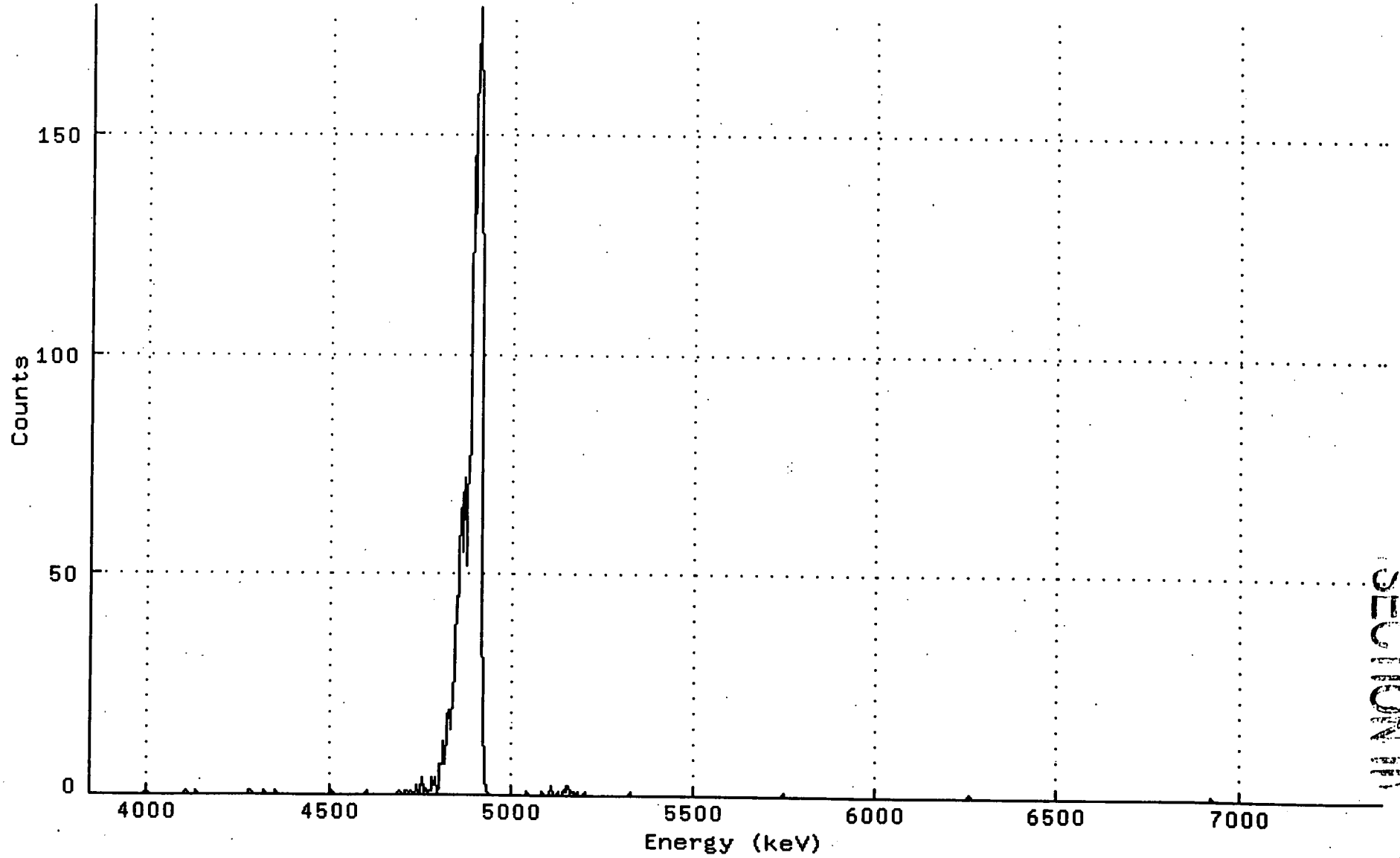
BATCH ID:	99116139	SAMPLE ID:	263400
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.810E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	037
ACQ DATE:	6-NOV-1999 08:58	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80001.	RECOVERY:	79.58%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	30.38
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:50	EFF CAL DATE:	3-NOV-1999 11:50
BKG FILENAME:	B_037_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	0.20	0.80	99.9	1.697E-02	1.949E-01	5.823E-01	4.060E-01
PU-239	5147.7	15.00	2.00	99.9	1.272E+00	7.188E-01	7.872E-01	5.085E-01
PU242	4890.7	2276.20	0.80	100.4	1.920E+02	9.446E+00	5.794E-01	4.040E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263400_PU.CNF;2
Title : 037
Sample Title:
Start Time: 6-NOV-1999 08:58: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83232E+03
Real Time : 0 22:13:22.00 Sample ID : 263400 Energy Slope : 3.47035E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



360

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263401_PU.CNF

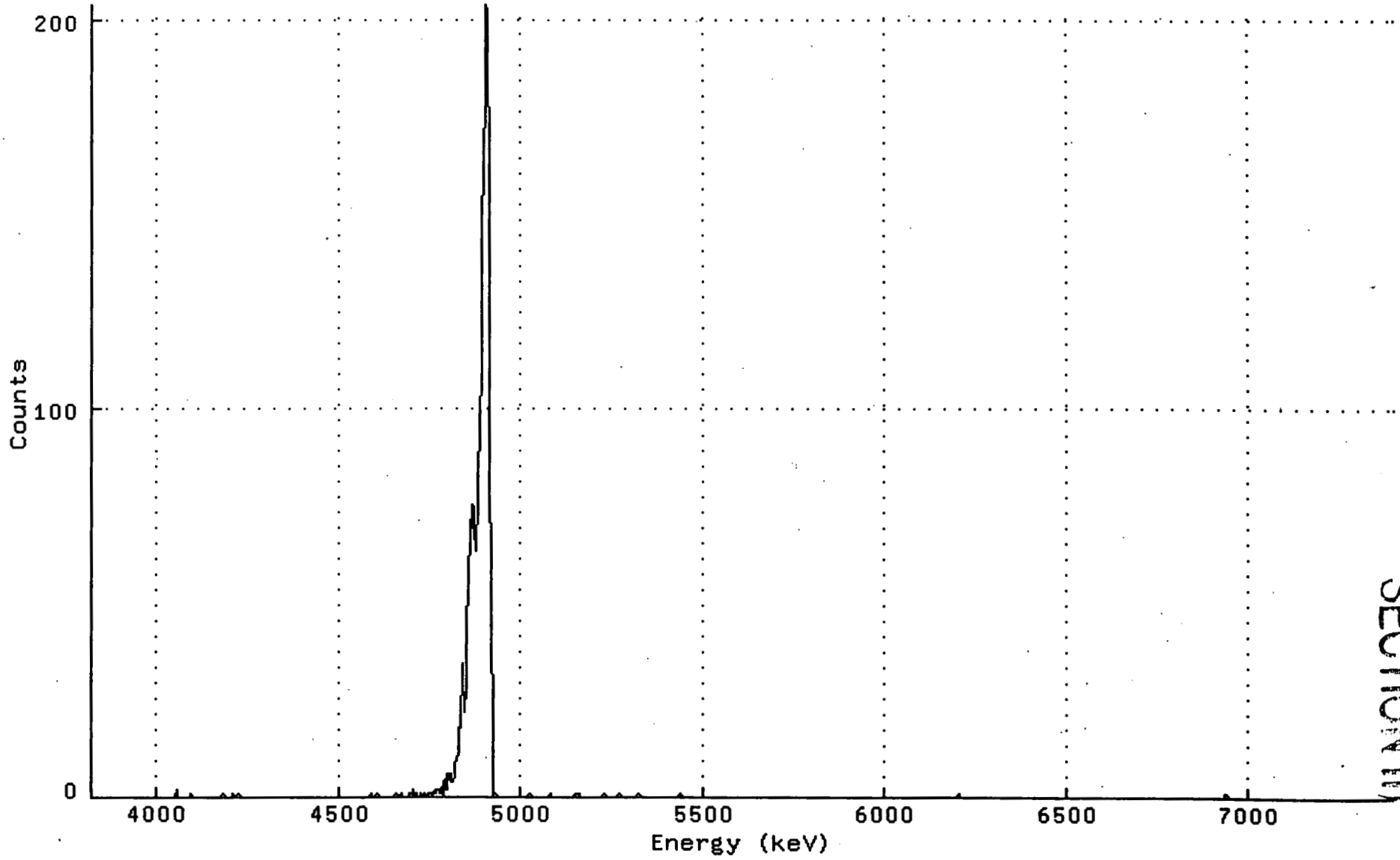
BATCH ID:	99116139	SAMPLE ID:	263401
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.080E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	038
ACQ DATE:	6-NOV-1999 08:58	AVERAGE EFFICIENCY:	22.6%
ELAPSED LIVE TIME:	80006.	RECOVERY:	82.68%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	25.83
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:51	EFF CAL DATE:	3-NOV-1999 11:51
BKG FILENAME:	B_038_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	1.00	0.00	99.9	1.305E-01	2.612E-01	3.535E-01	3.535E-01
PU-239	5147.7	2.80	1.20	99.9	3.653E-01	5.526E-01	1.018E+00	6.858E-01
PU242	4890.7	2310.00	0.00	100.4	2.998E+02	1.465E+01	3.518E-01	3.518E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263401_PU.CNF;1
Title : 038
Sample Title:
Start Time: 6-NOV-1999 08:58: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.81090E+03
Real Time : 0 22:13:26.00 Sample ID : 263401 Energy Slope : 3.49680E+00
Live Time : 0 22:13:26.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

362

80

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
8-NOV-1999 08:25:15

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263402_PU.CNF

****

BATCH ID:	99116139	SAMPLE ID:	263402
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.840E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	039
ACQ DATE:	6-NOV-1999 08:58	AVERAGE EFFICIENCY:	22.7%
ELAPSED LIVE TIME:	80004.	RECOVERY:	74.60%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	29.45
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:52	EFF CAL DATE:	3-NOV-1999 11:52
BKG FILENAME:	B_039_3NOV99		

****

NUCLIDE ACTIVITY SUMMARY

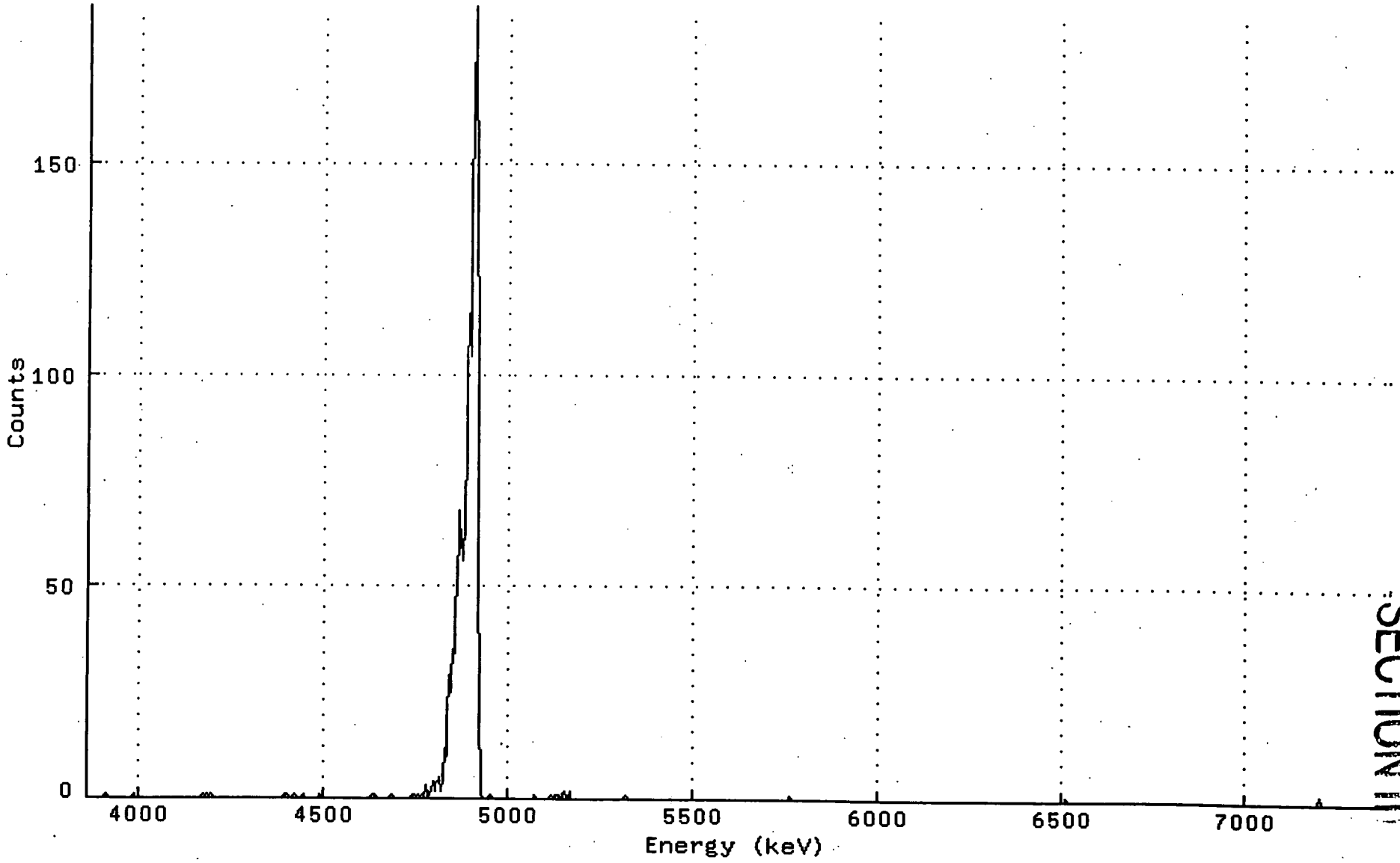
NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	-2.00	2.00	99.9	-2.307E-01	2.067E-01	1.070E+00	6.913E-01
PU-239	5147.7	9.80	1.20	99.9	1.129E+00	7.836E-01	8.994E-01	6.059E-01
PU242	4890.7	2097.20	0.80	100.4	2.405E+02	1.217E+01	7.877E-01	5.492E-01

****

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

343

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263402_PU.CNF;1
Title : 039
Sample Title:
Start Time: 6-NOV-1999 08:58: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.84845E+03
Real Time : 0 22:13:24.00 Sample ID : 263402 Energy Slope : 3.44841E+00
Live Time : 0 22:13:24.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

364

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263403_PU.CNF

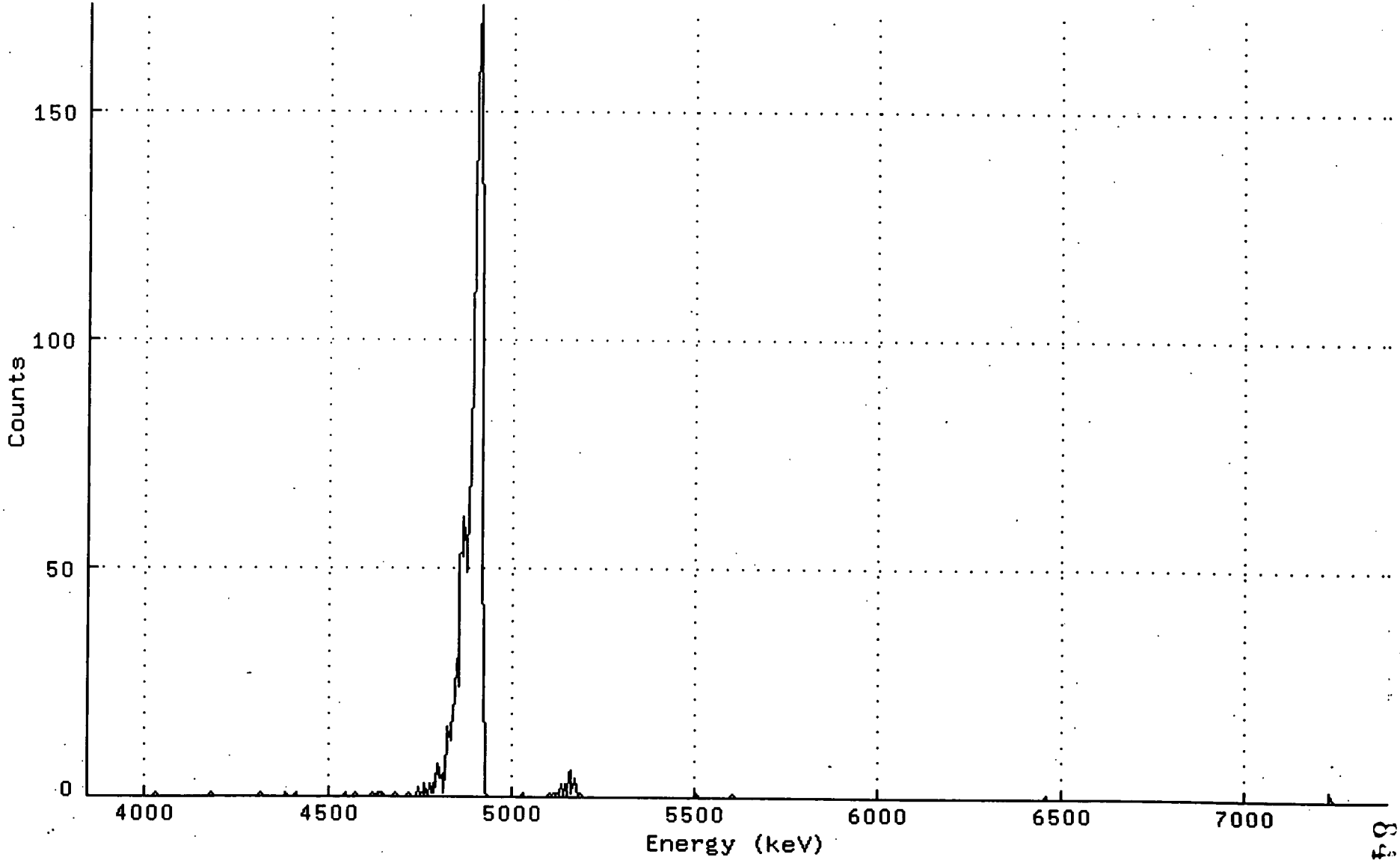
BATCH ID:	99116139	SAMPLE ID:	263403
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	2.214E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	040
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.0%
ELAPSED LIVE TIME:	80001.	RECOVERY:	70.13%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	25.16
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:53	EFF CAL DATE:	3-NOV-1999 11:53
BKG FILENAME:	B_040_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	-1.40	2.40	99.9	-2.944E-02	5.891E-02	2.083E-01	1.326E-01
PU-239	5147.7	39.00	2.00	99.9	8.196E-01	2.758E-01	1.951E-01	1.260E-01
PU242	4890.7	1994.80	1.20	100.4	4.171E+01	2.149E+00	1.632E-01	1.099E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263403_PU.CNF;1
Title : 040
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83160E+03
Real Time : 0 22:13:21.00 Sample ID : 263403 Energy Slope : 3.46943E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



366

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263404_PU.CNF

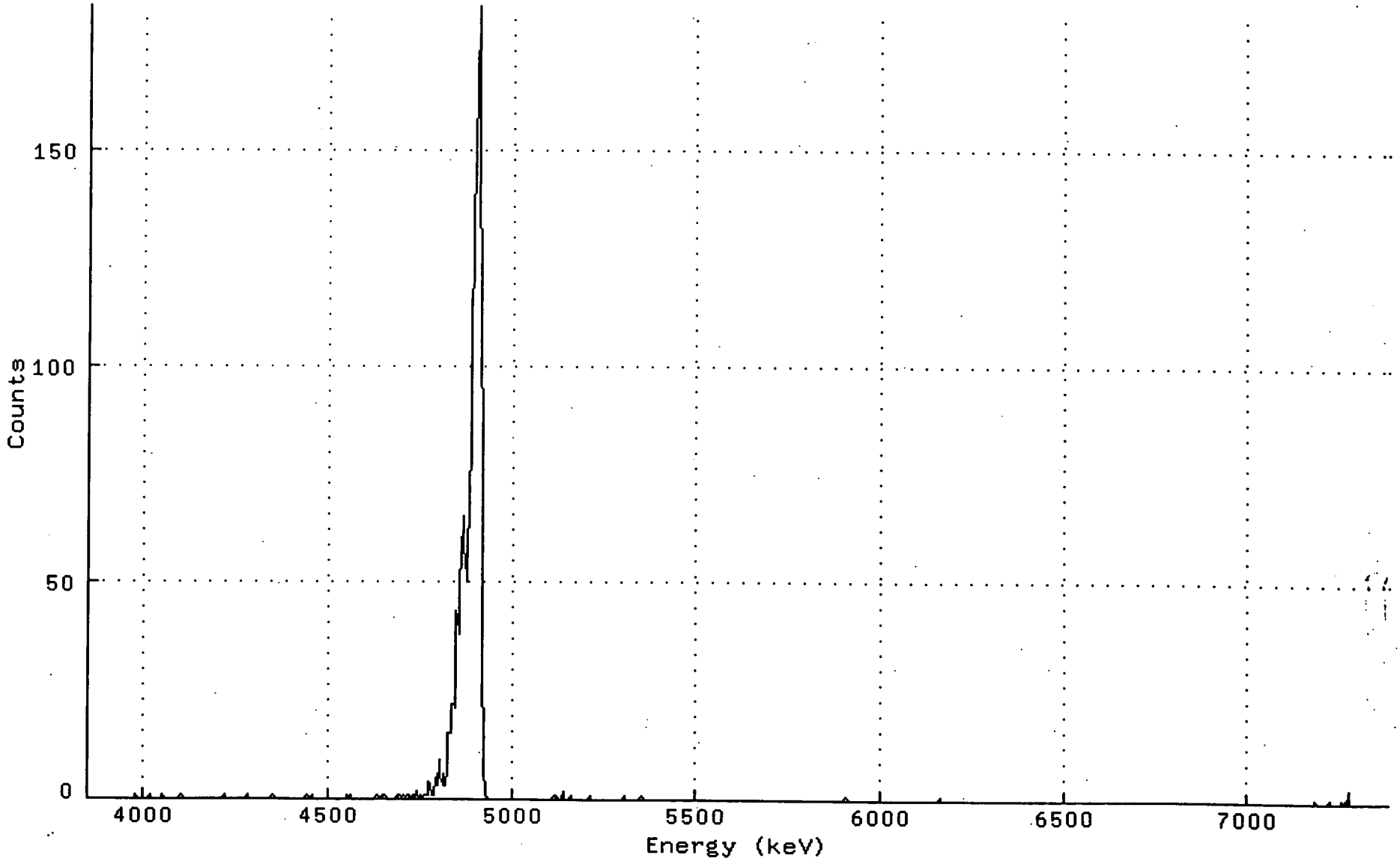
BATCH ID:	99116139	SAMPLE ID:	263404
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.420E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	041
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	75.21%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	28.33
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:55	EFF CAL DATE:	3-NOV-1999 11:55
BKG FILENAME:	B_041_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	0.20	0.80	99.9	2.591E-02	2.978E-01	8.895E-01	6.202E-01
PU-239	5147.7	3.60	2.40	99.9	4.662E-01	6.837E-01	1.284E+00	8.173E-01
PU242	4890.7	2095.80	1.20	100.4	2.700E+02	1.368E+01	1.005E+00	6.773E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263404_PU.CNF;1
Title : 041
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83954E+03
Real Time : 0 22:13:22.00 Sample ID : 263404 Energy Slope : 3.45264E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



348

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
8-NOV-1999 08:27:16

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263405_PU.CNF

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BATCH ID:	99116139	SAMPLE ID:	263405
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.220E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	042
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80006.	RECOVERY:	75.06%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	27.91
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:56	EFF CAL DATE:	3-NOV-1999 11:56
BKG FILENAME:	B_042_3NOV99		

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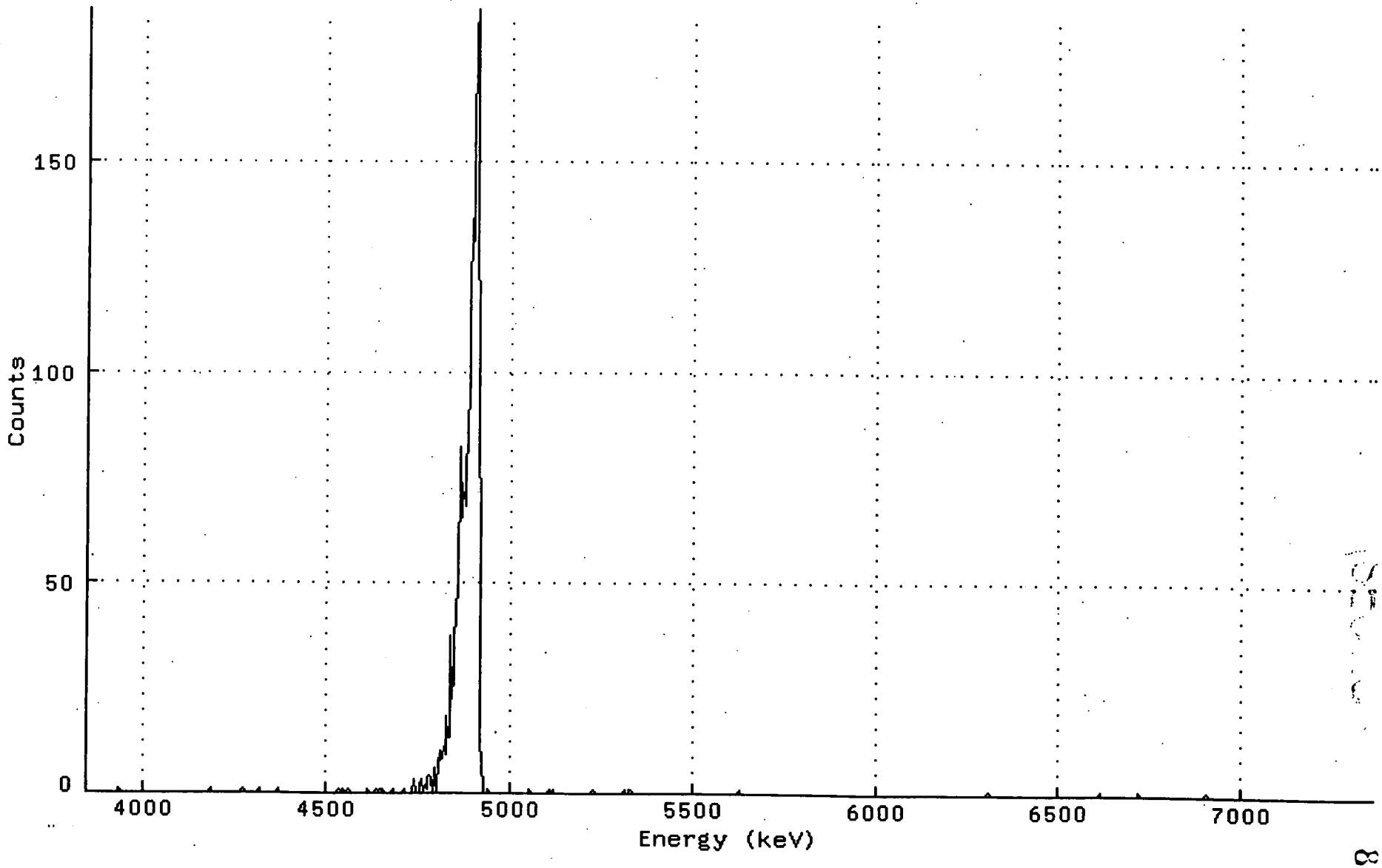
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/	SA	TPU/ERROR 2-SIGMA	MDC dpm/	SA	CRIT LEVEL dpm/	SA
PU-238	5487.1	-1.20	1.20	99.9	-1.563E-01		1.807E-01	1.016E+00		6.842E-01	
PU-239	5147.7	1.40	1.60	99.9	1.822E-01		4.967E-01	1.118E+00		7.354E-01	
PU242	4890.7	2214.80	1.20	100.4	2.868E+02		1.422E+01	1.011E+00		6.807E-01	

****

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263405_PU.CNF;1
Title : 042
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83381E+03
Real Time : 0 22:13:26.00 Sample ID : 263405 Energy Slope : 3.43728E+00
Live Time : 0 22:13:26.00 Sample Type: PU Energy Quad : 0.00000E+00



370

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
8-NOV-1999 08:28:13

89

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263406_PU.CNF

BATCH ID:	99116139	SAMPLE ID:	263406
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.480E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	043
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.6%
ELAPSED LIVE TIME:	80004.	RECOVERY:	69.44%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	26.09
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:57	EFF CAL DATE:	3-NOV-1999 11:57
BKG FILENAME:	B_043_3NOV99		

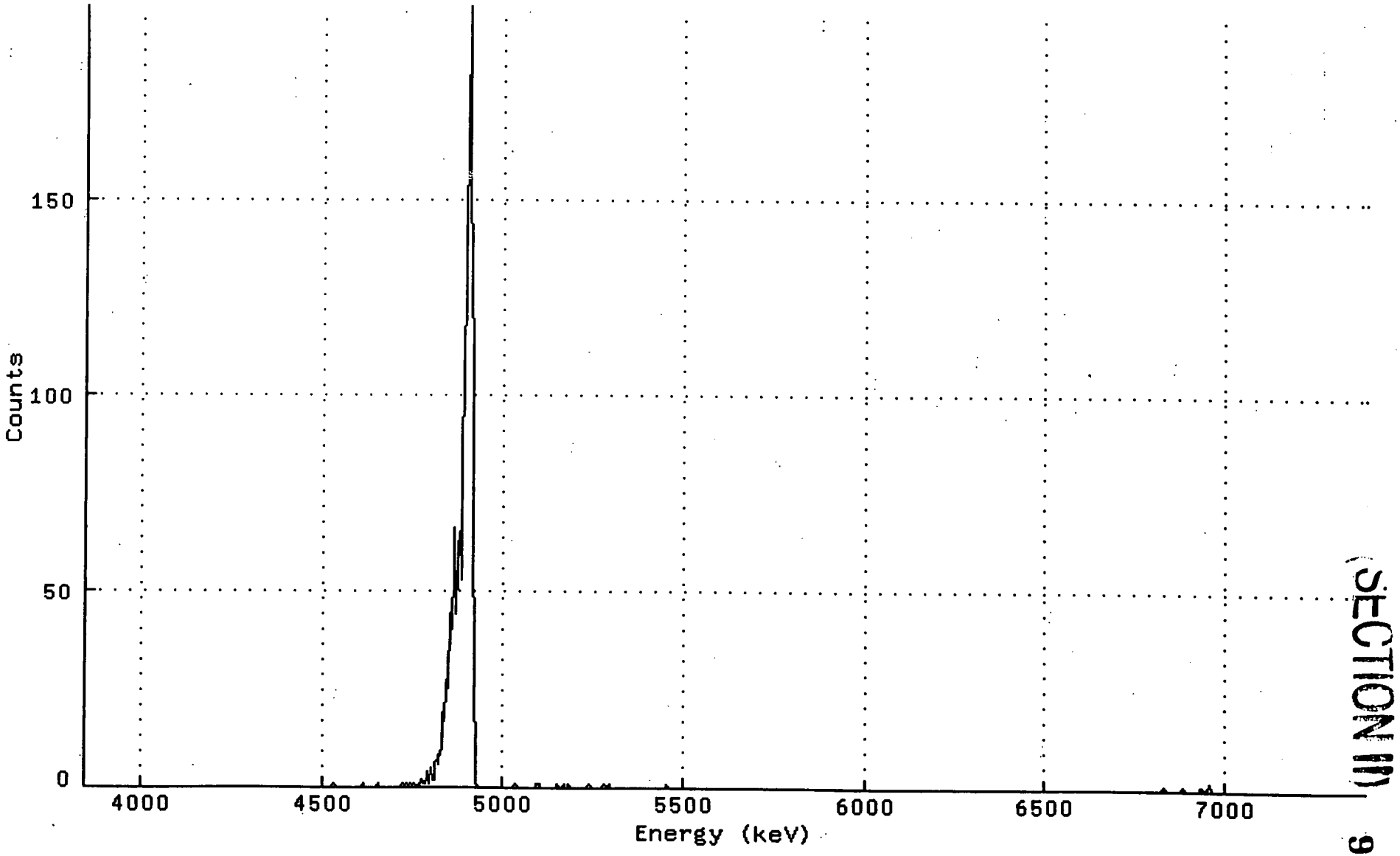
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	1.00	0.00	99.9	1.023E-01	2.048E-01	2.771E-01	2.771E-01
PU-239	5147.7	5.00	2.00	99.9	5.113E-01	5.720E-01	9.497E-01	6.134E-01
PU242	4890.7	2025.80	1.20	100.4	2.061E+02	1.056E+01	7.941E-01	5.349E-01

*** RECOUNT SAMPLE CL > 0.067 ***

371

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263406_PU.CNF;1
Title : 043
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83251E+03
Real Time : 0 22:13:24.00 Sample ID : 263406 Energy Slope : 3.46621E+00
Live Time : 0 22:13:24.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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372

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263407_PU.CNF

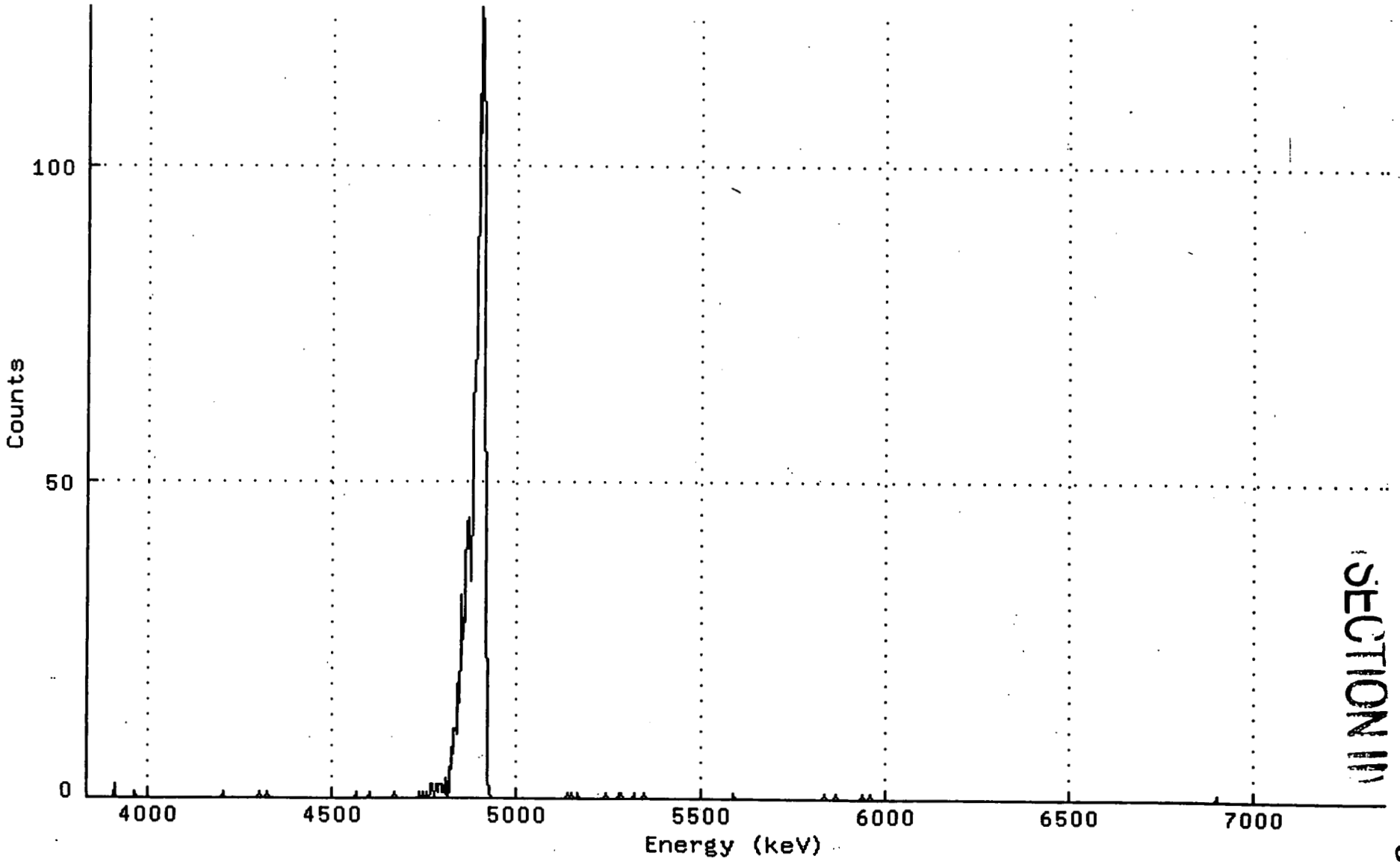
BATCH ID:	99116139	SAMPLE ID:	263407
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.470E-02	]SA
SAMPLE TITLE:		DETECTOR NUMBER:	044
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80001.	RECOVERY:	47.62%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	30.85
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:59	EFF CAL DATE:	3-NOV-1999 11:59
BKG FILENAME:	B_044_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/]SA	TPU/ERROR 2-SIGMA	MDC dpm/]SA	CRIT LEVEL dpm/]SA
PU-238	5487.1	-0.80	0.80	99.9	-1.522E-01	2.155E-01	1.306E+00	9.107E-01
PU-239	5147.7	2.60	0.40	99.9	4.944E-01	6.768E-01	1.075E+00	7.949E-01
PU242	4890.7	1406.60	0.40	100.4	2.661E+02	1.574E+01	1.069E+00	7.910E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263407_PU.CNF;1
Title : 044
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82612E+03
Real Time : 0 22:13:21.00 Sample ID : 263407 Energy Slope : 3.44356E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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374

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263408_PU.CNF

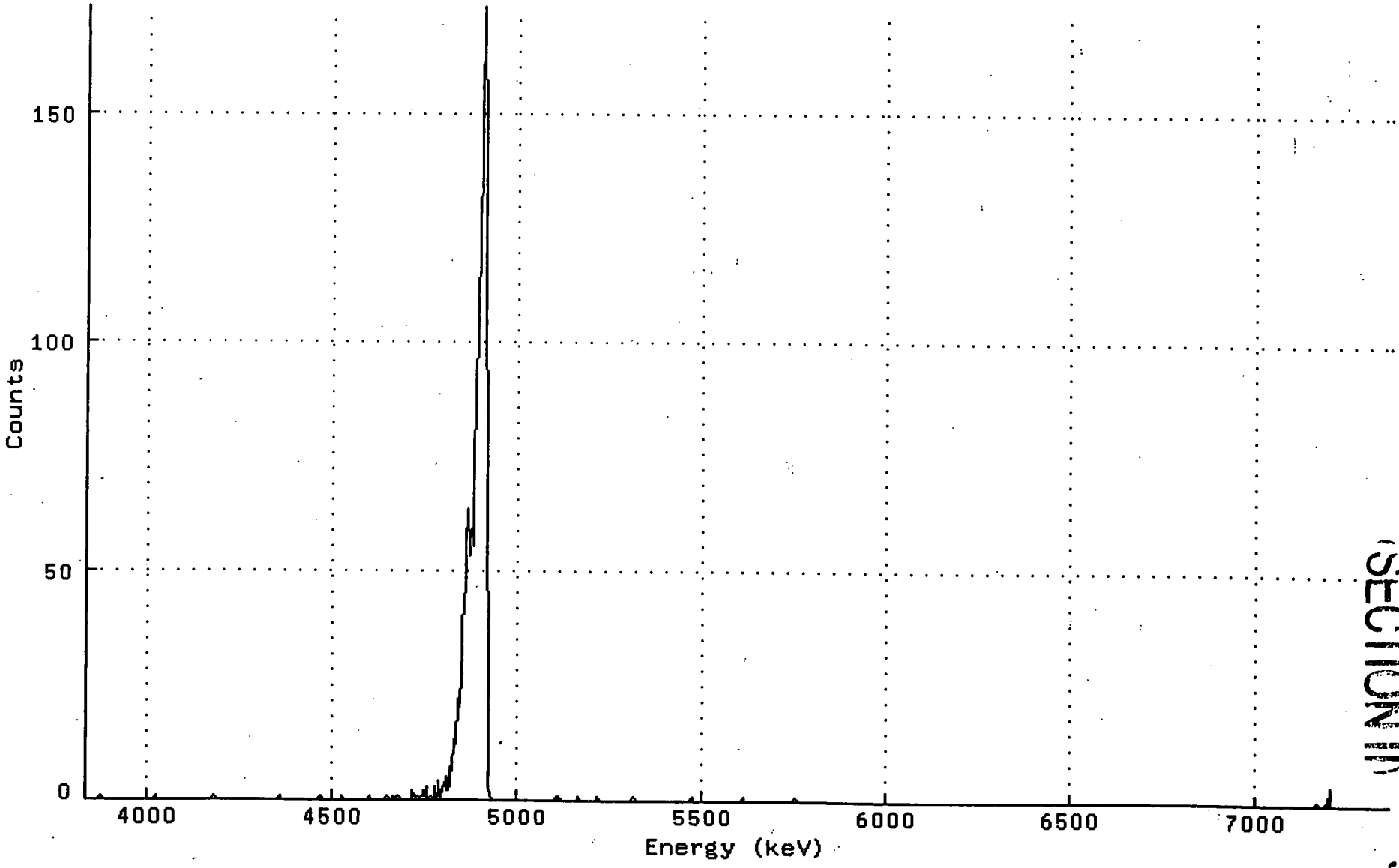
BATCH ID:	99116139	SAMPLE ID:	263408
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.420E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	045
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	66.73%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	30.62
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:00	EFF CAL DATE:	3-NOV-1999 12:00
BKG FILENAME:	B_045_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	0.20	0.80	99.9	2.803E-02	3.221E-01	9.622E-01	6.709E-01
PU-239	5147.7	2.20	0.80	99.9	3.082E-01	5.108E-01	9.622E-01	6.709E-01
PU242	4890.7	1937.40	1.60	100.4	2.700E+02	1.409E+01	1.198E+00	7.876E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263408_PU.CNF;1
Title : 045
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82237E+03
Real Time : 0 22:13:22.00 Sample ID : 263408 Energy Slope : 3.45302E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263409_PU.CNF

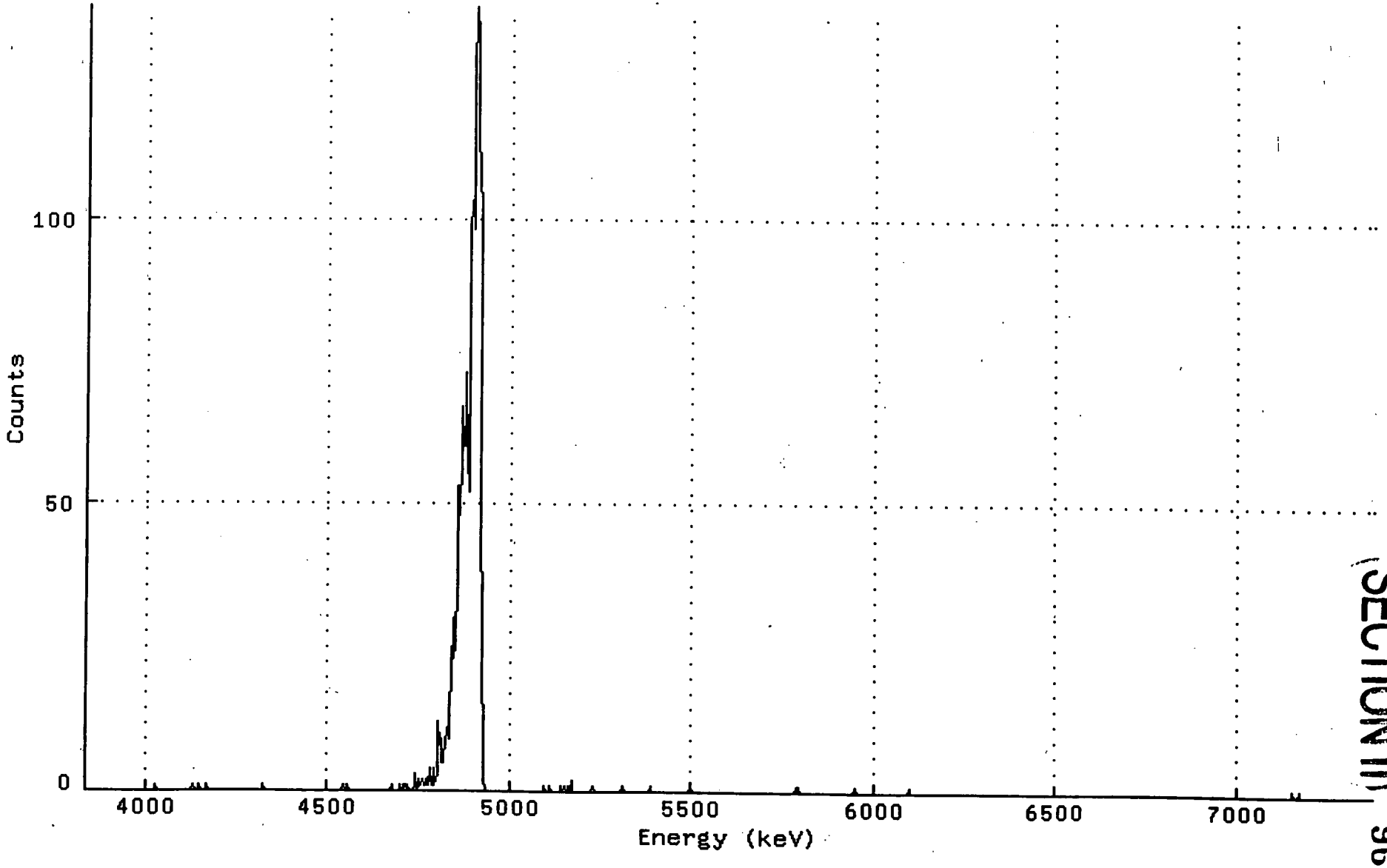
BATCH ID:	99116139	SAMPLE ID:	263409
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 4.560E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	046
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80000.	RECOVERY:	65.49%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	41.74
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:02	EFF CAL DATE:	3-NOV-1999 12:02
BKG FILENAME:	B_046_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	1.60	0.40	99.9	1.739E-01	3.196E-01	6.137E-01	4.540E-01
PU-239	5147.7	7.20	0.80	99.9	7.819E-01	6.282E-01	7.460E-01	5.201E-01
PU242	4890.7	1874.20	0.80	100.4	2.025E+02	1.070E+01	7.423E-01	5.175E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263409_PU.CNF;1
Title : 046
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82505E+03
Real Time : 0 22:13:20.00 Sample ID : 263409 Energy Slope : 3.45958E+00
Live Time : 0 22:13:20.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III 99

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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
8-NOV-1999 08:22:26

SECTION III 97

****

Spectral File: ND_AMS_ARCHIVE_S:S_99116139$263398D_PU.CNF

****

BATCH ID:	99116139	SAMPLE ID:	263398D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.550E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	047
ACQ DATE:	6-NOV-1999 09:00	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	83.42%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	25.57
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:03	EFF CAL DATE:	3-NOV-1999 12:03
BKG FILENAME:	B_047_3NOV99		

****

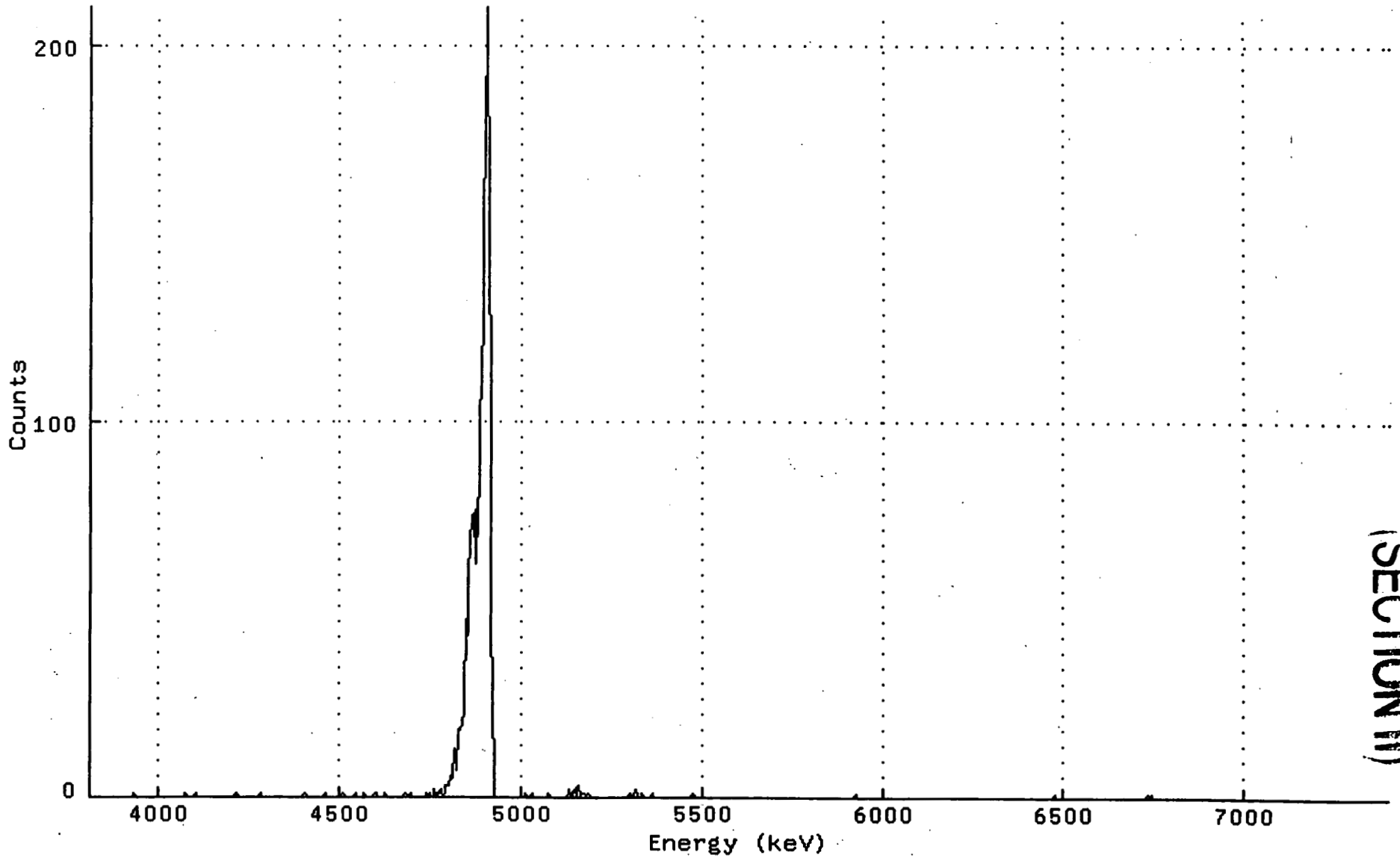
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	0.20	0.80	99.9	2.255E-02	2.591E-01	7.740E-01	5.397E-01
PU-239	5147.7	17.80	1.20	99.9	2.006E+00	1.001E+00	8.793E-01	5.924E-01
PU242	4890.7	2320.20	0.80	100.4	2.601E+02	1.270E+01	7.702E-01	5.370E-01

****

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116139$263398D_PU.CNF;2
Title : 047
Sample Title:
Start Time: 6-NOV-1999 09:00: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.79990E+03
Real Time : 0 22:13:22.00 Sample ID : 263398D Energy Slope : 3.50728E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



(SECTION II)

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Spectral File: ND_AMS_ARCHIVE_C:C_99116139$LCSWR33_PU.CNF

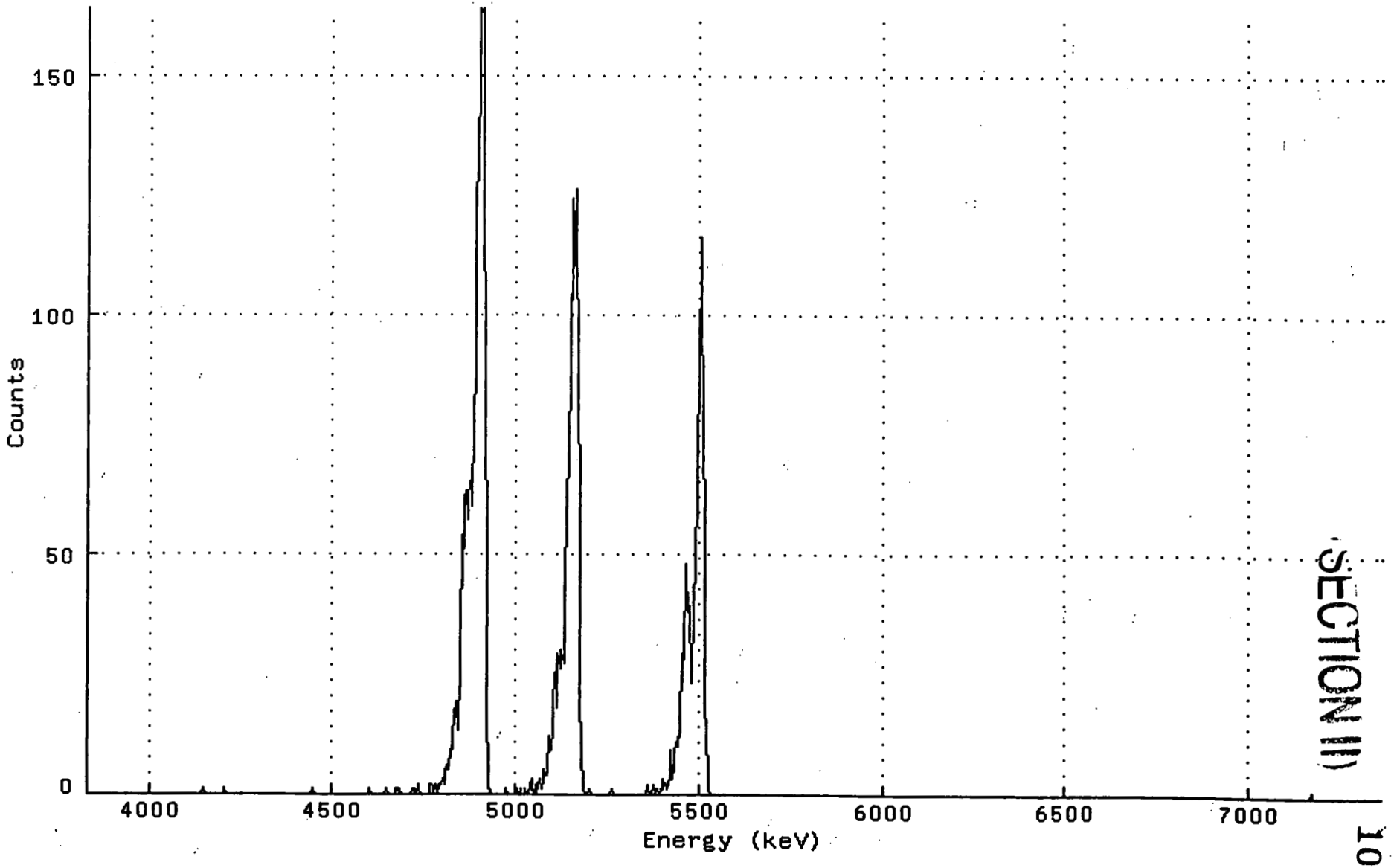
BATCH ID:	99116139	SAMPLE ID:	LCSWR33
SAMPLE DATE:	1-JAN-1987 00:00	ALIQUOT:	2.500E-01 mL
SAMPLE TITLE:		DETECTOR NUMBER:	048
ACQ DATE:	6-NOV-1999 08:59	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80001.	RECOVERY:	72.24%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	29.30
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:05	EFF CAL DATE:	3-NOV-1999 12:05
BKG FILENAME:	B_048_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ mL	TPU/ERROR 2-SIGMA	MDC pCi/ mL	CRIT LEVEL pCi/ mL
PU-238	5487.1	1134.00	0.00	99.9	1.016E+01	8.364E-01	2.193E-02	2.193E-02
PU-239	5147.7	1394.60	0.40	99.9	1.129E+01	8.835E-01	4.574E-02	3.383E-02
PU242	4890.7	2066.20	0.80	100.4	1.664E+01	8.476E-01	5.532E-02	3.857E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.C]C_99116139$LCSWR33_PU.CNF;3
Title : 048
Sample Title:
Start Time: 6-NOV-1999 08:59: Sample Time: 1-JAN-1987 00:00: Energy Offset: 3.82143E+03
Real Time : 0 22:13:22.00 Sample ID : LCSWR33 Energy Slope : 3.45077E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Sample Preparation and Analysis Log

Sample Type: Various Solids

(SECTION II) 101

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116138	Kristin K. Bu	10/29/99
		Pu-239/240,Pu-238	99116140		
		U-238, U235, U234	99116142	S Brian Thompson	11/9/99
Counting	RC-19 R06	Pu^{150}	99116140	S Brian Thompson	11/10/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		33			
16822	263410	2	0.750 G	Am, Pu, U	0.0486	34	14.664	30.104	15.440
16822	263411	3	0.750 G	Am, Pu, U	0.0769	35	14.710	24.468	9.758
16822	263412	4	0.750 G	Am, Pu, U		37		26.438	
16822	263413	5	0.750 G	Am, Pu, U		38		27.291	
16822	263414	6	0.750 G	Am, Pu, U		39		26.277	
16822	263415	7	0.750 G	Am, Pu, U		40		28.476	
16822	263416	8	0.750 G	Am, Pu, U		41		24.352	
16822	263417	9	0.750 G	Am, Pu, U		42		17.645	
16822	263418	10	0.750 G	Am, Pu, U	0.0499	43	14.469	29.512	15.043
16822	263419	11	0.750 G	Am, Pu, U	0.1436	44	14.434	19.657	5.223
16822	263420	12	0.750 G	Am, Pu, U	0.1426	45	14.546	19.806	5.260
16822	263421	13	0.750 G	Am, Pu, U	0.1451	46	14.578	19.747	5.169
16822	263410D	14	0.750 G	Am, Pu, U	0.0486	47	14.664	30.104	15.440
LCSWR1,	LCSWR33	15	0.250 mL	Am, Pu, U		48			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

-Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9

-Balance # 8 used for weights of samples and their aliquots

-Sample aliquot is the fraction of the total sample taken for analysis

OR 09 11/1/99 Qidong S. Lapitski 11/11/99

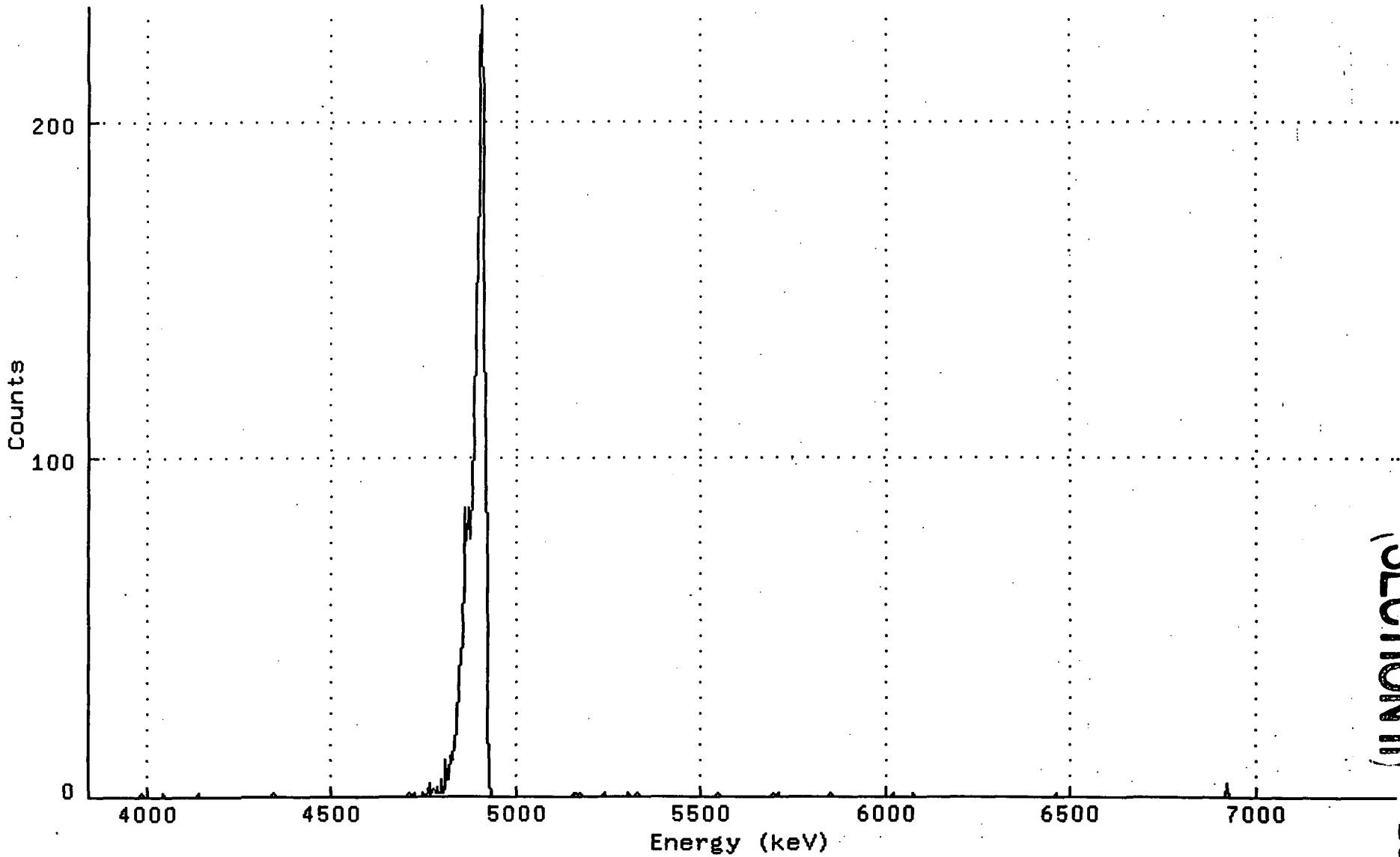
Spectral File: ND_AMS_ARCHIVE_R:R_99116140$PB_PU.CNF

BATCH ID:	99116140	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	1.000E+00 SA
SAMPLE TITLE:		DETECTOR NUMBER:	033
ACQ DATE:	8-NOV-1999 07:36	AVERAGE EFFICIENCY:	27.0%
ELAPSED LIVE TIME:	80009.	RECOVERY:	80.15%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	29.01
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:44	EFF CAL DATE:	3-NOV-1999 11:44
BKG FILENAME:	B_033_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	-0.20	1.20	99.9	-6.942E-04	8.442E-03	2.705E-02	1.822E-02
PU-239	5147.7	1.00	2.00	99.9	3.466E-03	1.352E-02	3.219E-02	2.079E-02
PU242	4890.7	2677.20	0.80	100.4	9.235E+00	4.271E-01	2.370E-02	1.652E-02

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.R]R_99116140$PB_PU.CNF;2
Title : 033
Sample Title:
Start Time: 8-NOV-1999 07:36: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83095E+03
Real Time : 0 22:13:29.00 Sample ID : PB Energy Slope : 3.45959E+00
Live Time : 0 22:13:29.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263410_PU.CNF

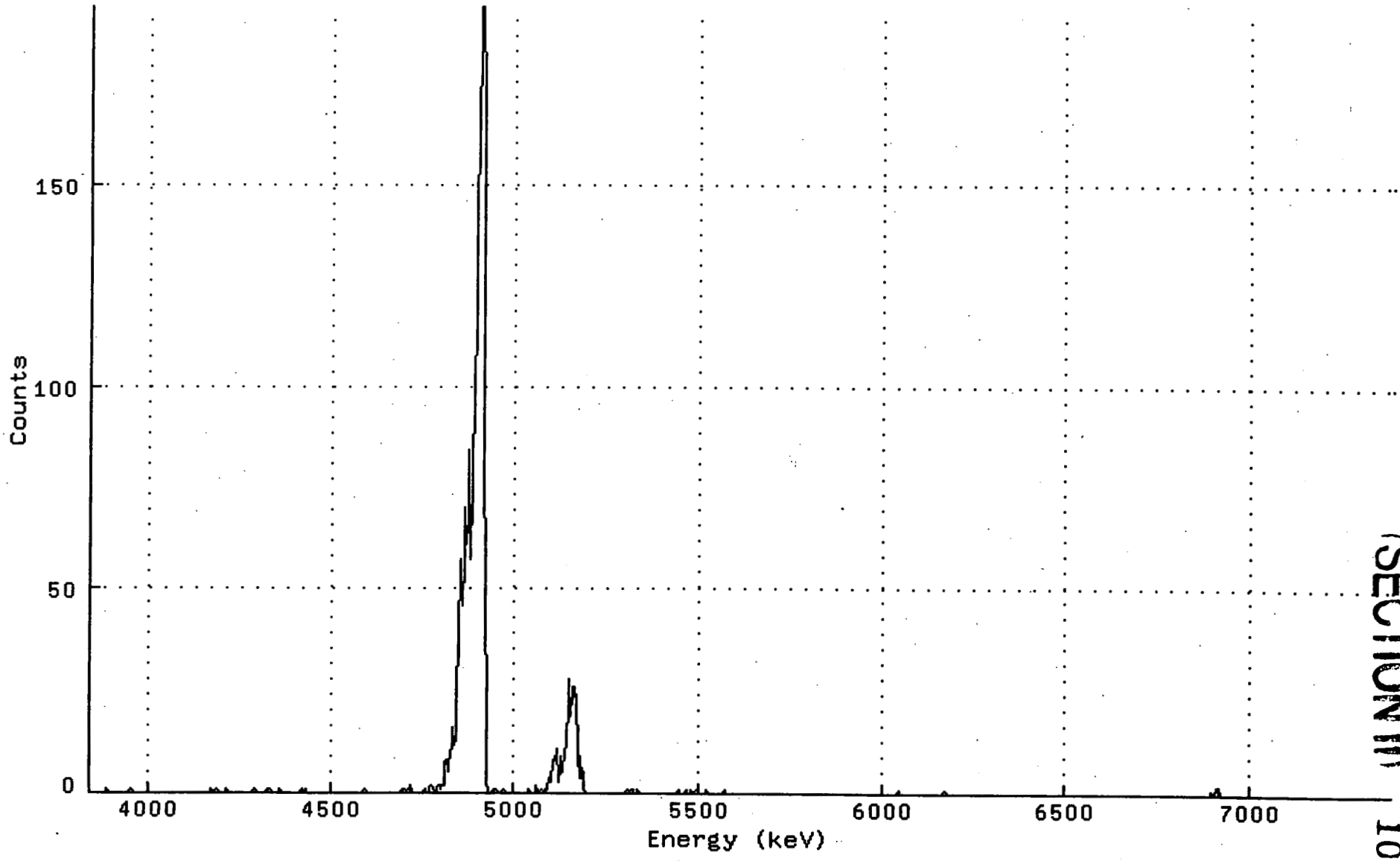
BATCH ID:	99116140	SAMPLE ID:	263410
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	034
ACQ DATE:	8-NOV-1999 07:37	AVERAGE EFFICIENCY:	22.4%
ELAPSED LIVE TIME:	80002.	RECOVERY:	82.28%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	26.37
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:45	EFF CAL DATE:	3-NOV-1999 11:45
BKG FILENAME:	B_034_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	6.00	0.00	99.9	5.031E-01	4.117E-01	2.271E-01	2.271E-01
PU-239	5147.7	329.20	0.80	99.9	2.758E+01	3.409E+00	5.756E-01	4.013E-01
PU242	4890.7	2279.20	0.80	100.4	1.900E+02	9.344E+00	5.727E-01	3.993E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263410_PU.CNF;2
Title : 034
Sample Title:
Start Time: 8-NOV-1999 07:37: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.82985E+03
Real Time : 0 22:13:22.00 Sample ID : 263410 Energy Slope : 3.46688E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III 105

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Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263411_PU.CNF

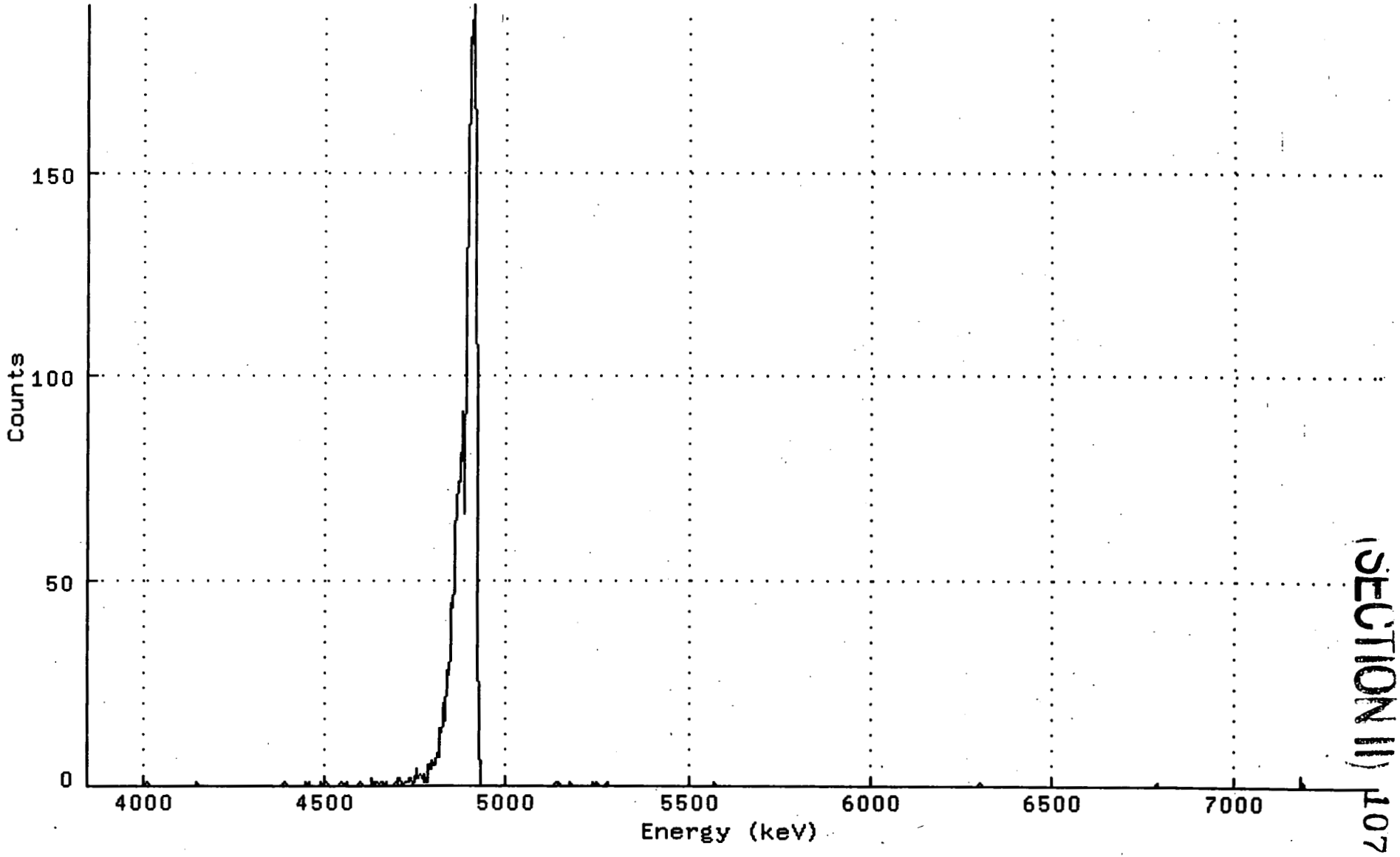
BATCH ID:	99116140	SAMPLE ID:	263411
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.690E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	035
ACQ DATE:	8-NOV-1999 07:37	AVERAGE EFFICIENCY:	26.2%
ELAPSED LIVE TIME:	80005.	RECOVERY:	77.53%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	31.40
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:46	EFF CAL DATE:	3-NOV-1999 11:46
BKG FILENAME:	B_035_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	-1.20	1.20	99.9	-5.762E-02	6.660E-02	3.744E-01	2.522E-01
PU-239	5147.7	1.80	1.20	99.9	8.636E-02	1.791E-01	3.744E-01	2.522E-01
PU242	4890.7	2515.60	0.40	100.4	1.201E+02	5.667E+00	2.698E-01	1.996E-01

*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263411_PU.CNF;2
Title : 035
Sample Title:
Start Time: 8-NOV-1999 07:37: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83373E+03
Real Time : 0 22:13:25.00 Sample ID : 263411 Energy Slope : 3.47115E+00
Live Time : 0 22:13:25.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION II 107

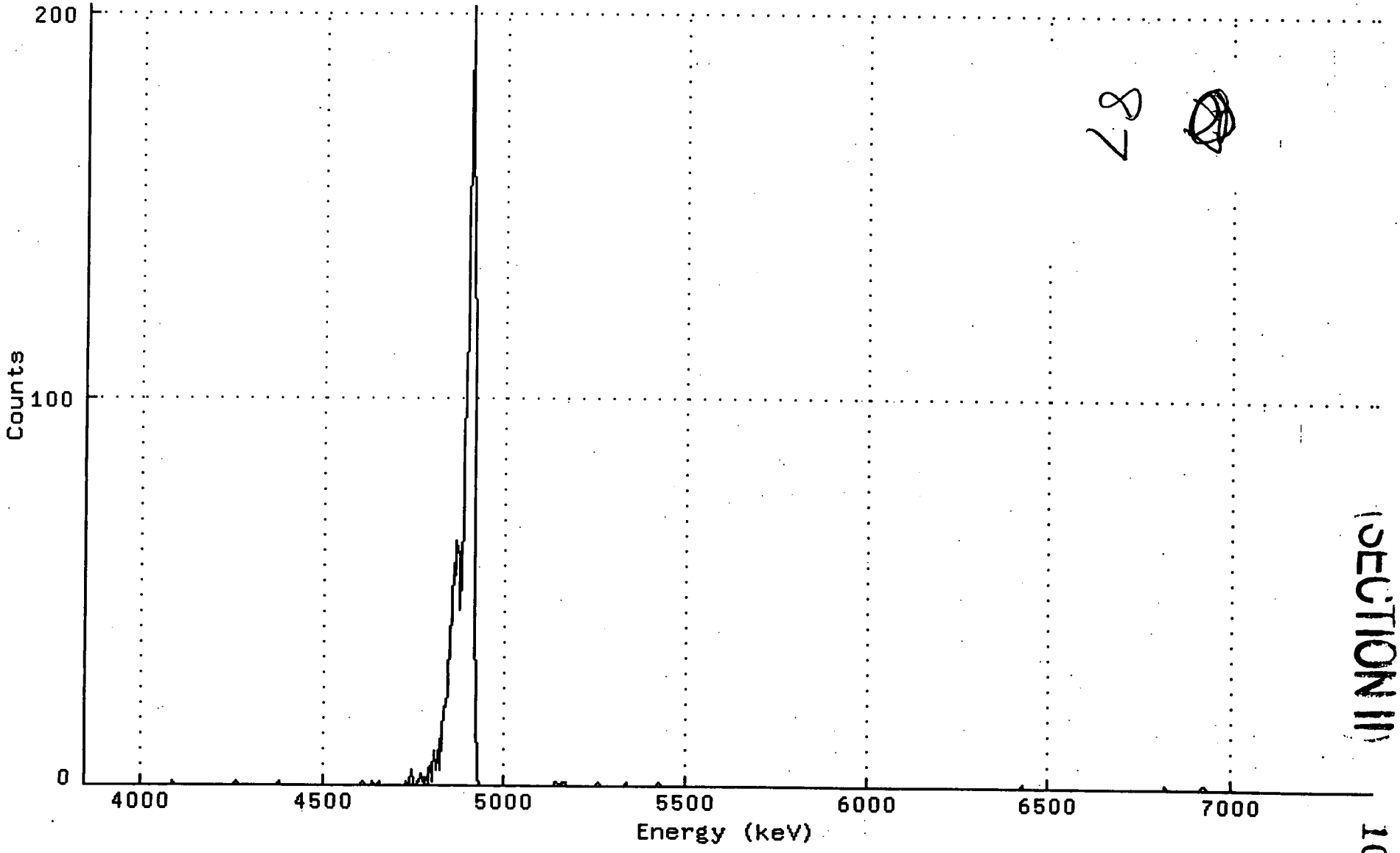
Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263412_PU.CNF

BATCH ID:	99116140	SAMPLE ID:	263412
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	037
ACQ DATE:	8-NOV-1999 07:38	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80002.	RECOVERY:	73.23%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	24.57
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:50	EFF CAL DATE:	3-NOV-1999 11:50
BKG FILENAME:	B_037_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/
PU-238	5487.1	1.00	0.00	99.9	2.663E-03	5.329E-03	7.212E-03	7.212E-03
PU-239	5147.7	3.00	2.00	99.9	7.984E-03	1.283E-02	2.471E-02	1.596E-02
PU242	4890.7	2094.60	0.40	100.4	5.547E+00	2.813E-01	1.496E-02	1.107E-02

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263412_PU.CNF;2
Title : 037
Sample Title:
Start Time: 8-NOV-1999 07:38: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83232E+03
Real Time : 0 22:13:22.00 Sample ID : 263412 Energy Slope : 3.47035E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



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SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263413_PU.CNF

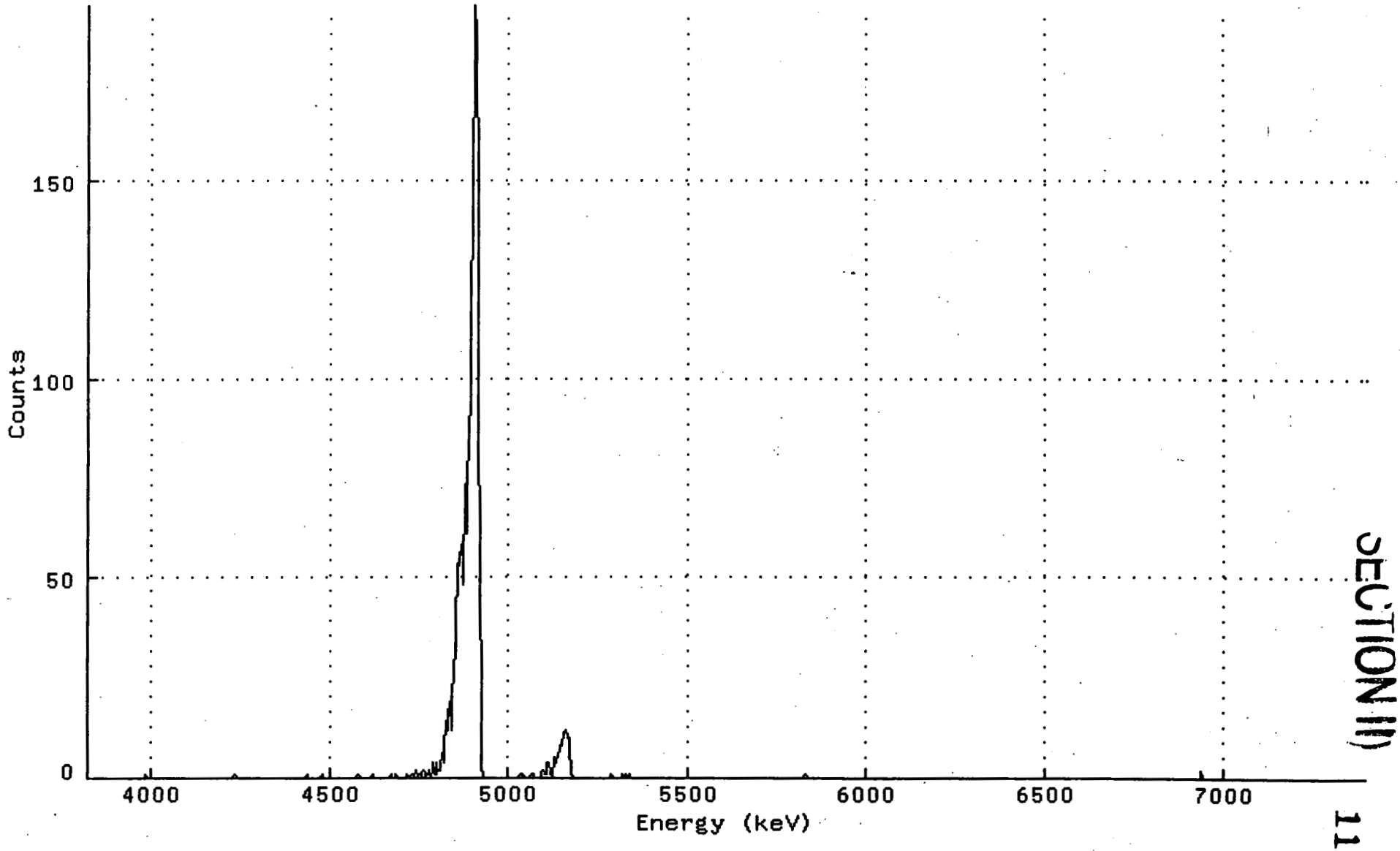
BATCH ID:	99116140	SAMPLE ID:	263413
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 7.500E-01	g
SAMPLE TITLE:		DETECTOR NUMBER:	038
ACQ DATE:	8-NOV-1999 07:38	AVERAGE EFFICIENCY:	22.6%
ELAPSED LIVE TIME:	80007.	RECOVERY:	74.48%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	23.81
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:51	EFF CAL DATE:	3-NOV-1999 11:51
BKG FILENAME:	B_038_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
PU-238	5487.1	1.00	0.00	99.9	2.681E-03	5.363E-03	7.259E-03	7.259E-03
PU-239	5147.7	131.80	1.20	99.9	3.531E-01	6.507E-02	2.090E-02	1.408E-02
PU242	4890.7	2081.00	0.00	100.4	5.547E+00	2.817E-01	7.223E-03	7.223E-03

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263413_PU.CNF;1
Title : 038
Sample Title:
Start Time: 8-NOV-1999 07:38: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.81090E+03
Real Time : 0 22:13:27.00 Sample ID : 263413 Energy Slope : 3.49680E+00
Live Time : 0 22:13:27.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III

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Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263414_PU.CNF

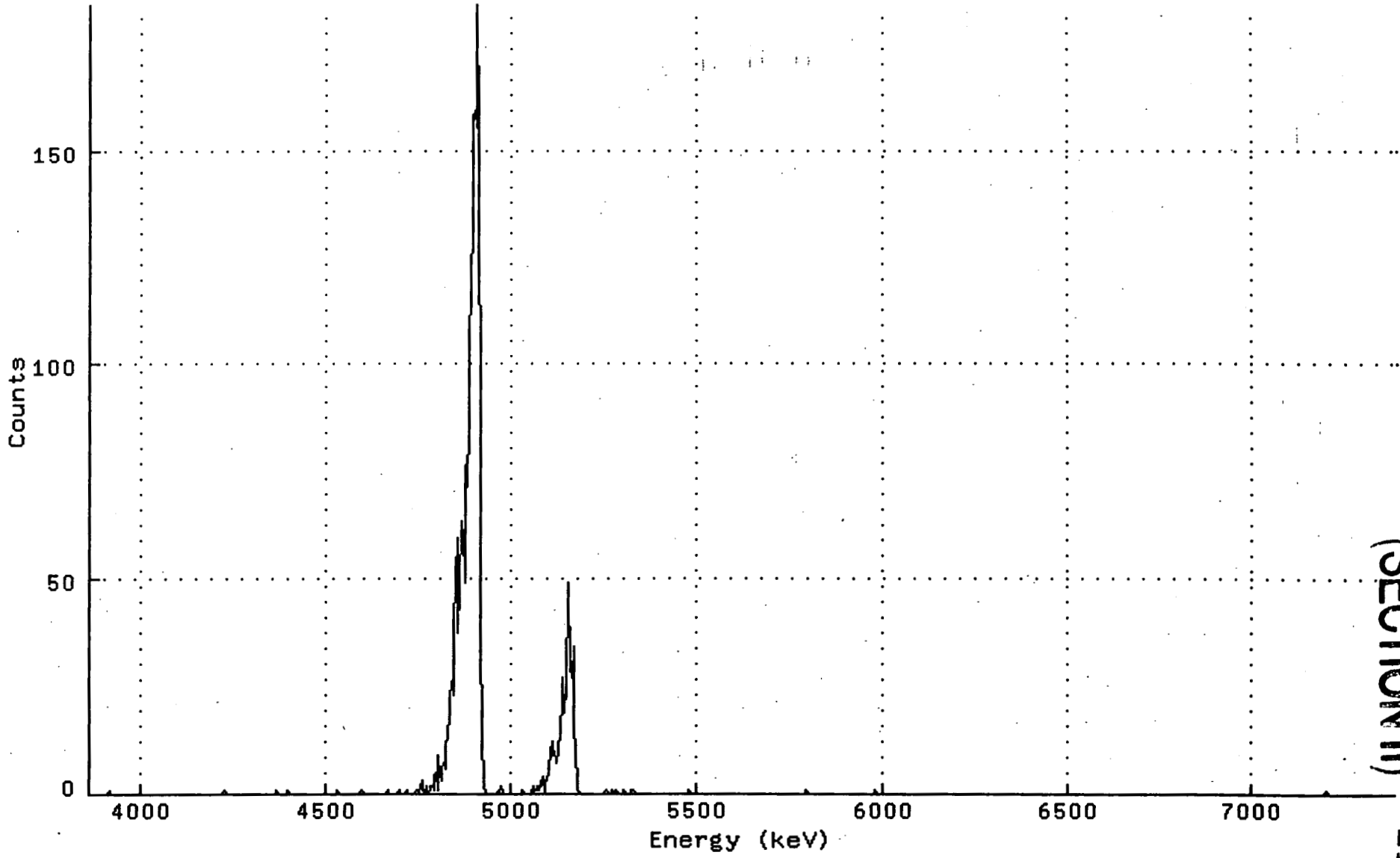
BATCH ID:	99116140	SAMPLE ID:	263414
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	039
ACQ DATE:	8-NOV-1999 07:39	AVERAGE EFFICIENCY:	22.7%
ELAPSED LIVE TIME:	80001.	RECOVERY:	76.49%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	28.73
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:52	EFF CAL DATE:	3-NOV-1999 11:52
BKG FILENAME:	B_039_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
PU-238	5487.1	-1.00	2.00	99.9	-2.594E-03	6.963E-03	2.407E-02	1.555E-02
PU-239	5147.7	429.80	1.20	99.9	1.114E+00	1.246E-01	2.023E-02	1.363E-02
PU242	4890.7	2150.20	0.80	100.4	5.547E+00	2.781E-01	1.772E-02	1.235E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263414_PU.CNF;1
Title : 039
Sample Title:
Start Time: 8-NOV-1999 07:39: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.84845E+03
Real Time : 0 22:13:21.00 Sample ID : 263414 Energy Slope : 3.44841E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



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SECTION III

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263415_PU.CNF

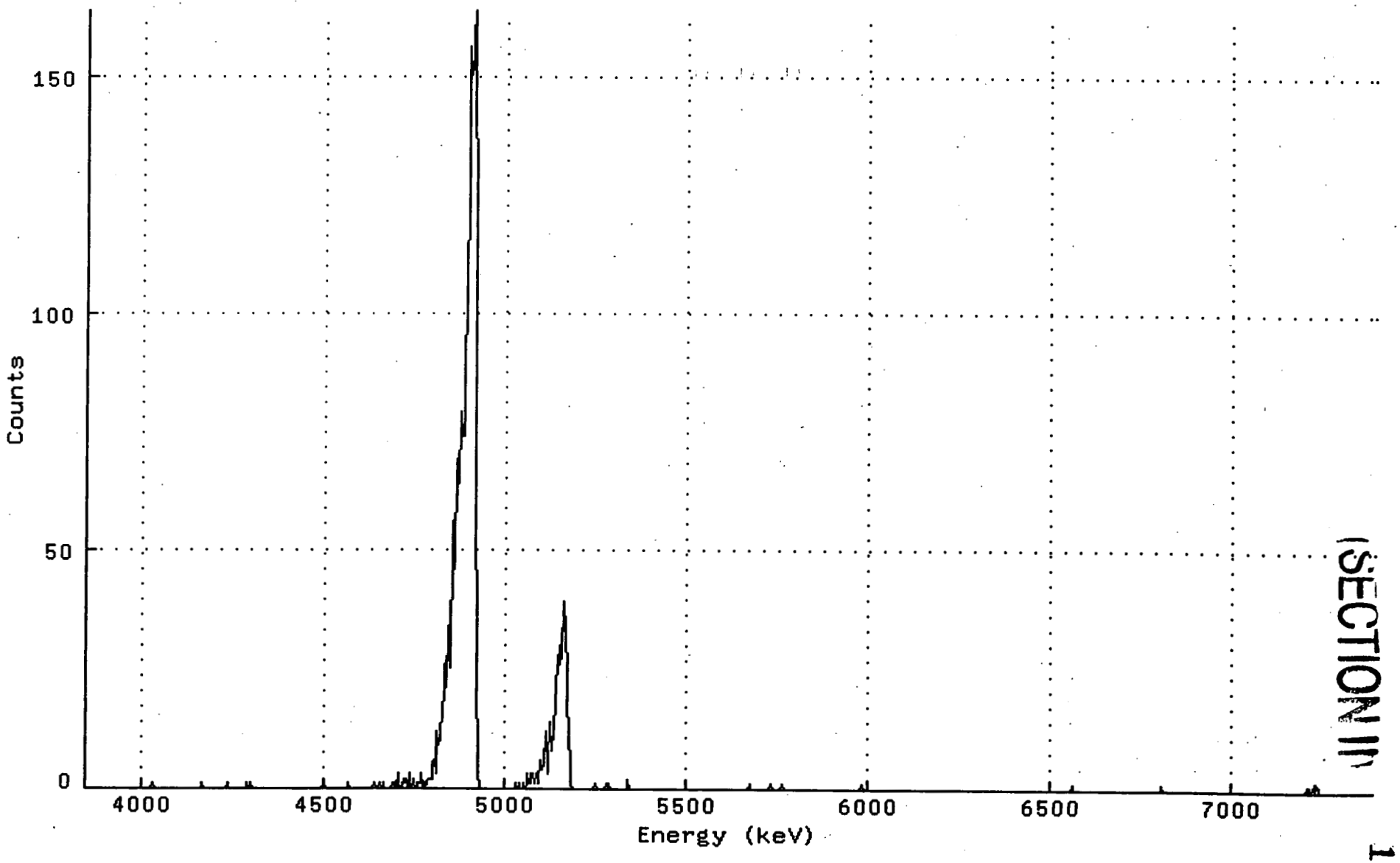
BATCH ID:	99116140	SAMPLE ID:	263415
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	040
ACQ DATE:	8-NOV-1999 07:39	AVERAGE EFFICIENCY:	23.0%
ELAPSED LIVE TIME:	80001.	RECOVERY:	77.56%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	30.72
LAMBDA VALUE:	100.	ROI TYPE:	EXPANDED
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:53	EFF CAL DATE:	3-NOV-1999 11:53
BKG FILENAME:	B_040_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
PU-238	5487.1	-2.40	2.40	99.9	-6.069E-03	4.967E-03	2.505E-02	1.595E-02
PU-239	5147.7	416.00	2.00	99.9	1.051E+00	1.189E-01	2.346E-02	1.516E-02
PU242	4890.7	2206.00	2.00	100.4	5.547E+00	2.753E-01	2.335E-02	1.508E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263415_PU.CNF;1
Title : 040
Sample Title:
Start Time: 8-NOV-1999 07:39: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83160E+03
Real Time : 0 22:13:21.00 Sample ID : 263415 Energy Slope : 3.46943E+00
Live Time : 0 22:13:21.00 Sample Type: PU Energy Quad : 0.00000E+00



(SECTION III)

115

397

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263416_PU.CNF

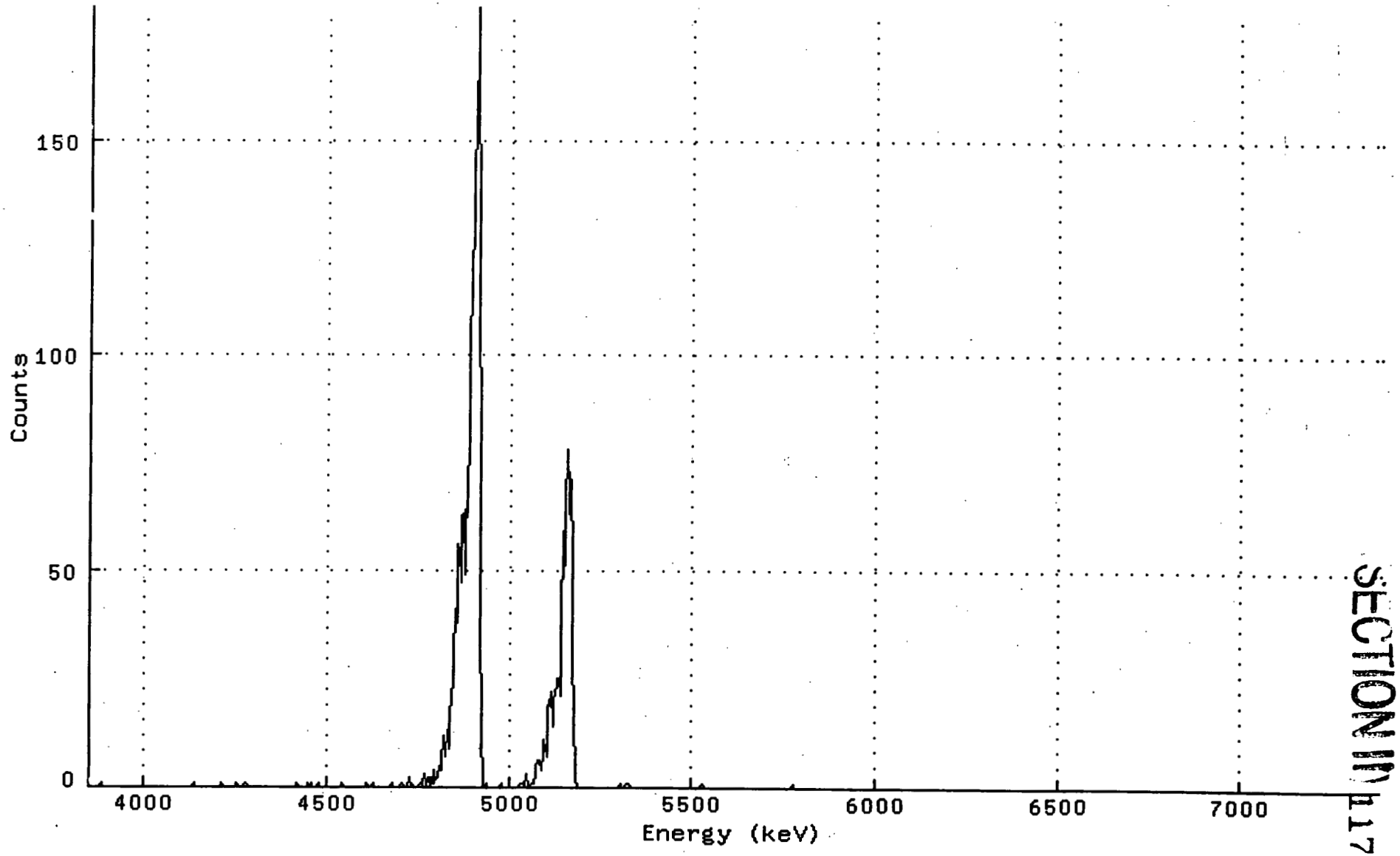
BATCH ID:	99116140	SAMPLE ID:	263416
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 7.500E-01	g
SAMPLE TITLE:		DETECTOR NUMBER:	041
ACQ DATE:	8-NOV-1999 07:39	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80005.	RECOVERY:	73.20%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	27.49
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:55	EFF CAL DATE:	3-NOV-1999 11:55
BKG FILENAME:	B_041_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
PU-238	5487.1	0.20	0.80	99.9	5.468E-04	6.284E-03	1.877E-02	1.309E-02
PU-239	5147.7	878.60	2.40	99.9	2.401E+00	2.127E-01	2.709E-02	1.725E-02
PU242	4890.7	2039.80	1.20	100.4	5.547E+00	2.839E-01	2.122E-02	1.429E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263416_PU.CNF;1
Title : 041
Sample Title:
Start Time: 8-NOV-1999 07:39: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83954E+03
Real Time : 0 22:13:26.00 Sample ID : 263416 Energy Slope : 3.45264E+00
Live Time : 0 22:13:25.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III 117

399

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263417_PU.CNF

BATCH ID:	99116140	SAMPLE ID:	263417
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	042
ACQ DATE:	8-NOV-1999 07:40	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80000.	RECOVERY:	75.69%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	33.95
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:56	EFF CAL DATE:	3-NOV-1999 11:56
BKG FILENAME:	B_042_3NOV99		

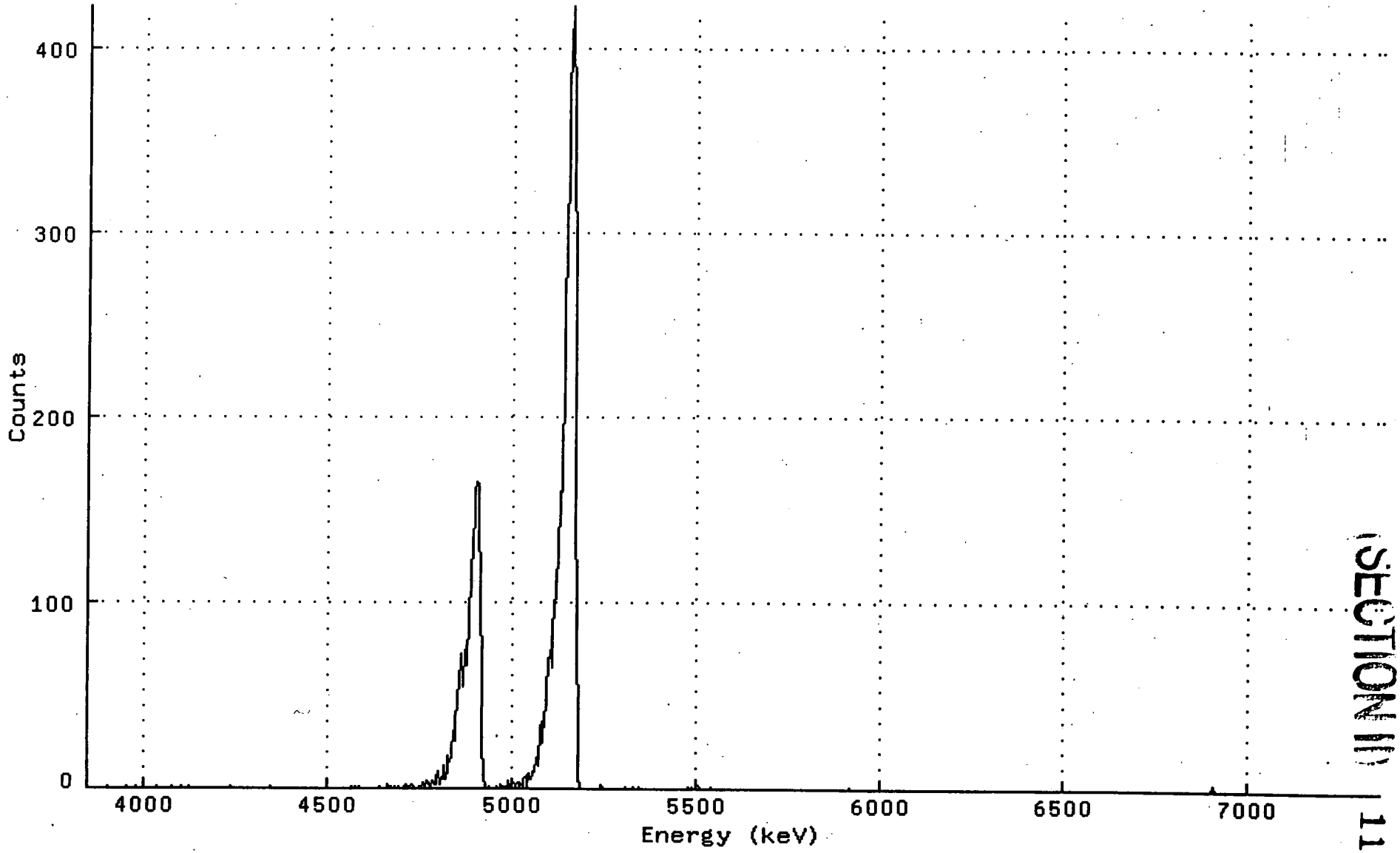
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/g	TPU/ERROR 2-SIGMA	MDC pCi/g	CRIT LEVEL pCi/
PU-238	5487.1	1.20	0.80	99.9	2.997E-03	7.611E-03	1.714E-02	1.195E-02
PU-239	5147.7	5176.40	1.60	99.9	1.292E+01	8.033E-01	2.144E-02	1.410E-02
PU242	4890.7	2233.40	1.60	100.4	5.547E+00	2.741E-01	2.134E-02	1.403E-02

*** POSITIVE ***

400

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263417_PU.CNF;1
Title : 042
Sample Title:
Start Time: 8-NOV-1999 07:40: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.83381E+03
Real Time : 0 22:13:20.00 Sample ID : 263417 Energy Slope : 3.43728E+00
Live Time : 0 22:13:20.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III 119

401

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 09:56:52

SECTION II 120

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263418_PU.CNF

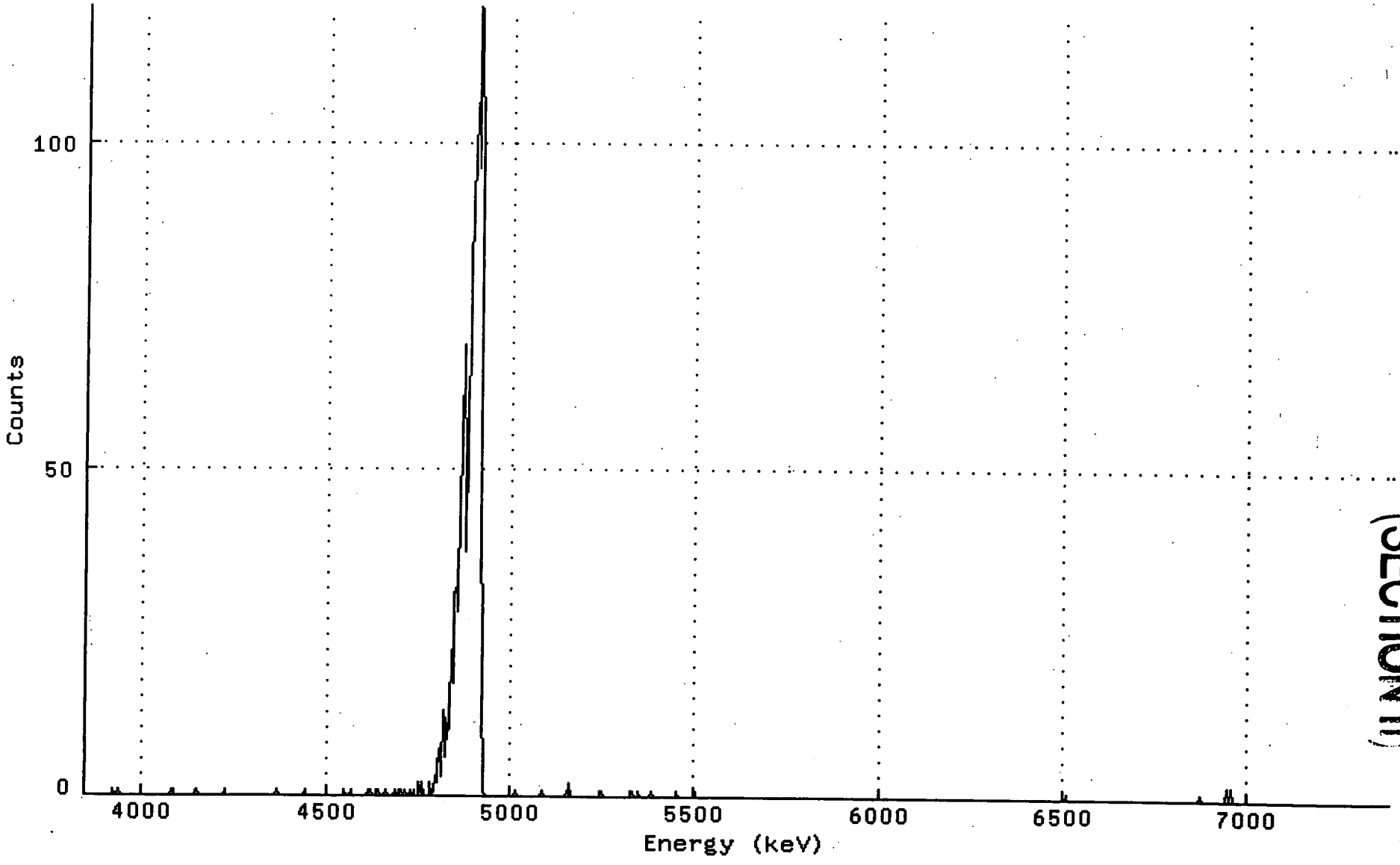
BATCH ID:	99116140	SAMPLE ID:	263418
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	4.990E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	043
ACQ DATE:	8-NOV-1999 07:40	AVERAGE EFFICIENCY:	23.6%
ELAPSED LIVE TIME:	80004.	RECOVERY:	56.51%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	49.25
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:57	EFF CAL DATE:	3-NOV-1999 11:57
BKG FILENAME:	B_043_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	3.00	0.00	99.9	3.385E-01	3.914E-01	3.057E-01	3.057E-01
PU-239	5147.7	2.00	2.00	99.9	2.256E-01	4.945E-01	1.048E+00	6.766E-01
PU242	4890.7	1648.80	1.20	100.4	1.851E+02	1.026E+01	8.760E-01	5.901E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263418_PU.CNF;1
Title : 043
Sample Title:
Start Time: 8-NOV-1999 07:40: Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.83251E+03
Real Time : 0 22:13:24.00 Sample ID : 263418 Energy Slope : 3.46621E+00
Live Time : 0 22:13:24.00 Sample Type: PU Energy Quad : 0.00000E+00



(SECTION II)

121

403

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 09:57:28 (SECTION III)

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263419_PU.CNF

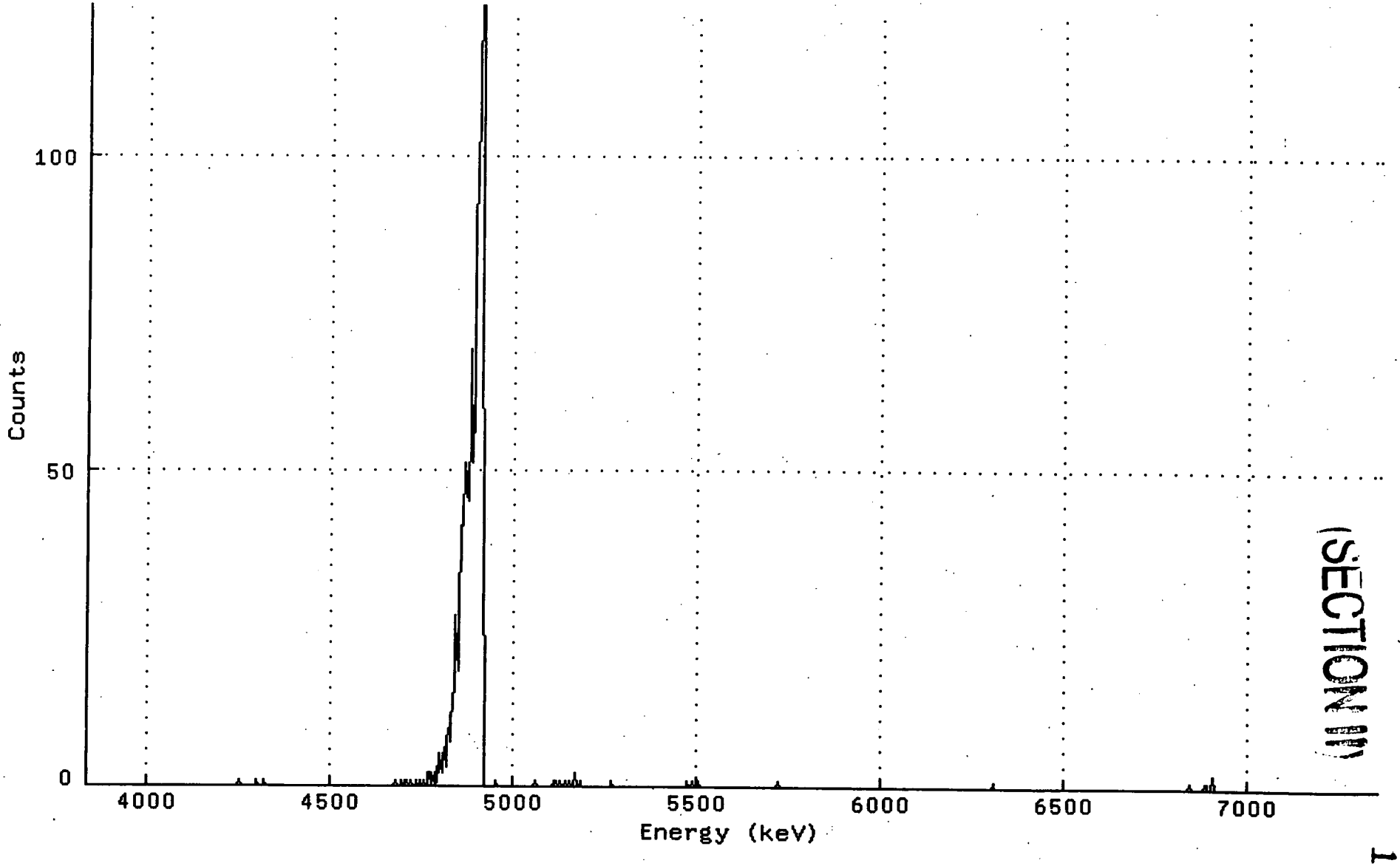
BATCH ID:	99116140	SAMPLE ID:	263419
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.436E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	044
ACQ DATE:	8-NOV-1999 07:41	AVERAGE EFFICIENCY:	23.9%
ELAPSED LIVE TIME:	80000.	RECOVERY:	51.52%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	34.31
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:59	EFF CAL DATE:	3-NOV-1999 11:59
BKG FILENAME:	B_044_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	2.20	0.80	99.9	9.348E-02	1.549E-01	2.918E-01	2.034E-01
PU-239	5147.7	10.60	0.40	99.9	4.503E-01	2.852E-01	2.400E-01	1.776E-01
PU242	4890.7	1521.60	0.40	100.4	6.431E+01	3.685E+00	2.388E-01	1.767E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263419_PU.CNF;1
Title : 044
Sample Title:
Start Time: 8-NOV-1999 07:41: Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.82612E+03
Real Time : 0 22:13:20.00 Sample ID : 263419 Energy Slope : 3.44356E+00
Live Time : 0 22:13:20.00 Sample Type: PU Energy Quad : 0.00000E+00



(SECTION II)

123

405

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263420_PU.CNF

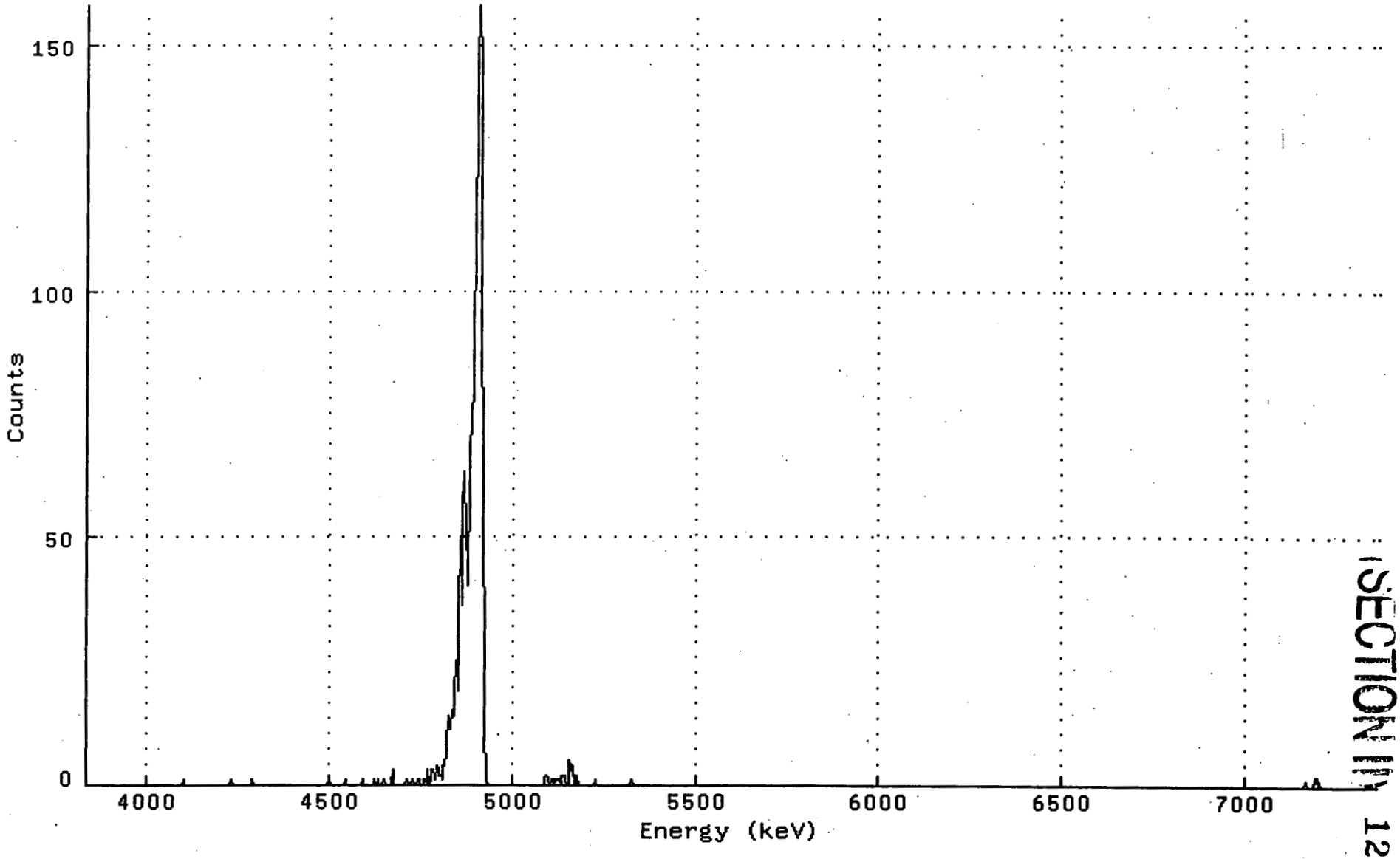
BATCH ID:	99116140	SAMPLE ID:	263420
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.426E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	045
ACQ DATE:	8-NOV-1999 07:41	AVERAGE EFFICIENCY:	23.5%
ELAPSED LIVE TIME:	80002.	RECOVERY:	62.46%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	26.82
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:00	EFF CAL DATE:	3-NOV-1999 12:00
BKG FILENAME:	B_045_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	-0.80	0.80	99.9	-2.872E-02	4.065E-02	2.465E-01	1.719E-01
PU-239	5147.7	33.20	0.80	99.9	1.192E+00	4.264E-01	2.465E-01	1.719E-01
PU242	4890.7	1813.40	1.60	100.4	6.476E+01	3.466E+00	3.068E-01	2.018E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263420_PU.CNF;1
Title : 045
Sample Title:
Start Time: 8-NOV-1999 07:41: Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.82237E+03
Real Time : 0 22:13:22.00 Sample ID : 263420 Energy Slope : 3.45302E+00
Live Time : 0 22:13:22.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION IV 125

407

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 09:58:19

SECTION II

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263421_PU.CNF

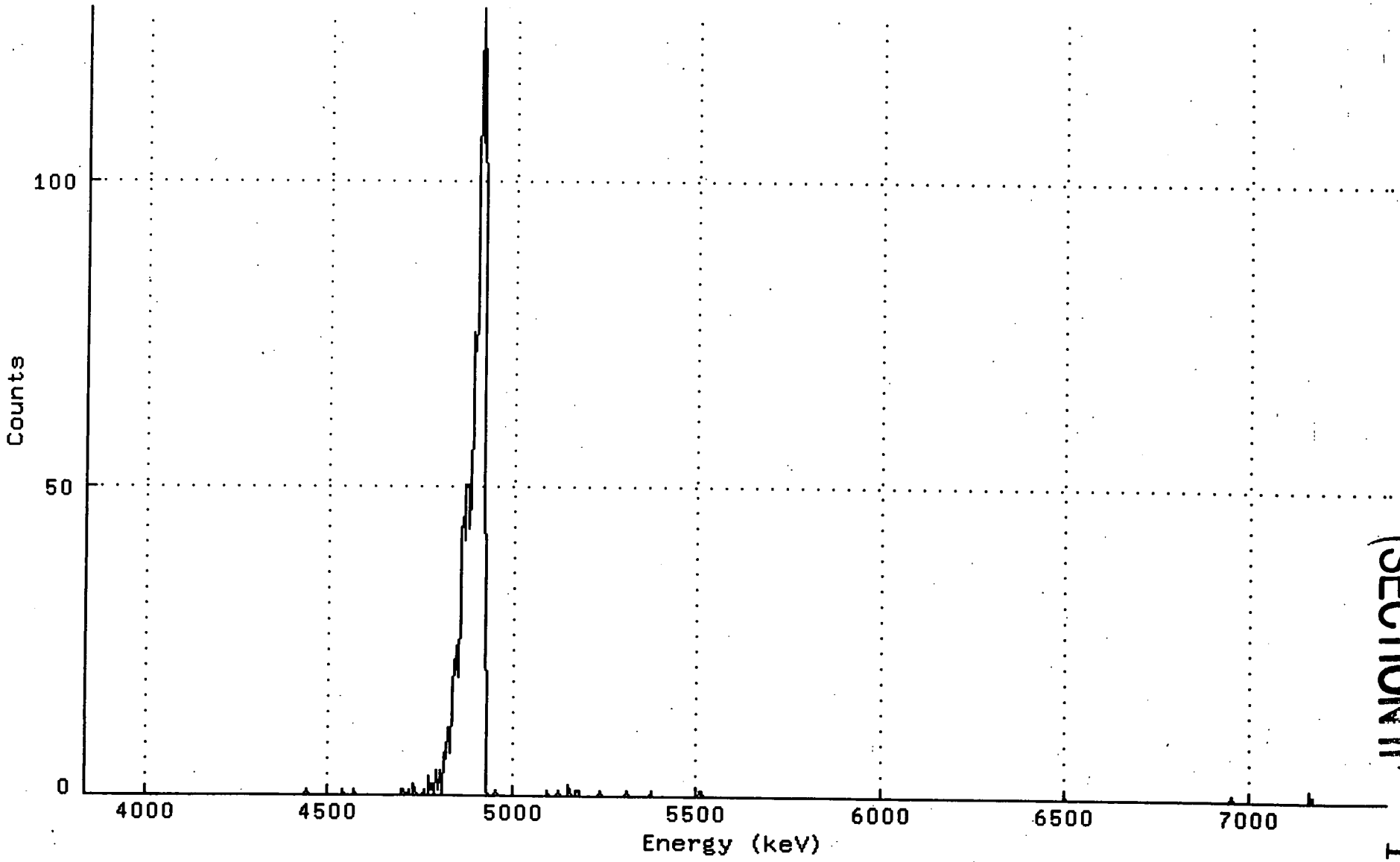
BATCH ID:	99116140	SAMPLE ID:	263421
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.451E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	046
ACQ DATE:	8-NOV-1999 07:41	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80008.	RECOVERY:	56.64%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	33.27
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:02	EFF CAL DATE:	3-NOV-1999 12:02
BKG FILENAME:	B_046_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
PU-238	5487.1	1.60	0.40	99.9	6.314E-02	1.161E-01	2.230E-01	1.649E-01
PU-239	5147.7	7.20	0.80	99.9	2.841E-01	2.283E-01	2.710E-01	1.890E-01
PU242	4890.7	1621.20	0.80	100.4	6.365E+01	3.557E+00	2.697E-01	1.880E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263421_PU.CNF;1
Title : 046
Sample Title:
Start Time: 8-NOV-1999 07:41: Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.82505E+03
Real Time : 0 22:13:28.00 Sample ID : 263421 Energy Slope : 3.45958E+00
Live Time : 0 22:13:28.00 Sample Type: PU Energy Quad : 0.00000E+00



(SECTION III)

127

409

Spectral File: ND_AMS_ARCHIVE_S:S_99116140$263410D_PU.CNF

BATCH ID:	99116140	SAMPLE ID:	263410D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	047
ACQ DATE:	8-NOV-1999 07:43	AVERAGE EFFICIENCY:	22.5%
ELAPSED LIVE TIME:	80006.	RECOVERY:	80.04%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	30.32
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:03	EFF CAL DATE:	3-NOV-1999 12:03
BKG FILENAME:	B_047_3NOV99		

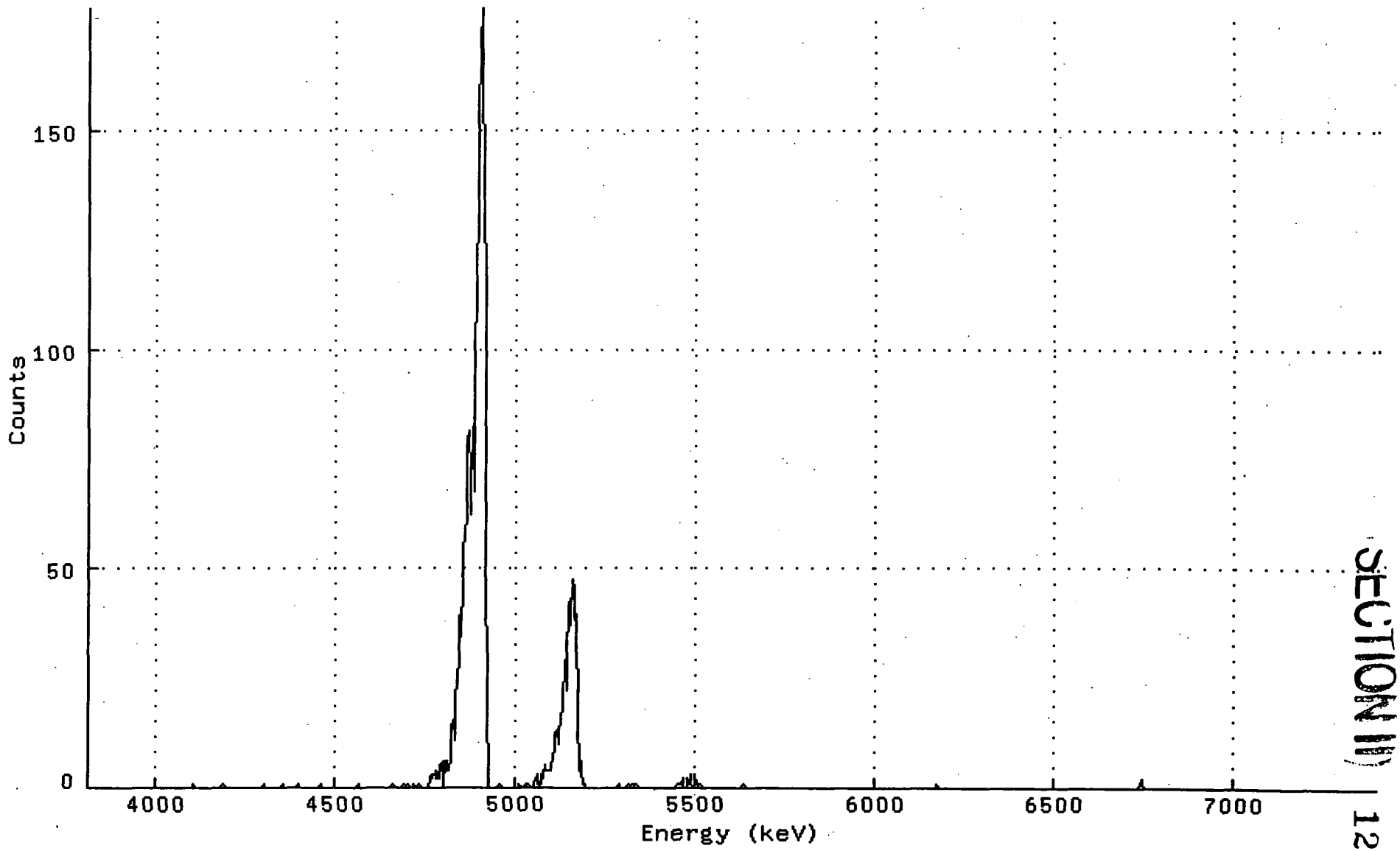
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
PU-238	5487.1	18.20	0.80	99.9	1.562E+00	7.597E-01	5.893E-01	4.109E-01
PU-239	5147.7	571.80	1.20	99.9	4.905E+01	4.937E+00	6.695E-01	4.510E-01
PU242	4890.7	2226.20	0.80	100.4	1.900E+02	9.415E+00	5.863E-01	4.088E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.067 ***

410

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.S]S_99116140$263410D_PU.CNF;2
Title : 047
Sample Title:
Start Time: 8-NOV-1999 07:43: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.79990E+03
Real Time : 0 22:13:26.00 Sample ID : 263410D Energy Slope : 3.50728E+00
Live Time : 0 22:13:26.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION III 129

411

Spectral File: ND_AMS_ARCHIVE_C:C_99116140$LCSWR33_PU.CNF

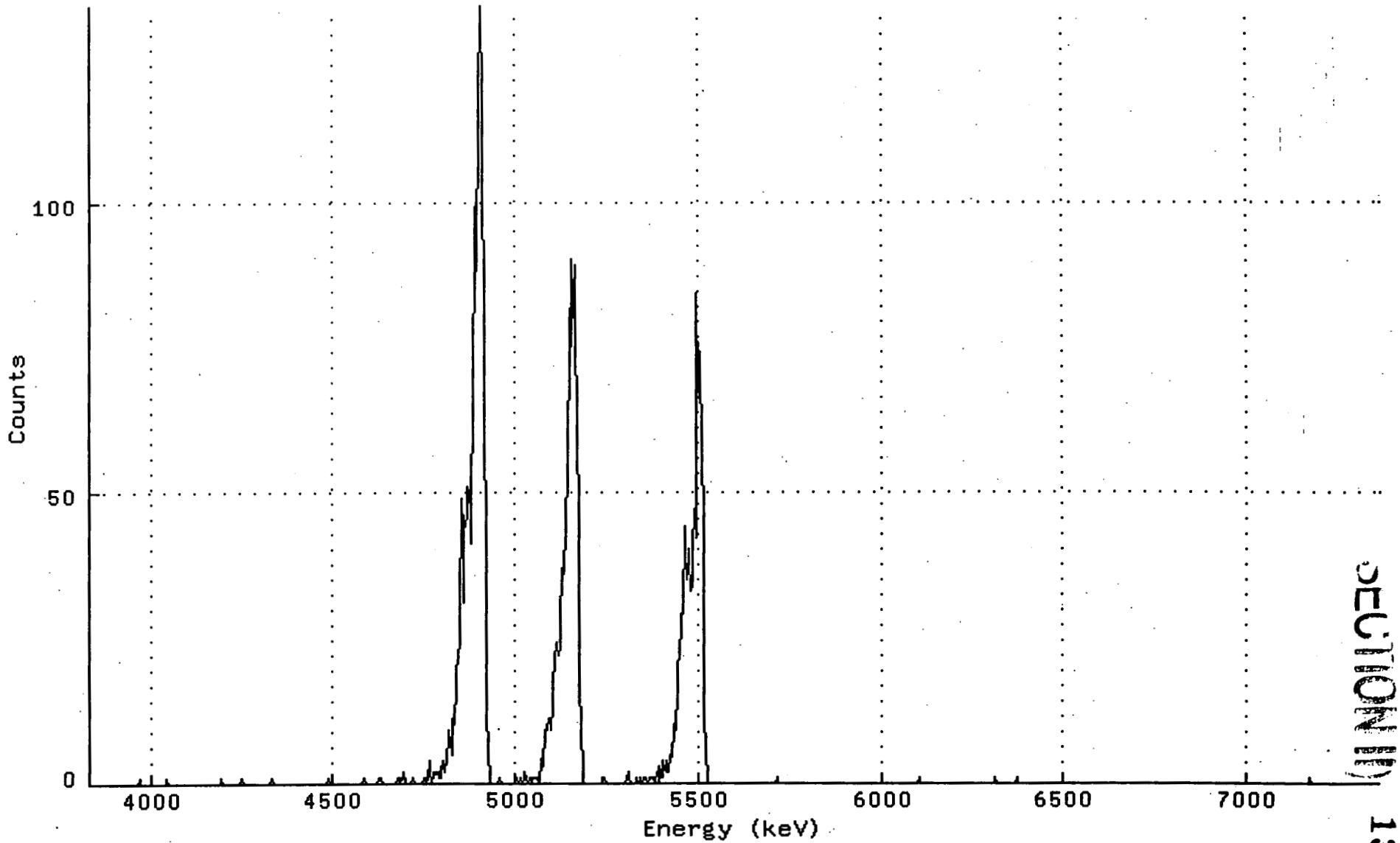
BATCH ID:	99116140	SAMPLE ID:	LCSWR33
SAMPLE DATE:	1-JAN-1987 00:00	ALIQUOT:	2.500E-01 mL
SAMPLE TITLE:		DETECTOR NUMBER:	048
ACQ DATE:	8-NOV-1999 07:44	AVERAGE EFFICIENCY:	23.1%
ELAPSED LIVE TIME:	80006.	RECOVERY:	57.80%
TRACER ID:	PU242_82-76-1	TRACER FWHM (kev):	32.30
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	9.235	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 12:05	EFF CAL DATE:	3-NOV-1999 12:05
BKG FILENAME:	B_048_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ mL	TPU/ERROR 2-SIGMA	MDC pCi/ mL	CRIT LEVEL pCi/ mL
PU-238	5487.1	1014.00	0.00	99.9	1.135E+01	9.950E-01	2.741E-02	2.741E-02
PU-239	5147.7	1126.60	0.40	99.9	1.140E+01	9.733E-01	5.716E-02	4.229E-02
PU242	4890.7	1653.20	0.80	100.4	1.664E+01	9.233E-01	6.914E-02	4.821E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[AHIGH.ALUSR.ARCHIVE.C]C_99116140$LCSWR33_PU.CNF;2
Title : 048
Sample Title:
Start Time: 8-NOV-1999 07:44: Sample Time: 1-JAN-1987 00:00: Energy Offset: 3.82143E+03
Real Time : 0 22:13:26.00 Sample ID : LCSWR33 Energy Slope : 3.45077E+00
Live Time : 0 22:13:26.00 Sample Type: PU Energy Quad : 0.00000E+00



SECTION 131

413

Sample Preparation and Analysis Log

SECTION II

Sample Type: Various Solids

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116137		10/29/99
		Pu-239/240,Pu-238	99116139		
		U-238, U235, U234	99116141		11/8/99
Counting	RC-19 R06	U130	99116141		11/10/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		4			
16822	263398	2	0.750 G	Am, Pu, U	0.0355	5	14.606	35.713	21.107
16822	263399	3	0.750 G	Am, Pu, U	0.0553	14	14.530	28.101	13.571
16822	263400	4	0.750 G	Am, Pu, U	0.0481	15	14.534	30.130	15.596
16822	263401	5	0.750 G	Am, Pu, U	0.0308	17	14.648	38.998	24.350
16822	263402	6	0.750 G	Am, Pu, U	0.0384	18	14.640	34.161	19.521
16822	263403	7	0.750 G	Am, Pu, U	0.2214	21	14.704	18.091	3.387
16822	263404	8	0.750 G	Am, Pu, U	0.0342	22	14.531	36.474	21.943
16822	263405	9	0.750 G	Am, Pu, U	0.0322	23	14.431	37.756	23.325
16822	263406	10	0.750 G	Am, Pu, U	0.0448	27	14.697	31.444	16.747
16822	263407	11	0.750 G	Am, Pu, U	0.0347	29	14.543	36.178	21.635
16822	263408	12	0.750 G	Am, Pu, U	0.0342	30	14.537	36.447	21.910
16822	263409	13	0.750 G	Am, Pu, U	0.0456	31	14.696	31.150	16.454
16822	263398D	14	0.750 G	Am, Pu, U	0.0355	32	14.606	35.713	21.107
LCSWR1	LCSWR33	15	0.250 mL	Am, Pu, U		8			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

-Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9.

-Balance # 8 used for weights of samples and their aliquots

-Sample aliquot is the fraction of the total sample taken for analysis

OK 11/10/99 Qiday S. Spata 11/11

Spectral File: ND_AMS_ARCHIVE_R:R_99116141$PB_UU.CNF

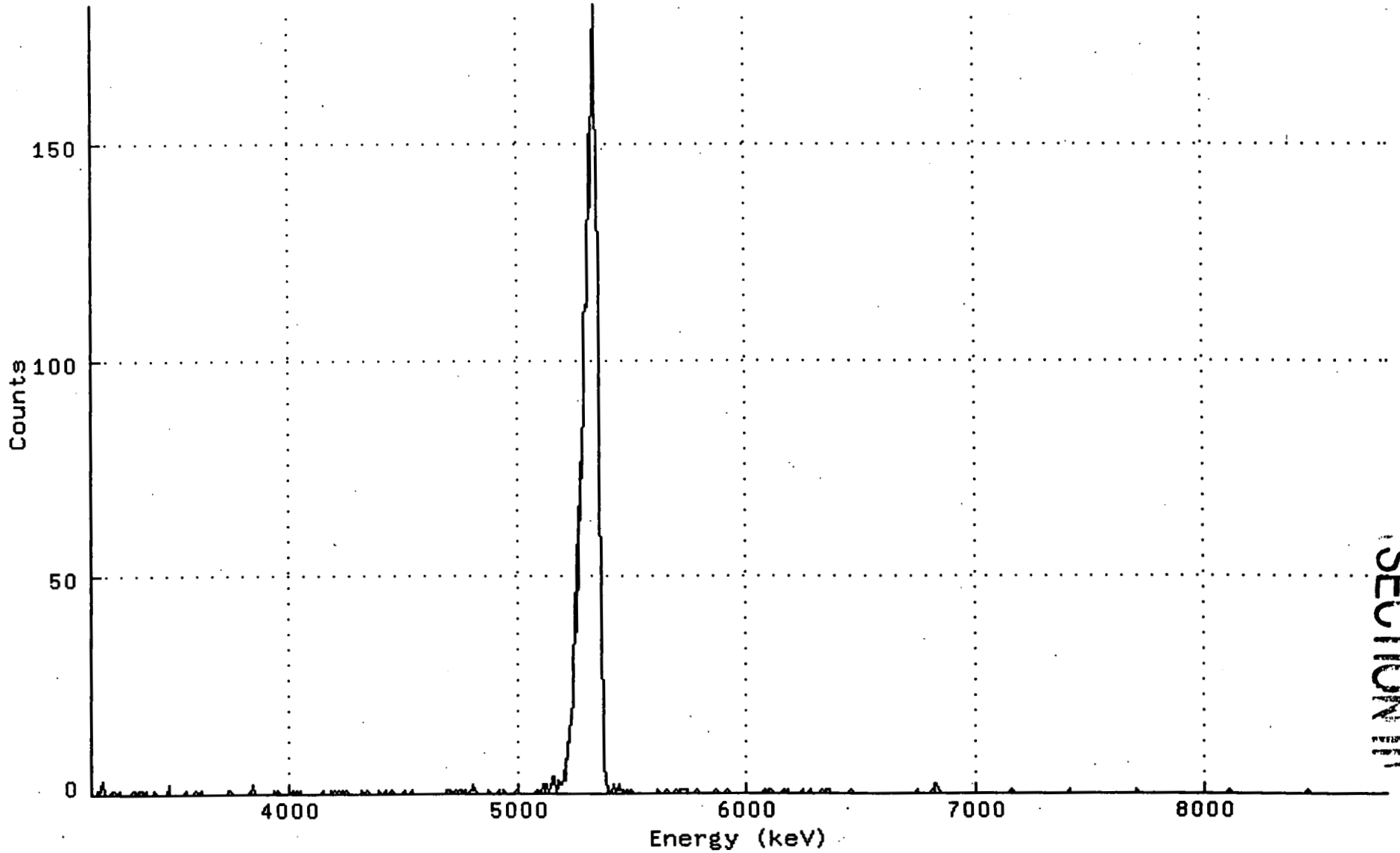
BATCH ID:	99116141	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	1.000E+00 SA
SAMPLE TITLE:		DETECTOR NUMBER:	004
ACQ DATE:	8-NOV-1999 08:01	AVERAGE EFFICIENCY:	26.3%
ELAPSED LIVE TIME:	80001.	RECOVERY:	65.47%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	70.20
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:09	EFF CAL DATE:	3-NOV-1999 11:09
BKG FILENAME:	B_004_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2426.60	4.40	99.8	1.059E+01	5.071E-01	5.432E-02	3.307E-02
U-234	4761.5	8.40	3.60	99.8	3.661E-02	3.202E-02	5.026E-02	3.104E-02
U-235	4385.5	0.60	6.40	80.9	3.226E-03	3.325E-02	7.782E-02	4.619E-02
U-238	4184.4	7.00	4.00	100.2	3.038E-02	3.085E-02	5.212E-02	3.194E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.R]R_99116141$PB_UU.CNF;2
Title : 004
Sample Title:
Start Time: 8-NOV-1999 08:01: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.12371E+03
Real Time : 0 22:13:21.00 Sample ID : PB Energy Slope : 5.53299E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION III

4/6

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:28:48

SECTION III

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263398_UU.CNF

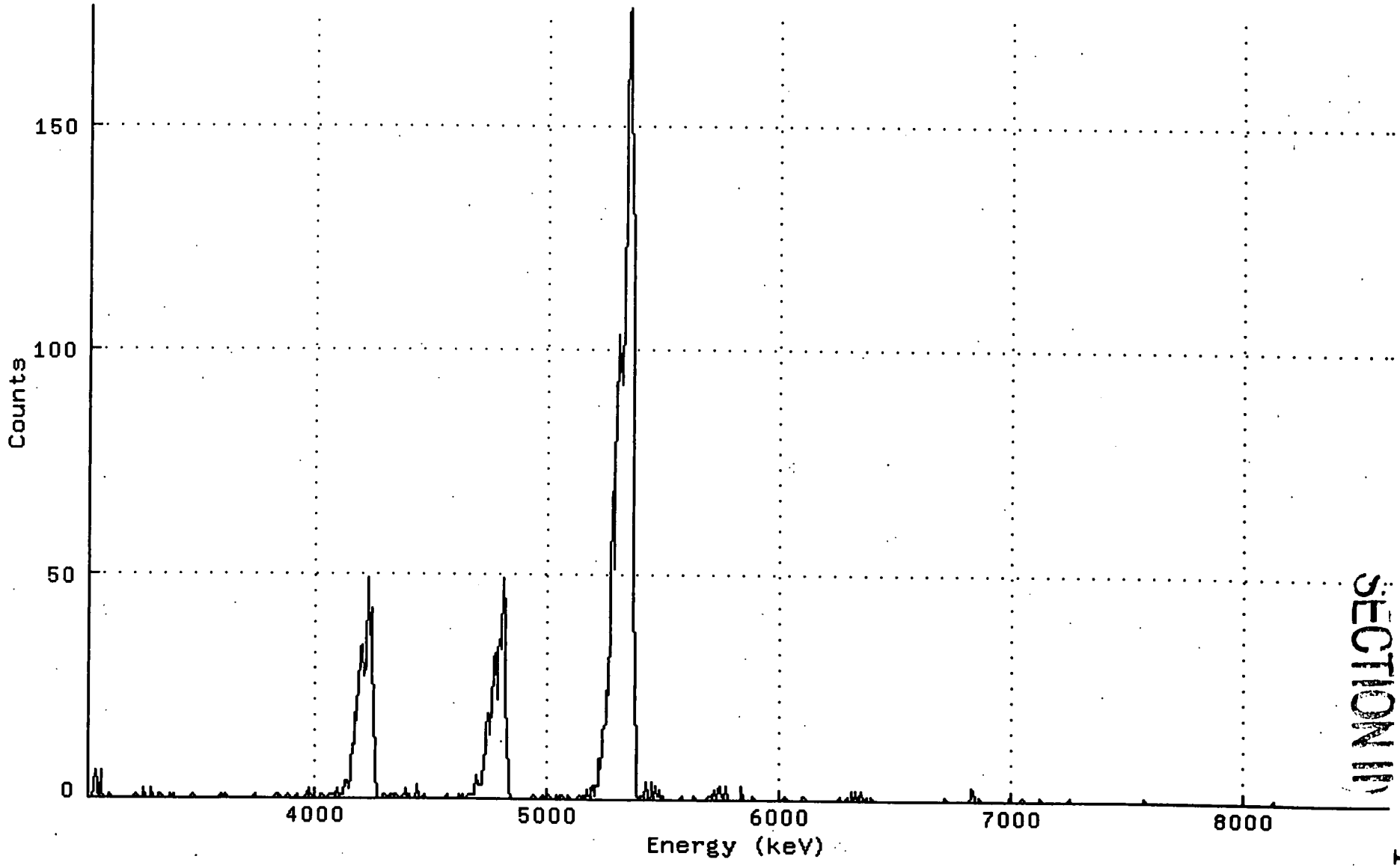
BATCH ID:	99116141	SAMPLE ID:	263398
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.550E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	005
ACQ DATE:	8-NOV-1999 08:02	AVERAGE EFFICIENCY:	24.8%
ELAPSED LIVE TIME:	80001.	RECOVERY:	63.55%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	73.70
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:11	EFF CAL DATE:	3-NOV-1999 11:11
BKG FILENAME:	B_005_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2222.40	9.60	99.8	2.982E+02	1.480E+01	2.295E+00	1.329E+00
U-234	4761.5	506.60	4.40	99.8	6.791E+01	7.158E+00	1.671E+00	1.017E+00
U-235	4385.5	14.40	3.60	80.9	2.381E+00	1.464E+00	1.907E+00	1.178E+00
U-238	4184.4	528.40	3.60	100.2	7.053E+01	7.316E+00	1.539E+00	9.505E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263398_UU.CNF;1
Title : 005
Sample Title:
Start Time: 8-NOV-1999 08:02: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.00761E+03
Real Time : 0 22:13:21.00 Sample ID : 263398 Energy Slope : 5.47794E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION III

4/8

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:29:44

(SECTION II) 137

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263399_UU.CNF

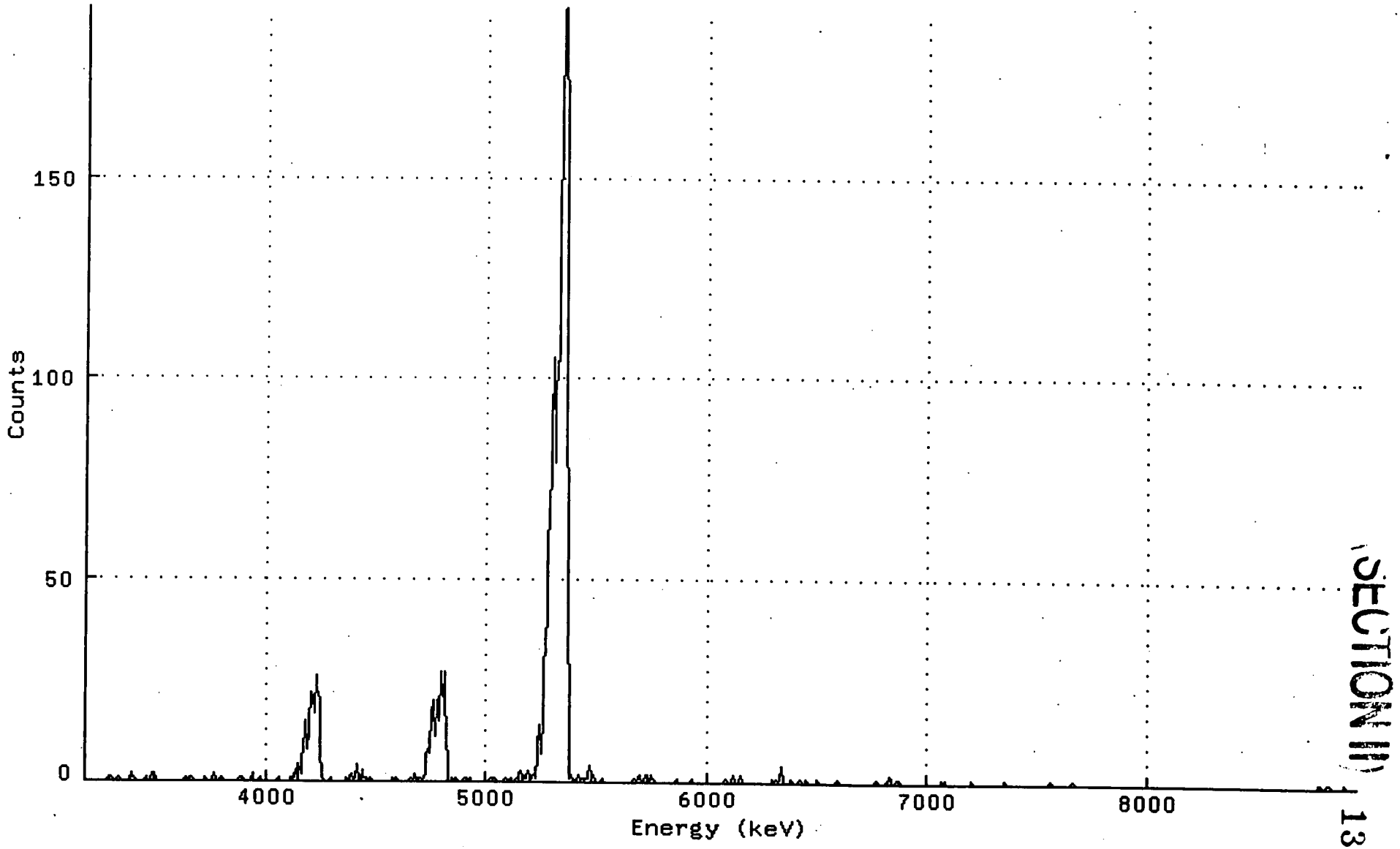
BATCH ID:	99116141	SAMPLE ID:	263399
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 5.530E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	014
ACQ DATE:	8-NOV-1999 08:03	AVERAGE EFFICIENCY:	25.8%
ELAPSED LIVE TIME:	80004.	RECOVERY:	58.40%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	65.48
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:15	EFF CAL DATE:	3-NOV-1999 11:15
BKG FILENAME:	B_014_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2121.80	15.20	99.8	1.914E+02	9.671E+00	1.878E+00	1.061E+00
U-234	4761.5	282.60	10.40	99.8	2.547E+01	3.425E+00	1.596E+00	9.201E-01
U-235	4385.5	10.80	7.20	80.9	1.201E+00	1.018E+00	1.689E+00	9.950E-01
U-238	4184.4	266.80	3.20	100.2	2.394E+01	3.252E+00	9.897E-01	6.165E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263399_UU.CNF;1
Title : 014
Sample Title:
Start Time: 8-NOV-1999 08:03: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.16926E+03
Real Time : 0 22:13:25.00 Sample ID : 263399 Energy Slope : 5.63329E+00
Live Time : 0 22:13:24.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION III
138

420

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:30:09

SECTION III

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263400_UU.CNF

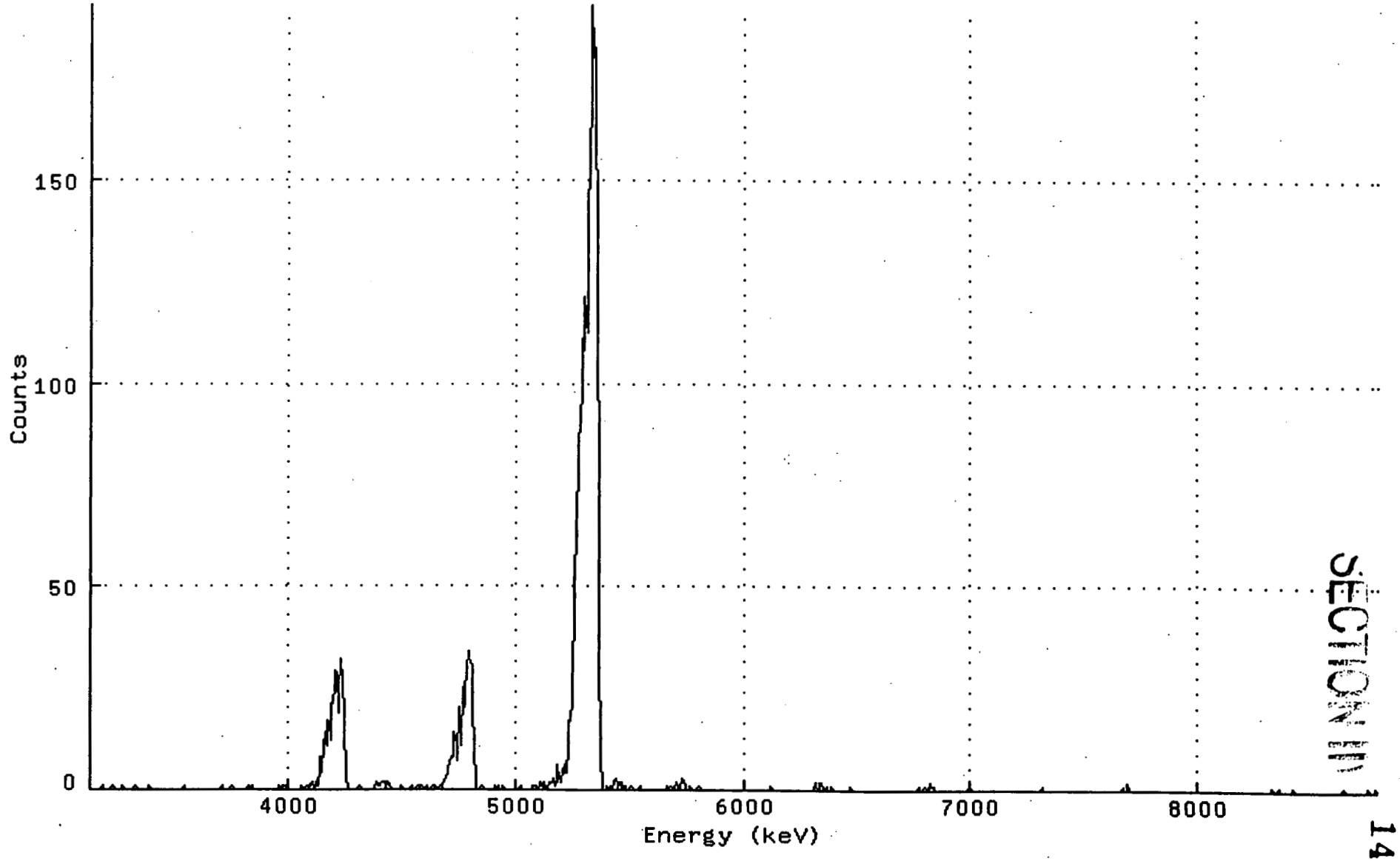
BATCH ID:	99116141	SAMPLE ID:	263400
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.810E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	015
ACQ DATE:	8-NOV-1999 08:04	AVERAGE EFFICIENCY:	26.3%
ELAPSED LIVE TIME:	80001.	RECOVERY:	69.08%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	70.93
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:16	EFF CAL DATE:	3-NOV-1999 11:16
BKG FILENAME:	B_015_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2557.40	7.60	99.8	2.201E+02	1.036E+01	1.335E+00	7.840E-01
U-234	4761.5	390.80	3.20	99.8	3.360E+01	3.863E+00	9.481E-01	5.906E-01
U-235	4385.5	20.00	2.00	80.9	2.121E+00	1.019E+00	9.849E-01	6.361E-01
U-238	4184.4	391.40	3.60	100.2	3.351E+01	3.852E+00	9.873E-01	6.096E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263400_UU.CNF;1
Title : 015
Sample Title:
Start Time: 8-NOV-1999 08:04: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.11350E+03
Real Time : 0 22:13:21.00 Sample ID : 263400 Energy Slope : 5.53088E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION 1

140

422

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:30:31

SECTION II 141

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263401_UU.CNF

BATCH ID:	99116141	SAMPLE ID:	263401
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.080E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	017
ACQ DATE:	8-NOV-1999 08:04	AVERAGE EFFICIENCY:	25.4%
ELAPSED LIVE TIME:	80003.	RECOVERY:	69.92%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	85.31
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:17	EFF CAL DATE:	3-NOV-1999 11:17
BKG FILENAME:	B_017_3NOV99		

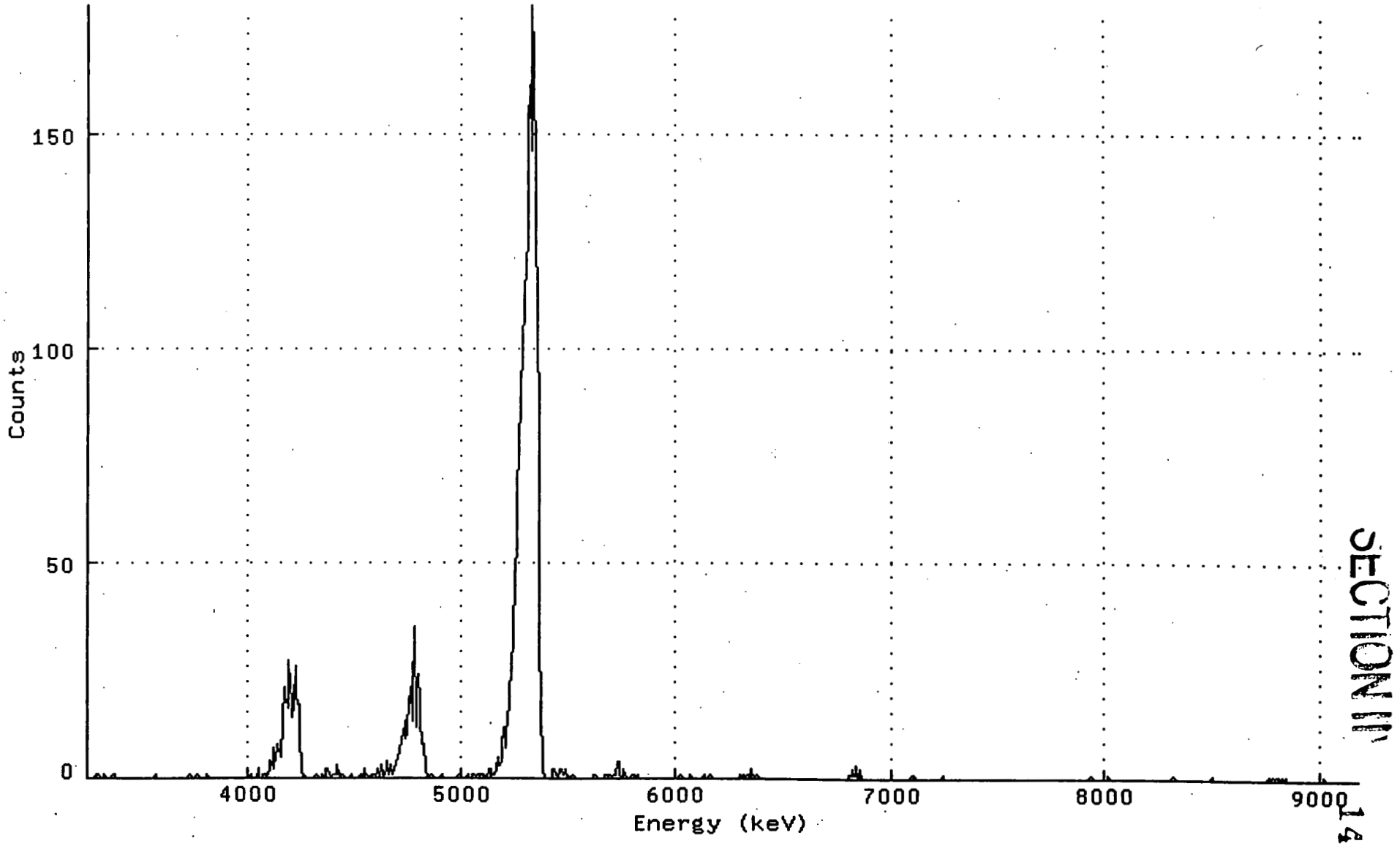
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2502.80	7.20	99.8	3.437E+02	1.631E+01	2.084E+00	1.228E+00
U-234	4761.5	323.60	10.40	99.8	4.440E+01	5.583E+00	2.429E+00	1.400E+00
U-235	4385.5	16.00	8.00	80.9	2.708E+00	1.771E+00	2.685E+00	1.572E+00
U-238	4184.4	330.80	3.20	100.2	4.519E+01	5.563E+00	1.507E+00	9.384E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

423

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263401_UU.CNF;1
Title : 017
Sample Title:
Start Time: 8-NOV-1999 08:04: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.24092E+03
Real Time : 0 22:13:23.00 Sample ID : 263401 Energy Slope : 5.79005E+00
Live Time : 0 22:13:23.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION III

142

424

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263402_UU.CNF

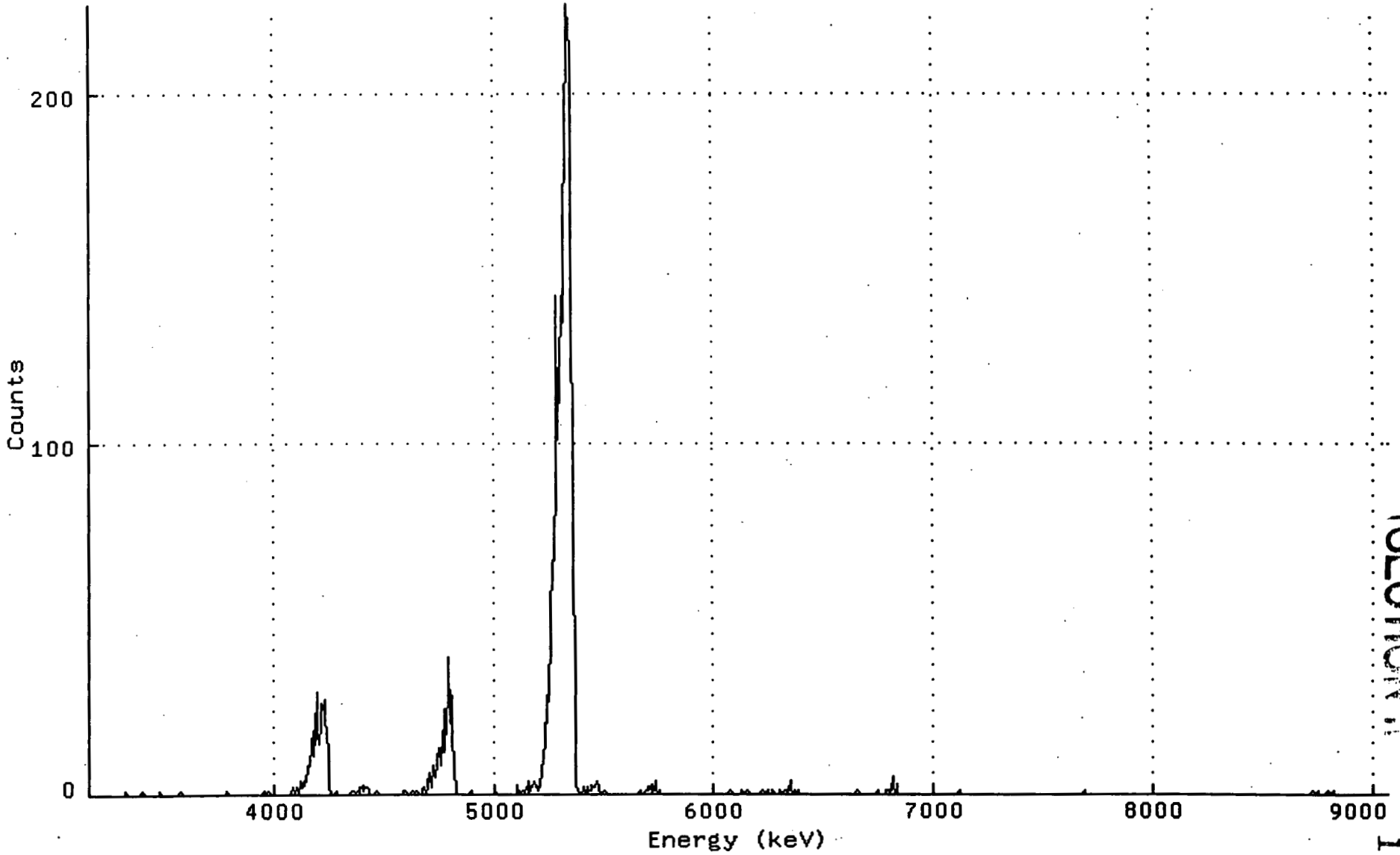
BATCH ID:	99116141	SAMPLE ID:	263402
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.840E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	018
ACQ DATE:	8-NOV-1999 08:04	AVERAGE EFFICIENCY:	25.7%
ELAPSED LIVE TIME:	80001.	RECOVERY:	73.74%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	75.87
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:19	EFF CAL DATE:	3-NOV-1999 11:19
BKG FILENAME:	B_018_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2669.20	6.80	99.8	2.757E+02	1.276E+01	1.531E+00	9.052E-01
U-234	4761.5	297.80	3.20	99.8	3.073E+01	3.937E+00	1.138E+00	7.088E-01
U-235	4385.5	16.60	2.40	80.9	2.113E+00	1.143E+00	1.262E+00	8.034E-01
U-238	4184.4	321.20	0.80	100.2	3.300E+01	4.079E+00	7.057E-01	4.921E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263402_UU.CNF;1
Title : 018
Sample Title:
Start Time: 8-NOV-1999 08:04: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.14332E+03
Real Time : 0 22:13:22.00 Sample ID : 263402 Energy Slope : 5.77529E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION III

144

426

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263403_UU.CNF

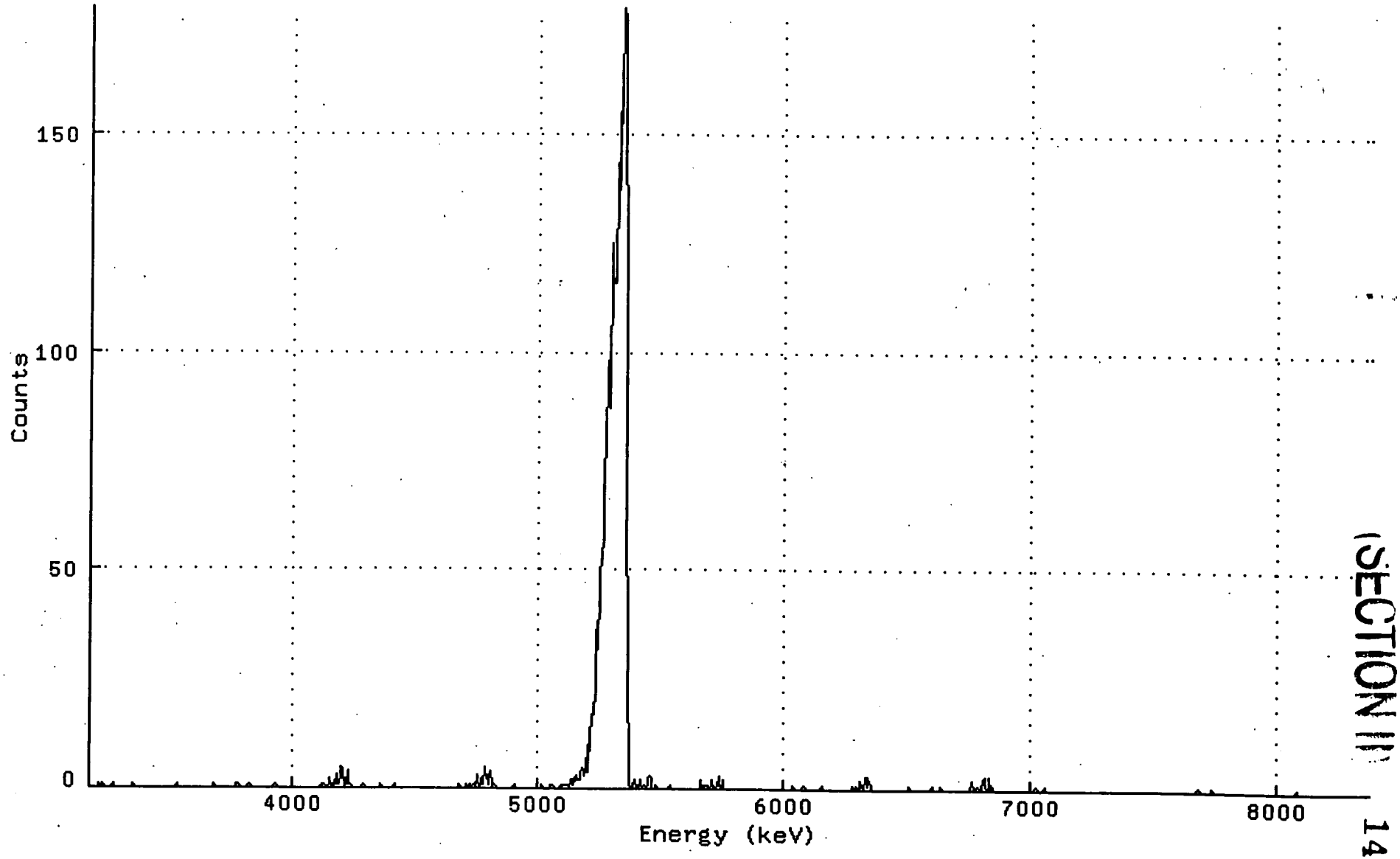
BATCH ID:	99116141	SAMPLE ID:	263403
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	2.214E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	021
ACQ DATE:	8-NOV-1999 08:04	AVERAGE EFFICIENCY:	26.9%
ELAPSED LIVE TIME:	80004.	RECOVERY:	72.13%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	80.32
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:20	EFF CAL DATE:	3-NOV-1999 11:20
BKG FILENAME:	B_021_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2734.20	2.80	99.8	4.781E+01	2.196E+00	1.833E-01	1.153E-01
U-234	4761.5	30.00	4.00	99.8	5.241E-01	2.103E-01	2.098E-01	1.286E-01
U-235	4385.5	0.20	2.80	80.9	4.308E-03	8.749E-02	2.261E-01	1.423E-01
U-238	4184.4	32.20	0.80	100.2	5.601E-01	2.030E-01	1.195E-01	8.332E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263403_UU.CNF;1
Title : 021
Sample Title:
Start Time: 8-NOV-1999 08:04: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.16516E+03
Real Time : 0 22:13:24.00 Sample ID : 263403 Energy Slope : 5.08694E+00
Live Time : 0 22:13:24.00 Sample Type: UU Energy Quad : 0.00000E+00



SECTION II

146

428

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:31:59

147

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263404_UU.CNF

BATCH ID:	99116141	SAMPLE ID:	263404
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.420E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	022
ACQ DATE:	8-NOV-1999 08:05	AVERAGE EFFICIENCY:	26.0%
ELAPSED LIVE TIME:	80004.	RECOVERY:	73.44%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	73.68
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:22	EFF CAL DATE:	3-NOV-1999 11:22
BKG FILENAME:	B_022_3NOV99		

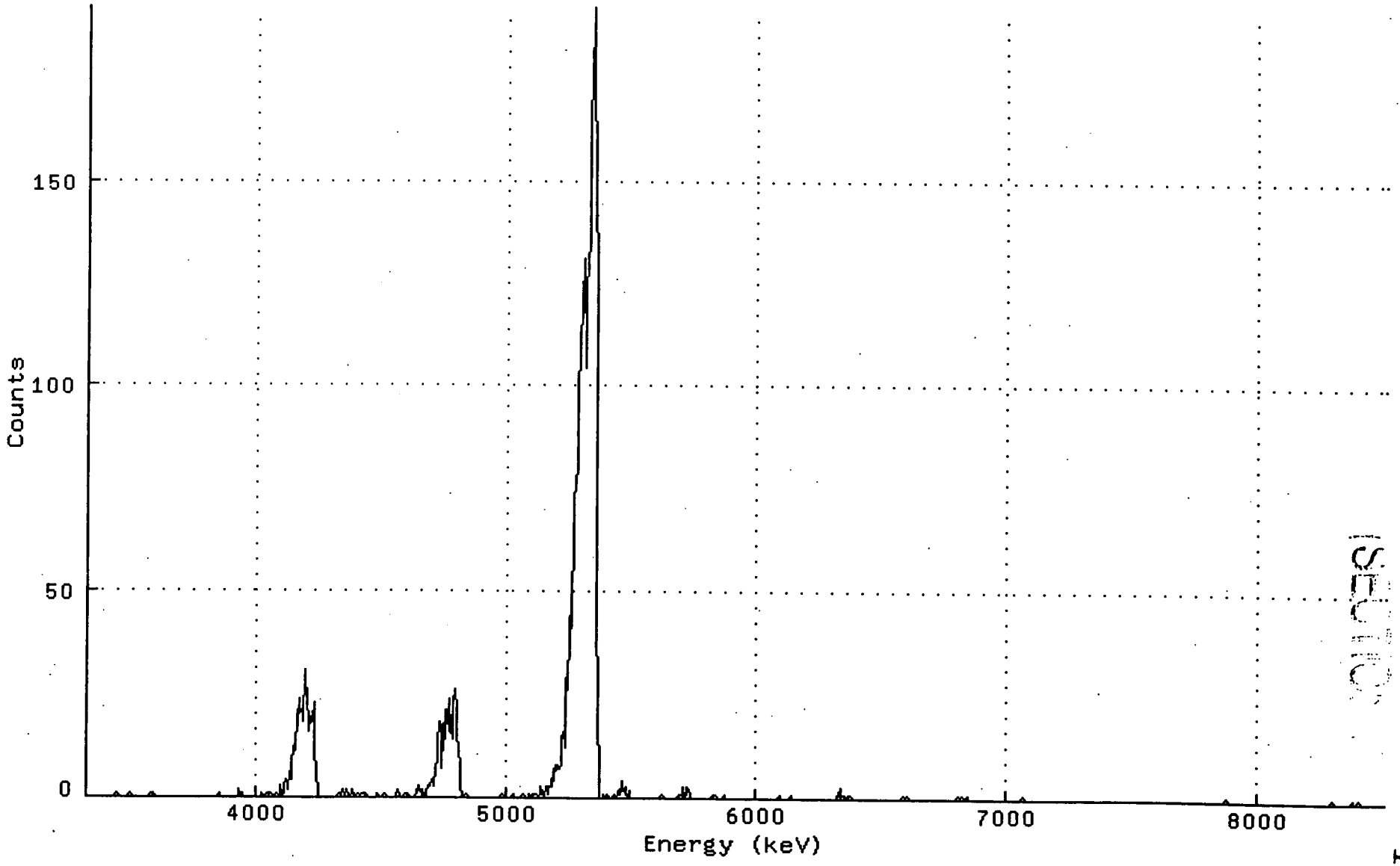
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2686.60	4.40	99.8	3.095E+02	1.428E+01	1.435E+00	8.733E-01
U-234	4761.5	345.80	3.20	99.8	3.980E+01	4.790E+00	1.269E+00	7.907E-01
U-235	4385.5	13.40	3.60	80.9	1.903E+00	1.224E+00	1.638E+00	1.011E+00
U-238	4184.4	380.80	3.20	100.2	4.364E+01	5.051E+00	1.264E+00	7.873E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

424

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263404_UU.CNF;1
Title : 022
Sample Title:
Start Time: 8-NOV-1999 08:05: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.31360E+03
Real Time : 0 22:13:24.00 Sample ID : 263404 Energy Slope : 5.06244E+00
Live Time : 0 22:13:24.00 Sample Type: UU Energy Quad : 0.00000E+00



429 430

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:32:23

149

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263405_UU.CNF

BATCH ID:	99116141	SAMPLE ID:	263405
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.220E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	023
ACQ DATE:	8-NOV-1999 08:05	AVERAGE EFFICIENCY:	25.9%
ELAPSED LIVE TIME:	80001.	RECOVERY:	65.55%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	77.57
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:25	EFF CAL DATE: 3-NOV-1999	11:25
BKG FILENAME:	B_023_3NOV99		

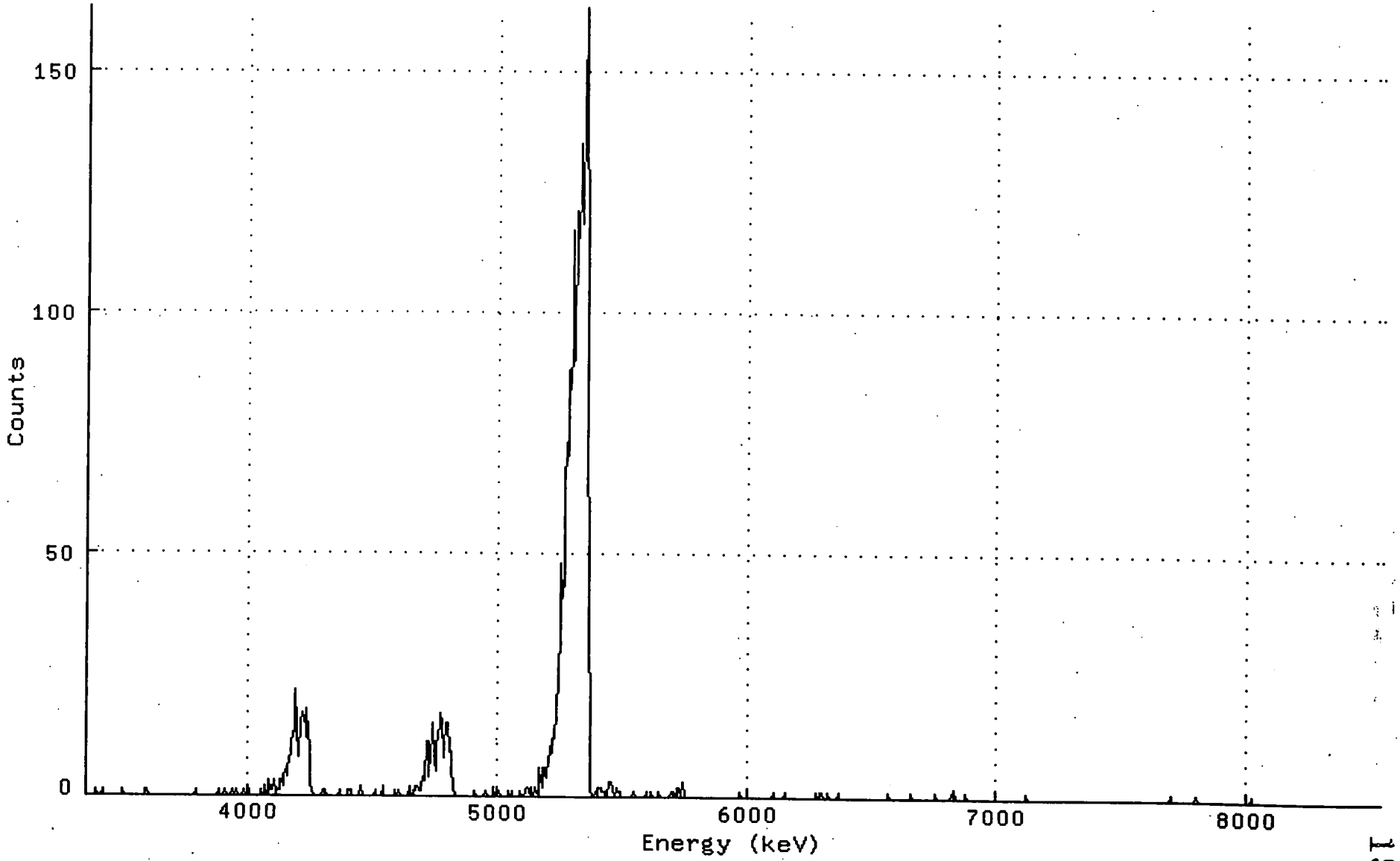
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2386.00	4.00	99.8	3.287E+02	1.583E+01	1.653E+00	1.013E+00
U-234	4761.5	246.20	4.80	99.8	3.389E+01	4.750E+00	1.775E+00	1.074E+00
U-235	4385.5	9.00	2.00	80.9	1.528E+00	1.170E+00	1.577E+00	1.019E+00
U-238	4184.4	263.40	1.60	100.2	3.610E+01	4.880E+00	1.178E+00	7.745E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

430 431

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263405_UU.CNF;1
Title : 023
Sample Title:
Start Time: 8-NOV-1999 08:05: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.33529E+03
Real Time : 0 22:13:21.00 Sample ID : 263405 Energy Slope : 5.07513E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



437-432

150

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:32:51

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263406_UU.CNF

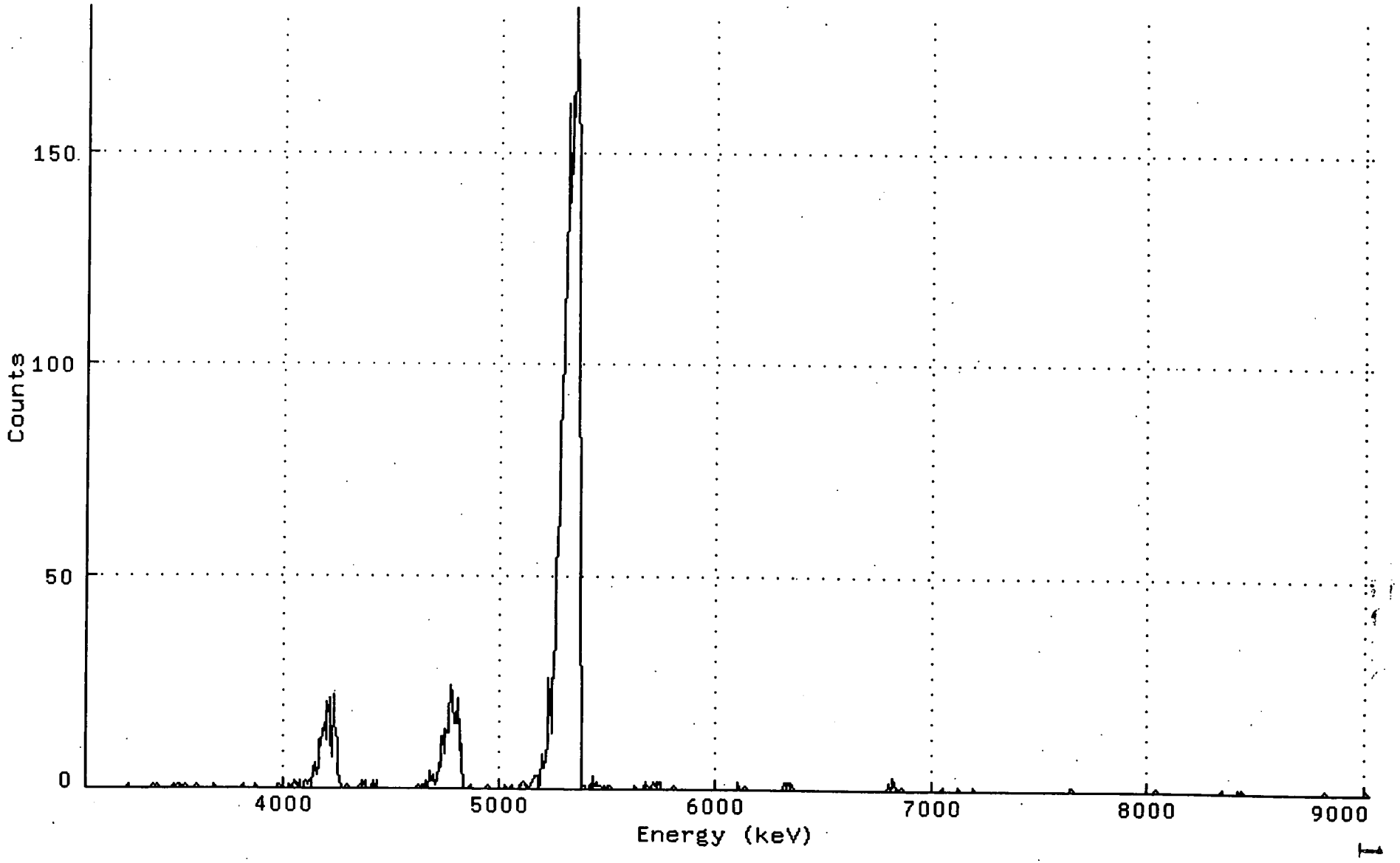
BATCH ID:	99116141	SAMPLE ID:	263406
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.480E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	027
ACQ DATE:	8-NOV-1999 08:05	AVERAGE EFFICIENCY:	26.9%
ELAPSED LIVE TIME:	80004.	RECOVERY:	69.33%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	82.20
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:26	EFF CAL DATE:	3-NOV-1999 11:26
BKG FILENAME:	B_027_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2624.80	5.20	99.8	2.363E+02	1.101E+01	1.197E+00	7.206E-01
U-234	4761.5	283.40	3.60	99.8	2.549E+01	3.341E+00	1.037E+00	6.405E-01
U-235	4385.5	7.40	3.60	80.9	8.210E-01	7.839E-01	1.280E+00	7.901E-01
U-238	4184.4	251.60	4.40	100.2	2.253E+01	3.114E+00	1.116E+00	6.794E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263406_UU.CNF;1
Title : 027
Sample Title:
Start Time: 8-NOV-1999 08:05: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.06696E+03
Real Time : 0 22:13:24.00 Sample ID : 263406 Energy Slope : 5.80698E+00
Live Time : 0 22:13:24.00 Sample Type: UU Energy Quad : 0.00000E+00



WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:33:16

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263407_UU.CNF

BATCH ID:	99116141	SAMPLE ID:	263407
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 3.470E-02	SA
SAMPLE TITLE:		DETECTOR NUMBER:	028
ACQ DATE:	8-NOV-1999 08:05	AVERAGE EFFICIENCY:	25.6%
ELAPSED LIVE TIME:	80001.	RECOVERY:	74.64%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	71.35
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:28	EFF CAL DATE:	3-NOV-1999 11:28
BKG FILENAME:	B_028_3NOV99		

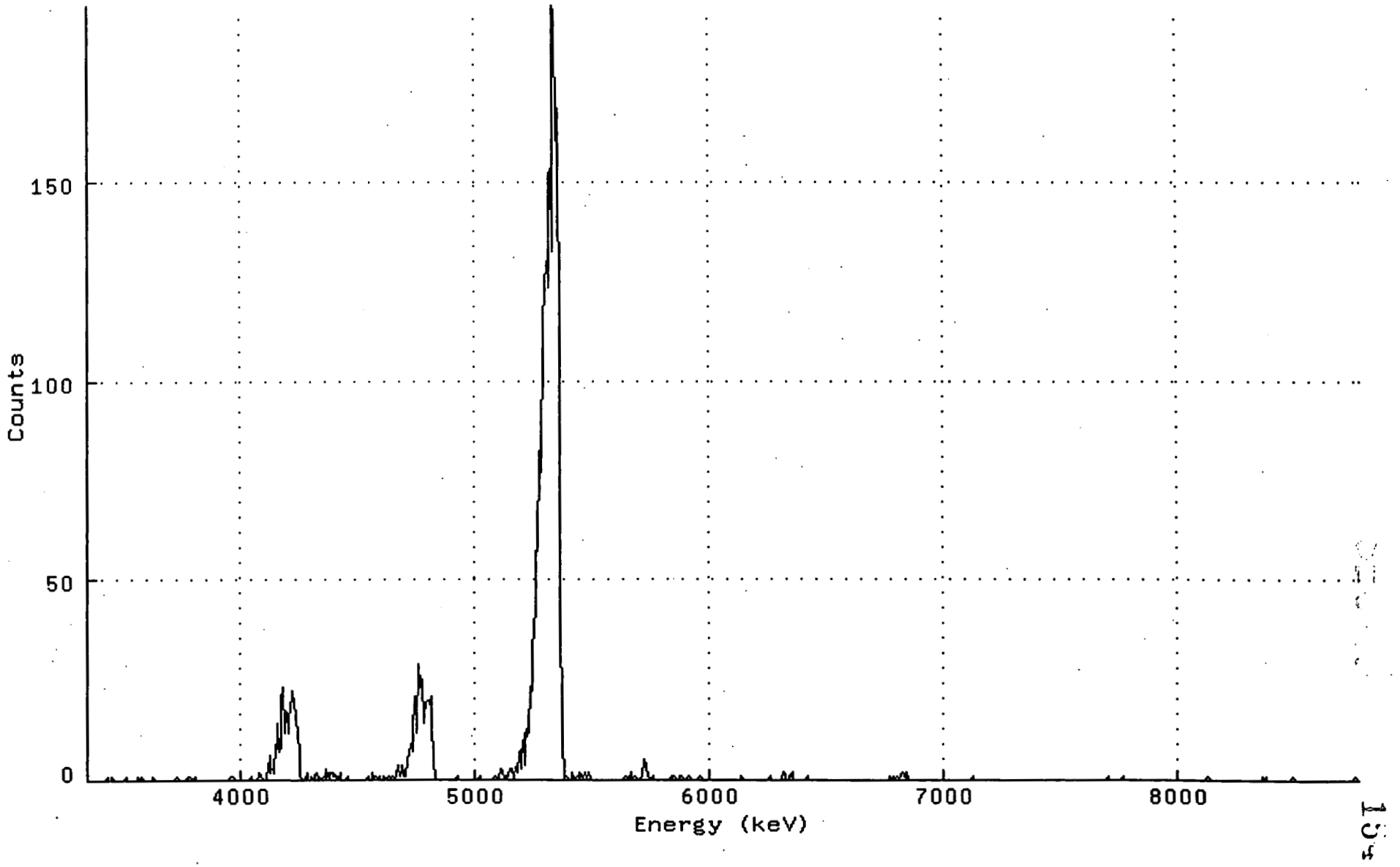
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2687.40	3.60	99.8	3.050E+02	1.411E+01	1.308E+00	8.076E-01
U-234	4761.5	358.60	2.40	99.8	4.067E+01	4.821E+00	1.124E+00	7.158E-01
U-235	4385.5	22.60	4.40	80.9	3.162E+00	1.510E+00	1.744E+00	1.061E+00
U-238	4184.4	312.40	3.60	100.2	3.528E+01	4.434E+00	1.302E+00	8.042E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

435

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263407_UU.CNF;1
Title : 028
Sample Title:
Start Time: 8-NOV-1999 08:05: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.33171E+03
Real Time : 0 22:13:22.00 Sample ID : 263407 Energy Slope : 5.30075E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



436

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:33:39

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263408_UU.CNF

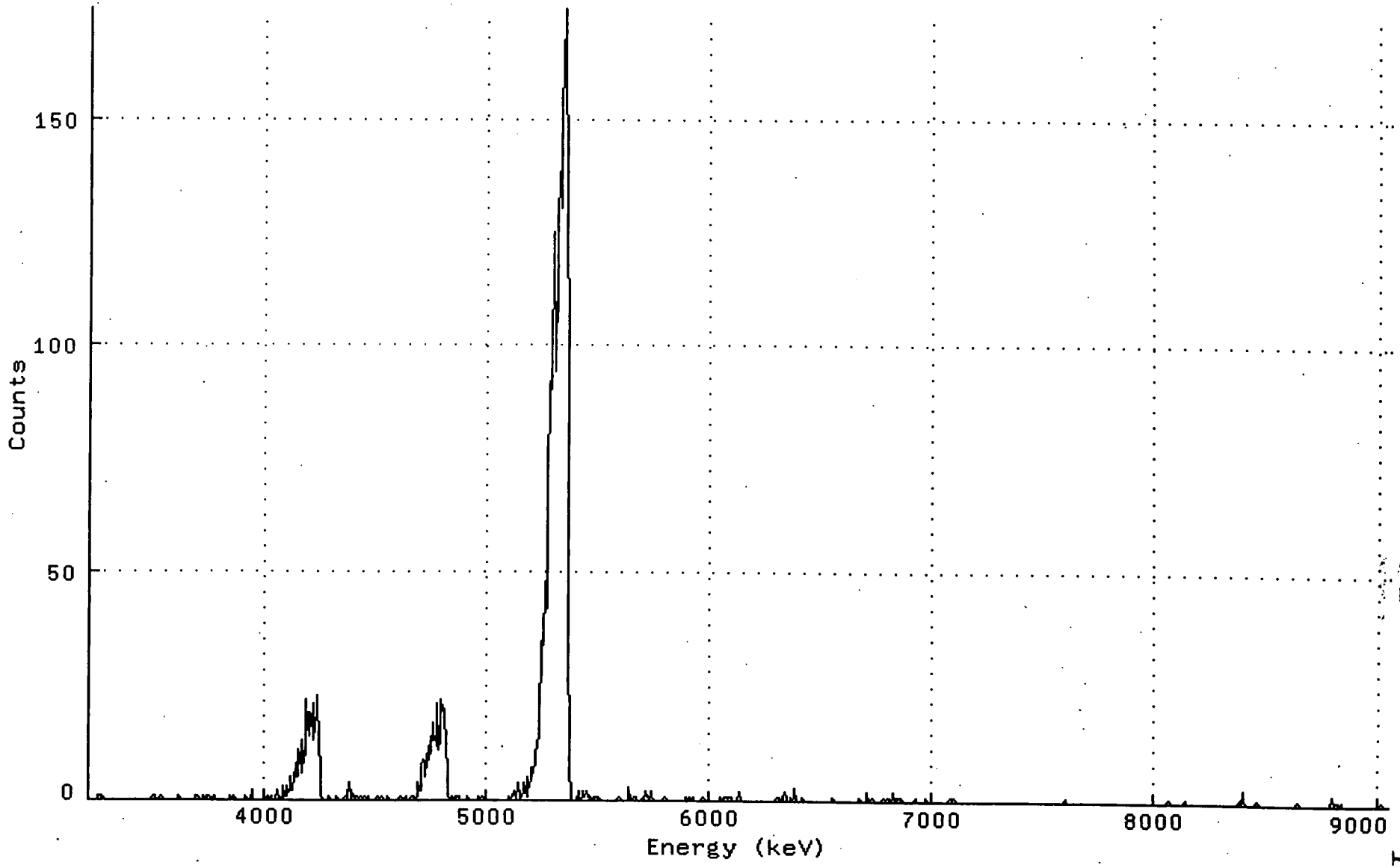
BATCH ID:	99116141	SAMPLE ID:	263408
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.420E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	030
ACQ DATE:	8-NOV-1999 08:06	AVERAGE EFFICIENCY:	25.6%
ELAPSED LIVE TIME:	80001.	RECOVERY:	63.40%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	81.39
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:29	EFF CAL DATE:	3-NOV-1999 11:29
BKG FILENAME:	B_030_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2285.40	7.60	99.8	3.095E+02	1.516E+01	2.101E+00	1.234E+00
U-234	4761.5	275.20	6.80	99.8	3.724E+01	5.006E+00	2.007E+00	1.187E+00
U-235	4385.5	11.40	7.60	80.9	1.903E+00	1.571E+00	2.592E+00	1.522E+00
U-238	4184.4	298.80	5.20	100.2	4.026E+01	5.210E+00	1.794E+00	1.079E+00

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263408_UU.CNF;1
Title : 030
Sample Title:
Start Time: 8-NOV-1999 08:06: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.19374E+03
Real Time : 0 22:13:21.00 Sample ID : 263408 Energy Slope : 5.71505E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:34:22

157

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263409_UU.CNF

BATCH ID:	99116141	SAMPLE ID:	263409
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.560E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	031
ACQ DATE:	8-NOV-1999 08:06	AVERAGE EFFICIENCY:	26.7%
ELAPSED LIVE TIME:	80000.	RECOVERY:	67.50%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	97.45
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:36	EFF CAL DATE:	3-NOV-1999 11:36
BKG FILENAME:	B_031_3NOV99		

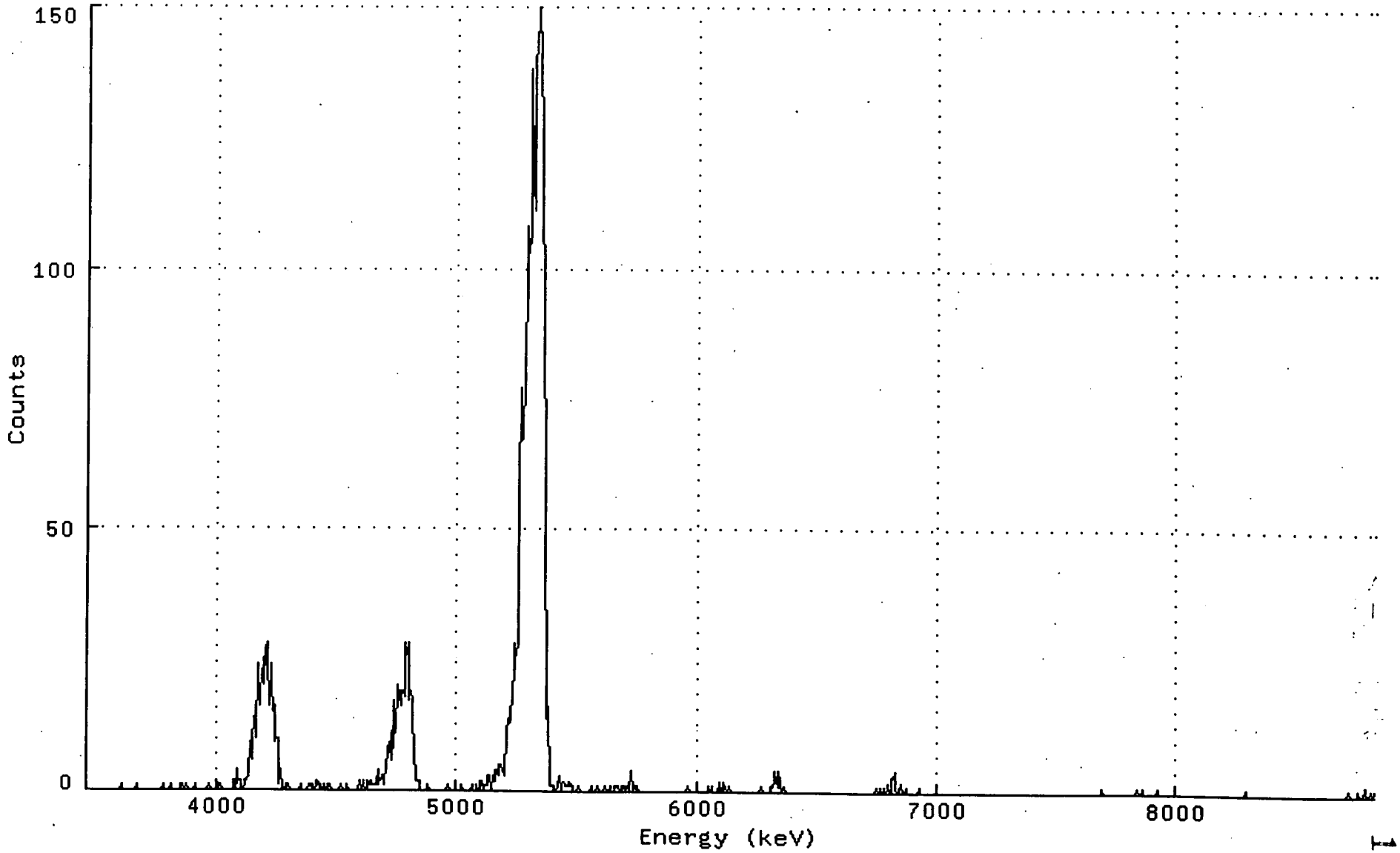
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2536.20	0.80	99.8	2.321E+02	1.094E+01	6.282E-01	4.380E-01
U-234	4761.5	377.99	12.01	99.8	3.457E+01	4.077E+00	1.721E+00	9.845E-01
U-235	4385.5	-10.21	27.21	80.9	-1.152E+00	1.193E+00	3.042E+00	1.674E+00
U-238	4184.4	396.39	11.61	100.2	3.609E+01	4.173E+00	1.689E+00	9.679E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

439

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263409_UU.CNF;1
Title : 031
Sample Title:
Start Time: 8-NOV-1999 08:06: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.44399E+03
Real Time : 0 22:13:20.00 Sample ID : 263409 Energy Slope : 5.24275E+00
Live Time : 0 22:13:20.00 Sample Type: UU Energy Quad : 0.00000E+00



440

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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:27:35

Spectral File: ND_AMS_ARCHIVE_S:S_99116141$263398D_UU.CNF

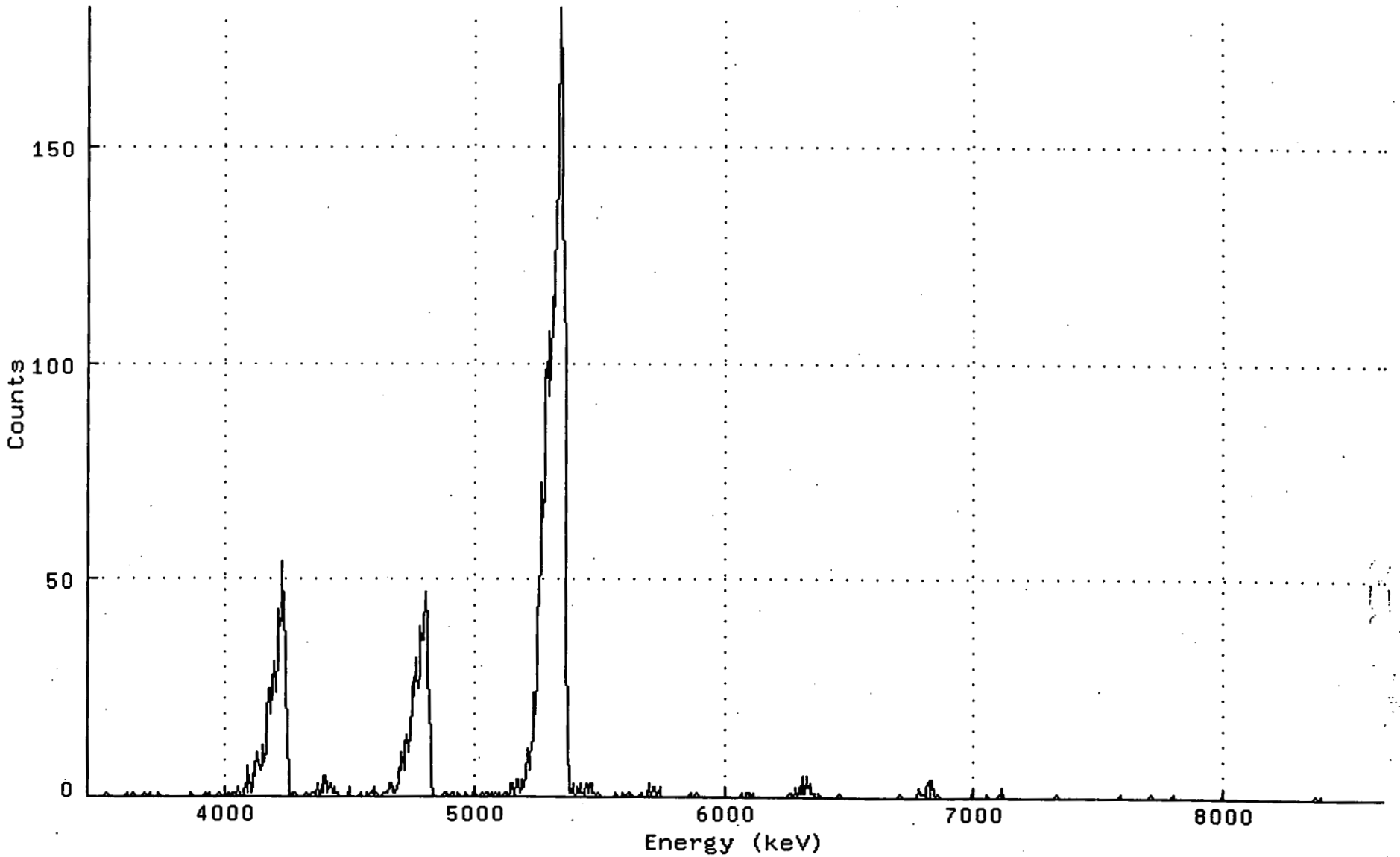
BATCH ID:	99116141	SAMPLE ID:	263398D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	3.550E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	032
ACQ DATE:	8-NOV-1999 08:06	AVERAGE EFFICIENCY:	25.7%
ELAPSED LIVE TIME:	80000.	RECOVERY:	69.15%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	77.43
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:34	EFF CAL DATE:	3-NOV-1999 11:34
BKG FILENAME:	B_032_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2497.80	7.20	99.8	2.982E+02	1.415E+01	1.811E+00	1.067E+00
U-234	4761.5	593.40	7.60	99.8	7.077E+01	6.992E+00	1.852E+00	1.088E+00
U-235	4385.5	37.00	4.00	80.9	5.444E+00	1.943E+00	1.767E+00	1.083E+00
U-238	4184.4	631.80	3.20	100.2	7.503E+01	7.226E+00	1.310E+00	8.157E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116141$263398D_UU.CNF;1
Title : 032
Sample Title:
Start Time: 8-NOV-1999 08:06: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.43640E+03
Real Time : 0 22:13:20.00 Sample ID : 263398D Energy Slope : 5.07167E+00
Live Time : 0 22:13:20.00 Sample Type: UU Energy Quad : 0.00000E+00



442

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
9-NOV-1999 10:26:52

Spectral File: ND_AMS_ARCHIVE_C:C_99116141$LCSWR1_UU.CNF

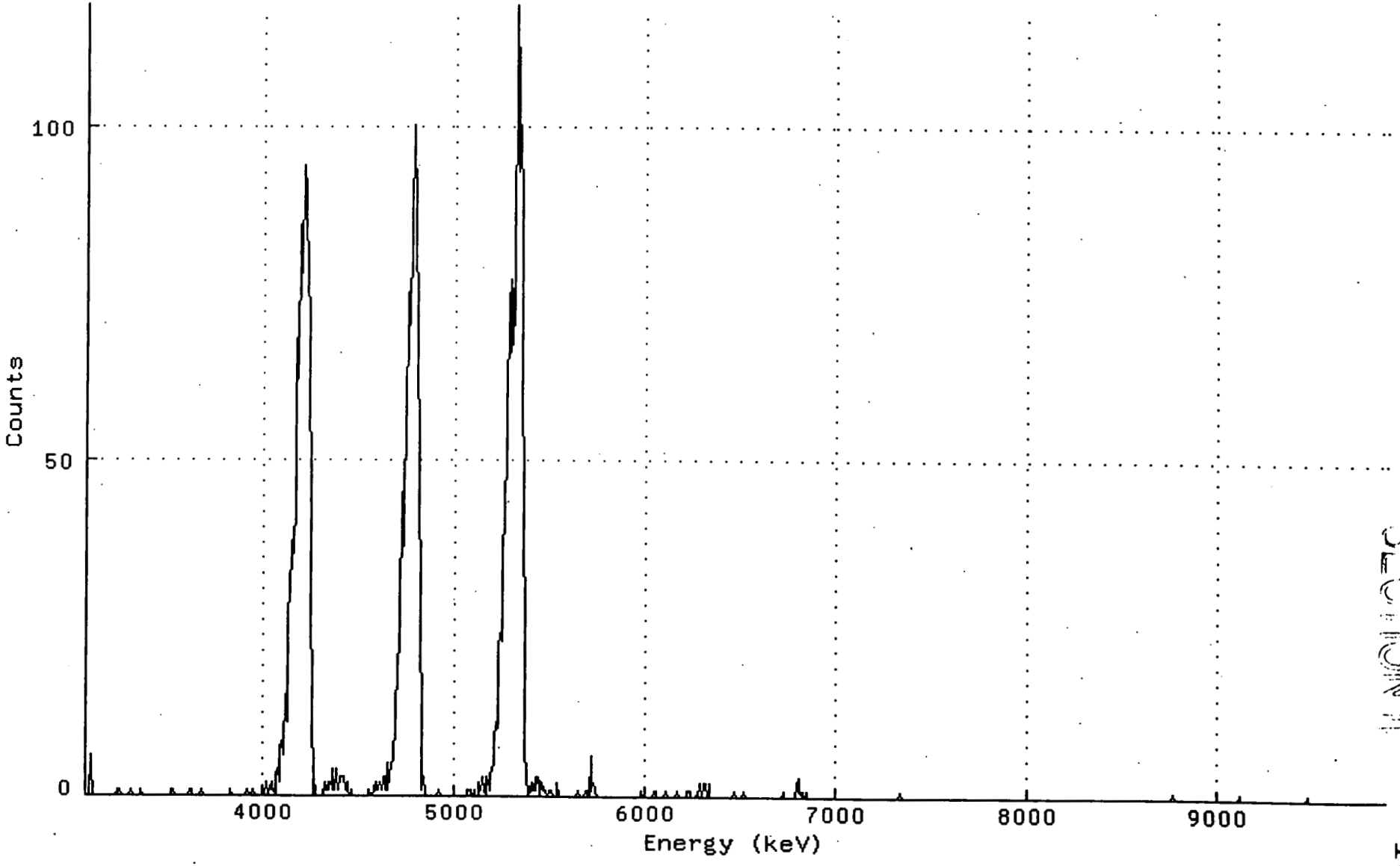
BATCH ID:	99116141	SAMPLE ID:	LCSWR1
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	2.500E-01 L
SAMPLE TITLE:		DETECTOR NUMBER:	008
ACQ DATE:	8-NOV-1999 08:03	AVERAGE EFFICIENCY:	17.0%
ELAPSED LIVE TIME:	80005.	RECOVERY:	57.34%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	79.48
LAMBDA VALUE:	100.	ROI TYPE:	STANDARD
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:12	EFF CAL DATE:	3-NOV-1999 11:12
BKG FILENAME:	B_008_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ L	TPU/ERROR 2-SIGMA	MDC pCi/ L	CRIT LEVEL pCi/ L
U232	5302.5	1375.60	6.40	99.8	1.907E+01	1.148E+00	2.005E-01	1.190E-01
U-234	4761.5	1167.40	1.60	99.8	1.617E+01	1.424E+00	1.190E-01	7.828E-02
U-235	4385.5	43.40	1.60	80.9	7.416E-01	2.360E-01	1.468E-01	9.657E-02
U-238	4184.4	1227.40	1.60	100.2	1.693E+01	1.474E+00	1.185E-01	7.794E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.C]C_99116141$LCSWR1_UU.CNF;2
Title : 008
Sample Title:
Start Time: 8-NOV-1999 08:03: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.04994E+03
Real Time : 0 22:13:25.00 Sample ID : LCSWR1 Energy Slope : 6.65596E+00
Live Time : 0 22:13:25.00 Sample Type: UU Energy Quad : 0.00000E+00



Sample Preparation and Analysis Log

Sample Type: Various Solids

	Method	Isotopes	Worklist Names	Chemist	Date
Digestion & Purification	RC-19 R06	Am-241	99116138	Gretchen K. Bu	10/29/99
		Pu-239/240,Pu-238	99116140		
		U-238, U235, U234	99116142		11/1/99
Counting	RC-19 R06	U150	99116142		11/1/99

Tracers (Internal Standards)

Isotope	ID	Conc(pCi/mL) @ RD		Aliquot(mL)	HL (years)	Activity(dpm)	Activity(pCi)
U-232	178-06-3	50.91	12/15/92	0.100	72	10.58	4.77
Am-243	82-76-2	50.80	12/15/92	0.100	7380	11.27	5.08
Pu-242	82-76-1	41.60	12/18/89	0.100	3.758E+05	9.24	4.16

Req	Sample ID	#	Aliquot Size	Comments/ Analysis	Sample Aliquot	Detector Number	Tare Weight(g)	Sample & Container(g)	Total Sample Size (g)
	PB	1	1 SA	Am, Pu, U		4			
16822	263410	2	0.750 G	Am, Pu, U	0.0486	5	14.664	30.104	15.440
16822	263411	3	0.750 G	Am, Pu, U	0.0769	14	14.710	24.468	9.758
16822	263412	4	0.750 G	Am, Pu, U		15		26.438	
16822	263413	5	0.750 G	Am, Pu, U		17		27.291	
16822	263414	6	0.750 G	Am, Pu, U		18		26.277	
16822	263415	7	0.750 G	Am, Pu, U		21		28.476	
16822	263416	8	0.750 G	Am, Pu, U		22		24.352	
16822	263417	9	0.750 G	Am, Pu, U		23		17.645	
16822	263418	10	0.750 G	Am, Pu, U	0.0499	27	14.469	29.512	15.043
16822	263419	11	0.750 G	Am, Pu, U	0.1436	14	14.434	19.657	5.223
16822	263420	12	0.750 G	Am, Pu, U	0.1426	15	14.546	19.806	5.260
16822	263421	13	0.750 G	Am, Pu, U	0.1451	17	14.578	19.747	5.169
16822	263410D	14	0.750 G	Am, Pu, U	0.0486	32	14.664	30.104	15.440
LCSWR1,	LCSWR33	15	0.250 mL	Am, Pu, U		8			
		16							
		17							
		18							
		19							
		20							
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

Comments and Actual conditions:

-Start date: 11/1/99

-Automatic pipets calibrated in accord with QC-6 on balance # 9

-Balance # 8 used for weights of samples and their aliquots

-Sample aliquot is the fraction of the total sample taken for analysis

OK
DM
11 11??
Q-Dday
S. Lynn 11/1/99

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:40:48

Spectral File: ND_AMS_ARCHIVE_R:R_99116142$PB_UU.CNF

BATCH ID:	99116142	SAMPLE ID:	PB
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 1.000E+00	SA
SAMPLE TITLE:		DETECTOR NUMBER:	004
ACQ DATE:	9-NOV-1999 10:10	AVERAGE EFFICIENCY:	26.3%
ELAPSED LIVE TIME:	80002.	RECOVERY:	70.25%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	55.47
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:09	EFF CAL DATE: 3-NOV-1999 11:09	
BKG FILENAME:	B_004_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	2603.60	4.40	99.8	1.059E+01	4.945E-01	5.063E-02	3.082E-02
U-234	4761.5	4.40	3.60	99.8	1.787E-02	2.498E-02	4.684E-02	2.893E-02
U-235	4385.5	-2.40	6.40	80.9	-1.203E-02	2.568E-02	7.252E-02	4.305E-02
U-238	4184.4	-1.00	4.00	100.2	-4.044E-03	1.735E-02	4.857E-02	2.977E-02

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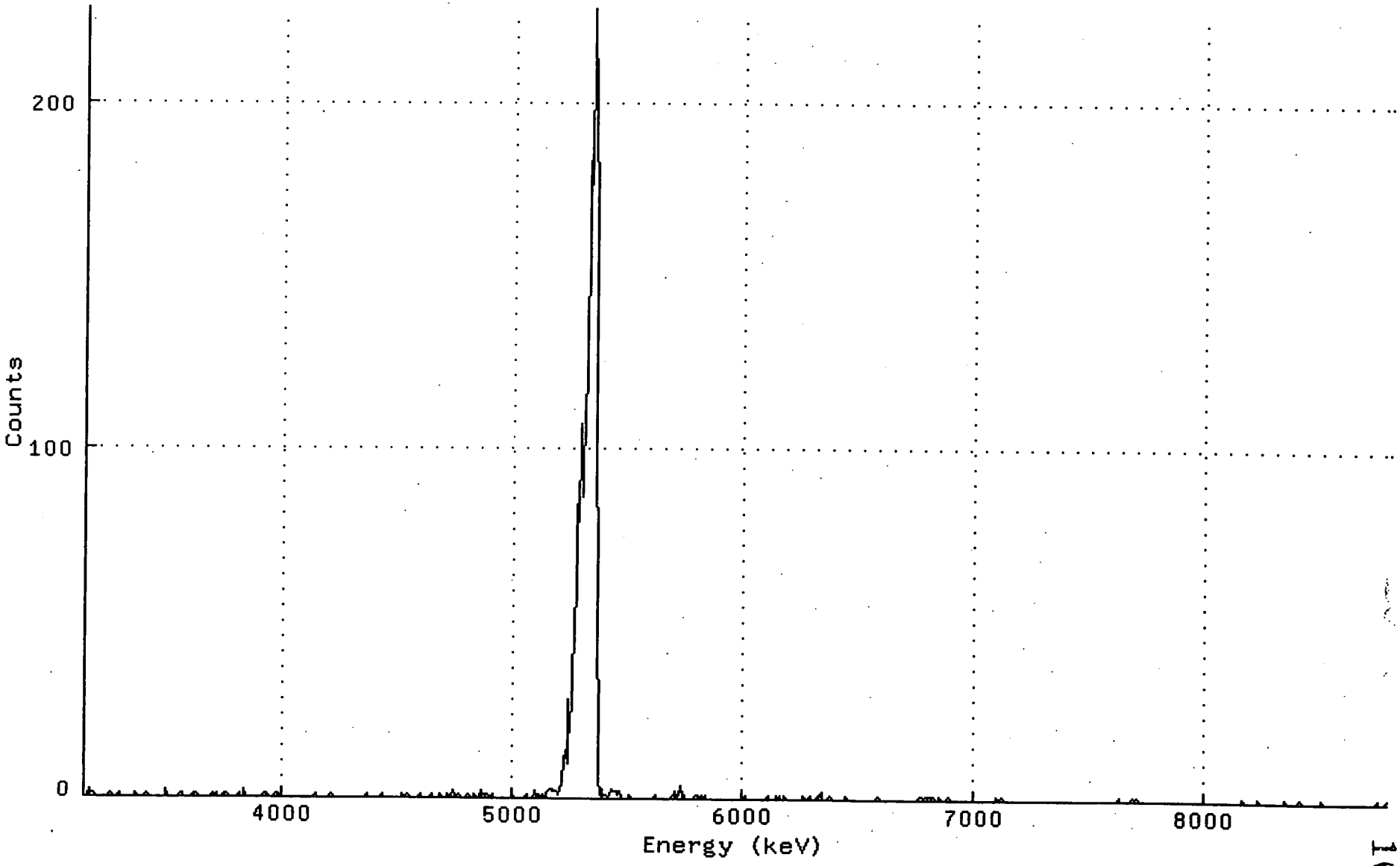
Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.R]R_99116142$PB_UU.CNF;4
Title : 004
Sample Title:
Start Time: 9-NOV-1999 10:10: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.12371E+03
Real Time : 0 22:13:22.00 Sample ID : PB Energy Slope : 5.53299E+00
Live Time : 0 22:13:22.00 Sample Type: UU Energy Quad : 0.00000E+00



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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:42:09

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263410_UU.CNF

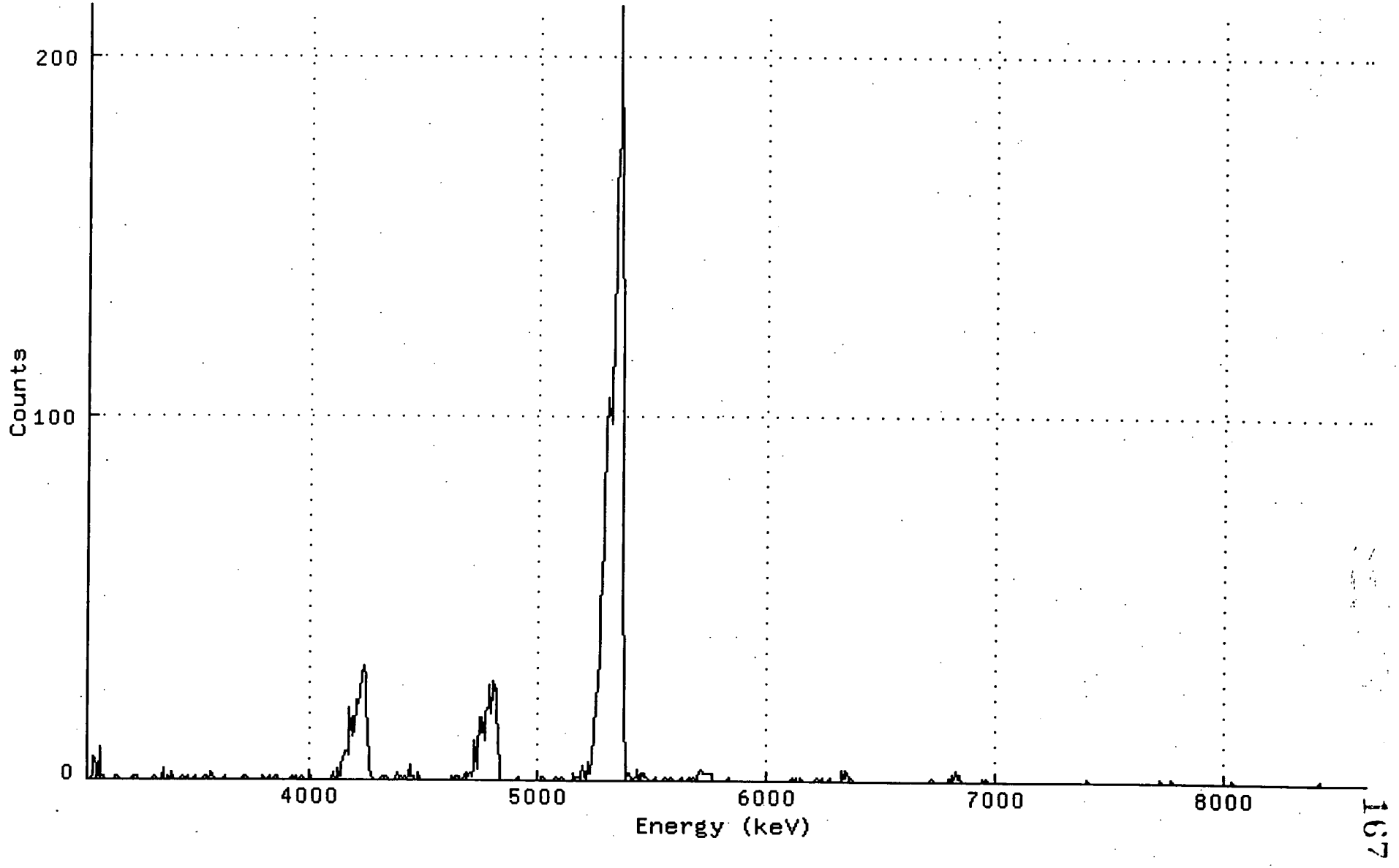
BATCH ID:	99116142	SAMPLE ID:	263410
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	005
ACQ DATE:	9-NOV-1999 10:10	AVERAGE EFFICIENCY:	24.8%
ELAPSED LIVE TIME:	80000.	RECOVERY:	66.69%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	44.20
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:11	EFF CAL DATE:	3-NOV-1999 11:11
BKG FILENAME:	B_005_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	2331.80	9.20	99.8	2.178E+02	1.062E+01	1.569E+00	9.110E-01
U-234	4761.5	347.60	4.40	99.8	3.244E+01	3.939E+00	1.163E+00	7.080E-01
U-235	4385.5	12.60	4.40	80.9	1.451E+00	1.000E+00	1.435E+00	8.734E-01
U-238	4184.4	364.60	4.40	100.2	3.388E+01	4.035E+00	1.158E+00	7.050E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263410_UU.CNF;4
Title : 005
Sample Title:
Start Time: 9-NOV-1999 10:10: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.00761E+03
Real Time : 0 22:13:20.00 Sample ID : 263410 Energy Slope : 5.47794E+00
Live Time : 0 22:13:20.00 Sample Type: UU Energy Quad : 0.00000E+00



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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:42:33

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Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263411_UU.CNF

BATCH ID:	99116142	SAMPLE ID:	263411
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.690E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	014
ACQ DATE:	9-NOV-1999 10:12	AVERAGE EFFICIENCY:	25.8%
ELAPSED LIVE TIME:	80000.	RECOVERY:	62.48%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	69.80
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:15	EFF CAL DATE:	3-NOV-1999 11:15
BKG FILENAME:	B_014_3NOV99		

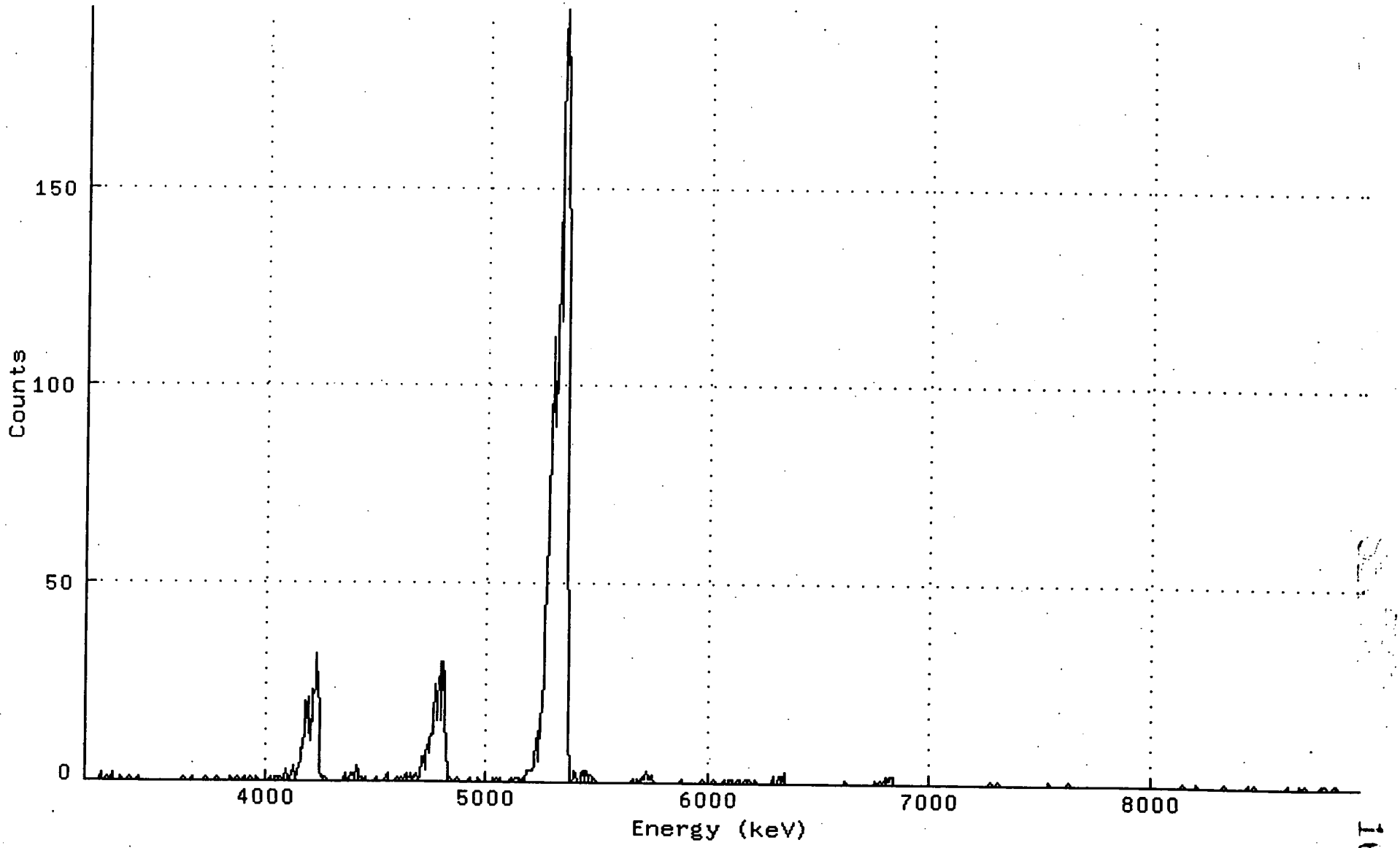
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	2269.80	15.20	99.8	1.376E+02	6.782E+00	1.263E+00	7.134E-01
U-234	4761.5	302.60	10.40	99.8	1.833E+01	2.386E+00	1.073E+00	6.185E-01
U-235	4385.5	14.80	7.20	80.9	1.106E+00	7.481E-01	1.135E+00	6.688E-01
U-238	4184.4	303.80	3.20	100.2	1.833E+01	2.350E+00	6.653E-01	4.144E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

450

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263411_UU.CNF;4
Title : 014
Sample Title:
Start Time: 9-NOV-1999 10:12: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.16926E+03
Real Time : 0 22:13:20.00 Sample ID : 263411 Energy Slope : 5.63329E+00
Live Time : 0 22:13:20.00 Sample Type: UU Energy Quad : 0.00000E+00



WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:42:53

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263412_UU.CNF

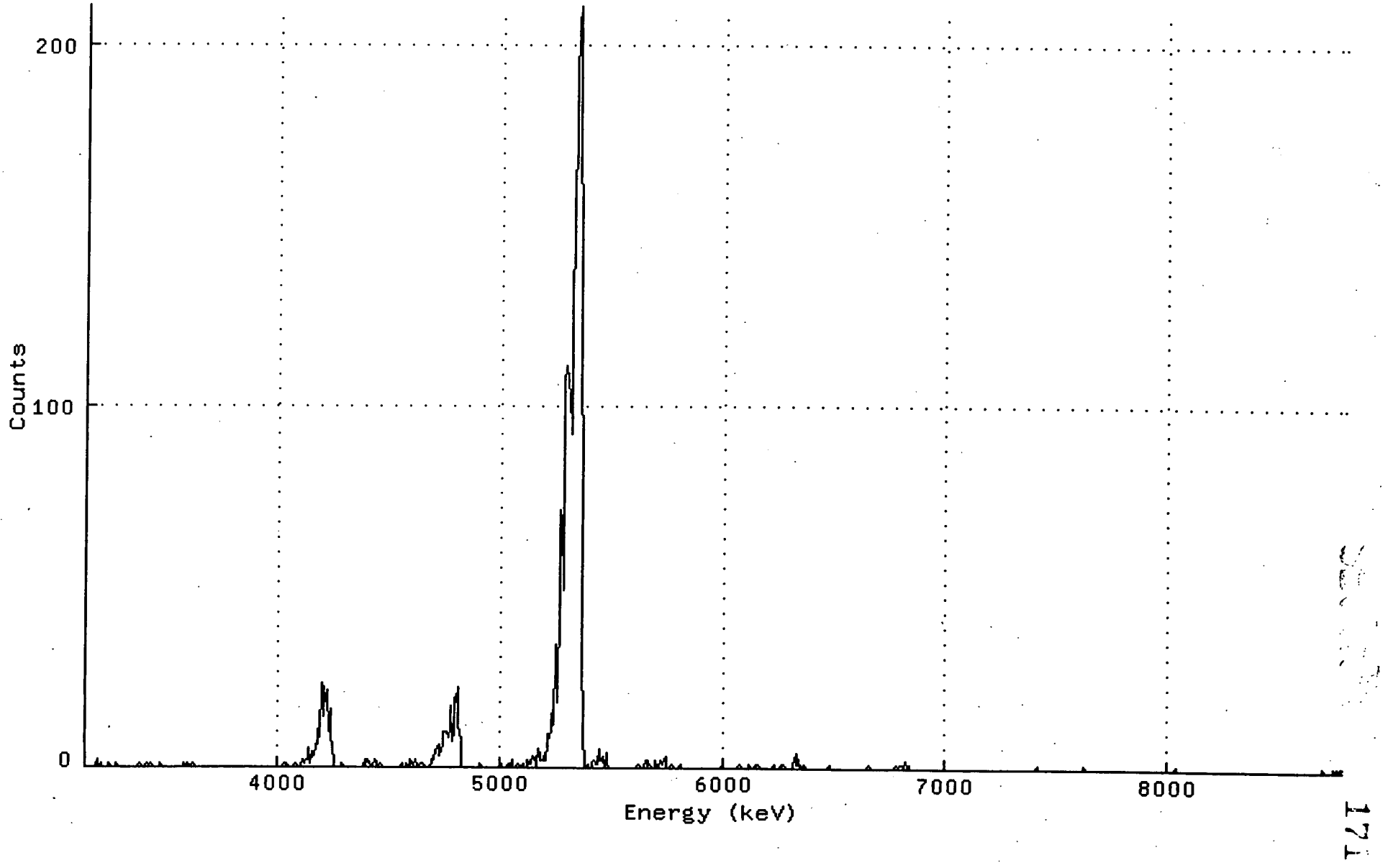
BATCH ID:	99116142	SAMPLE ID:	263412
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	015
ACQ DATE:	9-NOV-1999 10:12	AVERAGE EFFICIENCY:	26.3%
ELAPSED LIVE TIME:	80002.	RECOVERY:	67.71%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	73.97
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:16	EFF CAL DATE:	3-NOV-1999 11:16
BKG FILENAME:	B_015_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/ g
U232	5302.5	2506.40	7.60	99.8	6.357E+00	3.015E-01	3.935E-02	2.311E-02
U-234	4761.5	217.80	3.20	99.8	5.519E-01	8.119E-02	2.795E-02	1.741E-02
U-235	4385.5	13.00	2.00	80.9	4.064E-02	2.495E-02	2.903E-02	1.875E-02
U-238	4184.4	222.40	3.60	100.2	5.612E-01	8.188E-02	2.910E-02	1.797E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263412_UU.CNF;4
Title : 015
Sample Title:
Start Time: 9-NOV-1999 10:12: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.11350E+03
Real Time : 0 22:13:22.00 Sample ID : 263412 Energy Slope : 5.53088E+00
Live Time : 0 22:13:22.00 Sample Type: UU Energy Quad : 0.00000E+00



171

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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:43:06

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263413_UU.CNF

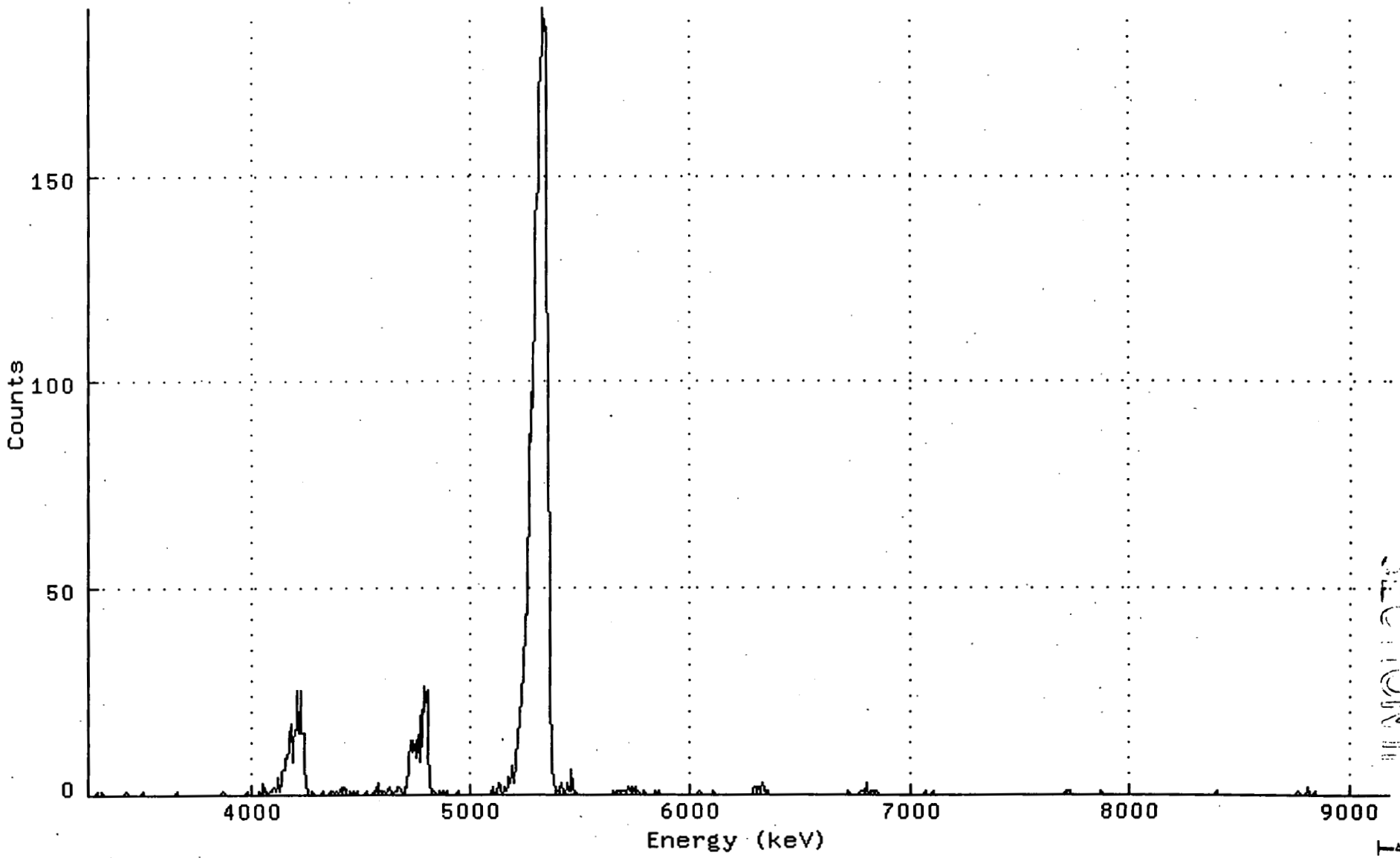
BATCH ID:	99116142	SAMPLE ID:	263413
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 7.500E-01	g
SAMPLE TITLE:		DETECTOR NUMBER:	017
ACQ DATE:	9-NOV-1999 10:13	AVERAGE EFFICIENCY:	25.4%
ELAPSED LIVE TIME:	80002.	RECOVERY:	72.69%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	81.77
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:17	EFF CAL DATE:	3-NOV-1999 11:17
BKG FILENAME:	B_017_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/ g
U232	5302.5	2601.80	7.20	99.8	6.357E+00	2.975E-01	3.708E-02	2.185E-02
U-234	4761.5	254.60	10.40	99.8	6.215E-01	8.667E-02	4.322E-02	2.492E-02
U-235	4385.5	12.00	8.00	80.9	3.614E-02	2.908E-02	4.777E-02	2.797E-02
U-238	4184.4	269.80	3.20	100.2	6.558E-01	8.777E-02	2.681E-02	1.670E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263413_UU.CNF;4
Title : 017
Sample Title:
Start Time: 9-NOV-1999 10:13: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.24092E+03
Real Time : 0 22:13:22.00 Sample ID : 263413 Energy Slope : 5.79005E+00
Live Time : 0 22:13:22.00 Sample Type: UU Energy Quad : 0.00000E+00



173

455

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:43:21

174

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263414_UU.CNF

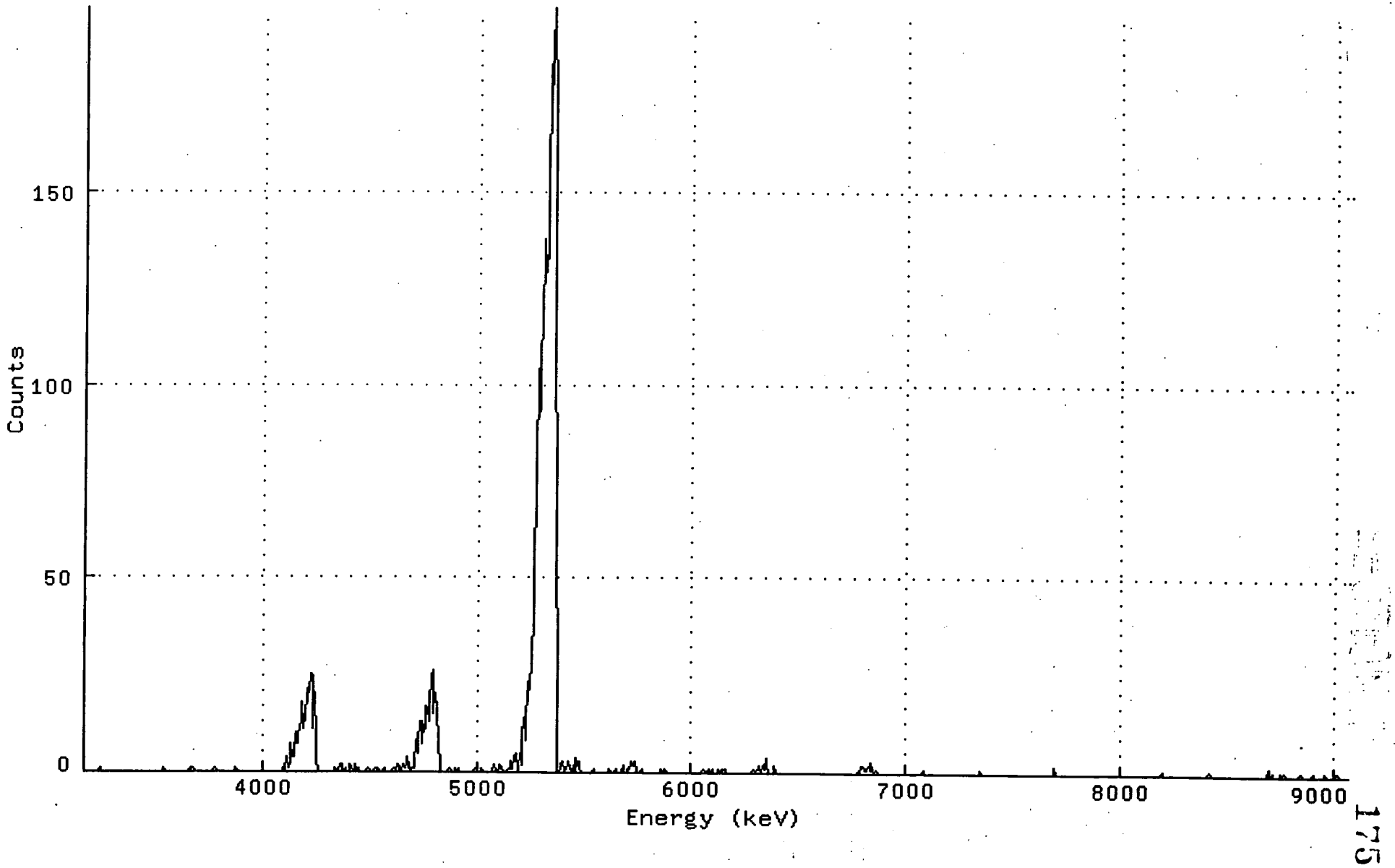
BATCH ID:	99116142	SAMPLE ID:	263414
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	018
ACQ DATE:	9-NOV-1999 10:13	AVERAGE EFFICIENCY:	25.7%
ELAPSED LIVE TIME:	80006.	RECOVERY:	70.06%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	83.97
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:19	EFF CAL DATE:	3-NOV-1999 11:19
BKG FILENAME:	B_018_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
U232	5302.5	2536.20	6.80	99.8	6.357E+00	2.996E-01	3.716E-02	2.197E-02
U-234	4761.5	283.80	3.20	99.8	7.107E-01	9.315E-02	2.762E-02	1.720E-02
U-235	4385.5	13.60	2.40	80.9	4.202E-02	2.555E-02	3.063E-02	1.950E-02
U-238	4184.4	291.20	0.80	100.2	7.261E-01	9.370E-02	1.713E-02	1.194E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263414_UU.CNF;4
Title : 018
Sample Title:
Start Time: 9-NOV-1999 10:13: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.14332E+03
Real Time : 0 22:13:26.00 Sample ID : 263414 Energy Slope : 5.77529E+00
Live Time : 0 22:13:26.00 Sample Type: UU Energy Quad : 0.00000E+00



457

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:43:35

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263415_UU.CNF

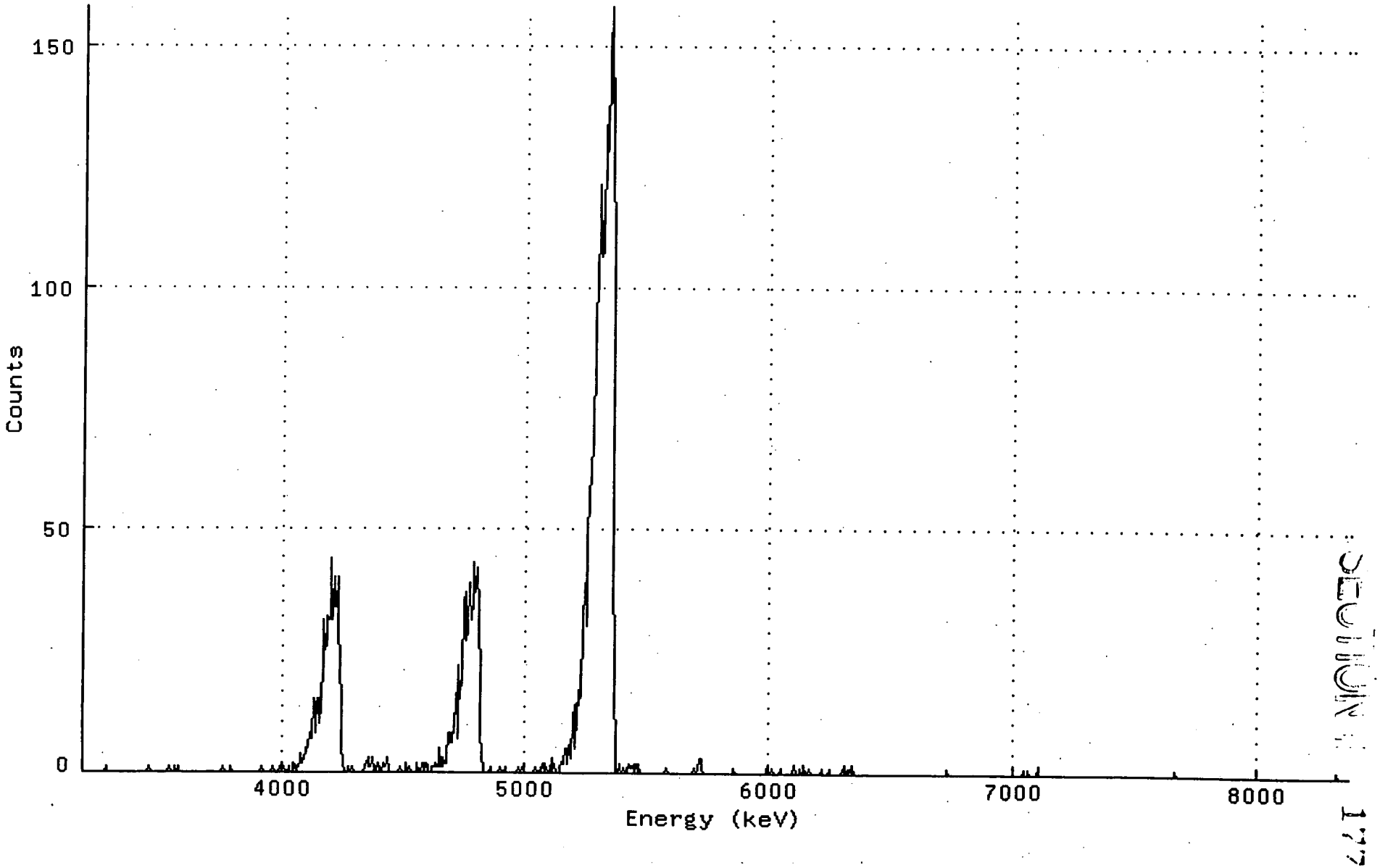
BATCH ID:	99116142	SAMPLE ID:	263415
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	021
ACQ DATE:	9-NOV-1999 10:13	AVERAGE EFFICIENCY:	26.9%
ELAPSED LIVE TIME:	80003.	RECOVERY:	66.12%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	79.79
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:20	EFF CAL DATE:	3-NOV-1999 11:20
BKG FILENAME:	B_021_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
U232	5302.5	2506.20	2.80	99.8	6.357E+00	3.011E-01	2.659E-02	1.673E-02
U-234	4761.5	659.00	4.00	99.8	1.670E+00	1.585E-01	3.044E-02	1.865E-02
U-235	4385.5	34.20	2.80	80.9	1.069E-01	3.903E-02	3.280E-02	2.064E-02
U-238	4184.4	641.20	0.80	100.2	1.618E+00	1.547E-01	1.733E-02	1.209E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263415_UU.CNF;4
Title : 021
Sample Title:
Start Time: 9-NOV-1999 10:13: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.16516E+03
Real Time : 0 22:13:23.00 Sample ID : 263415 Energy Slope : 5.08694E+00
Live Time : 0 22:13:23.00 Sample Type: UU Energy Quad : 0.00000E+00



459

WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:43:49

173

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263416_UU.CNF

BATCH ID:	99116142	SAMPLE ID:	263416
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	022
ACQ DATE:	9-NOV-1999 10:14	AVERAGE EFFICIENCY:	26.0%
ELAPSED LIVE TIME:	80001.	RECOVERY:	70.38%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	79.67
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:22	EFF CAL DATE:	3-NOV-1999 11:22
BKG FILENAME:	B_022_3NOV99		

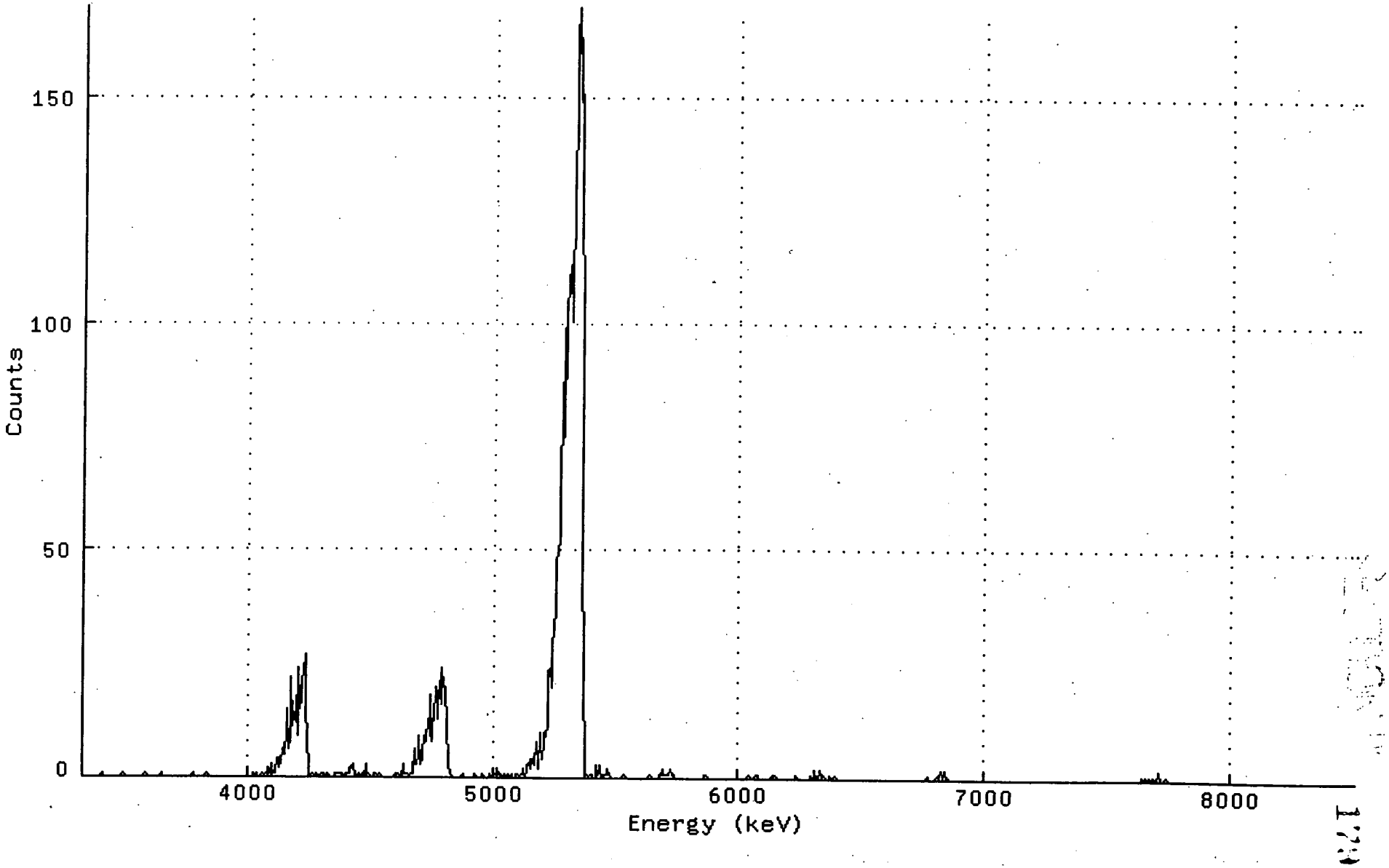
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
U232	5302.5	2574.60	4.40	99.8	6.357E+00	2.978E-01	3.075E-02	1.872E-02
U-234	4761.5	336.80	3.20	99.8	8.309E-01	1.013E-01	2.721E-02	1.695E-02
U-235	4385.5	26.40	3.60	80.9	8.035E-02	3.440E-02	3.510E-02	2.167E-02
U-238	4184.4	316.80	3.20	100.2	7.782E-01	9.731E-02	2.709E-02	1.687E-02

*** POSITIVE ***

460

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263416_UU.CNF;4
Title : 022
Sample Title:
Start Time: 9-NOV-1999 10:14: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.31360E+03
Real Time : 0 22:13:21.00 Sample ID : 263416 Energy Slope : 5.06244E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



461

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263417_UU.CNF

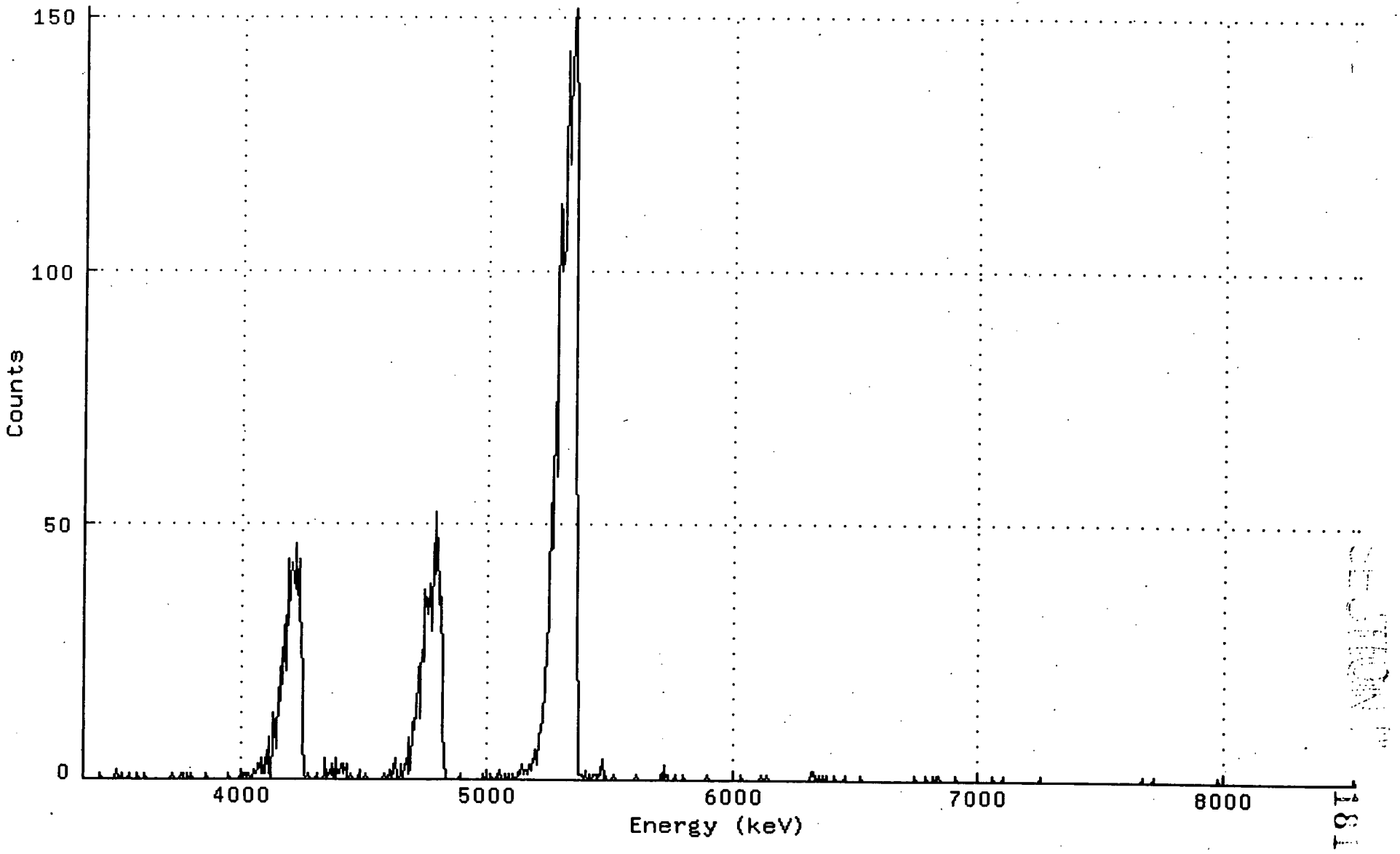
BATCH ID:	99116142	SAMPLE ID:	263417
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	7.500E-01 g
SAMPLE TITLE:		DETECTOR NUMBER:	023
ACQ DATE:	9-NOV-1999 10:14	AVERAGE EFFICIENCY:	25.9%
ELAPSED LIVE TIME:	80001.	RECOVERY:	66.78%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	78.57
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:25	EFF CAL DATE:	3-NOV-1999 11:25
BKG FILENAME:	B_023_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ g	TPU/ERROR 2-SIGMA	MDC pCi/ g	CRIT LEVEL pCi/
U232	5302.5	2431.00	4.00	99.8	6.357E+00	3.040E-01	3.138E-02	1.923E-02
U-234	4761.5	738.20	4.80	99.8	1.929E+00	1.767E-01	3.370E-02	2.039E-02
U-235	4385.5	37.00	2.00	80.9	1.193E-01	4.118E-02	2.993E-02	1.933E-02
U-238	4184.4	716.40	1.60	100.2	1.864E+00	1.721E-01	2.235E-02	1.470E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263417_UU.CNF;4
Title : 023
Sample Title:
Start Time: 9-NOV-1999 10:14: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.33529E+03
Real Time : 0 22:13:22.00 Sample ID : 263417 Energy Slope : 5.07513E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:44:18

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263418_UU.CNF

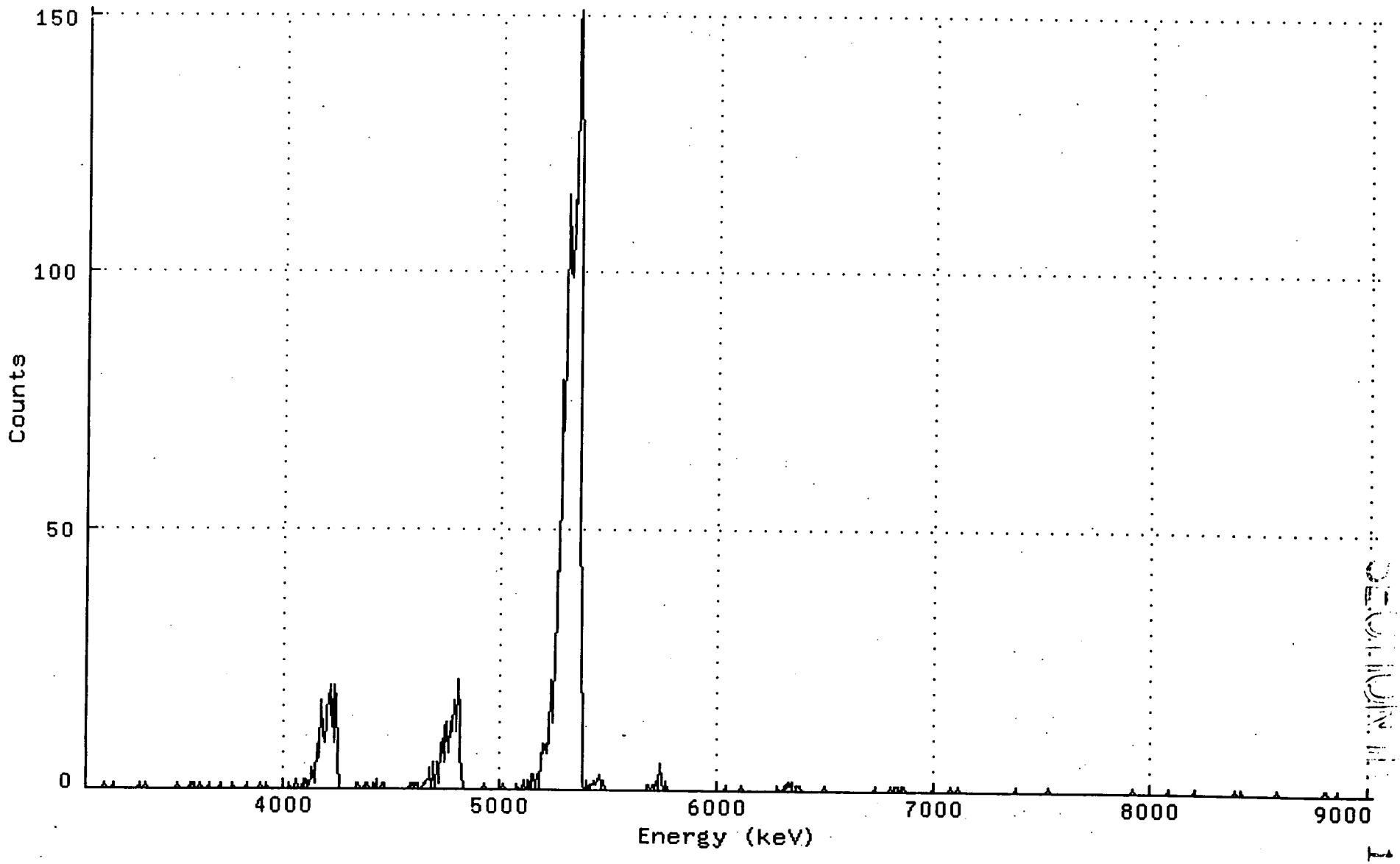
BATCH ID:	99116142	SAMPLE ID:	263418
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	4.990E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	027
ACQ DATE:	9-NOV-1999 10:14	AVERAGE EFFICIENCY:	26.9%
ELAPSED LIVE TIME:	80001.	RECOVERY:	53.70%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	85.39
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.579	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:26	EFF CAL DATE:	3-NOV-1999 11:26
BKG FILENAME:	B_027_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ SA
U232	5302.5	2032.80	5.20	99.8	2.120E+02	1.085E+01	1.388E+00	8.353E-01
U-234	4761.5	219.40	3.60	99.8	2.287E+01	3.386E+00	1.202E+00	7.425E-01
U-235	4385.5	6.40	3.60	80.9	8.231E-01	8.713E-01	1.483E+00	9.159E-01
U-238	4184.4	239.60	4.40	100.2	2.487E+01	3.551E+00	1.294E+00	7.876E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263418_UU.CNF;4
Title : 027
Sample Title:
Start Time: 9-NOV-1999 10:14: Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.06696E+03
Real Time : 0 22:13:21.00 Sample ID : 263418 Energy Slope : 5.80698E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:44:37

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263419_UU.CNF

BATCH ID:	99116142	SAMPLE ID:	263419
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.436E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	014
ACQ DATE:	10-NOV-1999 09:43	AVERAGE EFFICIENCY:	25.8%
ELAPSED LIVE TIME:	80000.	RECOVERY:	53.64%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	84.07
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.579	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:15	EFF CAL DATE:	3-NOV-1999 11:15
BKG FILENAME:	B_014_3NOV99		

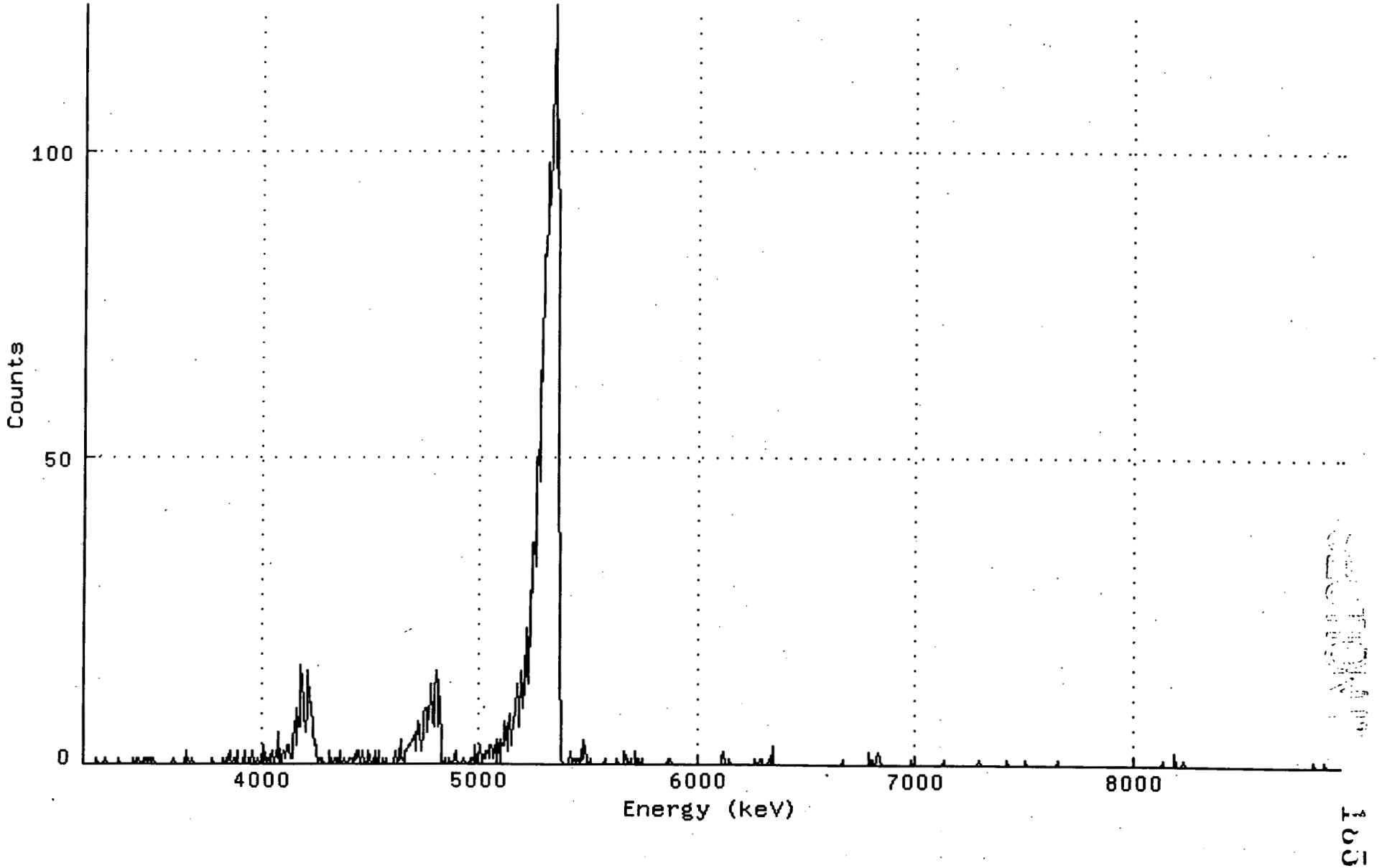
NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	1948.60	22.40	99.8	7.367E+01	3.853E+00	9.342E-01	5.183E-01
U-234	4761.5	188.60	10.40	99.8	7.128E+00	1.154E+00	6.691E-01	3.858E-01
U-235	4385.5	21.80	7.20	80.9	1.016E+00	5.298E-01	7.081E-01	4.172E-01
U-238	4184.4	183.60	4.40	100.2	6.909E+00	1.112E+00	4.690E-01	2.855E-01

*** POSITIVE ***

4666

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263419_UU.CNF;5
Title : 014
Sample Title:
Start Time: 10-NOV-1999 09:43 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.16926E+03
Real Time : 0 22:13:21.00 Sample ID : 263419 Energy Slope : 5.63329E+00
Live Time : 0 22:13:20.00 Sample Type: UU Energy Quad : 0.00000E+00



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WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:44:55

SECTION 11.186

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263420_UU.CNF

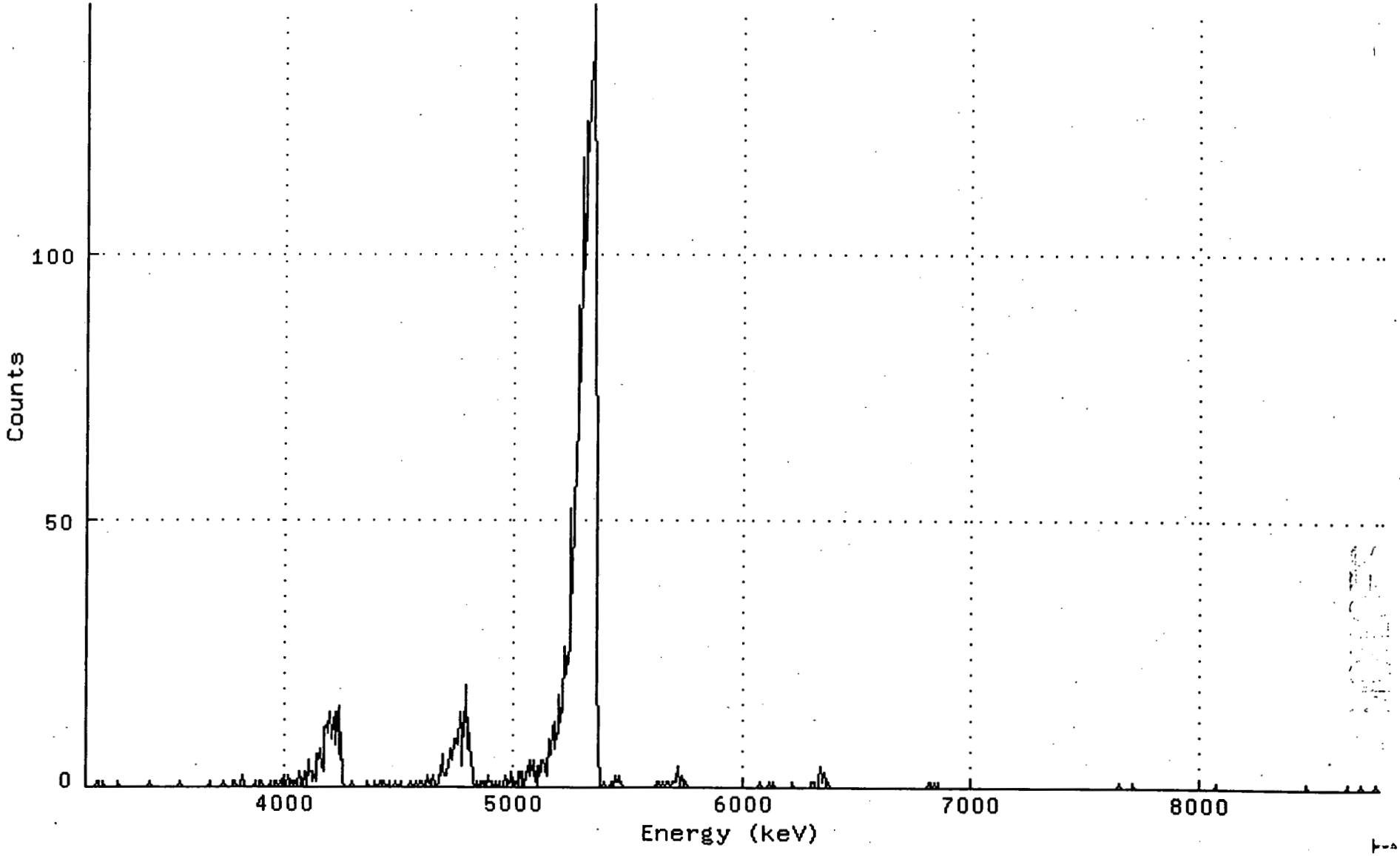
BATCH ID:	99116142	SAMPLE ID:	263420
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT: 1.426E-01	SA
SAMPLE TITLE:		DETECTOR NUMBER:	015
ACQ DATE:	10-NOV-1999 09:44	AVERAGE EFFICIENCY:	26.3%
ELAPSED LIVE TIME:	80005.	RECOVERY:	62.68%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	78.30
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.579	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:16	EFF CAL DATE:	3-NOV-1999 11:16
BKG FILENAME:	B_015_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	2320.40	9.60	99.8	7.419E+01	3.620E+00	5.471E-01	3.168E-01
U-234	4761.5	195.80	3.20	99.8	6.258E+00	9.679E-01	3.525E-01	2.195E-01
U-235	4385.5	8.00	2.00	80.9	3.154E-01	2.597E-01	3.661E-01	2.365E-01
U-238	4184.4	215.60	4.40	100.2	6.861E+00	1.020E+00	3.966E-01	2.414E-01

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263420_UU.CNF;5
Title : 015
Sample Title:
Start Time: 10-NOV-1999 09:44 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.11350E+03
Real Time : 0 22:13:25.00 Sample ID : 263420 Energy Slope : 5.53088E+00
Live Time : 0 22:13:25.00 Sample Type: UU Energy Quad : 0.00000E+00



WASTREN -- GRAND JUNCTION, CO
ALPHA SPECTROSCOPY REPORT
11-NOV-1999 08:45:10

Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263421_UU.CNF

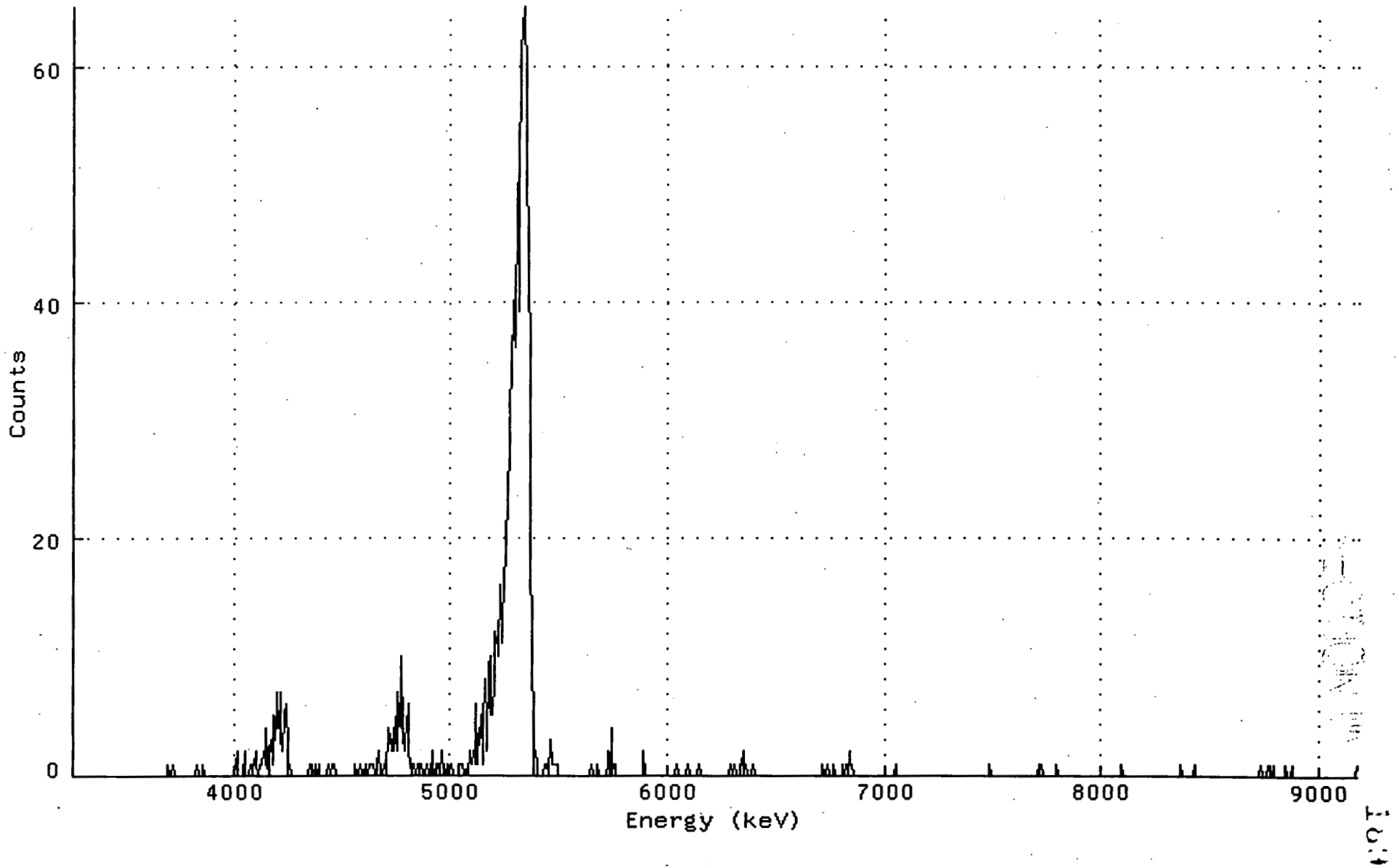
BATCH ID:	99116142	SAMPLE ID:	263421
SAMPLE DATE:	27-OCT-1999 00:00	ALIQUOT:	1.451E-01 SA
SAMPLE TITLE:		DETECTOR NUMBER:	017
ACQ DATE:	10-NOV-1999 09:46	AVERAGE EFFICIENCY:	25.4%
ELAPSED LIVE TIME:	80004.	RECOVERY:	30.13%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	90.83
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.579	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:17	EFF CAL DATE:	3-NOV-1999 11:17
BKG FILENAME:	B_017_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	1078.60	26.40	99.8	7.291E+01	4.881E+00	1.798E+00	9.903E-01
U-234	4761.5	72.60	10.40	99.8	4.906E+00	1.310E+00	1.196E+00	6.898E-01
U-235	4385.5	3.20	4.80	80.9	2.667E-01	5.254E-01	1.075E+00	6.505E-01
U-238	4184.4	77.00	4.00	100.2	5.181E+00	1.278E+00	8.081E-01	4.952E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263421_UU.CNF;6
Title : 017
Sample Title:
Start Time: 10-NOV-1999 09:46 Sample Time: 27-OCT-1999 00:00 Energy Offset: 3.24092E+03
Real Time : 0 22:13:24.00 Sample ID : 263421 Energy Slope : 5.79005E+00
Live Time : 0 22:13:24.00 Sample Type: UU Energy Quad : 0.00000E+00



Spectral File: ND_AMS_ARCHIVE_S:S_99116142$263410D_UU.CNF

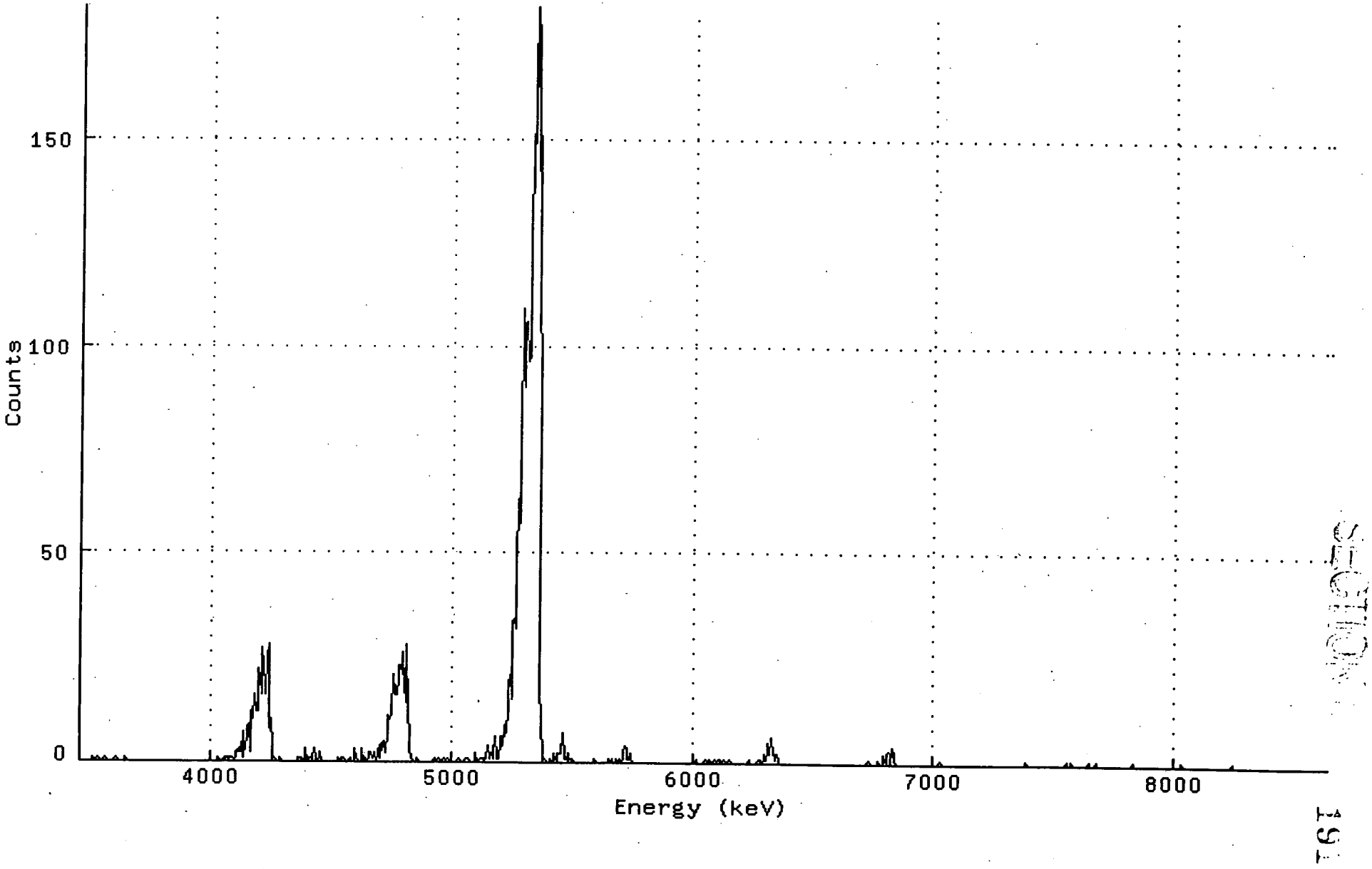
BATCH ID:	99116142	SAMPLE ID:	263410D
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT:	4.860E-02 SA
SAMPLE TITLE:		DETECTOR NUMBER:	032
ACQ DATE:	9-NOV-1999 10:16	AVERAGE EFFICIENCY:	25.7%
ELAPSED LIVE TIME:	80001.	RECOVERY:	65.88%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	72.39
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:34	EFF CAL DATE:	3-NOV-1999 11:34
BKG FILENAME:	B_032_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY dpm/ SA	TPU/ERROR 2-SIGMA	MDC dpm/ SA	CRIT LEVEL dpm/ S
U232	5302.5	2379.80	7.20	99.8	2.178E+02	1.052E+01	1.389E+00	8.182E-01
U-234	4761.5	343.40	7.60	99.8	3.140E+01	3.844E+00	1.420E+00	8.339E-01
U-235	4385.5	17.00	4.00	80.9	1.918E+00	1.078E+00	1.355E+00	8.302E-01
U-238	4184.4	344.80	3.20	100.2	3.139E+01	3.810E+00	1.004E+00	6.254E-01

*** POSITIVE ***
*** RECOUNT SAMPLE CL > 0.500 ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.S]S_99116142$263410D_UU.CNF;4
Title : 032
Sample Title:
Start Time: 9-NOV-1999 10:16: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.43640E+03
Real Time : 0 22:13:21.00 Sample ID : 263410D Energy Slope : 5.07167E+00
Live Time : 0 22:13:21.00 Sample Type: UU Energy Quad : 0.00000E+00



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Spectral File: ND_AMS_ARCHIVE_C:C_99116142$LCSWR1_UU.CNF

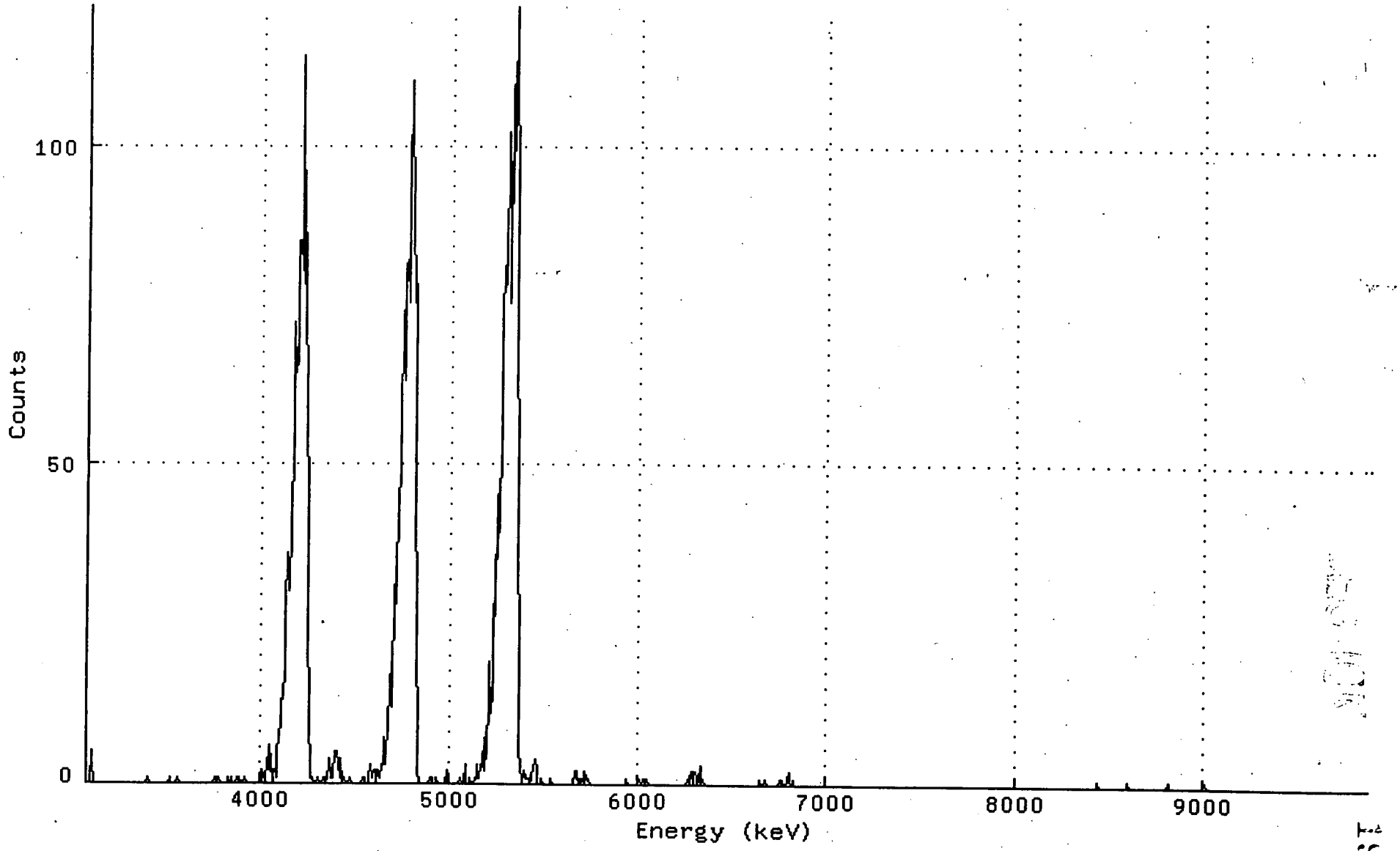
BATCH ID:	99116142	SAMPLE ID:	LCSWR1
SAMPLE DATE:	6-OCT-1999 00:00	ALIQUOT: 2.500E-01	L
SAMPLE TITLE:		DETECTOR NUMBER:	008
ACQ DATE:	9-NOV-1999 10:11	AVERAGE EFFICIENCY:	17.0%
ELAPSED LIVE TIME:	80006.	RECOVERY:	64.34%
TRACER ID:	U232-178-06-3	TRACER FWHM (kev):	86.49
LAMBDA VALUE:	100.	ROI TYPE:	MANUAL
CORRECTED TRACER DPM:	10.585	CONFIDENCE LEVEL:	4.65
SAMPLE MATRIX:	MISC	LLD CONSTANT:	2.71
ENERGY CAL DATE:	3-NOV-1999 11:12	EFF CAL DATE: 3-NOV-1999 11:12	
BKG FILENAME:	B_008_3NOV99		

NUCLIDE ACTIVITY SUMMARY

NUCLIDE	ENERGY	NET AREA	BKG	%ABN	ACTIVITY pCi/ L	TPU/ERROR 2-SIGMA	MDC pCi/ L	CRIT LEVEL pCi/
U232	5302.5	1543.60	6.40	99.8	1.907E+01	1.096E+00	1.787E-01	1.061E-01
U-234	4761.5	1307.40	1.60	99.8	1.614E+01	1.356E+00	1.061E-01	6.976E-02
U-235	4385.5	47.40	1.60	80.9	7.218E-01	2.194E-01	1.308E-01	8.606E-02
U-238	4184.4	1252.40	1.60	100.2	1.539E+01	1.306E+00	1.056E-01	6.946E-02

*** POSITIVE ***

Spectrum : WIZARD$DKC200:[ALPHA.ALUSR.ARCHIVE.C]C_99116142$LCSWR1_UU.CNF;4
Title : 008
Sample Title:
Start Time: 9-NOV-1999 10:11: Sample Time: 6-OCT-1999 00:00: Energy Offset: 3.04994E+03
Real Time : 0 22:13:26.00 Sample ID : LCSWR1 Energy Slope : 6.65596E+00
Live Time : 0 22:13:26.00 Sample Type: UU Energy Quad : 0.00000E+00



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RECEIVING DOCUMENTATION INDEX

Requisition Number 16822

RECEIVING DOCUMENTATION:	FROM	TO
Sample Log-in Sheet	1	2
Request for Analytical Services	3	
Chain of Sample Custody	4	6
Release Evaluation Form	7	8
Gross Gamma Scan	9	
Sample Preparation Form	10	
Lab Sample Tracking Record	11	

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Grand Junction Office Analytical Laboratory

Sample Log-in Sheet

Requisition: 16822

Received by (Print Name): Shelley Krigman

Received by (Signature): Shelley Krigman

Log-in Date: Nov 1, 99

Requestor: JEFF LIVELY

Project Number: 342303001

---

1. Custody Seal(s):
Shipping Container: (Absent) / Intact / Broken
Sample Container: (Absent) / Intact / Broken

2. Custody Seal No(s): NA

3. Chain of Custody Records: (Present) / Absent

4. Traffic Rpt, Pack List, Analytical Req.: (Present) / Absent

5. Freight Bill: Airbill / Sticker
Present / (Absent)

6. Freight Bill No(s): hand delivered

7. Sample Tags: Present / (Absent)

8. Sample Labels on Chain of Cust: (Listed) / Not Listed

9. Does the Information on Custody Records, Traffic Reports, Sample Labels Agree ?: (Yes) / No

10. Shipping Cont. Temp.: NA
and Condition: good

11. Sample pH: Acceptable / Not Acceptable
~~Not Applicable~~

	Sample	Ticket	Customer Id	Sample Type	Date Sampled	Condition	Date Received
1	263398	MED0000201	IVP0000201	MS	10/6/99	GOOD	10/29/99
2	263399	MED0000203	IVP0000203	MS	10/6/99	GOOD	10/29/99
3	263400	MED0000204	IVP0000204	MS	10/6/99	GOOD	10/29/99
4	263401	MED0000205	IVP0000205	MS	10/6/99	GOOD	10/29/99
5	263402	MED0000208	IVP0000208	MS	10/6/99	GOOD	10/29/99
6	263403	MED0000210	IVP0000210	MS	10/6/99	GOOD	10/29/99
7	263404	MED0000211	IVP0000211	MS	10/6/99	GOOD	10/29/99
8	263405	MED0000212	IVP0000212	MS	10/6/99	GOOD	10/29/99
9	263406	MED0000221	IVP0000221	MS	10/6/99	GOOD	10/29/99
10	263407	MED0000222	IVP0000222	MS	10/6/99	GOOD	10/29/99
11	263408	MED0000223	IVP0000223	MS	10/6/99	GOOD	10/29/99
12	263409	MED0000226	IVP0000226	MS	10/6/99	GOOD	10/29/99
13	263410	MED0000227	IVP0000227	MS	10/6/99	GOOD	10/29/99
14	263411	MED0000229	IVP0000229	MS	10/6/99	GOOD	10/29/99
15	263412	MED0000213	IVP0000213	MS	10/6/99	GOOD	10/29/99
16	263413	MED0000214	IVP0000214	MS	10/6/99	GOOD	10/29/99
17	263414	MED0000215	IVP0000215	MS	10/6/99	GOOD	10/29/99
18	263415	MED0000216	IVP0000216	MS	10/6/99	GOOD	10/29/99
19	263416	MED0000217	IVP0000217	MS	10/6/99	GOOD	10/29/99
20	263417	MED0000218	IVP0000218	MS	10/6/99	GOOD	10/29/99
21	263418	MED0000236	IVP0000236	MS	10/27/99	GOOD	10/29/99
22	263419	MED0000240	IVP0000240	MS	10/27/99	GOOD	10/29/99

	Sample	Ticket	Customer Id	Sample Type	Date Sampled	Condition	Date Received
23	263420	MED0000241	IVP0000241	MS	10/27/99	GOOD	10/29/99
24	263421	MED0000242	IVP0000242	MS	10/27/99	GOOD	10/29/99

2

Analyses Requested and Date Due

Test	Date Due	Test	Date Due	Test	Date Due	Test
AM241	11/12/99	M1	11/12/99	PUISO	11/12/99	SAS
UISO	11/12/99					

Reviewed by:

Sue Lyons
11/2/11

H&S Request for Analytical Service

Final Report to J Lively

Office/Tech. Bldg 3022, 206A

Project Rocky Flats IVP

Area Building 779 Cluster

Site ID No. Survey Unit 779-21

Number of Samples 11-1-99 ~~20~~ 24

Requisition No. 16822

Project No. 342303001

Date Submitted 10/28/99

Results Required

- * ☐ Immediate: 1 to 16 hours
- * ☐ Expedite: up to 48 hours
- ☑ Normal schedule: 4 to 14 days
- ☐ Delay acceptable: more than 14 days

* **Justification** _____

Analysis Required

- ☐ Airborne Silica
- ☐ Airborne Asbestos
- ☐ Airborne Radioparticulate
- ☑ Bulk
  - ☐ Asbestos ☐ Soil ☐ Metals ☐ Water ☑ Other Concrete, cinder Block
- ☐ Elemental (Use Symbol)
  - ☐ As ☐ Ba ☐ Cd ☐ Cr ☐ Pb ☐ Hg ☐ Se ☐ Ag
- ☑ Isotope (Use Symbol)
  - ☐ Ra-226 ☐ Th-230 ☐ U-Nat ☐ Po-210 ☑ Pu-238 -239 - 240/241 Am -241 ☑ U-234 -235 - 238
- ☐ Other Analysis
  - ☐ Volatiles ☐ Semi-volatiles ☐ PCBs ☐ pH ☐ Ignitability

Special Instructions Retain samples until determined by Jeff Lively

CRDL = 2.5 pCi / sample per nuclide

Please report results in dpm / sample

Sample Disposition: ☑ Return ☐ Store ☐ Destroy

A Hamilpin
H&S Representative Signature and Approval

10/28/99
Date

GJO 1796
4/97

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16822

Grand Junction Office

2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248–6000

Chain-of-Sample Custody

1. Page 1 of 2
2. Date ~~10/15/99~~ 10/7/99

3. Project Name Rocky Flats IVP

4. Site Location Building 779 - Survey Site Unit 779-21

5. Sampler *(print name)* Kathy Thompson
Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Plastic						12. Remarks	13. Condition Received
MED0000201	10/6/99	1228	IVP0000 201	Surface Media	1							
203		1237	203		1							
204		1250	204		1							
205		1256	205		1							
208		1304	208		1							
210		1310	210		1							
211		1316	211		1							
212		1320	212		1							
221		1540	221		1							
222		1544	222		1							
223		1550	223		1							
226		1556	226		1							
227		1600	227		1							

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/29/99	0945						
Received by *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**
Sue Lyst	10/29/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512
5/97

Preparation instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

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16822

Grand Junction Office

2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248-6000

Chain-of-Sample Custody

1. Page 2 of 2
2. Date 10/7/99

3. Project Name Rocky Flats IVP
4. Site Location Building 779-Survey Unit 779-21
5. Sampler (print name) Kathy Thompson, Jerry Cannon

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Plastic Vile	12. Remarks	13. Condition Received
MED 0000229	10/6/99	1604	IVP 0000 229	Surface Media	1		
213		1610	213		1		
214		1614	214		1		
215		1620	215		1		
216		1625	216		1		
217		1629	217		1		
218		1632	218		1		
							JC 10/29/99

14. Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Relinquished by (signature)	Date	Time
Jerry Cannon	10/29/99	0745						
Received by (signature)	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**	**Received by (signature)**	**Date**	**Time**
Sue Smith	10/29/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512 5/97 481

Preparation instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

16822

Grand Junction Office
2597 B 3/4 Road
Grand Junction, Colorado 81503
Telephone (970) 248-6000

Chain-of-Sample Custody

1. Page 1 of 1
2. Date 10/27/99

3. Project Name Rocky Flats IVP
4. Site Location Survey Unit 778-23
5. Sampler *(print name)* Jay Cameron

6. Sample No.	7. Date	8. Time	9. Sample Location	10. Sample Matrix	11. Containers: Cont. #055	12. Remarks	13. Condition Received
MED000236	10/27/99	N/A	IVP000236	Surface Media			
240			240				
241			241				
242			242				

14. Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time	Relinquished by *(signature)*	Date	Time
Jay Cameron	10/27/99	0945						
Received by *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**	**Received by** *(signature)*	**Date**	**Time**
Sue Smith	10/27/99	0945						

15. Method of Shipment	16. Laboratory/Destination	17. Airbill or Receipt Number

18. For Contract Laboratories Only—Receiver to sign, date, and return form by mail or with analytical data package

Company Name _____ Received by _____ Date _____

GJO 1512
5/97

Preparation Instructions on back of form.

Distribution: Original accompanies shipment, copies to relinquisher.

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SECTION II

RSFORMS-09.01-01

☐ Property ☐ Waste ☒ Sample

C...GINAL

RELEASE EVALUATION FORM

Release Evaluation No.: 991027-00779-001 EXTENDED: No EXPIRES.: n/a Charge No.: n/a

PART I SENDER/CUSTODIAN ACKNOWLEDGEMENT

Description of Property/Waste/Sample To Be Released/Transferred:
24 surface media samples and 66 smears from rooms 143/144/145/146/147/148/151/152

Current Location: B7779 Cluster

Destination: GJO Analytical Chemistry Laboratory, Grand Junction CO.

New Recipient/Custodian: Ron Chessmore 970-248-6166

History/Process Knowledge: Surface media samples and smears obtained for independent verification after final survey.

Has the specified material ever been in an RMMA/RBA/CA or contacted DOE controlled radioactive materials? Yes, Annex A was part of a CA.

1) By signing below, I certify information provided in Part I of this release evaluation to be true and accurate.
2) By signing below, I agree to comply with the specific requirements noted in Part II of this release evaluation.

Sender/Custodian: Art Samiljan Employee No [redacted] Date: 10/27/99 Ext 2863 Pager N/A

PART II RADIOLOGICAL ENGINEERING

SPECIFIC REQUIREMENTS AND/OR COMMENTS:

Based on the fact that **all** final survey surface media samples obtained in rooms 143, 144, 145, 146, 147, 148, 151, and 152 met the unrestricted release criteria, these additional independent verification surface media samples may be released for unrestricted use with no rad screening required. In addition, all measurements obtained to date for final survey indicate no alpha contamination above the unrestricted release limits of 100 dpm/100 cm^2 total or 100 dpm/100 cm^2 removable exists in the above referenced rooms. Therefore the independent verification smears obtained may be free released as well.

Evaluated: Mike Grube Emp. No: [redacted] Date: 10/27/99 Ext: 2863 Page 212-4696
Radiological Engineer

APPROVAL FOR TRANSFER/SHIPMENT

Approved: Mike Grube Emp. No [redacted] Date: 10/27/99 Ext: 2863 Page 212-4696
Radiological Engineer

4463

PROPERTY/WASTE RELEASE EVALUATION SIGNATURE REQUIREMENTS

Release Evaluation #: 991027-00779-001 Page 2 of 2

Release Evaluation for Waste:

A Release Evaluation for Waste requires an evaluation and unrestricted release approval signature. The evaluation signature is by the Radiological Engineer (RE) providing the methods or criteria for unrestricted release (i.e., survey requirements, analytical requirements, no survey required, etc.). The unrestricted release approval signature for a Release Evaluation for Waste shall be a RE authorized to provide unrestricted release approval. In addition, the evaluation and unrestricted release approval signatures shall not be the same RE. The intent of this provision is to provide peer review of the evaluation and method of unrestricted release. It is important the RE take the peer review process seriously and not become a "rubber stamp" for their fellow engineer.

Release Evaluation for Property:

A Release Evaluation for Property requires an evaluation and unrestricted release approval signature. For a Release Evaluation for Property, the evaluation and unrestricted release signature may be the same RE. In the past, only one signature was required for property for which a RE could provide an unrestricted release on the basis of process knowledge/history.

Release Evaluation for Samples:

Samples are any waste or material that is being shipped to an off-site facility for analysis. Samples that may be provided with an unrestricted release using process knowledge/history or standard contamination survey techniques may be authorized for shipment to an off-site facility using the signatory requirements specified for property. Samples which cannot be provided with an unrestricted release using process knowledge/history or standard contamination survey techniques shall be authorized for shipment from the Site using the methodology specified for waste, i.e., second signature being provided by a RE authorized to perform peer review and approval for shipment.

The approval for transfer/shipment section of a Sample Release Evaluation (SRE) shall be revised as noted below for samples which cannot be provide with an unrestricted release.

"The samples specified in Part 1 of this release evaluation are being provided with authorization for transport as non-radioactive materials in accordance with Department of Transportation (49 CFR) regulation. This authorization for shipment does not constitute an unrestricted release."

Additional Documentation:

Number of lines per section may be modified or additional pages attached to ensure adequate documentation of information necessary to perform release evaluation.

Additional pages or attachments to a release evaluation shall have the evaluation number, Page __ of __, initials of Radiological Engineer signing approval for transfer/shipment and date.

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@RAH

GROSS GAMMA SCAN

SIGNATURE: RD & SK

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Requisition: 16822 **BACKGROUND Cts/Sec:** 51 **Date:** 11-1-89

2000 pCi/g Reference Sample Counts/Second	found	Expected
Large Can:	4665	4622.9
30g Sample:	1007	1014.7

10000 pCi/g Reference Sample Counts/Second	found	Expected
Large Can:		
30g Sample:		

Sample	Customer Id	Ticket	Sample Counts/Second
263398	IVP0000201	MED00002	61
263399	IVP0000203	MED00002	66
263400	IVP0000204	MED00002	53
263401	IVP0000205	MED00002	65
263402	IVP0000208	MED00002	54
263403	IVP0000210	MED00002	49
263404	IVP0000211	MED00002	48
263405	IVP0000212	MED00002	69
263406	IVP0000221	MED00002	68
263407	IVP0000222	MED00002	77
263408	IVP0000223	MED00002	64
263409	IVP0000226	MED00002	60
263410	IVP0000227	MED00002	54
263411	IVP0000229	MED00002	77
263412	IVP0000213	MED00002	52
263413	IVP0000214	MED00002	68
263414	IVP0000215	MED00002	47
263415	IVP0000216	MED00002	57
263416	IVP0000217	MED00002	48
263417	IVP0000218	MED00002	60
263418	IVP0000236	MED00002	72
263419	IVP0000240	MED00002	65
263420	IVP0000241	MED00002	47
263421	IVP0000242	MED00002	62

WET CHEMISTRY
SAMPLE PREPARATION FORM

SECTION III

10

99116126

Requisition: 16822

Project: 342303001

Method: SP-4 R00

Date Started: 11-1-99

Date Completed: 11-1-99

Prep'ed By: SK & RD

Verified: SLo.

Sample	Ticket	Customer ID	Pan #	Dry	Crush	Sample Mesh	Blend	Split Ground	Blend	Final Mesh
263398	MED00002	IVP0000201	hand grind		≈ -60	+100	hand blend			→
263399	MED00002	IVP0000203								
263400	MED00002	IVP0000204								
263401	MED00002	IVP0000205								
263402	MED00002	IVP0000208								
263403	MED00002	IVP0000210								
263404	MED00002	IVP0000211								
263405	MED00002	IVP0000212								
263406	MED00002	IVP0000221								
263407	MED00002	IVP0000222								
263408	MED00002	IVP0000223								
263409	MED00002	IVP0000226								
263410	MED00002	IVP0000227								
263411	MED00002	IVP0000229								
263412	MED00002	IVP0000213								
263413	MED00002	IVP0000214								
263414	MED00002	IVP0000215								
263415	MED00002	IVP0000216								
263416	MED00002	IVP0000217								
263417	MED00002	IVP0000218								
263418	MED00002	IVP0000236								
263419	MED00002	IVP0000240	oily & asphalt	hand grind	≈ 60	hand blend				↓
263420	MED00002	IVP0000241	↓	↓	↓	↓	↓	↓	↓	↓
263421	MED00002	IVP0000242	↓	↓	↓	↓	↓	↓	↓	↓

Entered AS "SAS"
99116143
SLo. 11/2/99

LABORATORY SAMPLE TRACKING RECORD

Requisition: 16822 **Project:** 342303001 **Requestor:** JEFF LIVELY **Building 20** **Received:** 10/29/99

RCVD FROM	RCVD BY	DATE	STORAGE LOCATION	FOR	SAMPLES	CHECK-OUT DATE	INIT	CHECK-IN DATE	INIT	RETURN LOCATION	O	D	E	C	DISPOSAL INIT	DISPOSAL DATE	D	C	W
20	SK	11/1/99	364	AM241	263398-263421	11/1/99	JKB												
				PUISO	263398-263421														
		11/1/99	Rm143	SAS	263398-263421	11/1/99	SK	11/1/99	SK	Rm143									
			364	UISO	263398-263421	11/1/99	JKB												

TYPE CODES: O = Original D = Digest E = Extract C = Consumed

DISPOSAL CODES: D = Discard C = Customer W = Waste Management

SAMPLES RETURNED: SK / ID / 11-12-99
To Sample Plant BY TO DATE

SAMPLE DISPOSITION: ___D ___C ___W _____ / _____
BY DATE

487

Requisition: 16822

Requisition: 16822

Appendix D

Background Sample Data

[redacted]IDE [redacted]IDE[redacted]VER[redacted]CATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: E600: 515622 (#32) Calibration Expires: Inst: 3/23/00 Probe: 10/30/99

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1235	Direct Static Background Measurement	1.5 Minute	516338 (#140)	33.1	Start Shift
BACKGROUND	1236	Direct Static Background Measurement	1.5 Minute		20.6	
BACKGROUND	1237	Direct Static Background Measurement	1.5 Minute		12.4	
BACKGROUND	1336	Direct Static Background Measurement	1.5 Minute		16	After 1 hr use
BACKGROUND	1338	Direct Static Background Measurement	1.5 Minute		16	
BACKGROUND	1340	Direct Static Background Measurement	1.5 Minute		24	
BACKGROUND	1500	Direct Static Background Measurement	1.5 Minute		24.8	Final Check out.

Form IVP-1001, July 1999

Supervisory Review: A Samilton (Print Name) / [signature] (Signature) / 10-5-99 (Date) File Index Number _____

489

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: E600: 515622 (#321) Calibration Expires: ~~INST: 3/23/00~~ Probe 10/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1502	Direct Static Background Measurement	1.5 Minute	516338 (#140)	28.9	Final Checkout
BACKGROUND	1504	Direct Static Background Measurement	1.5 Minute	↓	24.8	↓
BACKGROUND	1604	Direct Static Background Measurement	1.5 Minute	515564 (#109)	11.4	~~AFI Start use~~ Final Checkout
BACKGROUND	1607	Direct Static Background Measurement	1.5 Minute	↓	11	↓
BACKGROUND	1609	Direct Static Background Measurement	1.5 Minute	↓	18	↓
BACKGROUND		Direct Static Background Measurement	1.5 Minute	W		
BACKGROUND		Direct Static Background Measurement	1.5 Minute			

Form IVP-1001, July 1999

Supervisory Review: A. Samilton (Print Name) / [signature] (Signature) / 10-5-99 (Date) File Index Number _____

490

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10-6-99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 5156.22 (#321) Calibration Expires: INST: 3/23/99 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1323	Direct Static Background Measurement	1.5 Minute	5/16338 #140	20.6	START USE
BACKGROUND	1325	Direct Static Background Measurement	1.5 Minute		28.9	
BACKGROUND	1327	Direct Static Background Measurement	1.5 Minute		41.3	
BACKGROUND	1415	Direct Static Background Measurement	1.5 Minute		~~5.3~~ 41.3	After 1 hr USE
BACKGROUND	1420	Direct Static Background Measurement	1.5 Minute		12.4	
BACKGROUND	1422	Direct Static Background Measurement	1.5 Minute		37.2	
BACKGROUND	1545	Direct Static Background Measurement	1.5 Minute		16.6	Final Checkout

Form IVP-1001, July 1999

Supervisory Review: A. Samilton / [signature] / 10-6-99

Print Name Signature Date

File Index Number _____

491

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/6/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: Inst 3/23/00 Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1547	Direct Static Background Measurement	1.5 Minute	S 16338 (#140)	12.4	Final Checkout
BACKGROUND	1549	Direct Static Background Measurement	1.5 Minute	↓	41.3	↓
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute	A		
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute			

Form IVP-1001, July 1999

Supervisory Review: A. Sanitan (Print Name), [signature] (Signature), 10-6-99 (Date) File Index Number

492

[redacted] INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/7/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 (#321) Calibration Expires: INST: 3/23/00 Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	0930	Direct Static Background Measurement	1.5 Minute	S16338 #140	28	First Use
BACKGROUND	0932	Direct Static Background Measurement	1.5 Minute		37	
BACKGROUND	0934	Direct Static Background Measurement	1.5 Minute		24	
BACKGROUND	1005	Direct Static Background Measurement	1.5 Minute		8.3	Final Use
BACKGROUND	1007	Direct Static Background Measurement	1.5 Minute		33	
BACKGROUND	1010	Direct Static Background Measurement	1.5 Minute		24	
BACKGROUND		Direct Static Background Measurement	1.5 Minute			

Form IVP-1001, July 1999

Supervisory Review: A. Sanisław (Print Name) / [signature] (Signature) / 10-7-99 (Date) File Index Number _____

493

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst. 3/23/00 | Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: K Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	0944	Direct Static Background Measurement	1.5 Minute	515564 (#109)	11.73	Initial Checkout.
BACKGROUND	0946	Direct Static Background Measurement	1.5 Minute	↓	8.38	↓
BACKGROUND	0948	Direct Static Background Measurement	1.5 Minute	↓	5.05	↓
BACKGROUND	1046	Direct Static Background Measurement	1.5 Minute	↓	8.18	After 1 hr. use / Final
BACKGROUND	1048	Direct Static Background Measurement	1.5 Minute	↓	11.64	↓
BACKGROUND	1050	Direct Static Background Measurement	1.5 Minute	↓	15.06	↓
BACKGROUND	1325	Direct Static Background Measurement	1.5 Minute	↓	14.48	initial use

Form IVP-1001, July 1999

Supervisory Review: A. Samuelson (Print Name), [signature] (Signature), 10/28/99 (Date) File Index Number

494

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S155622 (#321) Calibration Expires: Instr: 3/23/00 / Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1330	Direct Static Background Measurement	1.5 Minute	S155644 (#109)	18.23	Initial Use
BACKGROUND	1334	Direct Static Background Measurement	1.5 Minute	↓	11.09	↓
BACKGROUND	1443	Direct Static Background Measurement	1.5 Minute	↓	8.15	After 1 hr. Use
BACKGROUND	1448	Direct Static Background Measurement	1.5 Minute	↓	14.91	↓
BACKGROUND	1448	Direct Static Background Measurement	1.5 Minute	↓	14.626	↓
BACKGROUND	1527 ~~1515~~	Direct Static Background Measurement	1.5 Minute	↓	18.48	Final
BACKGROUND	1530	Direct Static Background Measurement	1.5 Minute	↓	15.16	↓

Form IVP-1001, July 1999

Supervisory Review: _____ / _____ / _____ File Index Number _____

Print Name Signature Date

495

INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S156022 (#321) Calibration Expires: Inst: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1532	Direct Static Background Measurement	1.5 Minute	S155564 (#109)	15.22	Final
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute	N		
BACKGROUND		Direct Static Background Measurement	1.5 Minute	A		
BACKGROUND		Direct Static Background Measurement	1.5 Minute			
BACKGROUND		Direct Static Background Measurement	1.5 Minute			

10/26/99

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Supervisory Review: _____ / _____ / _____
Print Name / Signature / Date

File Index Number _____

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INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/27/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 / Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	1240	Direct Static Background Measurement	1.5 Minute	515564 (#109)	17.95	pre-post media Initial Checkout
BACKGROUND	1245	Direct Static Background Measurement	1.5 Minute	↓	7.64	↓
BACKGROUND	1249	Direct Static Background Measurement	1.5 Minute	↓	7.90	↓
BACKGROUND	1314	Direct Static Background Measurement	1.5 Minute	515564 (#109)	7.84	Final
BACKGROUND	1316	Direct Static Background Measurement	1.5 Minute	↓	4.29	↓
BACKGROUND	1318	Direct Static Background Measurement	1.5 Minute	↓	4.16	↓
BACKGROUND		Direct Static Background Measurement	1.5 Minute	↓	10/27/99	↓

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Supervisory Review: _____ / _____ / _____
Print Name / Signature / Date

File Index Number _____

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INDEPENDENT VERIFICATION INSTRUMENT BACKGROUND DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/28/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 / Probe: 6/30/99

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include reason for background measurement)
BACKGROUND	0921	Direct Static Background Measurement	1.5 Minute	515564 (#109)	21.5	Initial Checkout
BACKGROUND	0924	Direct Static Background Measurement	1.5 Minute		14.48	
BACKGROUND	0926	Direct Static Background Measurement	1.5 Minute		21.4	
BACKGROUND	0945	Direct Static Background Measurement	1.5 Minute		11.44	Final
BACKGROUND	0947	Direct Static Background Measurement	1.5 Minute		14.73	
BACKGROUND	0949	Direct Static Background Measurement	1.5 Minute		14.80	
BACKGROUND		Direct Static Background Measurement	1.5 Minute	KT	10/28/99	

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Supervisory Review: _____ / _____ / _____ File Index Number _____

Print Name Signature Date

498

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: INST: 3/23/00 Probe: 6/30/0

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1245	Direct Static Measurement Response Check	1.5 Minute	S16338 (#140)	1861	✓		Start Use
RESP/CHECK	1246	Direct Static Measurement Response Check	1.5 Minute		1899	✓		
RESP/CHECK	1248	Direct Static Measurement Response Check	1.5 Minute		~~1892~~ KT 1891	✓		
RESP/CHECK	1342	Direct Static Measurement Response Check	1.5 Minute		1864	✓		After 1hr Use
RESP/CHECK	1344	Direct Static Measurement Response Check	1.5 Minute		1820	✓		
RESP/CHECK	1350	Direct Static Measurement Response Check	1.5 Minute		1700	✓		
RESP/CHECK	1505	Direct Static Measurement Response Check	1.5 Minute		1609	✓		Final Checkout

Form IVP-1002, July 1999

Supervisory Review: A. Samitson (Print Name) / (Signature) / 10-7-99 (Date) File Index Number

494

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15022 Calibration Expires: INST: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1508	Direct Static Measurement Response Check	1.5 Minute	S16338 (#140)	1684	✓		
RESP/CHECK	1510	Direct Static Measurement Response Check	1.5 Minute	↓	1746	✓		
RESP/CHECK	1514	Direct Static Measurement Response Check	1.5 Minute	S15564 (#109)	1547	✓		First Use
RESP/CHECK	1516	Direct Static Measurement Response Check	1.5 Minute	↓	1643	✓		↓
RESP/CHECK	1519	Direct Static Measurement Response Check	1.5 Minute	↓	1496	✓		↓
RESP/CHECK	1617 ~~1604~~ KK	Direct Static Measurement Response Check	1.5 Minute	↓	1533	✓		After 1 hr. Final Use
RESP/CHECK	1615 KK ~~1607~~	Direct Static Measurement Response Check	1.5 Minute	↓	1605	✓		↓

Form IVP-1002, July 1999

Supervisory Review: A. Samuelson (Print Name) / [signature] (Signature) / 10-7-99 (Date) File Index Number

500

[redacted]EP[redacted]EN[redacted]ERIF[redacted]TIO[redacted]IST[redacted]MEN[redacted]RES[redacted]ONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/5/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 Calibration Expires: INST: 3/23/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1618	Direct Static Measurement Response Check	1.5 Minute	S15564 (#140)	1557	✓		Final Use
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute	N/A				
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					

Form IVP-1002, July 1999

Supervisory Review: A Samilson (Print Name) / [signature] (Signature) / 10-7-99 (Date)

File Index Number

501

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10-6-99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: INST: 2/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathey Thompson Signature: Kathy Thompson BT

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1329	Direct Static Measurement Response Check	1.5 Minute	S 16338 #140	1854	✓		START USE
RESP/CHECK	1333	Direct Static Measurement Response Check	1.5 Minute		1899	✓		
RESP/CHECK	1335	Direct Static Measurement Response Check	1.5 Minute		1899	✓		
RESP/CHECK	1424	Direct Static Measurement Response Check	1.5 Minute		1866	✓		After 1hr USE
RESP/CHECK	1426	Direct Static Measurement Response Check	1.5 Minute		1914	✓		
RESP/CHECK	1430	Direct Static Measurement Response Check	1.5 Minute		1911	✓		
RESP/CHECK	1552	Direct Static Measurement Response Check	1.5 Minute		1783	✓		Final Checkout

Form IVP-1002, July 1999

Supervisory Review: A. Samilton (Print Name) / (Signature) / 10-7-99 (Date) File Index Number

502

[redacted]EPENDENT[redacted]RIF[redacted]TIO[redacted]IST[redacted]MEN[redacted]ES[redacted]SE[redacted]ECH[redacted]TA[redacted]EET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/6/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 (#321) Calibration Expires: Inst 3/23/00 Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1554	Direct Static Measurement Response Check	1.5 Minute	S 16338 (#140)	1783	✓		Final Checkout
RESP/CHECK	1556	Direct Static Measurement Response Check	1.5 Minute	↓	1791			↓
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute	N/A				
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					

Form IVP-1002, July 1999

Supervisory Review: A. Hamilton (Print Name) / (Signature) / 10-7-99 (Date) File Index Number

503

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/7/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 315622 (#321) Calibration Expires: INST: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	0937	Direct Static Measurement Response Check	1.5 Minute	S 16338 #140	1787	✓		First Use
RESP/CHECK	0940	Direct Static Measurement Response Check	1.5 Minute		1833	✓		
RESP/CHECK	0942	Direct Static Measurement Response Check	1.5 Minute		1858	✓		
RESP/CHECK	1013	Direct Static Measurement Response Check	1.5 Minute		1547	✓		Final Use
RESP/CHECK	1015	Direct Static Measurement Response Check	1.5 Minute		1498			
RESP/CHECK	1018	Direct Static Measurement Response Check	1.5 Minute		1609			
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute	N/A				

Form IVP-1002, July 1999

Supervisory Review: A. Hamilton / [signature] / 10-7-99

Print Name / Signature / Date

File Index Number

504

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst. 3/23/00 / Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check/measurement)
RESP/CHECK	0951	Direct Static Measurement Response Check	1.5 Minute	S 15564 (#109)	16446	✓		Initial Checkout
RESP/CHECK	0953	Direct Static Measurement Response Check	1.5 Minute		1379	✓		
RESP/CHECK	0956	Direct Static Measurement Response Check	1.5 Minute		1571	✓		
RESP/CHECK	1102 ~~1002KT~~	Direct Static Measurement Response Check	1.5 Minute		1489	✓		After 1 hr use/Final
RESP/CHECK	1105 ~~700KT~~	Direct Static Measurement Response Check	1.5 Minute		1512	✓		
RESP/CHECK	1107	Direct Static Measurement Response Check	1.5 Minute		1434	✓		
RESP/CHECK	1338	Direct Static Measurement Response Check	1.5 Minute		1512	✓		Initial Use

Form IVP-1002, July-1999

Supervisory Review: A. Samilton / [signature] / 10/28/99

Print Name Signature Date

505

File Index Number

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 / Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	1341	Direct Static Measurement Response Check	1.5 Minute	515564 (#109)	1461	✓		Initial Use
RESP/CHECK	1343	Direct Static Measurement Response Check	1.5 Minute		1581	✓		
RESP/CHECK	1450 ~~1349~~	Direct Static Measurement Response Check	1.5 Minute		1420	✓		After 1 hr. Use
RESP/CHECK	1453	Direct Static Measurement Response Check	1.5 Minute		1324	✓		
RESP/CHECK	1455	Direct Static Measurement Response Check	1.5 Minute		1448	✓		
RESP/CHECK	1536	Direct Static Measurement Response Check	1.5 Minute		1502	✓		Final
RESP/CHECK	1538	Direct Static Measurement Response Check	1.5 Minute		1393	✓		

Form IVP-1002, July 1999

Supervisory Review: H. Samilson / D Samilson / 10/28/99

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Print Name Signature Date

File Index Number

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst. 3/23/00 / Probe: 6/30/99

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept? YES	Accept? NO	Comments (Include reason for response check measurement)
RESP/CHECK	1540	Direct Static Measurement Response Check	1.5 Minute	515564 (#109)	1455	✓		Final
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute					KC 10/26/99

Form IVP-1002, July 1999

Supervisory Review: A. SAMUELSON / [signature] / 10/28/99

Print Name Signature Date

File Index Number

507

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/27/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 / Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample ID No. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	~~1247~~ 1257	Direct Static Measurement Response Check	1.5 Minute	515564 (#109)	1545	✓		pre-post media Initial Checkout
RESP/CHECK	1255	Direct Static Measurement Response Check	1.5 Minute	↓	1488	✓		↓
RESP/CHECK	1257	Direct Static Measurement Response Check	1.5 Minute	↓	1581	✓		↓
RESP/CHECK	1320	Direct Static Measurement Response Check	1.5 Minute	515564 (#109)	1639	✓		Final
RESP/CHECK	1322	Direct Static Measurement Response Check	1.5 Minute	↓	1625	✓		↓
RESP/CHECK	1324	Direct Static Measurement Response Check	1.5 Minute	↓	1382	✓		↓
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute		10/27/99			

Form IVP-1002, July 1999

Supervisory Review: A. SAMILTAN (Print Name) / A Samilton (Signature) / 10/28/99 (Date) File Index Number 508

INDEPENDENT VERIFICATION INSTRUMENT RESPONSE CHECK DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/28/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: ~~S155[illegible]~~ S15622 (#321) Calibration Expires: Inst: 3/23/00 / Probe

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample IDNo. (Affix or Record Background Bar Code)	Time	Measurement Type	Static Count Time (minutes)	HP-100 Probe ID#	GROSS Instrument Reading (dpm/100 cm²)	Accept YES	Accept NO	Comments (Include reason for response check measurement)
RESP/CHECK	0928	Direct Static Measurement Response Check	1.5 Minute	S15564 (#109)	1516	✓		Initial Checkout
RESP/CHECK	0930	Direct Static Measurement Response Check	1.5 Minute	↓	1458	✓		↓
RESP/CHECK	0932	Direct Static Measurement Response Check	1.5 Minute	↓	1578	✓		↓
RESP/CHECK	0952	Direct Static Measurement Response Check	1.5 Minute	↓	1468	✓		Final
RESP/CHECK	0954	Direct Static Measurement Response Check	1.5 Minute	↓	1536	✓		↓
RESP/CHECK	0956	Direct Static Measurement Response Check	1.5 Minute	↓	1526	✓		↓
RESP/CHECK		Direct Static Measurement Response Check	1.5 Minute	↓	↓			↓

10/28/99

Form IVP-1002, July 1999

Supervisory Review: A. Sanchez / [signature] / 10/28/99

Print Name / Signature / Date

File Index Number

509

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct. 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: Inst: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000201	1311	Direct Static Measurement	S16338 (#140)	1.5 Minute	24 dpm/100cm	~~Addit~~ Concrete - Tile Adhesive
IVP0000202	1313	Direct Static Measurement	↓	1.5 Minute	20	↓ Concrete
IVP0000203	1315	Direct Static Measurement	↓	1.5 Minute	16	Concrete - Tile Adhesive
IVP0000204	1317	Direct Static Measurement	↓	1.5 Minute	41	↓
IVP0000205	1320	Direct Static Measurement	↓	1.5 Minute	28	Concrete
IVP0000206	1322	Direct Static Measurement	↓	1.5 Minute	16	~~Addo~~ Concrete Block
dup IVP0000206	1324	Direct Static Measurement	↓	1.5 Minute	16	↓

Form IVP-1000, July 1999

Supervisory Review: ART SANCHEZ / [signature] / 10-7-99

Print Name / Signature / Date

File Index Number _____

510

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Last: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000207	1327	Direct Static Measurement	516338 (#140)	1.5 Minute	12	Concrete Block
IVP0000208	1330	Direct Static Measurement	"	1.5 Minute	4	Painted Concrete Block
IVP0000209	1332	Direct Static Measurement	"	1.5 Minute	20	Concrete Block
IVP0000210	1334	Direct Static Measurement	"	1.5 Minute	4	Painted Concrete Block
IVP0000211	1336	Direct Static Measurement	"	1.5 Minute	16	Painted ~~Concrete~~ KS Concrete Block
IVP0000212	1427	Direct Static Measurement	"	1.5 Minute	20	Concrete
dup IVP0000212	1430	Direct Static Measurement	"	1.5 Minute	28	"

Form IVP-1000, July 1999

Supervisory Review: Art Sanchez / [signature] / 10-7-99

Print Name Signature Date

File Index Number

511

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building | Survey Unit: 779-21 | Date: Oct 5, 1999

Instrument Model Number: Eberline, E 600 | Instrument ID Number: S15622 (#321) | Calibration Expires: Inst: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 | Operator Name: Kathy Thompson | Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000213	1433	Direct Static Measurement	S16338 (#140)	1.5 Minute	20.7 ~~28~~	Recounted on 10/6/99 due to logging error 13:54 hrs Concrete
IVP0000214	1437	Direct Static Measurement	↓	1.5 Minute	20.6 ~~28~~	11 1357 hrs Concrete
IVP0000215	1531	Direct Static Measurement	S 15564 (#109)	1.5 Minute	10.7	Concrete
IVP0000216	1533	Direct Static Measurement	↓	1.5 Minute	13.9	↓
IVP0000217	1535	Direct Static Measurement	↓	1.5 Minute	3.9	↓
IVP0000218	1537	Direct Static Measurement	↓	1.5 Minute	10.6	↓
Dup. IVP0000218	1540	Direct Static Measurement	↓	1.5 Minute	13.9	↓

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Supervisory Review: A. SAMILJAN / [signature] / 10-7-99

Print Name / Signature / Date

File Index Number

542

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/5/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 Calibration Expires: Inst: 3/23/00 Probe 2e/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000219	1555	Direct Static Measurement	515564 (#109)	1.5 Minute	13.9	Concrete
IVP0000220	1559	Direct Static Measurement	↓	1.5 Minute	13.9	↓
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		

N/A

Form IVP-1000, July 1999

Supervisory Review: A. Samuelson / [signature] / 10-7-99

Print Name Signature Date

File Index Number

513

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10-6-99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 (#321) Calibration Expires: INST 3/23/00 PROBE: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000221	1500	Direct Static Measurement	S16338 #140	1.5 Minute	16.6	Painted Cinder Block
IVP0000222	1502	Direct Static Measurement		1.5 Minute	8.3	"
IVP0000223	1408	Direct Static Measurement		1.5 Minute	4.1	"
IVP0000224	1410	Direct Static Measurement		1.5 Minute	16.6	Cinder Block
IVP0000225	1412	Direct Static Measurement		1.5 Minute	20.6	Cinder Block
IVP0000226	1415	Direct Static Measurement		1.5 Minute	41.3	Cinder Block
DUP IVP0000226	1417	Direct Static Measurement		1.5 Minute	16.55	"

Form IVP-1000, July 1999

Supervisory Review: A. Samilson (Print Name) / (Signature) / 10-7-99 (Date) File Index Number

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INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10-6-99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: INST: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000227	1531	Direct Static Measurement	S16338 #140	1.5 Minute	78.6	Cinder Block
IVP0000228	1533	Direct Static Measurement		1.5 Minute	12.42	Concrete
IVP0000229	1535	Direct Static Measurement		1.5 Minute	33.1	Concrete
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		

Form IVP-1000, July 1999

Supervisory Review: A. Samilton / [signature] / 10-7-99

Print Name Signature Date

File Index Number

515

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10-6-99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 (#321) Calibration Expires: Inst: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000212	1412	Direct Static Measurement	S 16338 #140	1.5 Minute	33.1	Post Media Sample
IVP0000201	1435	Direct Static Measurement		1.5 Minute	28.9	
IVP0000203	1438	Direct Static Measurement		1.5 Minute	14.6	
IVP0000204	1440	Direct Static Measurement		1.5 Minute	33.1	
IVP0000205	1442	Direct Static Measurement		1.5 Minute	20.6	
IVP0000208	1444	Direct Static Measurement		1.5 Minute	24.8	
~~IVP0000209~~ IVP0000210	1446	Direct Static Measurement		1.5 Minute	4.1	

Form IVP-1000, July 1999

Supervisory Review: A. Samilson (Print Name), (Signature), 10-7-99 (Date) File Index Number

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INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/6/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 Probe: 6/30/00 KT

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm / 100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000211	1449	Direct Static Measurement	516338 #140	1.5 Minute	20.6	Post Media Sample
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement	N	1.5 Minute		
		Direct Static Measurement	A	1.5 Minute		
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		

Form IVP-1000, July 1999

Supervisory Review: A. Sanchez / [signature] / 10-7-99

Print Name Signature Date

File Index Number

517

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-21 Date: 10/7/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: INST: 3/22/00 Probe 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location# or Sample ID# (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000221	0945	Direct Static Measurement	516338 #140	1.5 Minute	33.1	Post Media Sample
IVP0000222	0950	Direct Static Measurement		1.5 Minute	12.4	
IVP0000223	0953	Direct Static Measurement		1.5 Minute	20.6	
IVP0000226	0957	Direct Static Measurement		1.5 Minute	20.6	
IVP0000227	1000	Direct Static Measurement		1.5 Minute	24.8	
IVP0000229	1003	Direct Static Measurement		1.5 Minute	4.1	
		Direct Static Measurement	N/A	1.5 Minute		

Form IVP-1000, July 1999

Supervisory Review: A. Samiljan (Print Name), A. Samiljan (Signature), 10-7-99 (Date) File Index Number

518

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S155622 (#321) Calibration Expires: Inst: 3/23/00 / Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Jay Cameron Signature: Jay Cameron

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000231	1012	Direct Static Measurement	J 155564 (#109)	1.5 Minute	20.7	Concrete
IVP0000232	1014	Direct Static Measurement		1.5 Minute	20.7	
IVP0000233	1016	Direct Static Measurement		1.5 Minute	3.38	
IVP0000234	1019	Direct Static Measurement		1.5 Minute	7.0	
IVP0000235	1021	Direct Static Measurement		1.5 Minute	20.5	
IVP0000236	1023	Direct Static Measurement		1.5 Minute	20.4	
Duplicate IVP0000236	1026	Direct Static Measurement		1.5 Minute	27.4	

Form IVP-1000, July 1999

Supervisory Review: A. Somilton (Print Name), [signature] (Signature), 10/28/99 (Date) File Index Number

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INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: Inst: 3/23/00 Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Jay Cameron Signature: Jay Cameron

Sample Location # or Sample ID (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000237	1030	Direct Static Measurement	S15564 (#109)	1.5 Minute	20.5	Concrete
IVP0000238	1034	Direct Static Measurement		1.5 Minute	17.38	
IVP0000239	1037	Direct Static Measurement		1.5 Minute	10.33	
IVP0000240	1039	Direct Static Measurement		1.5 Minute	7.45	Tar on Concrete
IVP0000241	1042	Direct Static Measurement		1.5 Minute	24.6	
IVP0000242	1045	Direct Static Measurement		1.5 Minute	14.30	
Duplicate IVP 0000242	1047	Direct Static Measurement		1.5 Minute	11.05	

Form IVP-1000, July 1999

Supervisory Review: A. Hamilton / A. Hamilton / 10/28/99

Print Name / Signature / Date

File Index Number _____

S20

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S15622 (#321) Calibration Expires: Inst: 3/23/00 / Probe: 6/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Jay Cameron Signature: Jay Cameron

Sample Location# or Sample ID# (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and/or media composition, as applicable)
IVP0000243	1349	Direct Static Measurement	S15564 (#109)	1.5 Minute	17.25	Concrete
IVP0000244	1354	Direct Static Measurement	"	1.5 Minute	17.36	"
IVP0000245	1357	Direct Static Measurement	"	1.5 Minute	17.43	"
IVP0000246	1402	Direct Static Measurement	"	1.5 Minute	20.3	"
IVP0000247	1406	Direct Static Measurement	"	1.5 Minute	10.24	"
IVP0000248	1408	Direct Static Measurement	"	1.5 Minute	13.71	"
Duplicate IVP0000248	1410	Direct Static Measurement	"	1.5 Minute	20.4	"

Form IVP-1000, July 1999

Supervisory Review: R. Samilson / [signature] / 10/28/99

Print Name Signature Date

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File Index Number

INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: 515622 (#321) Calibration Expires: Inst: 3/23/00 | Probe: 10/5/00

Detector Probe Type: Eberline, HP-100 Operator Name: Jay Cameron Signature: Jay Cameron

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP0000249	1414	Direct Static Measurement	515564 (#109)	1.5 Minute	13.60	Concrete
IVP0000250	1435	Direct Static Measurement		1.5 Minute	3.55	
IVP0000251	1440	Direct Static Measurement		1.5 Minute	10.31	
IVP0000252	1502	Direct Static Measurement		1.5 Minute	10.59	
IVP0000253	1504	Direct Static Measurement		1.5 Minute	21.0	
IVP0000254	1506	Direct Static Measurement		1.5 Minute	10.58	
Duplicate IVP0000254	1508	Direct Static Measurement		1.5 Minute	10.51	

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Supervisory Review: A. Samilson (Print Name) / (Signature) / 10/28/99 (Date) File Index Number

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INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/26/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: S 15622 (#321) Calibration Expires: Inst: 3/23/00 / Probe: 10/30/00

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (cpm/100 cm²)	Comments (Include description of surface characteristics and media composition as applicable)
IVP0000255	1510	Direct Static Measurement	S15564 (#109)	1.5 Minute	14.06	Concrete
IVP0000256	1512	Direct Static Measurement		1.5 Minute	11.06	
IVP0000257	1515	Direct Static Measurement		1.5 Minute	13.92	
IVP0000258	1517	Direct Static Measurement		1.5 Minute	21.0	
IVP0000259	1520	Direct Static Measurement		1.5 Minute	17.74	
Duplicate IVP0000259	1523	Direct Static Measurement		1.5 Minute	7.58	
N A	10/26/99	Direct Static Measurement	N A 10/26/99	1.5 Minute		N A 10/26/99

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Supervisory Review: A. Samuelson / [signature] / 10/28/99

Print Name Signature Date

File Index Number

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INDEPENDENT VERIFICATION SURVEY DATA SHEET

Survey Location: RFETS, 779 Cluster / Building Survey Unit: 779-23 Date: 10/28/99

Instrument Model Number: Eberline, E 600 Instrument ID Number: SI5622 (#321) Calibration Expires: Inst: 3/23/99 | Probe 6/30/99

Detector Probe Type: Eberline, HP-100 Operator Name: Kathy Thompson Signature: Kathy Thompson

Sample Location # or Sample ID # (Affix or record Bar Code #)	Time	Sample or Measurement Type	HP-100 Probe ID Number	Static Count Time	GROSS Instrument Reading (dpm/100 cm²)	Comments (Include description of surface characteristics and media composition, as applicable)
IVP 0000236	0935	Direct Static Measurement	SI5564 (#109)	1.5 Minute	30.9	Post Media Sample Reading
IVP 000240	0937	Direct Static Measurement		1.5 Minute	20.9	
IVP 0000241	0939	Direct Static Measurement		1.5 Minute	13.88	
IVP 0000242	0941	Direct Static Measurement		1.5 Minute	7.12	
Duplicate IVP 0000242	0943	Direct Static Measurement		1.5 Minute	3.80	
		Direct Static Measurement		1.5 Minute		
		Direct Static Measurement		1.5 Minute		

KT 10/28/99

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Supervisory Review: A. Sambasivan (Print Name), [signature] (Signature), 10/28/99 (Date) File Index Number

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Appendix E

Background Data Set

Background Data, Building 779, Survey Unit 779-21

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)
BACKGROUND	10/5/99	12:33:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm^2	0.2076	6.9
BACKGROUND	10/5/99	12:36:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3
BACKGROUND	10/5/99	12:38:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6
BACKGROUND	10/5/99	13:47:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4
BACKGROUND	10/5/99	13:48:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4
BACKGROUND	10/5/99	13:50:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1
BACKGROUND	10/5/99	14:53:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1
BACKGROUND	10/5/99	14:55:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm^2	0.2076	6.0
BACKGROUND	10/5/99	14:57:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1
BACKGROUND	10/5/99	16:13:00	321	109	Scaler	Alpha	Gross	11.40	dpm/100cm^2	0.1949	2.2
BACKGROUND	10/5/99	16:15:00	321	109	Scaler	Alpha	Gross	11.30	dpm/100cm^2	0.1949	2.2
BACKGROUND	10/5/99	16:17:00	321	109	Scaler	Alpha	Gross	18.00	dpm/100cm^2	0.1949	3.5
BACKGROUND	10/6/99	13:23:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3
BACKGROUND	10/6/99	13:25:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm^2	0.2076	6.0
BACKGROUND	10/6/99	13:27:00	321	140	Scaler	Alpha	Gross	41.40	dpm/100cm^2	0.2076	8.6
BACKGROUND	10/6/99	14:17:00	321	140	Scaler	Alpha	Gross	41.40	dpm/100cm^2	0.2076	8.6
BACKGROUND	10/6/99	14:19:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6
BACKGROUND	10/6/99	14:21:00	321	140	Scaler	Alpha	Gross	37.20	dpm/100cm^2	0.2076	7.7
BACKGROUND	10/6/99	15:46:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4
BACKGROUND	10/6/99	15:47:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6
BACKGROUND	10/6/99	15:49:00	321	140	Scaler	Alpha	Gross	41.40	dpm/100cm^2	0.2076	8.6
BACKGROUND	10/7/99	9:29:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm2	0.2076	6.0
BACKGROUND	10/7/99	9:31:00	321	140	Scaler	Alpha	Gross	37.20	dpm/100cm2	0.2076	7.7
BACKGROUND	10/7/99	9:33:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm2	0.2076	5.1
BACKGROUND	10/7/99	10:06:00	321	140	Scaler	Alpha	Gross	8.28	dpm/100cm2	0.2076	1.7
BACKGROUND	10/7/99	10:08:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm2	0.2076	6.9
BACKGROUND	10/7/99	10:10:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1

Summary Statistics

Number of Measurements	27
Mean	24.2
Log Normal Mean	21.901964
Median	24.8
Std. Deviation	10.37711
CV	0.4289506

Response Data, Building 779, Survey Unit 779-21

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units
RESP/CHECK	10/5/99	12:56:00	321	140	Scaler	Alpha	Gross	1870.00	dpm/100cm^2
RESP/CHECK	10/5/99	12:59:00	321	140	Scaler	Alpha	Gross	1900.00	dpm/100cm^2
RESP/CHECK	10/5/99	13:10:00	321	140	Scaler	Alpha	Gross	1890.00	dpm/100cm^2
RESP/CHECK	10/5/99	13:54:00	321	140	Scaler	Alpha	Gross	1870.00	dpm/100cm^2
RESP/CHECK	10/5/99	13:56:00	321	140	Scaler	Alpha	Gross	1820.00	dpm/100cm^2
RESP/CHECK	10/5/99	13:59:00	321	140	Scaler	Alpha	Gross	1700.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:03:00	321	140	Scaler	Alpha	Gross	1610.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:04:00	321	140	Scaler	Alpha	Gross	1680.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:06:00	321	140	Scaler	Alpha	Gross	1750.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:11:00	321	109	Scaler	Alpha	Gross	1550.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:15:00	321	109	Scaler	Alpha	Gross	1510.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:17:00	321	109	Scaler	Alpha	Gross	1640.00	dpm/100cm^2
RESP/CHECK	10/5/99	15:18:00	321	109	Scaler	Alpha	Gross	1500.00	dpm/100cm^2
RESP/CHECK	10/5/99	16:20:00	321	109	Scaler	Alpha	Gross	1530.00	dpm/100cm^2
RESP/CHECK	10/5/99	16:22:00	321	109	Scaler	Alpha	Gross	1610.00	dpm/100cm^2
RESP/CHECK	10/5/99	16:23:00	321	109	Scaler	Alpha	Gross	1560.00	dpm/100cm^2
RESP/CHECK	10/5/99	16:26:00	321	109	Scaler	Alpha	Gross	1560.00	dpm/100cm^2
RESP/CHECK	10/6/99	13:33:00	321	140	Scaler	Alpha	Gross	1850.00	dpm/100cm^2
RESP/CHECK	10/6/99	13:35:00	321	140	Scaler	Alpha	Gross	1900.00	dpm/100cm^2
RESP/CHECK	10/6/99	13:37:00	321	140	Scaler	Alpha	Gross	1900.00	dpm/100cm^2
RESP/CHECK	10/6/99	14:23:00	321	140	Scaler	Alpha	Gross	1870.00	dpm/100cm^2
RESP/CHECK	10/6/99	14:25:00	321	140	Scaler	Alpha	Gross	1910.00	dpm/100cm^2
RESP/CHECK	10/6/99	14:32:00	321	140	Scaler	Alpha	Gross	1910.00	dpm/100cm^2
RESP/CHECK	10/6/99	15:51:00	321	140	Scaler	Alpha	Gross	1780.00	dpm/100cm^2
RESP/CHECK	10/6/99	15:53:00	321	140	Scaler	Alpha	Gross	1780.00	dpm/100cm^2
RESP/CHECK	10/6/99	15:54:00	321	140	Scaler	Alpha	Gross	1790.00	dpm/100cm^2
RESP/CHECK	10/7/99	9:35:00	321	140	Scaler	Alpha	Gross	1790.00	dpm/100cm^2
RESP/CHECK	10/7/99	9:35:00	321	140	Scaler	Alpha	Gross	1790.00	dpm/100cm^2
RESP/CHECK	10/7/99	9:38:00	321	140	Scaler	Alpha	Gross	1830.00	dpm/100cm^2
RESP/CHECK	10/7/99	10:14:00	321	140	Scaler	Alpha	Gross	1550.00	dpm/100cm^2
RESP/CHECK	10/7/99	10:16:00	321	140	Scaler	Alpha	Gross	1500.00	dpm/100cm^2
RESP/CHECK	10/7/99	10:18:00	321	140	Scaler	Alpha	Gross	1610.00	dpm/100cm^2

Probe #	Response	-20%	20%
140	1599	1279	1919
109	1631	1305	1957

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Direct Static Surface Contamination Measurements, Building 779, Survey Unit 779-21

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)	Count Time (seconds)
IVP0000201	10/5/99	13:13:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1	90
IVP0000202	10/5/99	13:15:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000203	10/5/99	13:17:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000204	10/5/99	13:20:00	321	140	Scaler	Alpha	Gross	41.40	dpm/100cm^2	0.2076	8.6	90
IVP0000205	10/5/99	13:22:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm^2	0.2076	6.0	90
IVP0000206	10/5/99	13:25:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000207	10/5/99	13:31:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6	90
IVP0000208	10/5/99	13:36:00	321	140	Scaler	Alpha	Gross	4.14	dpm/100cm^2	0.2076	0.9	90
IVP0000209	10/5/99	13:38:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000210	10/5/99	13:41:00	321	140	Scaler	Alpha	Gross	4.14	dpm/100cm^2	0.2076	0.9	90
IVP0000211	10/5/99	13:44:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000212	10/5/99	14:14:00	321	140	Scaler	Alpha	Gross	24.85	dpm/100cm^2	0.2076	5.2	90
IVP0000213	10/6/99	13:54:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000214	10/6/99	13:56:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000215	10/5/99	15:28:00	321	109	Scaler	Alpha	Gross	10.80	dpm/100cm^2	0.1947	2.1	90
IVP0000216	10/5/99	15:30:00	321	109	Scaler	Alpha	Gross	13.90	dpm/100cm^2	0.1947	2.7	90
IVP0000217	10/5/99	15:33:00	321	109	Scaler	Alpha	Gross	3.90	dpm/100cm^2	0.1947	0.8	90
IVP0000218	10/5/99	15:35:00	321	109	Scaler	Alpha	Gross	12.25	dpm/100cm^2	0.1947	2.4	90
IVP0000219	10/5/99	16:01:00	321	109	Scaler	Alpha	Gross	14.00	dpm/100cm^2	0.1947	2.7	90
IVP0000220	10/5/99	16:06:00	321	109	Scaler	Alpha	Gross	13.90	dpm/100cm^2	0.1947	2.7	90
IVP0000221	10/6/99	15:02:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000222	10/6/99	15:07:00	321	140	Scaler	Alpha	Gross	8.28	dpm/100cm^2	0.2076	1.7	90
IVP0000223	10/6/99	15:10:00	321	140	Scaler	Alpha	Gross	4.14	dpm/100cm^2	0.2076	0.9	90
IVP0000224	10/6/99	15:15:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000225	10/6/99	15:23:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000226	10/6/99	15:25:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm^2	0.2076	6.0	90
IVP0000227	10/6/99	15:31:00	321	140	Scaler	Alpha	Gross	78.60	dpm/100cm^2	0.2076	16.3	90
IVP0000228	10/6/99	15:35:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6	90
IVP0000229	10/6/99	15:42:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm^2	0.2076	6.9	90

Mean Of Replicate Measurements

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Post Surface Media Sampling Direct Static Surface Measurements, Building 779, Survey Unit 779-21

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)	Count Time (seconds)
IVP0000201	10/6/99	14:36:00	321	140	Scaler	Alpha	Gross	29.00	dpm/100cm^2	0.2076	6.0	90
IVP0000203	10/6/99	14:39:00	321	140	Scaler	Alpha	Gross	16.60	dpm/100cm^2	0.2076	3.4	90
IVP0000204	10/6/99	14:41:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm^2	0.2076	6.9	90
IVP0000205	10/6/99	14:43:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000208	10/6/99	14:45:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1	90
IVP0000210	10/6/99	14:48:00	321	140	Scaler	Alpha	Gross	4.14	dpm/100cm^2	0.2076	0.9	90
IVP0000211	10/6/99	14:51:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000212	10/6/99	14:11:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm^2	0.2076	6.9	90
IVP0000221	10/7/99	9:46:00	321	140	Scaler	Alpha	Gross	33.10	dpm/100cm^2	0.2076	6.9	90
IVP0000222	10/7/99	9:50:00	321	140	Scaler	Alpha	Gross	12.40	dpm/100cm^2	0.2076	2.6	90
IVP0000223	10/7/99	9:53:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000226	10/7/99	9:56:00	321	140	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.2076	4.3	90
IVP0000227	10/7/99	10:00:00	321	140	Scaler	Alpha	Gross	24.80	dpm/100cm^2	0.2076	5.1	90
IVP0000229	10/7/99	10:03:00	321	140	Scaler	Alpha	Gross	4.14	dpm/100cm^2	0.2076	0.9	90

Surface Media Sample Data, Survey Unit 779-21
Alpha Isotopic Analysis

Sample Location	Sample ID #	Lab Sample ID #	Sample Weight (grams)	Date Collected MM/DD/YY	Time Collected	Units	Am-241		Pu-238		Pu-239/240		U-234	U-235		U-238	Total Transuranic Activity (dpm/100 cm^2)	Total Uranium Activity (dpm/100 cm^2)
							Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value		
IVP0000201	MED0000201	263398	21.10	10/06/99	12:28	dpm/100 cm^2	2.02	2.02	0.38	0.19	1.28	1.28	67.91	2.38	2.38	70.53	3.49	140.82
IVP0000203	MED0000203	263399	13.57	10/06/99	12:37	dpm/100 cm^2	2.60	2.60	0.61	0.31	2.90	2.90	25.47	1.69	0.85	23.94	5.81	50.26
IVP0000204	MED0000204	263400	15.60	10/06/99	12:50	dpm/100 cm^2	2.92	2.92	0.58	0.29	1.27	1.27	33.60	2.12	2.12	33.51	4.48	69.23
IVP0000205	MED0000205	263401	24.35	10/06/99	12:56	dpm/100 cm^2	1.11	1.11	0.35	0.18	1.02	0.51	44.40	2.71	2.71	45.19	1.80	92.30
IVP0000208	MED0000208	263402	19.52	10/06/99	13:04	dpm/100 cm^2	1.18	1.18	1.07	0.54	1.13	1.13	30.73	2.11	2.11	33.00	2.85	65.84
IVP0000210	MED0000210	263403	3.39	10/06/99	13:10	dpm/100 cm^2	0.41	0.41	0.21	0.11	0.82	0.82	0.52	0.23	0.12	0.56	1.34	1.20
IVP0000211	MED0000211	263404	21.94	10/06/99	13:16	dpm/100 cm^2	1.74	1.74	0.89	0.45	1.28	0.64	39.80	1.90	1.90	43.64	2.83	85.34
IVP0000212	MED0000212	263405	23.33	10/06/99	13:20	dpm/100 cm^2	0.87	0.44	1.02	0.51	1.12	0.56	33.89	1.58	0.79	36.10	1.51	70.78
IVP0000221	MED0000221	263406	16.75	10/06/99	15:40	dpm/100 cm^2	0.50	0.50	0.28	0.14	0.95	0.48	25.49	1.28	0.64	22.53	1.12	48.66
IVP0000222	MED0000222	263407	21.64	10/06/99	15:44	dpm/100 cm^2	0.48	0.48	1.31	0.66	1.08	0.54	40.67	3.16	3.16	35.28	1.68	79.11
IVP0000223	MED0000223	263408	21.91	10/06/99	15:50	dpm/100 cm^2	2.42	2.42	0.96	0.48	0.96	0.48	37.24	2.59	1.30	40.26	3.38	78.80
IVP0000226	MED0000226	263409	16.45	10/06/99	15:56	dpm/100 cm^2	1.39	1.39	0.61	0.31	0.78	0.78	34.57	3.04	1.52	36.09	2.48	72.18
IVP0000227	MED0000227	263410	15.44	10/06/99	16:00	dpm/100 cm^2	6.28	6.28	0.50	0.50	27.58	27.58	32.44	1.45	1.45	33.88	34.36	67.77
IVP0000229	MED0000229	263411	9.76	10/06/99	16:04	dpm/100 cm^2	0.40	0.20	0.37	0.19	0.37	0.19	18.33	1.14	0.57	18.33	0.57	37.23

Background Data, Building 779, Survey Unit 779-23

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)
BACKGROUND	10/26/99	9:40:00	321	109	Scaler	Alpha	Gross	11.70	dpm/100cm^2	0.1949	2.3
BACKGROUND	10/26/99	9:42:00	321	109	Scaler	Alpha	Gross	8.39	dpm/100cm^2	0.1949	1.6
BACKGROUND	10/26/99	9:43:00	321	109	Scaler	Alpha	Gross	5.06	dpm/100cm^2	0.1949	1.0
BACKGROUND	10/26/99	10:44:00	321	109	Scaler	Alpha	Gross	8.18	dpm/100cm^2	0.1949	1.6
BACKGROUND	10/26/99	10:46:00	321	109	Scaler	Alpha	Gross	11.60	dpm/100cm^2	0.1949	2.3
BACKGROUND	10/26/99	10:49:00	321	109	Scaler	Alpha	Gross	15.10	dpm/100cm^2	0.1949	2.9
BACKGROUND	10/26/99	13:25:00	321	109	Scaler	Alpha	Gross	14.50	dpm/100cm^2	0.1949	2.8
BACKGROUND	10/26/99	13:31:00	321	109	Scaler	Alpha	Gross	18.20	dpm/100cm^2	0.1949	3.5
BACKGROUND	10/26/99	13:33:00	321	109	Scaler	Alpha	Gross	11.10	dpm/100cm^2	0.1949	2.2
BACKGROUND	10/26/99	14:39:00	321	109	Scaler	Alpha	Gross	8.16	dpm/100cm^2	0.1949	1.6
BACKGROUND	10/26/99	14:42:00	321	109	Scaler	Alpha	Gross	14.90	dpm/100cm^2	0.1949	2.9
BACKGROUND	10/26/99	14:44:00	321	109	Scaler	Alpha	Gross	14.70	dpm/100cm^2	0.1949	2.9
BACKGROUND	10/26/99	15:24:00	321	109	Scaler	Alpha	Gross	18.50	dpm/100cm^2	0.1949	3.6
BACKGROUND	10/26/99	15:25:00	321	109	Scaler	Alpha	Gross	15.20	dpm/100cm^2	0.1949	3.0
BACKGROUND	10/26/99	15:29:00	321	109	Scaler	Alpha	Gross	15.20	dpm/100cm^2	0.1949	3.0
BACKGROUND	10/27/99	12:46:00	321	109	Scaler	Alpha	Gross	7.64	dpm/100cm^2	0.1949	1.5
BACKGROUND	10/27/99	12:46:00	321	109	Scaler	Alpha	Gross	7.64	dpm/100cm^2	0.1949	1.5
BACKGROUND	10/27/99	12:48:00	321	109	Scaler	Alpha	Gross	7.91	dpm/100cm^2	0.1949	1.5
BACKGROUND	10/27/99	13:09:00	321	109	Scaler	Alpha	Gross	7.84	dpm/100cm^2	0.1949	1.5
BACKGROUND	10/27/99	13:11:00	321	109	Scaler	Alpha	Gross	4.29	dpm/100cm^2	0.1949	0.8
BACKGROUND	10/27/99	13:13:00	321	109	Scaler	Alpha	Gross	4.16	dpm/100cm^2	0.1949	0.8
BACKGROUND	10/28/99	9:17:00	321	109	Scaler	Alpha	Gross	21.50	dpm/100cm^2	0.1949	4.2
BACKGROUND	10/28/99	9:20:00	321	109	Scaler	Alpha	Gross	14.50	dpm/100cm^2	0.1949	2.8
BACKGROUND	10/28/99	9:22:00	321	109	Scaler	Alpha	Gross	21.40	dpm/100cm^2	0.1949	4.2
BACKGROUND	10/28/99	9:41:00	321	109	Scaler	Alpha	Gross	11.40	dpm/100cm^2	0.1949	2.2
BACKGROUND	10/28/99	9:42:00	321	109	Scaler	Alpha	Gross	14.70	dpm/100cm^2	0.1949	2.9
BACKGROUND	10/28/99	9:46:00	321	109	Scaler	Alpha	Gross	14.80	dpm/100cm^2	0.1949	2.9

Summary Statistics

Number of Measurements	27
Mean	12.2
Log Normal Mean	10.98497
Median	11.7
Std. Deviation	4.938474
CV	0.406186

Response Data, Building 779, Survey Unit 779-23

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units
RESP/CHECK	10/26/99	9:46:00	321	109	Scaler	Alpha	Gross	1650	dpm/100cm^2
RESP/CHECK	10/26/99	9:47:00	321	109	Scaler	Alpha	Gross	1380	dpm/100cm^2
RESP/CHECK	10/26/99	9:52:00	321	109	Scaler	Alpha	Gross	1570	dpm/100cm^2
RESP/CHECK	10/26/99	10:58:00	321	109	Scaler	Alpha	Gross	1490	dpm/100cm^2
RESP/CHECK	10/26/99	11:00:00	321	109	Scaler	Alpha	Gross	1510	dpm/100cm^2
RESP/CHECK	10/26/99	11:01:00	321	109	Scaler	Alpha	Gross	1430	dpm/100cm^2
RESP/CHECK	10/26/99	13:35:00	321	109	Scaler	Alpha	Gross	1510	dpm/100cm^2
RESP/CHECK	10/26/99	13:37:00	321	109	Scaler	Alpha	Gross	1460	dpm/100cm^2
RESP/CHECK	10/26/99	13:38:00	321	109	Scaler	Alpha	Gross	1580	dpm/100cm^2
RESP/CHECK	10/26/99	14:46:00	321	109	Scaler	Alpha	Gross	1420	dpm/100cm^2
RESP/CHECK	10/26/99	14:48:00	321	109	Scaler	Alpha	Gross	1320	dpm/100cm^2
RESP/CHECK	10/26/99	14:50:00	321	109	Scaler	Alpha	Gross	1450	dpm/100cm^2
RESP/CHECK	10/26/99	15:32:00	321	109	Scaler	Alpha	Gross	1500	dpm/100cm^2
RESP/CHECK	10/26/99	15:33:00	321	109	Scaler	Alpha	Gross	1390	dpm/100cm^2
RESP/CHECK	10/26/99	15:35:00	321	109	Scaler	Alpha	Gross	1460	dpm/100cm^2
RESP/CHECK	10/27/99	12:52:00	321	109	Scaler	Alpha	Gross	1540	dpm/100cm^2
RESP/CHECK	10/27/99	12:54:00	321	109	Scaler	Alpha	Gross	1490	dpm/100cm^2
RESP/CHECK	10/27/99	12:56:00	321	109	Scaler	Alpha	Gross	1580	dpm/100cm^2
RESP/CHECK	10/27/99	13:14:00	321	109	Scaler	Alpha	Gross	1640	dpm/100cm^2
RESP/CHECK	10/27/99	13:16:00	321	109	Scaler	Alpha	Gross	1630	dpm/100cm^2
RESP/CHECK	10/27/99	13:18:00	321	109	Scaler	Alpha	Gross	1380	dpm/100cm^2
RESP/CHECK	10/28/99	9:24:00	321	109	Scaler	Alpha	Gross	1520	dpm/100cm^2
RESP/CHECK	10/28/99	9:25:00	321	109	Scaler	Alpha	Gross	1460	dpm/100cm^2
RESP/CHECK	10/28/99	9:27:00	321	109	Scaler	Alpha	Gross	1580	dpm/100cm^2
RESP/CHECK	10/28/99	9:47:00	321	109	Scaler	Alpha	Gross	1470	dpm/100cm^2
RESP/CHECK	10/28/99	9:49:00	321	109	Scaler	Alpha	Gross	1540	dpm/100cm^2
RESP/CHECK	10/28/99	9:51:00	321	109	Scaler	Alpha	Gross	1530	dpm/100cm^2

Probe #	Response	-20%	20%
140	1599	1279	1919
109	1631	1305	1957

Direct Static Surface Contamination Measurements, Building 779, Survey Unit 779-23

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)	Count Time (seconds)
IVP0000231	10/26/99	10:08:00	321	109	Scaler	Alpha	Gross	20.80	dpm/100cm^2	0.1947	4.0	90
IVP0000232	10/26/99	10:10:00	321	109	Scaler	Alpha	Gross	20.70	dpm/100cm^2	0.1947	4.0	90
IVP0000233	10/26/99	10:12:00	321	109	Scaler	Alpha	Gross	3.38	dpm/100cm^2	0.1947	0.7	90
IVP0000234	10/26/99	10:16:00	321	109	Scaler	Alpha	Gross	7.00	dpm/100cm^2	0.1947	1.4	90
IVP0000235	10/26/99	10:18:00	321	109	Scaler	Alpha	Gross	20.60	dpm/100cm^2	0.1947	4.0	90
IVP0000236	10/26/99	10:20:00	321	109	Scaler	Alpha	Gross	24.00	dpm/100cm^2	0.1947	4.7	90
IVP0000237	10/26/99	10:27:00	321	109	Scaler	Alpha	Gross	20.50	dpm/100cm^2	0.1947	4.0	90
IVP0000238	10/26/99	10:29:00	321	109	Scaler	Alpha	Gross	17.40	dpm/100cm^2	0.1947	3.4	90
IVP0000239	10/26/99	10:31:00	321	109	Scaler	Alpha	Gross	10.30	dpm/100cm^2	0.1947	2.0	90
IVP0000240	10/26/99	10:34:00	321	109	Scaler	Alpha	Gross	7.45	dpm/100cm^2	0.1947	1.5	90
IVP0000241	10/26/99	10:36:00	321	109	Scaler	Alpha	Gross	24.70	dpm/100cm^2	0.1947	4.8	90
IVP0000242	10/26/99	10:39:00	321	109	Scaler	Alpha	Gross	12.70	dpm/100cm^2	0.1947	2.5	90
IVP0000243	10/26/99	13:45:00	321	109	Scaler	Alpha	Gross	17.30	dpm/100cm^2	0.1947	3.4	90
IVP0000244	10/26/99	13:50:00	321	109	Scaler	Alpha	Gross	17.40	dpm/100cm^2	0.1947	3.4	90
IVP0000245	10/26/99	13:52:00	321	109	Scaler	Alpha	Gross	17.40	dpm/100cm^2	0.1947	3.4	90
IVP0000246	10/26/99	13:58:00	321	109	Scaler	Alpha	Gross	20.40	dpm/100cm^2	0.1947	4.0	90
IVP0000247	10/26/99	14:01:00	321	109	Scaler	Alpha	Gross	10.20	dpm/100cm^2	0.1947	2.0	90
IVP0000248	10/26/99	14:03:00	321	109	Scaler	Alpha	Gross	17.0	dpm/100cm^2	0.1947	3.3	90
IVP0000249	10/26/99	14:10:00	321	109	Scaler	Alpha	Gross	13.60	dpm/100cm^2	0.1947	2.6	90
IVP0000250	10/26/99	14:30:00	321	109	Scaler	Alpha	Gross	3.55	dpm/100cm^2	0.1947	0.7	90
IVP0000251	10/26/99	14:35:00	321	109	Scaler	Alpha	Gross	10.30	dpm/100cm^2	0.1947	2.0	90
IVP0000252	10/26/99	14:57:00	321	109	Scaler	Alpha	Gross	10.60	dpm/100cm^2	0.1947	2.1	90
IVP0000253	10/26/99	14:59:00	321	109	Scaler	Alpha	Gross	21.00	dpm/100cm^2	0.1947	4.1	90
IVP0000254	10/26/99	15:01:00	321	109	Scaler	Alpha	Gross	10.60	dpm/100cm^2	0.1947	2.1	90
IVP0000255	10/26/99	15:06:00	321	109	Scaler	Alpha	Gross	14.10	dpm/100cm^2	0.1947	2.7	90
IVP0000256	10/26/99	15:09:00	321	109	Scaler	Alpha	Gross	10.70	dpm/100cm^2	0.1947	2.1	90
IVP0000257	10/26/99	15:12:00	321	109	Scaler	Alpha	Gross	13.90	dpm/100cm^2	0.1947	2.7	90
IVP0000258	10/26/99	15:13:00	321	109	Scaler	Alpha	Gross	21.00	dpm/100cm^2	0.1947	4.1	90
IVP0000259	10/26/99	15:16:00	321	109	Scaler	Alpha	Gross	12.65	dpm/100cm^2	0.1947	2.5	90

Mean of Replicate Measurements

Post Surface Media Sampling Direct Static Surface Measurements, Building 779, Survey Unit 779-23

Sample Location	Date	Time	E600 Serial #	Probe Serial #	Instrument Operating Mode	Channel Selected	Background Compensation Mode	Recorded Value	Units	Instrument Efficiency	Instrument raw count rate (cpm)	Count Time (seconds)
IVP0000236	10/28/99	9:30:00	321	109	Scaler	Alpha	Gross	30.90	dpm/100cm^2	0.1947	6.0	90
IVP0000240	10/28/99	9:32:00	321	109	Scaler	Alpha	Gross	21.00	dpm/100cm^2	0.1947	4.1	90
IVP0000241	10/28/99	9:34:00	321	109	Scaler	Alpha	Gross	13.90	dpm/100cm^2	0.1947	2.7	90
IVP0000242	10/28/99	9:36:00	321	109	Scaler	Alpha	Gross	5.471	dpm/100cm^2	0.1947	1.1	90

Surface Media Sample Data, Survey Unit 779-23
Alpha Isotopic Analysis

Sample Location	Sample ID #	Lab Sample ID #	Sample Weight (grams)	Date Collected MM/DD/YY	Time Collected	Units	Am-241		Pu-238		Pu-239/240		U-234	U-235		U-238	Total Transuranic Activity (dpm/100 cm^2)	Total Uranium Activity (dpm/100 cm^2)
							Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value	Reported Value	Reported Values w/Samples MDA at 0.5 MDA	Reported Value		
IVP0000236	MED0000236	263418	15.04	10/27/99	11:50	dpm/100 cm^2	0.32	0.32	0.34	0.34	1.05	1.05	22.87	1.48	0.74	24.87	1.71	48.48
IVP0000240	MED0000240	263419	5.22	10/27/99	11:53	dpm/100 cm^2	1.11	1.11	0.29	0.15	0.45	0.45	7.13	1.02	0.51	6.91	1.71	14.55
IVP0000241	MED0000241	263420	5.26	10/27/99	11:57	dpm/100 cm^2	0.31	0.16	0.25	0.13	1.19	1.19	6.26	0.37	0.19	6.86	1.47	13.31
IVP0000242	MED0000242	263421	7.17	10/27/99	12:04	dpm/100 cm^2	0.35	0.35	0.22	0.11	0.28	0.28	4.91	1.08	0.54	5.18	0.74	10.63

Appendix F

Duplicate Sample Data

Cross Reference Table for Blank and Spiked Samples for Survey Units 779–21 and 779–23

Sample Location	Sample Ticket Number (IVC)	Date Transferred	Smear Number
50C	259748	10/20/99	50
66C	259749	10/20/99	66
67C	259750	10/20/99	67
68C	259751	10/20/99	68
69C	259752	10/20/99	69
70C	259753	10/20/99	70
81C	259754	10/20/99	81
20C	259777	10/20/99	20
21C	259778	10/20/99	21
22C	259779	10/20/99	22
30C	259782	10/20/99	30
26C	259783	10/20/99	26
27C	259784	10/20/99	27
IVP0000260	263395	10/27/99	SMR0000260
IVP0000261	263396	10/27/99	SMR0000261
IVP0000262	263397	10/27/99	SMR0000262
IVP0000591	263362	10/06/99	SMR0000591
IVP0000592	263363	10/06/99	SMR0000592
IVP0000593	263364	10/06/99	SMR0000593
IVP0000594	263361	10/06/99	SMR0000594
IVP0000595	263365	10/06/99	SMR0000595

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

INSTRUMENT DATA

Mfg. Eberline	Mfg.	Mfg.
Model SAC-4	Model	Model
Serial # 814	Serial #	Serial #
Cal Due 2-11-00	Cal Due	Cal Due
Bkg. 0.3	Bkg.	Bkg.
Efficiency 33%	Efficiency	Efficiency
MDA 88 dpm	MDA	MDA
Mfg. NE Tech.	Mfg.	Mfg.
Model Electra	Model	Model
Serial #	Serial #	Serial #
Cal Due	Cal Due	Cal Due
Bkg.	Bkg.	Bkg.
Efficiency	Efficiency	Efficiency
MDA	MDA	MDA

Survey Type: ~~PRE~~ 10-27-99 Contamination

Building: 706

Location: RM-109

Purpose: IVC

RWP #: N/A

Date: ~~27 Oct. 99~~ 20 Oct. 99 Time: ~~10~~ 1414

RCT: Ron Murphy / Signature / Emp. #
Print name

RCT: N/A / Signature / Emp. #
Print name

PRE # : N/A

Comments: RESULTS BASED ON TWO MINUTE COUNT TIME.

SURVEY RESULTS

I.D. #	Location/Description	dpm/100cm²α (swipe)	dpm/100cm²α (direct)
20	IVC Sample # 20	~~0.5~~ 0.5	N/A
21	21	11.5	
22	22	10.0	
26	26	25	
27	27	25.5	
30	30	29.0	
50	50	0.0	
66	66	0.0	
67	67	0.0	
68	68	0.0	
69	69	0.5	
70	70	0.5	
81	81	0.5	

AND NO OTHERS

	Location/Description	dpm/100cm²α (swipe)	dpm/100cm²α (direct)

AND OTHERS

Date Reviewed: 10.28.99 RS Supervision: Ron Worster / Signature
Print Name

[redacted]

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill | Chain-of-Custody Number: 99R03178001 | Matrix: Waste
Site Sample ID: 016.001
Other Sample ID: 6779 Final Survey 77899 | Collection Date: 10/11/99 | Batch Number: 1720 | Date Received: 10/12/99 | Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1720-06	0.577	0.247	0.281	0.056
ACW03	U-235	KH199-1720-06	0.051	0.072	0.073	0.089
ACW03	U-238	KH199-1720-06	0.646	0.242	0.274	0.098
ACW03	PU-239/240	KH199-1720-06B	1.72	0.416	0.539	0.081
ACW03	AM-241	KH199-1720-06	1.10	0.300	0.372	0.042

Quality Control Samples			
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB
Pu	SCAQC-1720-LC1B	SCAQC-1720-LD1B	SCAQC-1720-PBB
Am	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB

PRELIMINARY INFORMATION

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill Chain-of-Custody Number: 99R0317#001 Matrix: Waste
Site Sample ID: 017.001
Other Sample ID: B779 Final Survey 77859 Collection Date: 10/11/99 Date Received: 10/12/99
Batch Number: 1720 Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1720-07	1.62	0.379	0.486	0.109
ACW03	U-235	KH199-1720-07	0.237	0.162	0.166	0.064
ACW03	U-238	KH199-1720-07	1.27	0.341	0.424	0.108
ACW03	PU-239/240	KH199-1720-07B	2.81	0.645	0.856	0.100
ACW03	AM-241	KH199-1720-07	0.901	0.239	0.287	0.039

	Quality Control Samples		
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB
Pu	SCAQC-1720-LC1B	SCAQC-1720-LD1B	SCAQC-1720-PBB
Am	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB

PRELIMINARY INFORMATION

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill	Chain-of-Custody Number: 99R0317#001		Matrix: Waste
Site Sample ID: 918.001			
Other Sample ID: B778 Final Survey 77939	Collection Date: 10/11/99	Date Received: 10/12/99	
	Batch Number: 1720	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1720-08	0.687	0.222	0.249	0.110
ACW03	U-235	KH199-1720-08	0.158	0.129	0.138	0.115
ACW03	U-238	KH199-1720-08	0.746	0.264	0.285	0.089
ACW03	PU-238/240	KH199-1720-08B	1.32	0.373	0.456	0.052
ACW03	AM-241	KH199-1720-08	0.754	0.254	0.295	0.096

Quality Control Samples			
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB
Pu	SCAQC-1720-LC1B	SCAQC-1720-LD1B	SCAQC-1720-PBB
Am	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill	Chain-of-Custody Number: 99R03178001		Matrix: Waste
Site Sample ID: 919.001			
Other Sample ID: 8779 Final Survey 77939	Collection Date: 10/11/99	Date Received: 10/12/99	
	Batch Number: 1720	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1720-09	0.460	0.168	0.216	0.054
ACW03	U-235	KH199-1720-09	0.025	0.049	0.050	0.067
ACW03	U-238	KH199-1720-09	0.668	0.239	0.273	0.054
ACW03	PU-238/240	KH199-1720-09B	6.01	1.07	1.61	0.049
ACW03	AM-241	KH199-1720-09	3.11	0.611	0.671	0.042

Quality Control Samples			
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB
Pu	SCAQC-1720-LC1B	SCAQC-1720-LD1B	SCAQC-1720-PBB
Am	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB

PRELIMINARY INFORMATION

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill Chain-of-Custody Number: 99R0317#001 Matrix: Waste
Site Sample ID: 020.001
Other Sample ID: 8779 Final Survey 77839 Collection Date: 10/11/99 Date Received: 10/12/99
Batch Number: 1720 Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1720-10	1.41	0.384	0.477	0.059
ACW03	U-235	KH199-1720-10	0.322	0.189	0.213	0.079
ACW03	U-238	KH199-1720-10	1.77	0.436	0.563	0.104
ACW03	Am-241	KH199-1720-10	5.03	0.847	1.31	0.039

Quality Control Samples

Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB
Am	SCAQC-1720-LC1	SCAQC-1720-LD1	SCAQC-1720-PB

PRELIMINARY INFORMATION

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill | Chain-of-Custody Number: 99R03176001 | Matrix: Waste
Site Sample ID: 921.001
Other Sample ID: B770 Final Survey 77939 | Collection Date: 10/11/99 | Date Received: 10/12/99
Batch Number: 1721 | Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1721-01	2.41	0.460	0.686	0.044
ACW03	U-235	KH199-1721-01	0.160	0.122	0.133	0.054
ACW03	U-238	KH199-1721-01	2.30	0.446	0.641	0.044
ACW03	PU-239/240	KH199-1721-01	14.2	2.21	3.60	0.047
ACW03	AM-241	KH199-1721-01	6.99	1.14	1.79	0.041

	Quality Control Samples		
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB
Pu	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB
Am	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB

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PRELIMINARY INFORMATION

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Radioanalytical Results

Report Identification Number: 99R0317

Project Name: Kaiser-Hill Chain-of-Custody Number: 99R0317#001 Matrix: Waste
Site Sample ID: 022.001
Other Sample ID: B778 Final Survey 77838 Collection Date: 10/11/99 Date Received: 10/12/99
Batch Number: 1721 Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1721-02	2.50	0.507	0.711	0.107
ACW03	U-235	KH199-1721-02	0.166	0.133	0.144	0.063
ACW03	U-238	KH199-1721-02	2.42	0.485	0.682	0.080
ACW03	PU-238/240	KH199-1721-02	22.2	3.20	5.47	0.044
ACW03	AM-241	KH199-1721-02	14.2	2.32	3.67	0.050

	Quality Control Samples		
Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB
Pu	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB
Am	SCAQC-1721-LC1	SCAQC-1721-LD1	SCAQC-1721-PB

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Radioanalytical Results

Report Identification Number: 99A8940

Project Name:	Kaiser-Hill	Chain-of-Custody Number:	99A8940#002	Matrix:	Waste
Site Sample ID:	019.002				
Other Sample ID:	77920 B779 RM 114 115.115A EXH DUCT	Collection Date:	7/28/99	Date Received:	7/30/99
		Batch Number:	1648	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1648-09	0.589	0.190	0.223	0.077
ACW03	U-235	KH199-1648-09	0.034	0.048	0.049	0.046
ACW03	U-238	KH199-1648-09	0.801	0.222	0.273	0.037
ACW03	PU-239/240	KH199-1648-09	0.054	0.067	0.068	0.091
ACW03	AM-241	KH199-1648-09	0.043	0.059	0.060	0.079

Quality Control Samples

Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB
Pu	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB
Am	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB

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032

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: 99A8940

Project Name:	Kaiser-Hill	Chain-of-Custody Number:	99A8940#002	Matrix:	Waste
Site Sample ID:	020.002				
Other Sample ID:	77920 B779 RM 114 115.115A EXH DUCT	Collection Date:	7/28/99	Date Received:	7/30/99
		Batch Number:	1648	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ Counting Error (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	U-233/234	KH199-1648-10	1.78	0.373	0.516	0.085
ACW03	U-235	KH199-1648-10	0.186	0.119	0.132	0.050
ACW03	U-238	KH199-1648-10	2.14	0.416	0.597	0.072
ACW03	PU-239/240	KH199-1648-10	0.685	0.213	0.254	0.077
ACW03	AM-241	KH199-1648-10	0.282	0.138	0.149	0.073

Quality Control Samples

Radionuclide	Laboratory Control Sample (LC)	Laboratory Duplicate Analysis (LD)	Preparation Blank (PB)
U	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB
Pu	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB
Am	SCAQC-1648-LC1	SCAQC-1648-LD1	SCAQC-1648-PB

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		Plutonium-239/240	3.20E-02	6.26E-02	8.66E-02	0.30	86.36
		Uranium-233/234	1.92E-01	1.77E-01	2.42E-01	1.00	93.90
		Uranium-235	3.65E-02	7.13E-02	9.86E-02	1.00	93.90
		Uranium-238	4.00E-01	2.36E-01	9.86E-02	1.00	93.90
99A9009-017.002	9908389-17	Americium-241	5.36E-02	8.56E-02	1.52E-01	0.30	96.71
		Plutonium-239/240	0.00E+00	0.00E+00	9.91E-02	0.30	95.79
		Uranium-233/234	8.37E-02	1.62E-01	3.57E-01	1.00	87.27
		Uranium-235	1.65E-02	6.56E-02	1.88E-01	1.00	87.27
		Uranium-238	3.34E-01	2.07E-01	1.88E-01	1.00	87.27
99A9009-018.002	9908389-18	Americium-241	0.00E+00	0.00E+00	7.96E-02	0.30	96.07
		Plutonium-239/240	5.59E-02	8.93E-02	1.59E-01	0.30	91.39
		Uranium-233/234	5.37E-01	2.63E-01	2.87E-01	1.00	83.83
		Uranium-235	-2.08E-02	2.35E-02	1.92E-01	1.00	83.83
		Uranium-238	5.19E-01	2.40E-01	7.82E-02	1.00	83.83
99A9009-019.002	9908389-19	Americium-241	2.81E-01	1.70E-01	2.00E-01	0.30	100.36
		Plutonium-239/240	3.51E-01	1.99E-01	1.67E-01	0.30	89.30
		Uranium-233/234	2.75E-01	1.59E-01	1.68E-01	1.00	94.22
		Uranium-235	-9.48E-03	4.88E-02	1.78E-01	1.00	94.22
		Uranium-238	3.33E-01	1.69E-01	1.28E-01	1.00	94.22
99A9009-020.002	9908389-20	Americium-241	9.48E-02	1.26E-01	2.27E-01	0.30	105.92
		Plutonium-239/240	5.36E-01	3.10E-01	2.28E-01	0.30	83.10
		Uranium-233/234	4.10E-01	2.41E-01	2.99E-01	1.00	97.37
		Uranium-235	-7.26E-03	1.42E-02	1.51E-01	1.00	97.37
		Uranium-238	3.77E-01	2.14E-01	1.79E-01	1.00	97.37
QC640994	Blank	Americium-241	6.69E-02	9.18E-02	1.58E-01	0.30	80.88
		Plutonium-239/240	0.00E+00	0.00E+00	7.67E-02	0.30	90.53
		Uranium-233/234	1.33E-02	7.13E-02	1.97E-01	1.00	80.85
		Uranium-235	-1.14E-02	1.58E-02	1.41E-01	1.00	80.85
		Uranium-238	6.56E-02	8.14E-02	1.19E-01	1.00	80.85
QC640995	Duplicate 99A9009-020.002	Americium-241	2.79E-01	2.07E-01	2.20E-01	0.30	96.81
		Plutonium-239/240	5.01E-01	2.50E-01	1.59E-01	0.30	106.14

Rocky Flats

Sample QC Results Summary
10/19/99

Batch # : 158815
RIN 99A9460
Line Item Code: RC01B004
Matrix: Waste

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL pCi/g	Tracer Yield %
99A9460-020.001	9909522-20	Americium-241	6.70E-02	6.56E-02	4.54E-02	0.30	104.01
		Plutonium-239/240	6.80E-02	9.46E-02	1.68E-01	0.30	74.00
		Uranium-233/234	1.64E-01	1.04E-01	1.21E-01	1.00	106.35
		Uranium-235	7.03E-03	3.14E-02	8.59E-02	1.00	106.35
		Uranium-238	1.29E-01	9.09E-02	1.06E-01	1.00	106.35
99A9460-021.001	9909522-21	Americium-241	2.01E-01	1.26E-01	1.35E-01	0.30	89.14
		Plutonium-239/240	3.62E-01	1.52E-01	9.68E-02	0.30	98.41
		Uranium-233/234	6.87E-01	2.19E-01	1.07E-01	1.00	83.17
		Uranium-235	1.79E-02	3.50E-02	4.84E-02	1.00	83.17
		Uranium-238	1.08E+00	2.77E-01	1.51E-01	1.00	83.17
99A9460-022.001	9909522-22	Americium-241	1.61E-01	9.99E-02	4.37E-02	0.30	103.24
		Plutonium-239/240	2.60E-01	1.42E-01	1.16E-01	0.30	87.79
		Uranium-233/234	7.99E-01	2.25E-01	1.71E-01	1.00	97.45
		Uranium-235	-7.95E-03	6.41E-02	1.71E-01	1.00	97.45
		Uranium-238	7.55E-01	2.13E-01	1.26E-01	1.00	97.45
99A9460-023.001	9909522-23	Americium-241	6.32E-01	2.03E-01	4.62E-02	0.30	103.24
		Plutonium-239/240	1.16E+00	2.77E-01	1.41E-01	0.30	104.60
		Uranium-233/234	1.03E+00	2.46E-01	1.25E-01	1.00	100.88
		Uranium-235	8.92E-02	7.11E-02	4.01E-02	1.00	100.88
		Uranium-238	1.04E+00	2.46E-01	1.10E-01	1.00	100.88
99A9460-024.001	9909522-24	Americium-241	8.30E-01	2.40E-01	4.89E-02	0.30	93.24
		Plutonium-239/240	1.74E+00	3.25E-01	4.29E-02	0.30	101.06
		Uranium-233/234	1.56E+00	3.17E-01	2.19E-01	1.00	92.82
		Uranium-235	6.17E-02	7.09E-02	1.14E-01	1.00	92.82
		Uranium-238	1.30E+00	2.77E-01	4.18E-02	1.00	92.82
99A9460-025.001	9909522-25	Americium-241	7.24E-01	2.11E-01	4.36E-02	0.30	97.18

		Plutonium-239/240	9.16E-01	2.60E-01	1.13E-01	0.30	78.73
		Uranium-233/234	5.65E-01	1.81E-01	1.21E-01	1.00	97.46
		Uranium-235	-7.32E-03	3.72E-02	1.21E-01	1.00	97.46
		Uranium-238	4.43E-01	1.64E-01	1.34E-01	1.00	97.46
99A9460-026.001	9909522-26	Americium-241	8.04E-01	2.12E-01	3.96E-02	0.30	102.58
		Plutonium-239/240	2.21E+00	4.04E-01	1.40E-01	0.30	87.15
		Uranium-233/234	6.71E-01	1.94E-01	1.28E-01	1.00	104.85
		Uranium-235	5.47E-02	7.11E-02	1.28E-01	1.00	104.85
		Uranium-238	6.16E-01	1.83E-01	1.01E-01	1.00	104.85
99A9460-027.001	9909522-27	Americium-241	2.89E-01	1.30E-01	4.12E-02	0.30	105.01
		Plutonium-239/240	5.34E-01	1.83E-01	9.58E-02	0.30	99.91
		Uranium-233/234	1.17E+00	2.63E-01	1.11E-01	1.00	91.61
		Uranium-235	3.00E-02	5.53E-02	1.11E-01	1.00	91.61
		Uranium-238	1.05E+00	2.47E-01	9.04E-02	1.00	91.61
99A9460-028.001	9909522-28	Americium-241	1.08E+00	2.50E-01	4.07E-02	0.30	102.50
		Plutonium-239/240	2.31E+00	3.85E-01	9.96E-02	0.30	101.86
		Uranium-233/234	5.69E-01	1.78E-01	1.26E-01	1.00	99.74
		Uranium-235	2.02E-02	3.98E-02	8.13E-02	1.00	99.74
		Uranium-238	5.82E-01	1.74E-01	3.67E-02	1.00	99.74
QC650057	Blank	Americium-241	1.65E-02	8.95E-02	2.08E-01	0.30	96.43
		Plutonium-239/240	-3.73E-02	4.23E-02	2.09E-01	0.30	69.82
		Uranium-233/234	-2.71E-04	4.62E-02	1.27E-01	1.00	101.74
		Uranium-235	-1.36E-04	3.27E-02	1.00E-01	1.00	101.74
		Uranium-238	-2.75E-02	4.23E-02	1.47E-01	1.00	101.74
QC650058	Duplicate 99A9460-028.001	Americium-241	9.55E-01	2.34E-01	4.04E-02	0.30	107.73
		Plutonium-239/240	2.19E+00	3.75E-01	4.53E-02	0.30	99.49
		Uranium-233/234	5.52E-01	1.89E-01	1.62E-01	1.00	89.37
		Uranium-235	-7.64E-03	3.89E-02	1.26E-01	1.00	89.37
		Uranium-238	8.51E-01	2.24E-01	1.10E-01	1.00	89.37
QC650059	LCS	Americium-241	1.01E+01	7.95E-01	4.42E-02	0.30	98.52
		Plutonium-239/240	9.87E+00	8.03E-01	1.02E-01	0.30	86.73

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Sample QC Results Summary
10/19/99

Uranium-233/234	1.03E+01	8.62E-01	3.08E-01	1.00	89.07
Uranium-235	3.95E-01	2.02E-01	2.69E-01	1.00	89.07
Uranium-238	1.10E+01	8.84E-01	1.86E-01	1.00	89.07

LCS recovery:

	Nom. Conc.	Recovery:
Am-241	10.87	93%
Pu-239/240	10.62	93%
U-238	10.74	102%

Equivalency:

Am-241	F/E = 0.365
Pu-239/240	F/E = 0.223
U-233/234	F/E = 0.065
U-235	F/E = 0.5
U-238	F/E = 0.948

Rocky Flats

Sample QC Results Summary
10/19/99

Batch # : 158817
RIN 99A9460
Line Item Code: RC01B004
Matrix: Waste

KHCO ID #	GEL ID #	Analysis	Result pCi/g	2sigma Error pCi/g	MDA pCi/g	RDL pCi/g	Tracer Yield %
99A9460-029.001	9909522-29	Americium-241	1.66E+00	3.70E-01	1.41E-01	0.30	102.89
		Plutonium-239/240	3.41E+00	3.20E-01	5.73E-02	0.30	80.69
		Uranium-233/234	5.22E-01	1.67E-01	1.12E-01	1.00	102.77
		Uranium-235	2.65E-02	3.66E-02	3.58E-02	1.00	102.77
		Uranium-238	3.17E-01	1.31E-01	9.77E-02	1.00	102.77
99A9460-030.001	9909522-30	Americium-241	7.57E-01	2.54E-01	6.03E-02	0.30	98.70
		Plutonium-239/240	1.20E+00	2.18E-01	1.33E-01	0.30	69.74
		Uranium-233/234	8.78E-01	2.29E-01	1.27E-01	1.00	95.23
		Uranium-235	-3.01E-04	5.11E-02	1.40E-01	1.00	95.23
		Uranium-238	8.41E-01	2.20E-01	4.07E-02	1.00	95.23
QC650064	Blank	Americium-241	2.94E-01	1.32E-01	4.19E-02	0.30	108.37
		Plutonium-239/240	2.41E-02	5.79E-02	1.12E-01	0.30	49.05
		Uranium-233/234	-1.09E-02	2.97E-02	9.97E-02	1.00	107.37
		Uranium-235	2.14E-02	2.96E-02	2.89E-02	1.00	107.37
		Uranium-238	1.12E-01	7.02E-02	6.41E-02	1.00	107.37
QC650065	Duplicate 99A0243-007.001	Americium-241	2.00E+00	3.98E-01	2.92E-01	0.30	94.79
		Plutonium-239/240	6.78E-01	1.98E-01	1.74E-01	0.30	52.61
		Uranium-233/234	7.66E-01	2.16E-01	1.40E-01	1.00	88.55
		Uranium-235	2.24E-02	4.42E-02	9.02E-02	1.00	88.55
		Uranium-238	7.66E-01	2.13E-01	1.11E-01	1.00	88.55
QC650066	LCS	Americium-241	8.63E+00	7.80E-01	1.22E-01	0.30	100.72
		Plutonium-239/240	8.24E+00	5.92E-01	1.18E-01	0.30	53.57
		Uranium-233/234	8.00E+00	6.26E-01	1.52E-01	1.00	96.01
		Uranium-235	3.54E-01	1.34E-01	9.32E-02	1.00	96.01
		Uranium-238	8.26E+00	6.34E-01	1.27E-01	1.00	96.01

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Rocky Flats

Sample QC Results Summary
10/19/99

LCS recovery:

	Nom. Conc.	Recovery:
Am-241	8.88	97%
Pu-239/240	8.68	95%
U-238	8.77	94%

Equivalency:

Am-241	F/E = 0.533
Pu-239/240	F/E = 0.111
U-233/234	F/E = 0.566
U-235	F/E = 0.504
U-238	F/E = 0.574

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Appendix G

Instrument Calibration Data

Data Set Sheet

Mo

SHP100 Property Number. S16338 Serial Number. 140

Eberline E600 Property Number S15622 Serial Number 321

2.2 Calibration Source

Isotope/ Source	Source Serial No.	Certified Activity (dpm)	Observed Activity (dpm)	% Difference	Efficiency cpm/dpm	SOURCE GEOMETRY
~~Cl-36~~ SR-90	CSL#604177	16,600	N/A	N/A	.3524	37mm disc
~~Th-230~~ Pu-239	GM-785	1604 dpm/100cm²	1605 dpm/100cm²	0.06 %	.2076	150 cm² PLANE

4.9 Record the alpha background count rate (< 5 cpm) 2.2 cpm

4.12 Record the beta background count rate (< 600 cpm) 267 cpm

4.14 Record the beta efficiency (cpm/dpm) in the cell marked "4.14" in the right hand column of the above table.

4.18 Decrease in beta efficiency after 4 hours N/A % SEE NOTE #1

4.19 GEOMETRY - DETECTOR CENTERED OVER SOURCE, PROBE FACE @ ≈ 3/16"

5. Completion

Service Request No. N/A PASSED ✓ FAILED ___

(Reason) PROBE CALIBRATION FOR USE @ RFETS, IVC SURVEYS

6. LIMITED Calibration Sticker and Interval

New Sticker Attached ✓ Due Date 6/30/2000

This calibration complies the requirements of ANSI 323-1978 and 10 CFR 835, and has been calibrated using standards whose accuracy is traceable to the National Institute of Standards and Technology.

Signature J W Livery Date 6/30/99

#1 THIS IS PERformed as part of the field Q.C. of the HP-100 probe when response checks are performed for the probes ≈ every hour during field use. Experience shows that probe efficiency (ε) does not degrade more than 20% over the 2-hour period a probe is used. See attached graphs.

#2 Plateau Graph was not printed out for the record since no printer was available in the field. The selected high voltage (1592 vdc) results in <1% β → α crossover.

EBERLINE E-600 CALIBRATION REPORT

06/30/99 09:34:06

E-600	Serial Number	: 321
	Program Version	: E600 V3.12
	Calibration Date/Due Date	: 03/23/99 to 03/23/00
	Scaler Precision	: 10%
	Lower Threshold Slope	: 0.9524
	Lower Threshold Intercept	: -0.1429 mV
	Upper Threshold Slope	: 1.02
	Upper Threshold Intercept	: -0.6074 mV
	Alarm Editing	: Enabled
	Latching Alarms	: Enabled
	Auto Ranging	: Disabled
	Beep on Auto-Range	: No
	Ignore E-600 Cal. Date	: No
	Ignore Probe Cal. Date	: No
	Ratemeter Mode Support	: Enabled
	Integrate Mode Support	: Enabled
	Scaler Mode Support	: Enabled
	Peak Hold Mode Support	: Enabled
	Background Update Mode Support	: Enabled
	Log ID Source	: Internal/Aux.
	Star Key Ratemeter Function	: Zero Display
	Star Key Integrate Function	: Zero Display
	Scaler Display Units	: Rate
	Scaler Counting Mode	: Fixed Time
Smart	Probe Serial Number	: 140
	Type	: HP-100
	Calibration Date/Due Date	: 06/30/99 to 06/30/00
	Dead Time	: 7.50 usec
	Surface Area	: 100 cm2
	Max High Voltage	: 1900 Vdc
	Overrange	: 80000 cps

Probe HP-100 140 continued...

Channel 1

Channel Type	: Alpha
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1592 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Upper
Upper Cal. Constant	: 0.2076 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0
Upper to Lower Crossover	: 1.12

Channel 2

Channel Type	: Beta
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1592 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Lower
Lower Cal. Constant	: 0.3524 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0
Upper to Lower Crossover	: 1.12

Channel 3

Channel Type	: Alpha/Beta
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1592 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Both
Lower Cal. Constant	: 0.3524 counts/disint.
Upper Cal. Constant	: 0.2076 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0
Upper to Lower Crossover	: 1.12

Cable Length: 60 inches

Signature: [signature] Date: 6/30/99

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After-Calibration Source Response Check Data Sheet

Location ROCKY FLATS IVC

Month AUG Day 4 Year 1999

Survey Instrument Data

Manufacturer EBERLINE

Model No. E600

Government Property No. 515622

Calibration Due Date 3/23/2000

Detector/Probe Data *(if applicable)*

Manufacturer EBERLINE

Model No. E-600 / W SHP-100 # 140

Government Property No. 516338

Calibration Due Date 6/30/2000

Check Source Data

Isotope Pu-239

Source I.D. No. GM-785

Instrument Scale	Source Detector Distance	Shielding/Geometry	Instrument Response	-20%	+20%	Scale Units
N/A	≈ 1/8"	CONTACT W/ RUBBER FEET	1599	1279	1919	dpm/100cm²

Comments:

A. SAMILJAN — Performed by (print)

[signature] — Performed by (signature)

8/4/99 — Date

J. LIVELY — Reviewed by (print)

[signature] — Reviewed by (signature)

8/6/99 — Date

File Index No. ____

GJO 1974e
11/98

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Data Set Sheet

SHP100 Property Number. $15564 Serial Number. 109

Eberline E600 Property Number $15622 Serial Number 321

2.2 Calibration Source

Isotope/ Source	Source Serial No.	Certified Activity (dpm)	Observed Activity (dpm)	% Difference	Efficiency cpm/dpm	SOURCE GEOMETRY
~~Cl-36~~ SR-90	CSL*6041	77 16,600	N/A	N/A	.3838	37 mm disc
~~Th-230~~ Pu-239	GM-785	1604 dpm/100cm²	1684 dpm/100cm²	4.99 %	.1949	150cm² PLANE

4.9 Record the alpha background count rate (< 5 cpm) 2.4 cpm

4.12 Record the beta background count rate (< 600 cpm) 243 cpm

4.14 Record the beta efficiency (cpm/dpm) in the cell marked "4.14" in the right hand column of the above table.

4.18 Decrease in beta efficiency after 4 hours N/A % SEE NOTE #1

4.19 GEOMETRY - DETECTOR CENTERED OVER SOURCE, PROBE FACE @ ≈ 3/16"

5. Completion

Service Request No. N/A PASSED ✓ FAILED ___

(Reason) PROBE CALIBRATION FOR USE @ RFETS, IVC SURVEYS

6. LIMITED Calibration Sticker and Interval

New Sticker Attached ✓ Due Date 6/30/2000

This calibration complies the requirements of ANSI 323-1978 and 10 CFR 835, and has been calibrated using standards whose accuracy is traceable to the National Institute of Standards and Technology.

Signature [signature] Date 6/30/99

#1 THIS IS PERFORMED AS PART OF THE FIELD Q.C. OF THE HP-100 PROBE WHERE RESPONSE CHECKS ARE PERFORMED FOR THE PROBES ≈ EVERY HOUR DURING FIELD USE. EXPERIENCE SHOWS THAT PROBE EFFICIENCY (α) DOES NOT DEGRADE MORE THAN 20% OVER THE 2 HOUR PERIOD A PROBE IS USED. SEE ATTACHED GRAPHS.

#2 PLATEAU GRAPH WAS NOT PRINTED OUT FOR THE RECORD SINCE NO PRINTER WAS AVAILABLE IN THE FIELD. THE SELECTED HIGH VOLTAGE (1572 VDC) RESULTED IN < 1% β → α CROSSOVER.

EBERLINE E-600 CALIBRATION REPORT

06/30/99 10:30:36

E-600	Serial Number	: 321
	Program Version	: E600 V3.12
	Calibration Date/Due Date	: 03/23/99 to 03/23/00
	Scaler Precision	: 10%
	Lower Threshold Slope	: 0.9524
	Lower Threshold Intercept	: -0.1429 mV
	Upper Threshold Slope	: 1.02
	Upper Threshold Intercept	: -0.6074 mV
	Alarm Editing	: Enabled
	Latching Alarms	: Enabled
	Auto Ranging	: Disabled
	Beep on Auto-Range	: No
	Ignore E-600 Cal. Date	: No
	Ignore Probe Cal. Date	: No
	Ratemeter Mode Support	: Enabled
	Integrate Mode Support	: Enabled
	Scaler Mode Support	: Enabled
	Peak Hold Mode Support	: Enabled
	Background Update Mode Support	: Enabled
	Log ID Source	: Internal/Aux.
	Star Key Ratemeter Function	: Zero Display
	Star Key Integrate Function	: Zero Display
	Scaler Display Units	: Rate
	Scaler Counting Mode	: Fixed Time
Smart	Probe Serial Number	: 109
	Type	: HP-100
	Calibration Date/Due Date	: 06/30/99 to 06/30/00
	Dead Time	: 7.50 usec
	Surface Area	: 100 cm2
	Max High Voltage	: 1900 Vdc
	Overrange	: 80000 cps

560

Probe HP-100 109 continued...

Channel 1

Channel Type	: Alpha
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1572 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Upper
Upper Cal. Constant	: 0.1949 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0012
Upper to Lower Crossover	: 0.0838

Channel 2

Channel Type	: Beta
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1572 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Lower
Lower Cal. Constant	: 0.3838 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0012
Upper to Lower Crossover	: 0.0838

Channel 3

Channel Type	: Alpha/Beta
Rate Units	: dpm/100cm2
Response Times	: 22,10,3 secs
High Voltage	: 1572 Vdc
Lower Threshold	: 1.00 mV
Upper Threshold	: 27.1 mV
Selected Window	: Both
Lower Cal. Constant	: 0.3838 counts/disint.
Upper Cal. Constant	: 0.1949 counts/disint.
Scaler Time	: 90 secs
Lower to Upper Crossover	: 0.0012
Upper to Lower Crossover	: 0.0838

Cable Length: 60 inches

Signature: John W Livey Date: 6/30/99

After-Calibration Source Response Check Data Sheet

Location Rock Flats IUC
Month Aug Day 4 Year 1999

Survey Instrument Data

Manufacturer EBERLING
Model No. E-600
Government Property No. $ 15622
Calibration Due Date 3-23-00

Detector/Probe Data *(if applicable)*

Manufacturer EBERLING
Model No. E-600/w SHP-100 #109
Government Property No. $ 15564
Calibration Due Date 6-30-00

Check Source Data

Isotope Pu-239
Source I.D. No. GM-785

Instrument Scale	Source Detector Distance	Shielding/Geometry	Instrument Response	-20%	+20%	Scale Units
NA	~ 1/8"	CONTACT W/ RUBBER FEET	1631	1305	1957	dpm/100 cm²

Comments:

A. SAMILSON — Performed by (print)
Performed by (signature) — 8/4/99 Date

J. LIVELY — Reviewed by (print)
Reviewed by (signature) — 8/6/99 Date

File Index No. _____

562 GJO 1974e 11/98

Appendix H

Raw Data

This appendix contains the raw ASCI text file data download directly from the E-600 instrument's memories without modification, sorting, or data reduction of any kind. The data are actually contained in three separate ASCI files; one file corresponding to each date in which information was collected. One unique aspect of this data presentation is that the data is presented exactly in the chronological order in which it was collected in the field. This provides an electronic time stamp permitting verification that time criteria included in the field operating procedures associated with the IV SAP were met.

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"BACKGROUND","10/05/99","12:33:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","12:36:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","12:38:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","12:56:00","140","Scaler","Alpha",1.87E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","12:59:00","140","Scaler","Alpha",1.90E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","13:10:00","140","Scaler","Alpha",1.89E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000201","10/05/99","13:13:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000202","10/05/99","13:15:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000203","10/05/99","13:17:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000204","10/05/99","13:20:00","140","Scaler","Alpha",4.14E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000205","10/05/99","13:22:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000206","10/05/99","13:25:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000206","10/05/99","13:26:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000207","10/05/99","13:31:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"30","10/05/99","13:36:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000208","10/05/99","13:36:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000209","10/05/99","13:38:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000210","10/05/99","13:41:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000211","10/05/99","13:44:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","13:47:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"36","10/05/99","13:48:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","13:48:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"38","10/05/99","13:50:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","13:50:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","13:54:00","140","Scaler","Alpha",1.87E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","13:56:00","140","Scaler","Alpha",1.82E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","13:59:00","140","Scaler","Alpha",1.70E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000212","10/05/99","14:14:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"44","10/05/99","14:16:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000212","10/05/99","14:16:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"46","10/05/99","14:22:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"47","10/05/99","14:22:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"48","10/05/99","14:23:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"49","10/05/99","14:23:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"50","10/05/99","14:24:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"51","10/05/99","14:24:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"52","10/05/99","14:24:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"53","10/05/99","14:25:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status

"54","10/05/99","14:28:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","14:53:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","14:55:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","14:57:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:03:00","140","Scaler","Alpha",1.61E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:04:00","140","Scaler","Alpha",1.68E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:06:00","140","Scaler","Alpha",1.75E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"61","10/05/99","15:10:00","109","Scaler","Alpha",1.55E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"62","10/05/99","15:10:00","109","Scaler","Alpha",1.55E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"63","10/05/99","15:10:00","109","Scaler","Alpha",1.55E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:11:00","109","Scaler","Alpha",1.55E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"65","10/05/99","15:13:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"66","10/05/99","15:13:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"67","10/05/99","15:13:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"68","10/05/99","15:13:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"69","10/05/99","15:13:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"70","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"71","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"72","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"73","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"74","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"75","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"76","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"77","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"78","10/05/99","15:14:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:15:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"80","10/05/99","15:17:00","109","Scaler","Alpha",1.64E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:17:00","109","Scaler","Alpha",1.64E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","15:18:00","109","Scaler","Alpha",1.50E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"83","10/05/99","15:24:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"84","10/05/99","15:27:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"85","10/05/99","15:27:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"86","10/05/99","15:27:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"87","10/05/99","15:27:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"88","10/05/99","15:27:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"89","10/05/99","15:28:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"90","10/05/99","15:28:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"91","10/05/99","15:28:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status

"IVP0000215","10/05/99","15:28:00","109","Scaler","Alpha",1.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000216","10/05/99","15:30:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000217","10/05/99","15:33:00","109","Scaler","Alpha",3.90E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000218","10/05/99","15:35:00","109","Scaler","Alpha",1.06E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000218","10/05/99","15:37:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000219","10/05/99","16:01:00","109","Scaler","Alpha",1.40E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"98","10/05/99","16:05:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"99","10/05/99","16:06:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000220","10/05/99","16:06:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","16:13:00","109","Scaler","Alpha",1.14E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/05/99","16:15:00","109","Scaler","Alpha",1.13E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","16:20:00","109","Scaler","Alpha",1.53E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","16:22:00","109","Scaler","Alpha",1.61E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","16:23:00","109","Scaler","Alpha",1.56E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/05/99","16:26:00","109","Scaler","Alpha",1.56E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"BACKGROUND","10/06/99","13:23:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","13:25:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","13:27:00","140","Scaler","Alpha",4.14E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","13:33:00","140","Scaler","Alpha",1.85E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","13:35:00","140","Scaler","Alpha",1.90E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","13:37:00","140","Scaler","Alpha",1.90E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000213","10/06/99","13:54:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000214","10/06/99","13:56:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000212","10/06/99","14:11:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","14:17:00","140","Scaler","Alpha",4.14E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","14:19:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BAN-GROUND","10/06/99","14:21:00","140","Scaler","Alpha",3.72E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","14:23:00","140","Scaler","Alpha",1.87E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","14:25:00","140","Scaler","Alpha",1.91E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","14:32:00","140","Scaler","Alpha",1.91E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000201","10/06/99","14:36:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000203","10/06/99","14:39:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000204","10/06/99","14:41:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000205","10/06/99","14:43:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000208","10/06/99","14:45:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000211","10/06/99","14:48:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000211","10/06/99","14:51:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000221","10/06/99","15:02:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000222","10/06/99","15:07:00","140","Scaler","Alpha",8.28E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000223","10/06/99","15:10:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000224","10/06/99","15:15:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000225","10/06/99","15:23:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000226","10/06/99","15:25:00","140","Scaler","Alpha",4.14E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000226","10/06/99","15:28:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000227","10/06/99","15:31:00","140","Scaler","Alpha",7.86E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000228","10/06/99","15:35:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000229","10/06/99","15:42:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","15:46:00","140","Scaler","Alpha",1.66E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","15:47:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/06/99","15:49:00","140","Scaler","Alpha",4.14E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","15:51:00","140","Scaler","Alpha",1.78E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","15:53:00","140","Scaler","Alpha",1.78E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/06/99","15:54:00","140","Scaler","Alpha",1.79E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"BACKGROUND","10/07/99","09:29:00","140","Scaler","Alpha",2.90E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/07/99","09:31:00","140","Scaler","Alpha",3.72E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/07/99","09:33:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","09:35:00","140","Scaler","Alpha",1.79E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","09:35:00","140","Scaler","Alpha",1.79E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","09:38:00","140","Scaler","Alpha",1.83E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000221","10/07/99","09:46:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000222","10/07/99","09:50:00","140","Scaler","Alpha",1.24E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000223","10/07/99","09:53:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000226","10/07/99","09:56:00","140","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000227","10/07/99","10:00:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"IVP0000229","10/07/99","10:03:00","140","Scaler","Alpha",4.14E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/07/99","10:06:00","140","Scaler","Alpha",8.28E+00,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/07/99","10:08:00","140","Scaler","Alpha",3.31E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"BACKGROUND","10/07/99","10:10:00","140","Scaler","Alpha",2.48E+01,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","10:14:00","140","Scaler","Alpha",1.55E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","10:16:00","140","Scaler","Alpha",1.50E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/07/99","10:18:00","140","Scaler","Alpha",1.61E+03,"Gross","dpm/100cm2",321,0,14.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"BACKGROUND","10/26/99","09:40:00","109","Scaler","Alpha",1.17E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","09:42:00","109","Scaler","Alpha",8.39E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","09:43:00","109","Scaler","Alpha",5.06E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","09:46:00","109","Scaler","Alpha",1.65E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","09:47:00","109","Scaler","Alpha",1.38E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","09:52:00","109","Scaler","Alpha",1.57E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000231","10/26/99","10:08:00","109","Scaler","Alpha",2.08E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000232","10/26/99","10:10:00","109","Scaler","Alpha",2.07E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000233","10/26/99","10:12:00","109","Scaler","Alpha",3.38E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000234","10/26/99","10:16:00","109","Scaler","Alpha",7.00E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000235","10/26/99","10:18:00","109","Scaler","Alpha",2.06E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000236","10/26/99","10:20:00","109","Scaler","Alpha",2.05E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000236","10/26/99","10:22:00","109","Scaler","Alpha",2.75E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000237","10/26/99","10:27:00","109","Scaler","Alpha",2.05E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000238","10/26/99","10:29:00","109","Scaler","Alpha",1.74E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000239","10/26/99","10:31:00","109","Scaler","Alpha",1.03E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000240","10/26/99","10:34:00","109","Scaler","Alpha",7.45E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000241","10/26/99","10:36:00","109","Scaler","Alpha",2.47E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000242","10/26/99","10:39:00","109","Scaler","Alpha",1.43E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000242","10/26/99","10:41:00","109","Scaler","Alpha",1.11E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","10:44:00","109","Scaler","Alpha",8.18E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","10:46:00","109","Scaler","Alpha",1.16E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","10:49:00","109","Scaler","Alpha",1.51E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","10:56:00","109","Scaler","Alpha",1.31E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","10:58:00","109","Scaler","Alpha",1.49E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","11:00:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","11:01:00","109","Scaler","Alpha",1.43E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","13:25:00","109","Scaler","Alpha",1.45E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","13:31:00","109","Scaler","Alpha",1.82E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","13:33:00","109","Scaler","Alpha",1.11E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","13:35:00","109","Scaler","Alpha",1.51E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","13:37:00","109","Scaler","Alpha",1.46E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","13:38:00","109","Scaler","Alpha",1.58E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000243","10/26/99","13:45:00","109","Scaler","Alpha",1.73E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000244","10/26/99","13:50:00","109","Scaler","Alpha",1.74E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000245","10/26/99","13:52:00","109","Scaler","Alpha",1.74E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000246","10/26/99","13:58:00","109","Scaler","Alpha",2.04E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000247","10/26/99","14:01:00","109","Scaler","Alpha",1.02E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status

"IVP0000248","10/26/99","14:03:00","109","Scaler","Alpha",1.37E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000248","10/26/99","14:08:00","109","Scaler","Alpha",2.05E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"203","10/26/99","14:10:00","109","Scaler","Alpha",1.36E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000249","10/26/99","14:10:00","109","Scaler","Alpha",1.36E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000250","10/26/99","14:30:00","109","Scaler","Alpha",3.55E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000251","10/26/99","14:35:00","109","Scaler","Alpha",1.03E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","14:39:00","109","Scaler","Alpha",8.16E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","14:42:00","109","Scaler","Alpha",1.49E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","14:44:00","109","Scaler","Alpha",1.47E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","14:46:00","109","Scaler","Alpha",1.42E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","14:48:00","109","Scaler","Alpha",1.32E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","14:50:00","109","Scaler","Alpha",1.45E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000252","10/26/99","14:57:00","109","Scaler","Alpha",1.06E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000253","10/26/99","14:59:00","109","Scaler","Alpha",2.10E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000254","10/26/99","15:01:00","109","Scaler","Alpha",1.06E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000254","10/26/99","15:03:00","109","Scaler","Alpha",1.05E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000255","10/26/99","15:06:00","109","Scaler","Alpha",1.41E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000256","10/26/99","15:09:00","109","Ratemeter","Alpha",1.07E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000257","10/26/99","15:12:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000258","10/26/99","15:13:00","109","Scaler","Alpha",2.10E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000259","10/26/99","15:16:00","109","Scaler","Alpha",1.77E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000259","10/26/99","15:20:00","109","Scaler","Alpha",7.59E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","15:24:00","109","Scaler","Alpha",1.85E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","15:25:00","109","Scaler","Alpha",1.52E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/26/99","15:29:00","109","Scaler","Alpha",1.52E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","15:32:00","109","Scaler","Alpha",1.50E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","15:33:00","109","Scaler","Alpha",1.39E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/26/99","15:35:00","109","Scaler","Alpha",1.46E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"

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"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"BACKGROUND","10/27/99","12:46:00","109","Scaler","Alpha",7.64E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/27/99","12:46:00","109","Scaler","Alpha",7.64E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/27/99","12:48:00","109","Scaler","Alpha",7.91E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","12:52:00","109","Scaler","Alpha",1.54E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","12:54:00","109","Scaler","Alpha",1.49E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","12:56:00","109","Scaler","Alpha",1.58E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/27/99","13:09:00","109","Scaler","Alpha",7.84E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/27/99","13:11:00","109","Scaler","Alpha",4.29E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/27/99","13:13:00","109","Scaler","Alpha",4.16E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","13:14:00","109","Scaler","Alpha",1.64E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","13:16:00","109","Scaler","Alpha",1.63E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/27/99","13:18:00","109","Scaler","Alpha",1.38E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"

"Survey Location","Log Date","Log Time","Probe S/N","Log Mode","Channel Type","Reading","Gross/Net","Units","E-600 S/N","E-600 Address","Stored Bkg","Bkg Units","Status"

"241","10/28/99","09:12:00","109","Scaler","Alpha",7.98E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"242","10/28/99","09:13:00","109","Scaler","Alpha",7.98E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"243","10/28/99","09:13:00","109","Scaler","Alpha",7.98E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:17:00","109","Scaler","Alpha",2.15E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:20:00","109","Scaler","Alpha",1.45E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:22:00","109","Scaler","Alpha",2.14E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:24:00","109","Scaler","Alpha",1.52E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:25:00","109","Scaler","Alpha",1.46E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:27:00","109","Scaler","Alpha",1.58E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000236","10/28/99","09:30:00","109","Scaler","Alpha",3.09E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000240","10/28/99","09:32:00","109","Scaler","Alpha",2.10E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000241","10/28/99","09:34:00","109","Scaler","Alpha",1.39E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000242","10/28/99","09:36:00","109","Scaler","Alpha",7.13E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"IVP0000242","10/28/99","09:38:00","109","Scaler","Alpha",3.80E+00,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:41:00","109","Scaler","Alpha",1.14E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:42:00","109","Scaler","Alpha",1.47E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"BACKGROUND","10/28/99","09:46:00","109","Scaler","Alpha",1.48E+01,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:47:00","109","Scaler","Alpha",1.47E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:49:00","109","Scaler","Alpha",1.54E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"
"RESP/CHECK","10/28/99","09:51:00","109","Scaler","Alpha",1.53E+03,"Gross","dpm/100cm2",321,0,0.0,"dpm/100cm2","Normal"