N00210.AR.000347
NTC GREAT LAKES
5090.3a

FINAL REPORT

Radiological Remediation and Final Status Survey
Former Monazite Sand Storage Area

Naval Station Great Lakes – Great Lakes, Illinois

Project USN 2006-009
CABRERA Project Nos. 03-3040.30
Contract No. DAAA09-02-D-0024, Delivery Order 00030

Prepared for:

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June 2008

EXECUTIVE SUMMARY

Cabrera Services, Inc. (CABRERA), under contract to the United States (U.S.) Army Joint Munitions Command (JMC), performed characterization, remediation, and final status survey (FSS) activities within the remaining areas of the former Monazite Sand Storage Area (FMSSA) at the Naval Station Great Lakes in Great Lakes, Illinois, hereafter referred to as the 'Site'. The Site is shown in the Site Location Map presented as Figure 1.

Field work performed during the 2007 calendar year was performed under previously prepared CABRERA work plans entitled, *Work Plan for the Characterization of the Recreation and Center Tank Areas and Radiological Remediation and Final Status Survey of the North Fence Area* (CABRERA, 2004b), *Work Plan for the Remediation of the Recreation and Center Tank Areas and Site Wide Final Status Survey* (CABRERA, 2004d), and *Public Private Venture Area Remediation Addendum* to *Work Plan for the Remediation of the Recreation and Center Tank Areas and Site Wide Final Status Survey* (CABRERA, 2007a). These Work Plans governed all field activities performed during this project. All activities were performed under the oversight of Naval Sea Systems Command Detachment (NAVSEADET) Radiological Affairs Support Organization (RASO).

The field activities described herein were performed concurrently with the remediation field activities within the Public Private Venture (PPV) area of the site. However, the results and conclusions discussed in this report only apply to the Former Monazite Sand Storage Area. The PPV area requires additional work to be completed and therefore results for these areas will be provided under separate cover. The FMSSA includes survey units (SU) 1, 2, 3, 4, 5 as shown on Figure 2, as well as SUs 17 and 18 (the latter two for the former soil stockpile).

Project activities performed during the most recent mobilization included:

- Gamma Walkover Surveys (GWS) in all accessible areas;
- Direct-push soil coring and downhole gamma logging (DGL);
- Surface and subsurface soil sampling at systematic and biased locations;
- On-site laboratory soil preparation and gamma spectroscopy analyses;
- Development and submission of site-specific derived concentration guideline level (DCGL) document for the Site. This document was approved by NRC Region 3 and thus allowed a 4 picoCuries per gram (pCi/g) Thorium-232 (^{232}Th) DCGL to be used henceforth;
- Excavation and remediation of Site soils containing ^{232}Th greater than the DCGL, including the soil stockpile remaining from remediation activities in the former monazite sand storage area performed in 2004. The stockpile was leveled with a *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (U.S. Nuclear Regulatory Commission [NRC], 2000) FSS performed in two sequential 1-foot lifts;
- Packaging and shipment of 102 tons of impacted excavated soils;
- Performance of a post-remediation, MARSSIM FSS within each SU.

- Site restoration activities, including backfill of completed excavation areas.

Soils exceeding the DCGL of 4 pCi/g ^{232}Th were packaged in 10 cubic yard (cy) soft-sided containers, (i.e., super-sacks). Each super-sack was found to hold approximately 8.5 tons of soil. The super-sacks were temporarily stored on-site, then transported to a nearby railhead in Kenosha, Wisconsin, where the containers were transloaded into gondola railcars. The wastes were profiled for disposal at the Waste Control Specialists (WCS) facility in Andrews, Texas, as unimportant quantities of source material (less than 0.05% by weight, or equivalent to 55 pCi/g of ^{232}Th). The highest concentration of ^{232}Th identified in these soils was 32 pCi/g.

FSS activities consisted of a 100% GWS and sample collection and analysis. Systematic and biased sampling consisted of soil sampling from 120 locations, with samples obtained via a direct-push rig with a macrocore sampler or through surface sampling methods.

All FSS sample results were shown to be below the Site DCGL of 4.0 pCi/g. The FSS data indicate that the Site is suitable for release for unrestricted use.

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ACRONYMS AND ABBREVIATIONS

^{228}Ac	actinium-228
AEC	Atomic Energy Commission
CABRERA	Cabrera Services, Inc.
CFR	Code of Federal Regulations
^{109}Cd	cadmium-109
^{60}Co	cobalt-60
cpm	counts per minute
^{137}Cs	cesium-137
cy	cubic yard
DCGL	Derived Concentration Guideline Level
DGL	Downhole Gamma Logging
DoD	Department of Defense
DOT	U.S. Department of Transportation
FMSSA	Former Monazite Sand Storage Area
FSS	Final Status Survey
g	gram
GM	Geiger-Mueller
GPS	Global Positioning System
GWS	Gamma Walkover Survey
HEPA	High-Efficiency Particulate Air
HPGe	High Purity Germanium
in	inch
JMC	U.S. Army Joint Munitions Command
keV	kiloelectron volt
m	meter
m/s	meters per second
MARLAP	Multi-Agency Radiological Laboratory Analytical Protocols
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
µR/h	microRoentgen per hour
NaI	sodium iodide
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
NAVSEADET	Naval Sea Systems Command Detachment
PPV	Public Private Venture
pCi/g	picocurie per gram
QA	Quality Assurance
QC	Quality Control
^{226}Ra	radium-226
RASO	Radiological Affairs Support Office
ROC	Radionuclide(s) of Concern
SSSV	Surface Soil Screening Values
SSV	Soil Screening Values
SU	Survey Unit
TCLP	Toxicity Characteristic Leachate Procedure
^{232}Th	thorium-232
U.S.	United States
WAC	Waste Acceptance Criteria
WCS	Waste Control Specialists
Z_{Rep}	Z- Replicate

1.0 INTRODUCTION

Cabrera Services, Inc. (CABRERA) performed characterization, remediation, and Final Status Survey (FSS) activities within the Former Monazite Sand Storage Area (FMSSA) at the Naval Station Great Lakes in Great Lakes, Illinois (hereafter referred to as the Site). Activities during 2007 focused on areas of the Site requiring additional investigation, remediation, and FSS based on the results of the investigations performed in the 2003-2004 timeframe. These areas are referred to as survey units (SU) 1 through 5, 17, and 18 throughout this document. Remedial and survey activities were performed under contract to the US Army Joint Munitions Command (JMC) and the oversight of the US Navy's Naval Sea Systems Command Detachment (NAVSEADET) Radiological Affairs Support Organization (RASO).

1.1 Background

Monazite is a rare earth phosphate containing a variety of rare earth oxides particularly cerium and thorium oxide. Thorium has wide industrial applications and has been mined as monazite sand since the 1930's. In 1964, the Atomic Energy Commission (AEC) granted license #STC-133 to the General Services Administration authorizing the storage and repackaging, as necessary, to store and transfer uranium and thorium solids at specific locations, including the Naval Station in Great Lakes. While this license is still presently active, the inclusion of the Naval Station Great Lakes was terminated in April 1981. In 1974, the AEC granted license #STE-8179 to Engelhard Minerals & Chemicals Corporation, authorizing the package and shipment of a strategic pile of monazite sand from the Site. It is reported that this sand was shipped to Holland that same year. The AEC also granted license #SMC-1207, authorizing "Repackaging of monazite sands in U.S. Department of Transportation (DOT) approved containers." These operations were confined to the following locations: Savannah Army Depot, Savannah, Illinois; Army Ammunitions Plant, Ravenna, Ohio; and U.S. Navy Administrative Command, Supply Depot (currently referred to as Naval Station Great Lakes), Great Lakes, Illinois. This former AEC license indicated that 1,826,153 pounds of monazite sand containing 9.226% of thorium oxide was held at the Naval Station prior to shipment off-site. Records show that monazite sand was shipped to W.R. Grace & Company, Chattanooga, Tennessee. The sand was shipped from Great Lakes and Savannah, Illinois from early September through mid-October 1974; and from Ravenna from early November through mid-November 1974. There is limited information on the extent of residual contamination resulting from these operations. No records have been found indicating that a closeout survey of the monazite sand storage area (current Site) was conducted, prior to CABRERA'S efforts beginning in 2000.

1.2 Previous Site Activities

Nuclear Regulatory Commission (NRC) Region III conducted an inspection in January of 2000, and found several locations of elevated gamma activity on the north side of the former monazite sand storage area near the northern boundary. Surface exposure rates of 80 microRoentgen per hour (µR/h) were observed along the North Fence Area northern boundary. CABRERA was contracted by the Navy to assess the area.

On March 8, 2000, CABRERA performed a detailed characterization which identified several locations of elevated gamma activity, and by gamma spectroscopy, identified the presence of thorium-232 (^{232}Th). CABRERA characterized the area formerly known as Tank Farm #5. The Tank Farm was surveyed and surface soil samples were collected and analyzed for ^{232}Th. Gamma radiation levels above the ambient level were identified along the north fence line in locations between and surrounding tanks H, L, and K (see Figure 3). During the survey, six soil samples were collected from areas where elevated gamma radiation levels were observed. These samples were analyzed for ^{232}Th using gamma spectroscopy. Analytical results for the samples indicated that ^{232}Th concentrations ranged from 0.93 picocurie per gram (pCi/g) to 64.31 pCi/g, with an average activity concentration of approximately 17 pCi/g. CABRERA also performed FSS activities during 2000, and released the areas surrounding the warehouse Building 8012. These released SUs were part of the area referred to as the construction zone. FSSs recommending unrestricted/restricted release were accepted by the NRC.

During the 2003 characterization survey, soil samples were collected from the soil pile and North Fence Area to provide information regarding chemical contaminants that could affect disposal options. Laboratory analyses performed were in accordance with U.S. Ecology Waste Acceptance Criteria (WAC) requirements. These analyses included a toxicity characteristic leachate procedure (TCLP), total metals, mercury, semi-volatiles, volatiles, chlorinated herbicides, and organochlorine pesticides. The sample analytical results were below Title 40 Code of Federal Regulations (CFR) Part 261 land disposal limits, indicating that no hazardous chemical constituents were identified.

In 2004, CABRERA was contracted to remove the soil pile and characterize the remaining soils. The soil pile, prior to remedial activities, covered an area approximately 100 feet by 50 feet and was approximately 16 feet high. The soil pile was reconfigured in order to ease remediation and to ensure uniformity between the SUs. The remediation occurred incrementally, as one foot lifts of soil from the pile. Each lift was evaluated as a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Class 1 SU prior to its removal. Most of the soil pile was suitable for release for unrestricted use, approximately 1,730 cubic yards (cy). This soil was beneficially reused to provide additional capping material for a nearby, on-site landfill. Approximately 70 cy of soil from the soil pile exceeded the Derived Concentration Guideline Level (DCGL) and were disposed off-site at the U.S. Ecology Grandview, Idaho facility as unimportant quantities of source material. The highest concentration of ^{232}Th identified in these soil pile soils was 2.7 pCi/g.

Characterization surveys were performed on the base of the soil pile and the one foot soil layer beneath it. ^{232}Th concentrations ranged from -0.13 to 1.1 pCi/g. The characterization surveys also identified elevated concentrations of radium-226 (^{226}Ra) at the base and beneath the soil pile (southeast corner), with concentrations as high as 120 pCi/g. During the sampling process, the remnants of a 'sound powered phone jack' containing radium, as characterized by Department of Defense (DoD) personnel, were found below ground level near the this area of the soil pile. The elevated ^{226}Ra results are likely due to contamination from this debris.

Additionally, the scope of CABRERA'S 2004 contract also included remediation and FSS of the North Fence Area. Following the direction of RASO, only characterization surveys were performed for the North Fence Area; however, these North Fence Area characterization

surveys were performed using MARSSIM FSS guidance and were to be used to support future North Fence Area FSS evaluations. Based on the survey results, approximately 170 cy of North Fence Area soils exceeded the DCGL of 1 pCi/g and were disposed of off-site at the U.S. Ecology Grandview, Idaho facility as unimportant quantities of source material. The highest concentration of ^{232}Th identified in these soils was 8.6 pCi/g.

As part of the removal action, CABRERA characterized the remainder of this portion of the Site, with results published in a Technical Memorandum. It was estimated that an additional 1,526 cy of material required remediation. As part of the previous activities, CABRERA performed remediation in the Center Tank Area and the area just south of the Center Tank Area referred to as the Recreation Area. FSSs in the Center Tank Area performed by CABRERA and scoping surveys completed by the NRC showed additional areas of contamination above the existing clean-up goal of 1 pCi/g above background [NRC default surface soil screening value (SSSV)]. This included some areas at the boundary of the original footprint remediated at a greater depth than anticipated and over a larger area than previously identified. Additionally, the NRC identified contamination up to 20 pCi/g at the headwall of a drainage pipe that empties into Skokie ditch. The headwall is in the northern portion of the industrial area.

In 2006, CABRERA performed radiological surveys which were used to develop the remediation approach used during these final activities. The Navy demolished Tank H and the nearby storage building so the 2007 remediation activities could be completed.

1.3 Radionuclide of Concern

The Radionuclide of Concern (ROC) associated with monazite sand is natural thorium and its decay products. The monazite stored at Site 18, was unaltered and unprocessed, thereby preserving the natural concentrations and secular equilibrium. There is no evidence of chemical or physical processes that would disturb this equilibrium.

Soil analysis results from the 2000 and 2004 characterization surveys (CABRERA 2000 and 2004a) confirmed the presence of ^{232}Th, in secular equilibrium with its progeny, as the Site ROC. Monazite sand typically contains 5-7% radioactive thorium and 0.1-0.3% radioactive uranium. Isotopes from the thorium series naturally dominate, and while uranium series radionuclides while expected to be present, are in concentrations low enough to not be considered Site ROCs. One discrete location at the Site contained ^{226}Ra; however, it was determined to be due to an isolated piece of equipment deposited there and not due to its presence within natural monazite sands. For this reason, radium was not considered a project ROC.

1.4 Derived Concentration Guideline Level

Historically, the DCGL used by CABRERA at the Great Lakes Naval facility was 1.1 pCi/g above ambient background for ^{232}Th. This was based on the use of the default soil screening value for ^{232}Th published in NUREG-5512, Vol. 3 (NRC, 1999). This value was used at the site between 2000 and 2007 for all characterization and remediation efforts.

In 2007, CABRERA prepared a site-specific DCGL evaluation for the Site, which calculated a ^{232}Th cleanup value of 4 pCi/g, based on a resident gardener scenario, to support the remaining remediation and FSS activities at the Site. This DCGL value, with support from JMC and RASO, was submitted to the NRC Region III and approved for use. All FSS data evaluated herein is therefore compared to this new 4 pCi/g DCGL value. The derivation of this DCGL is provided in detail in the *Final Site-Specific Derived Concentration Guideline Level* (CABRERA, 2007b), provided in Appendix G.

1.5 Site Reference Coordinate System

The Site reference coordinate system was designed to ensure sample and measurement locations are spatially identified such that each location is reliably reproducible. The basic unit of the coordinate system is meters. SU grids, Site boundaries, and other survey reference points are described by northing and easting coordinates, in meters, tied to the Illinois East State Plane Coordinate System, North American Datum 1983. References in this report to specific locations are of the form "xxx,xxx.x north, yyy,yyy.y east"; where xxx,xxx.x is the northing coordinate in meters and yyy,yyy.y is the easting coordinate in meters.

2.0 CHARACTERIZATION ACTIVITIES

Characterization was performed, prior to remedial activities, within SUs 3, 4, 5, 17, and 18. SU 2 was unable to be characterized due to the presence of a soil stockpile from previous remedial activities with an approximate volume of 875 cy (referred to later as SUs 17 and 18). Characterization activities consisted of gamma walkover survey (GWS), systematic and biased soil sampling, downhole gamma logging (DGL), and on-site gamma spectroscopy analysis. These surveys served to augment those previously collected by CABRERA between 2000 and 2004.

2.1 Gamma Walkover Surveys

As part of the characterization activities for Site 18, GWSs were performed over 100% of the accessible surfaces in each of the SUs. The purpose of the GWSs was to identify areas of elevated surface radioactivity. GWSs were performed using a Trimble XR-Pro and TSC 1 global positioning system (GPS) coupled to a Ludlum Model 44-10 2x2 Sodium Iodide (NaI) detector with a Ludlum Model 2221 scaler/ratemeter. All GPS positional data collection was done in real time using differential correction provided by either the satellite signal or the Coast Guard beacon signal. The GWS was performed following MARSSIM protocol, by walking straight parallel lines at a rate of approximately 0.5 meters per second (m/s) while moving the detector in a serpentine motion of approximately 1 meter wide and a consistent distance of approximately 2-4 inches above the ground surface. GWS data in gross counts per minute (cpm) from the scaler/ratemeter was automatically logged into the GPS unit at a rate of once per second. All GPS data was collected in U.S. State Plane Feet, Illinois East State Plane Coordinate System, North American Datum 1983. Upon survey completion, the data was downloaded from the GPS unit and sent to a data processing specialist for import into a geographical information system for processing and imaging.

2.2 Soil Sampling

Systematic surface and subsurface soil samples were taken at locations determined by a random start triangular grid-sampling pattern, in accordance with MARSSIM protocols. Samples were collected using a direct-push rig, e.g., Geoprobe®, to a total depth of 4 feet below ground surface, resulting in four 1-foot increments for each location. The entire core was inspected by a field geologist, who characterized the soil types and determined the increment level of the native soil.

A minimum of two intervals were analyzed from each core; the top-foot increment and a subsurface increment with the highest DGL reading. Each was prepared and analyzed in the CABRERA on-site gamma spectroscopy laboratory using a high purity germanium (HPGe) detector system. Those samples which exceeded the Site DCGL of 4 pCi/g were used to identify areas which required remediation.

3.0 REMEDIATION ACTIVITIES

Based on the results of surface and subsurface characterization soil samples, it was determined that small areas of soil in SUs 3, 4, 5, and 18 would exceed the new Site clean-up criterion. Historical records indicated that some soils within SU 1 would also require excavation and offsite disposal. GWS and on-site gamma spectroscopy analysis of excavation support samples were used to delineate the specific areas where soil was to be removed.

3.1 Survey Unit 1 Remediation Activities

Previous historical records indicated that a "sound-powered phone jack" containing ^{226}Ra had been buried in the vicinity of SU 1. While no coordinates existed, there was a benchmark (a cone) that delineated the location of the source. This position was supported by 2 x 2 NaI counts upwards of 150,000 cpm and physical evidence such as broken glass and metal. During excavation activities, 6" lifts with an area of 3 meters x 3 meters square were executed and soil was hand dug in the immediate vicinity of the jack. The remediated soils were live-loaded into a SuperSack lift-liner with an excavator. An investigation sample (SU1-IN1) was taken of the remediated soil, which showed a ^{226}Ra concentration of 29.8 pCi/g. Biased samples were also taken around the periphery of the localized excavation area to ensure the remaining soils all met the Site release criteria.

3.2 Survey Unit 2 Remediation Activities

No remediation of soils in SU 2 were required aside from the relocation of the soil stockpile located atop of the SU 2 soils.

3.3 Survey Units 3, 4, and 5 Remediation Activities

Characterization surveys prior to and including 2007 characterization sampling identified the areas requiring remediation within SUs 3, 4, and 5. Excavation areas were bounded using the coordinates of soil samples with results exceeding the DCGL. The areas were then systematically excavated until the remedial support samples all demonstrated results under 4 pCi/g.

3.4 Survey Units 17 and 18 Remediation Activities

The soil stockpile generated during 2004 remediation activities was temporarily staged within the boundaries of what was considered SU 2. As part of the 2007 remediation and FSS activities, this stockpile was initially leveled to 2 feet high using an excavator and front-end loader to allow two consecutive 'lifts' to be performed. The first 1 foot layer of the stockpile was surveyed as SU 17 with a 100% GWS and 14 systematic soil samples collected. Successful survey and removal of the first lift would lead to the initiation of the second lift's activities.

The GWS results for SU 17 showed an isolated area toward the center of the unit. Three biased samples were collected in this area, but all were shown to be below the DCGL (maximum ^{232}Th concentration of 2.18 pCi/g).

The GWS results for SU 18 showed a similar hotspot in the same isolated area as SU 17. The levels of the GWS and the results of the pre-remediation biased sample (SU18-B32, 32 pCi/g) indicated this area required remedial action. Approximately 10 cy of soil was removed from this area and loaded into a SuperSack lift-liner. The remainder of SU 18 was removed as clean and set aside for use as backfill upon successful completion of FSS activities.

3.5 Waste Packaging

All areas were remediated using a 330 Caterpillar excavator and a 924 Caterpillar front-end loader. The soils were excavated from each area and transferred directly into the bucket of the loader for transport to a central lift-liner packaging area. The lifting frame was placed in the central island of Vermont Court, with lift-liners placed into the frame as needed. The loader would bring excavated soils to the lifting frame location and load the liners. Once the liner was filled to capacity, it was zipped closed and lifted out of the frame using a 24,000-lb forklift. The filled bags were temporarily staged at the southern end of Vermont Court, on top of geotextile fabric. It was determined during the course of excavation activities that a single lift-liner could hold approximately 8.5 tons of excavated soil.

3.6 Waste Shipment and Disposal

Soils exceeding the DCGL of 4 pCi/g ^{232}Th were packaged in 10 cy soft-sided containers, (i.e., super-sacks). Each super-sack was found to hold approximately 8.5 tons of soil. The super-sacks were temporarily stored on-site, and then transported to a nearby railhead in Kenosha, Wisconsin, where the containers were transloaded into gondola railcars. The wastes were profiled for disposal at the U.S. Ecology facility in Grandview, Idaho as unimportant quantities of source material (less than 0.05% by weight, or equivalent to 55 pCi/g of ^{232}Th). The highest concentration of ^{232}Th identified in these soils was 32 pCi/g.

The soils shipped during 2007 were a combination of those remediated from the FMSSA as well as a portion of the soils remediated from within the PPV area. Since more remedial activities are scheduled within the Public Private Venture (PPV) area in 2008, a full discussion of the waste shipment and disposal operations will not be included here. This discussion, complete with copies of all waste manifests, will be provided with the PPV Final Closure Report.

4.0 FINAL STATUS SURVEY ACTIVITIES

An FSS was conducted after the remedial activities were complete. All activities were performed in accordance with the *Public Private Venture Area Remediation Addendum* to *Work Plan for the Remediation of the Recreation and Center Tank Areas and Site Wide Final Status Survey* (CABRERA, 2007a) which was developed using MARSSIM guidelines.

4.1 Gamma Walkover Survey

As part of the FSS activities for the Site, GWSs were performed over 100% of each of the SUs and after remediation was complete, GWS was performed over the excavation areas within SUs 3, 4, 5, 17, and 18. Prior GWS from characterizations were also used if the area was determined to be initially clean. In areas where the post-remediation GWS overlapped the pre-remediation data, the two data sets were merged with the post-remediation data given preference.

4.2 Systematic Surface Soil Sampling

Surface soil samples (to one foot) were collected in each of the SUs. The minimum number of systematic soil sample locations required in each of the SUs was established using MARSSIM guidance. Surface soil samples were collected in the SUs using a systematic triangular grid pattern with a random start point. Grid spacing was calculated for each SU based on the area of the SU. Random start point coordinates were established using a computer-generated random coordinate set. Systematic sample locations are shown in Figure 4 and the FSS results are presented in Appendix C. The chain of custody was maintained for the collected soil and the sample was transferred to the on-site laboratory.

4.3 Biased Soil Sampling

Surface soil samples were collected at biased locations to identify potential areas of elevated radioactivity. Biased surface soil samples were collected within the excavation areas and at previously remediated areas.

4.4 On-site Gamma Spectroscopy Laboratory

Following sample collection and logging, they were prepared for analysis by heating to dryness in a conventional oven. Once dry, the soil was sieved and ground to a consistent particle size to provide a homogeneous sample. All sieving and grinding operations were performed (inside a hood equipped with a high-efficiency particulate air (HEPA) filtration system. The completed sample was then packaged for counting in a 1-liter Marinelli container.

CABRERA performed on-site gamma spectroscopy sample analyses on soil all samples utilizing a coaxial HPGe detector. Prior to the performance of project sample analyses, the detector was calibrated using a mixed gamma standard traceable to the National Institute of Standards Technology (NIST).

The gamma spectroscopy system was operated by a trained operator in accordance with CABRERA'S Standard Operating Procedures. The operator performed spectral analysis during

each measurement, which encompassed the evaluation of spectra for problems such as peak shift, high dead-time and other potential inconsistencies in spectral structure. A qualified Health Physicist reviewed the integrity of the sample analysis results for each sample prior to submittal of final results to RASO for approval. This review encompassed the analysis of sample results for spectral energy shift, agreement between progeny activities assumed to be in secular equilibrium, the presence of potentially unidentified radionuclides, as well as other potential inconsistencies. Sample count times were determined to be fifteen minutes, in order to accomplish the sufficient minimum detectable concentrations (MDCs) to meet applicable Site clean up criterion.

CABRERA utilized a radionuclide library consisting of radionuclides present in natural background and cesium-137 (^{137}Cs), from global nuclear weapons testing fallout, to analyze the gamma spectral data. Radionuclide gamma/x-ray energies and yields were extracted from the National Nuclear Data Center NUDAT nuclear data database (version dated 22 August 2002). CABRERA gamma spectroscopy data reported for actinium-228 (^{228}Ac) was used to represent ^{232}Th activity concentrations under the assumption of secular equilibrium. Thus, references to ^{232}Th activity concentrations herein are based on the gamma spectroscopy results of ^{228}Ac. The ^{228}Ac gamma lines used to infer ^{232}Th activity concentration are 911.2 kiloelectron volts (keV) at 25.8% yield, 969.0 keV at 15.8% yield, and 338.3 keV at 11.3% yield, and several additional lower yielding gamma lines. The Onsite Gamma Spectroscopy Laboratory raw results are included as Appendix C.

Discussion of On-site Lab Quality Assurance and Quality Control (QA/QC) results are presented in Section 6.0, with QC data included as Appendix D.

5.0 FINAL STATUS SURVEY RESULTS

Evaluation of the FSS data compiled within each SU was performed using the MARSSIM Sign Test. The Sign Test was chosen since the levels of natural ^{232}Th in Site soils are at levels considered to be negligible in comparison to the new $DCGL_w$ of 4 pCi/g. Therefore, a background reference area was not required for the MARSSIM FSS evaluation of the data. The results of each SU sign test is summarized below in Table 5-1 with Sign Test Worksheets for each SU also included in Appendix A. Plots of the GWS results from within each SU are provided in the Figures section of this report.

5.1 Survey Unit 1

The FSS evaluation of SU 1 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 21 systematic samples. Since no contoured Z-score value was greater than 3.0, no bias samples were necessary in SU 1. The ^{232}Th concentrations of the systematic samples ranged from 0.05 to 0.99 pCi/g, averaging 0.47 pCi/g with a standard deviation of 0.25 pCi/g. All FSS sample results for SU 1 were below the Site action level for ^{232}Th of 4 pCi/g. This SU passed the release criteria and is thereby suitable for unrestricted release.

5.2 Survey Unit 2

The FSS evaluation of SU 2 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 20 systematic samples. Since no contoured Z-score value was greater than 3.0, no bias samples were necessary in SU 2. The ^{232}Th concentrations of the systematic samples ranged from 0.18 to 1.37 pCi/g, averaging 0.81 pCi/g with a standard deviation of 0.37 pCi/g. All FSS sample results for SU 2 were below the Site action level for ^{232}Th of 4 pCi/g. This SU passed the release criteria and is thereby suitable for unrestricted release.

5.3 Survey Unit 3

The FSS evaluation of SU 3 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 18 systematic samples and 5 bias samples. The ^{232}Th concentrations of the systematic samples ranged from 0.56 to 1.70 pCi/g, averaging 0.92 with a standard deviation of 0.32. The ^{232}Th concentrations of the bias samples ranged from 0.67 to 3.90 pCi/g. All FSS sample results for SU 3 were below the Site action level for ^{232}Th of 4 pCi/g. This SU passed the release criteria and is thereby suitable for unrestricted release.

5.4 Survey Unit 4

The FSS evaluation of SU 4 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 21 systematic samples and 2 bias samples. The ^{232}Th concentrations of the systematic samples ranged from 0.27 to 1.61 pCi/g, averaging 0.75 pCi/g with a standard deviation of 0.30 pCi/g. The ^{232}Th concentrations of the bias samples ranged from 0.82 to 1.08 pCi/g. All FSS sample results for SU 4 were below the Site action level for ^{232}Th of 4 pCi/g. This SU passed the release criteria and is thereby suitable for unrestricted release.

5.5 Survey Unit 5

The FSS evaluation of SU 5 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 21 systematic samples and 3 bias samples. The ^{232}Th concentrations of the systematic samples ranged from 0.17 to 1.26 pCi/g, averaging 0.79 pCi/g with a standard deviation of 0.28 pCi/g. The ^{232}Th concentrations of the bias samples ranged from 0.98 to 2.39 pCi/g. All FSS sample results for SU 5 were below the Site action level for ^{232}Th of 4 pCi/g. This SU passed the release criteria and is thereby suitable for unrestricted release.

5.6 Survey Unit 17

The FSS evaluation of SU 17 encompassed the performance of a GWS and the collection and gamma spectroscopy analysis of 14 systematic samples and 3 bias samples (SU17-B29, B30, and B31). The ^{232}Th concentrations of the systematic samples ranged from 1.01 to 1.61 pCi/g, averaging 1.36 pCi/g with a standard deviation of 0.17 pCi/g. The ^{232}Th concentrations of the bias samples ranged from 1.25 to 2.18 pCi/g, all below the Site DCGL for ^{232}Th of 4 pCi/g. This lift was removed completely as meeting the release criteria and is thereby suitable for restricted reuse as backfill on-site.

5.7 Survey Unit 18

The FSS evaluation of SU 18 included the performance of a GWS and the collection and gamma spectroscopy analysis of 14 systematic samples and one bias sample post-remediation (SU18-B33). The ^{232}Th concentrations of the systematic samples ranged from 1.01 to 1.93 pCi/g, averaging 1.25 pCi/g with a standard deviation of 0.25 pCi/g. The ^{232}Th concentration of the bias sample was 1.43 pCi/g. All FSS sample results for SU 18 were below the Site action level for ^{232}Th of 4 pCi/g. This lift was removed completely as meeting the release criteria and is thereby suitable for restricted reuse as backfill on-site.

TABLE 5-1: FSS SUMMARY STATISTICS

Survey Unit Statistic	Survey Unit						
	SU-1	**SU-2**	**SU-3**	**SU-4**	**SU-5**	**SU-17**	**SU-18**
Sample Size, n	21	20	18	21	21	14[1]	14[1]
Prospective Assumed Sigma	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Sample Average	0.47	0.81	0.92	0.75	0.79	1.36	1.25
Sample Maximum	0.99	1.37	1.70	1.61	1.26	1.61	1.93
Sample Minimum	0.05	0.18	0.56	0.27	0.17	1.01	1.01
Sample Retrospective Sigma	0.25	0.37	0.32	0.30	0.28	0.17	0.25
Bias Sample Maximum	N/A	N/A	3.90	1.08	2.39	2.18	1.53[2]
Bias Sample Minimum	N/A	N/A	0.67	0.82	0.98	1.25	1.53[2]
Sign Test Results (Pass or Fail)	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes:
1. The number of samples was reduced for SU-17 & SU-18 as these were the soil stockpiles from previous remediation efforts.
2. Only one bias sample was collected for SU 18

6.0 SITE RESTORATION

Upon completion of all FSS activities, a Backfill Request Authorization Letter was submitted to RASO for approval. Upon concurrence from RASO that all remediation and survey objectives had been met, each open excavation was back-filled with borrow-source gravel back to grade level. In areas where additional investigations are planned for 2008, geotextile fabric was used to demarcate the boundary of where successful remediation and FSS had been completed.

Copies of each Backfill Request Letter are provided in Appendix F.

7.0 QUALITY ASSURANCE / QUALITY CONTROL

7.1 CABRERA On-site Laboratory Quality Control Results

7.1.1 System Calibration

The CABRERA Laboratory HPGe detector was calibrated with a NIST traceable multi-line gamma Marinelli standard prior to the performance of project sample analyses. The Marinelli standard used for the system efficiency calibration consisted of a geometry identical to the sample geometry, with a density approximate to the average density of the project samples.

7.1.2 Daily Quality Control Checks

Cadmium-109 (^{109}Cd) and cobalt-60 (^{60}Co) sources were used to perform daily Quality Control (QC) activities. Analysis of the QC standards was performed each day sample analyses were conducted in order to evaluate the detector performance against established gamma spectroscopy QC criteria for the project. The QC criteria consisted of detector resolution, using measurement of Full Width at Half Maximum, peak energy measurements, and decay corrected activity concentration measurements. Each criterion was evaluated for ^{109}Cd at 88.1 keV and ^{60}Co at 1332.5 keV. Daily QC results passed comparison criteria for each day that project sample analyses were performed. Results for all daily QC checks are provided in Appendix D.

The Quality Control Charts show a tendency toward the end of the project (last week of November) for a decrease in the efficiency approaching the action level. However, the results were still within acceptable limits so the resulting data was accepted without qualification.

7.1.3 Laboratory Blanks

The CABRERA Laboratory performed blank analyses to test analytical accuracy and to estimate the extent of bias in the measurements. CABRERA prepared blanks consisting of a media similar to the samples and free of radiological contamination. Blank analyses were performed weekly in accordance with the laboratory's written procedures. Blank sample analysis results for ^{232}Th were all less than the analytical MDC, indicating that laboratory sample processing and handling did not introduce a positive bias in the sample results.

7.1.4 Laboratory Replicate Sample Analyses

CABRERA performed replicate analyses for 5% of the samples analyzed in the CABRERA Laboratory. Replicate analyses entailed repeating the analysis of a previously analyzed sample and comparing the results statistically using a Z-Replicate method as recommended in Chapter 18 of the Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) manual. Z_{Rep} evaluates a sample result against a duplicate (or QA sample), including the stated uncertainties of each sample. The formula for Z_{Rep} is:

$$Z_{\mathrm{Re}\,plicate} = \frac{Sample - Duplicate}{\sqrt{\sigma^2_{Sample} + \sigma^2_{Duplicate}}}$$

Where:

Sample	=	first sample value (original),
Duplicate	=	second sample value (duplicate),
Sample	=	total propagated measurement uncertainty of the sample, and
Duplicate	=	total propagated measurement uncertainty of the duplicate

The calculated Z_{Rep} results should be compared to a performance criteria of ±2.57. Duplicate analyses that result in a Z_{Rep} outside of ±2.57 should be investigated for possible discrepancies in analytical precision or sources of disagreement within the following assumptions:

- The sample measurement and duplicate or replicate measurement are of the same normally distributed population;
- The standard deviations represent the true standard deviation of the measured population

Results of the CABRERA on-site Laboratory replicate evaluations for are provided in Table 7-1. All on-site laboratory replicate samples passed the requisite Z-score evaluation.

7.1.5 Off-site Laboratory Cross-Check Duplicate Analyses

Test America performed cross-check gamma spectroscopy analyses on 10% of the soil samples collected and analyzed by the CABRERA Laboratory. Results of both laboratories were compared using the Z-Replicate (Z_{Rep}) method as described in Section 7.1.4. The results of the laboratory comparisons for all SUs are provided in Table 7-2 . Test America laboratory data packages are included as Appendix E.

Of the samples evaluated during the off-site cross-check 10 (or 40%) were found to have a Z_{Rep} greater than the tolerance level of 2.57. It was later discovered that Test America utilized only 350-g aliquot samples (out of the ~1500g provided) to perform their analyses. We feel this sub-sampling introduced additional sample bias caused by heterogeneity within the total volume. Depending on whether the off-site lab sampled either localized “pockets” of contamination (or not), their results may have been preferentially biased versus the aggregate average reported via the entire sample mass in the on-site laboratory.

It should be noted that of these 10 failures, five had Z_{Rep} values between 2.65 and 3.27, with very low relative ^{232}Th concentrations (< 2 pCi/g). These samples displayed a distribution of both positive and negative results, indicating only slight impact of the heterogeneity. The remaining five had higher variation, but also higher concentrations of ^{232}Th, which likely are correlated with the relative impact of the heterogeneity. Although this stated failure rate is abnormally high, CABRERA feels that it is primarily due to preparation bias and should not attributable to the accuracy of the CABRERA Laboratory. For this reason, we feel no additional data qualification is warranted.

TABLE 7-1: SUMMARY OF ON-SITE LABORATORY QA REPLICATE SAMPLE COMPARISON

Original Sample Result			Replicate Sample Results			Z-Score	Z-Score Pass/Fail (<2.57)
Sample ID	Result	Uncert	Sample ID	Result	Uncert		
SU1-8-PR	ND	--	SU1-8-PR Dup	ND	--	N/A	N/A
SU1-13-PR	ND	--	SU1-13-PR Dup	3.46E-01	0.09	N/A	N/A
SU2-26-PR	7.36E-01	0.13	SU2-26-PR Dup	7.47E-01	0.13	0.06	Pass
SU2-35-PR	9.62E-01	0.11	SU2-35-PR Dup	8.87E-01	0.12	0.45	Pass
SU3-52-1	1.12E+00	0.17	SU3-52-1 Dup	9.79E-01	0.16	0.61	Pass
SU3-58-1	6.22E-01	0.11	SU3-58-1 Dup	5.19E-01	0.13	0.59	Pass
SU4-71-1	8.13E-01	0.16	SU4-71-1 Dup	6.32E-01	0.15	0.84	Pass
SU4-75-1	ND	--	SU4-75-1 Dup	ND	--	N/A	N/A
SU4-79-1	1.05E+00	0.15	SU4-79-1 Dup	1.01E+00	0.15	0.18	Pass
SU5-85-1	7.48E-01	0.18	SU5-85-1 Dup	ND	--	N/A	N/A
SU5-91-3	6.51E-01	0.13	SU5-91-3 Dup	7.29E-01	0.13	0.42	Pass
SU5-93-2	1.02E+00	0.17	SU5-93-2 Dup	9.93E-01	0.16	0.14	Pass
SU5-101-2	8.51E-01	0.15	SU5-101-2 Dup	8.34E-01	0.14	0.08	Pass
SU5-104-1	1.18E+00	0.17	SU5-104-1 Dup	1.14E+00	0.18	0.16	Pass
SU5-105-1	5.83E-01	0.16	SU5-105-1 Dup	5.20E-01	0.15	0.30	Pass
SU5B-052 PR	9.83E-01	0.13	SU5B-052 PR Dup	9.59E-01	0.14	0.13	Pass
SU17-05-1	1.18E+00	0.13	SU17-05-1 Dup	1.18E+00	0.15	0.01	Pass
SU17-10-1	1.61E+00	0.18	SU17-10-1-Dup	1.30E+00	0.17	1.26	Pass
SU17-14-1	1.01E+00	0.13	SU17-14-1-Dup	9.96E-01	0.14	0.07	Pass
SU17-B29-1	1.25E+00	0.15	SU17-B29-1 Dup	1.34E+00	0.14	0.44	Pass
SU18-07-1	1.07E+00	0.16	SU18-07-1 Dup	1.03E+00	0.16	0.18	Pass
SU18-11-1	1.01E+00	0.15	SU18-11-1 Dup	1.15E+00	0.15	0.68	Pass

Note: ND = Not Detected

TABLE 7-2: COMPARISON OF ON-SITE LAB RESULTS WITH OFF-SITE LABORATORY QA RESULTS

Sample ID	Off-site Lab Sample Results		On-site Lab Sample Results		Z-Score	Z-Score Pass/Fail (<2.57)
	Result	Uncert	Result	Uncert		
SU1-14-PR	0.80	0.15	0.99	0.08	1.11	Pass
SU2-25-PR	0.98	0.11	1.29	0.07	2.36	Pass
SU2-31-PR	1.00	0.13	0.98	0.06	0.14	Pass
SU3-43-1	1.48	0.15	1.70	0.12	1.13	Pass
SU3-52-2	1.10	0.16	1.36	0.10	1.39	Pass
SU3-55-1	1.20	0.12	1.59	0.08	2.73	***Fail***
SU3B-049 PR	4.60	0.26	3.90	0.11	2.53	Pass
SU4-64-2	1.00	0.11	1.63	0.10	4.32	***Fail***
SU4-65-1	0.63	0.10	1.11	0.09	3.57	***Fail***
SU4-67-2	1.11	0.14	1.03	0.08	0.50	Pass
SU4-76-1	1.13	0.13	1.61	0.09	3.05	Fail
SU4-79-3	1.07	0.12	1.24	0.08	1.20	Pass
SU5-88-1	0.74	0.12	1.15	0.08	2.83	***Fail***
SU5-93-1	1.12	0.18	1.13	0.10	0.06	Pass
SU5-93-2	1.11	0.16	1.02	0.09	0.48	Pass
SU5-103-1	1.41	0.13	1.10	0.09	1.97	Pass
SU5B-054 PR	3.04	0.22	2.39	0.11	2.65	***Fail***
SU17-07-1	1.41	0.14	1.58	0.09	1.04	Pass
SU17-10-1	1.47	0.17	1.61	0.09	0.75	Pass
SU17-12-1	1.68	0.19	1.60	0.09	0.40	Pass
SU17-B30-1	4.16	0.32	2.18	0.09	5.98	***Fail***
SU18-04-1	1.08	0.15	1.59	0.09	2.95	***Fail***
SU18-06-1	2.62	0.20	1.93	0.08	3.27	***Fail***
SU18-B32-1	40.10	1.45	32.18	0.35	5.31	***Fail***
SU18-B33-1	2.05	0.24	1.53	0.16	1.79	Pass

Note: All results in pCi/g

7.2 Field Instrumentation QC Results

Data collection activities were performed in accordance with written procedures and/or protocols in order to ensure consistent, repeatable results. The Field Site Manager ensured that individuals were appropriately trained to use project instrumentation and other equipment, and that instrumentation met the required detection sensitivities.

7.2.1 Calibration Requirements

Radiological instruments were used to scan soil surfaces, equipment, personnel, and clothing for radiological contamination. Current calibration/maintenance records were kept on-site for review and inspection (included in Appendix B). The records include, at a minimum, the following:

- equipment identification (model and serial number)
- manufacturer
- date of last calibration
- calibration due date

Instrumentation was maintained and calibrated to manufacturers' specifications to ensure that required traceability, sensitivity, accuracy and precision of the equipment/instruments were maintained. Instruments were calibrated at a facility possessing appropriate NRC and/or Agreement State licenses for performing calibrations using NIST traceable sources. Copies of these calibration certificates are included in Appendix B.

7.2.2 QC Source and Background Checks

Prior to daily use, instruments were QC checked by comparing the instruments' response to a designated radiation source and to ambient background. Prior to the commencement of field operations a reference location was used for performance of these checks. Background checks were performed in an identical fashion with the source removed. At the start of the field activities, this procedure was repeated ten times to establish an average instrument response.

During QC checks, instruments used to obtain qualitative radiological data were inspected for physical damage, current calibration, and erroneous readings in accordance with applicable procedures and protocols.

Instrument response to the designated QC check source was evaluated against the average established at the start of the field activities. Performance criteria of ± 20% of this average were used as an investigation action level for qualitative field instruments, such as a Ludlum 44-20 3x3 NaI, a 44-9 Geiger-Mueller (GM) detector, and a Ludlum 43-93 dual-phosphor scintillator probe.

Performance criteria of ± 2 sigma as an investigation level and ± 3 sigma as an action level were used for quantitative instruments, i.e., instruments used for formal reporting or release

purposes. These instruments included the stationary smear counting instruments (Ludlum 2929 with a 43-10-1 probes).

During this work evolution, several Ludlum 2929 smear counters were used (see QC sheets in Appendix B). One of the instruments was incorrectly diagnosed as failing due to upward trends in detector count rates, causing daily QC failures. However, it was determined that the increases in background were from increases in monazite sand inventory in stored samples in the room below. These samples were contributing to elevated ambient background dose rate in the counting room. Once this was determined, the samples were moved, and the instruments were restored to a normal operating condition. All QC checks were within the established performance criteria as shown on control charts, included as Appendix B to this report.

7.3 GPS Daily Field Checks

At the start of the field effort the average easting and northing GPS position data was also established. These checks were always performed at the same location and were logged in the GPS unit. During subsequent routine checks, GPS position data was compared to the established averages. All measurements were within the criteria, as shown on control charts included as Appendix B to this report.

8.0 CONCLUSION

CABRERA performed characterization, remediation, and FSS activities within the former FMSSA at the Naval Station Great Lakes in Great Lakes, Illinois. Activities performed included GWS in all accessible areas, direct-push soil coring and DGL to characterize soils at depth, surface and subsurface soil sampling at systematic and biased locations, and on-site preparation and analysis of samples in a field gamma spectroscopy laboratory.

CABRERA also developed and submitted a site-specific DCGL document for the Site to NRC Region 3. This document was approved for use and thus allowed a 4 pCi/g ^{232}Th DCGL to be used for FSS purposes. This value replaced the former NRC Soil Screening Values (SSV) as the Site DCGL (1.1 pCi/g ^{232}Th above background).

Remediation of contaminated soils at the Site led to the packaging and shipment of 102 tons of impacted excavated soils to waste control specialists (WCS) in Andrews, Texas, as unimportant quantities of source material (less than 0.05% by weight, or equivalent to 55 pCi/g of ^{232}Th). Soft-sided 'Super Sack" lift liner containers were used for all waste packaging activities. As these lift-liners were sealed, each was temporarily stored in a central location on-site until they could be transported to a nearby railhead in Kenosha, Wisconsin. The lift-liners were then trans-loaded into gondola railcars and manifested to WCS. The highest concentration of ^{232}Th identified in the remediated soils was 32 pCi/g.

FSS activities consisted of a 100% GWS and sample collection and analysis. Systematic and biased sampling consisted of soil sampling from 120 locations, with samples obtained via a direct-push rig with a macrocore sampler or through surface sampling methods. All FSS sample results were shown to be below the Site DCGL of 4.0 pCi/g. The FSS data indicate that the SUs investigated within the FMSSA are suitable for release for unrestricted use.

9.0 REFERENCES

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(CABRERA, 2004b) *Work Plan for the Characterization of the Recreation and Center Tank Areas and Radiological Remediation and Final Status Survey of the North Fence Area*, Cabrera Services, Inc., August 2004.

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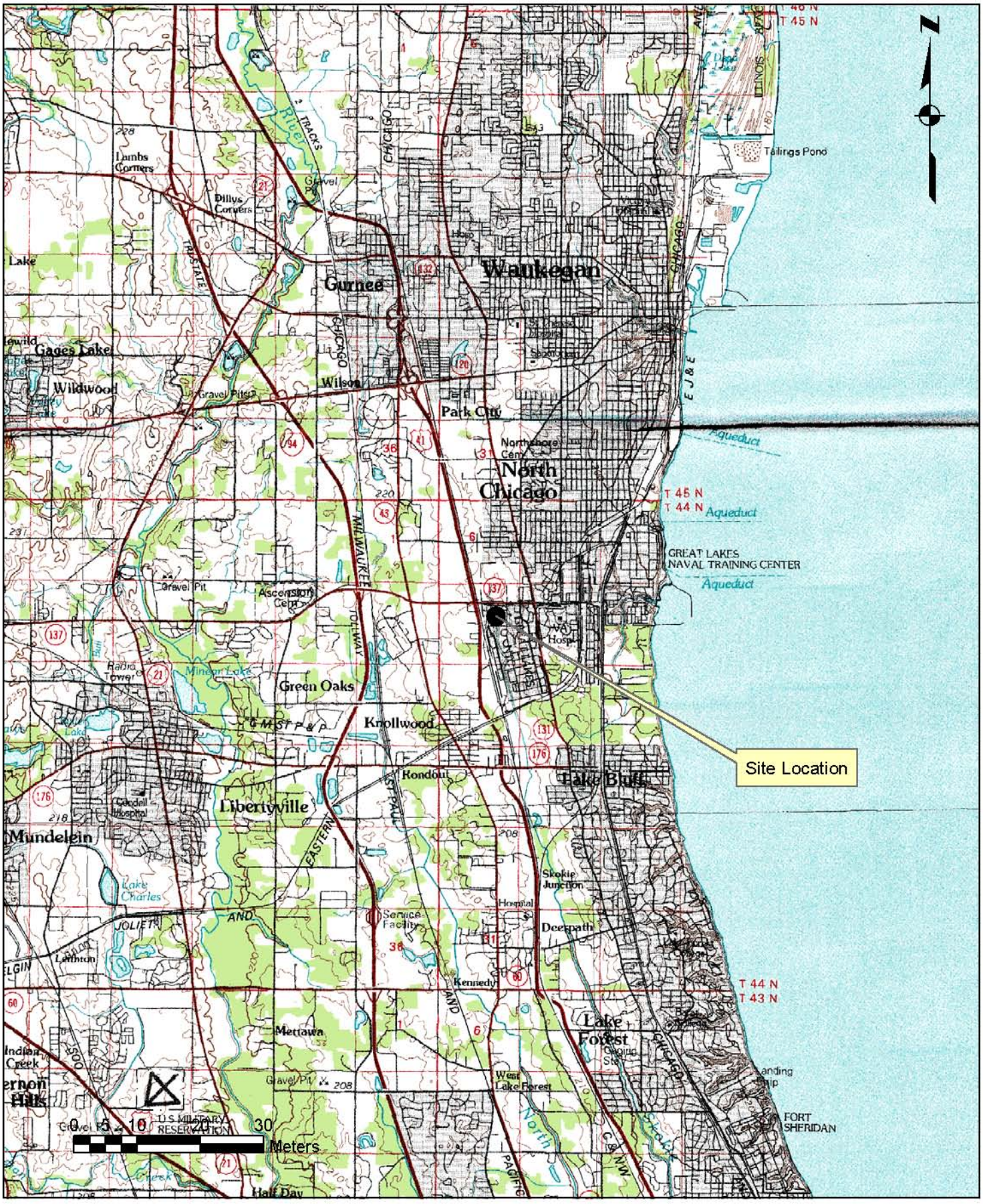
FIGURES



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Site Location Map

Naval Station Great Lakes

Date: January 2006
Project #: 05-3060.01
File Name: 05-3060.01_Fg1_Site
Prepared By: BP

Figure 1

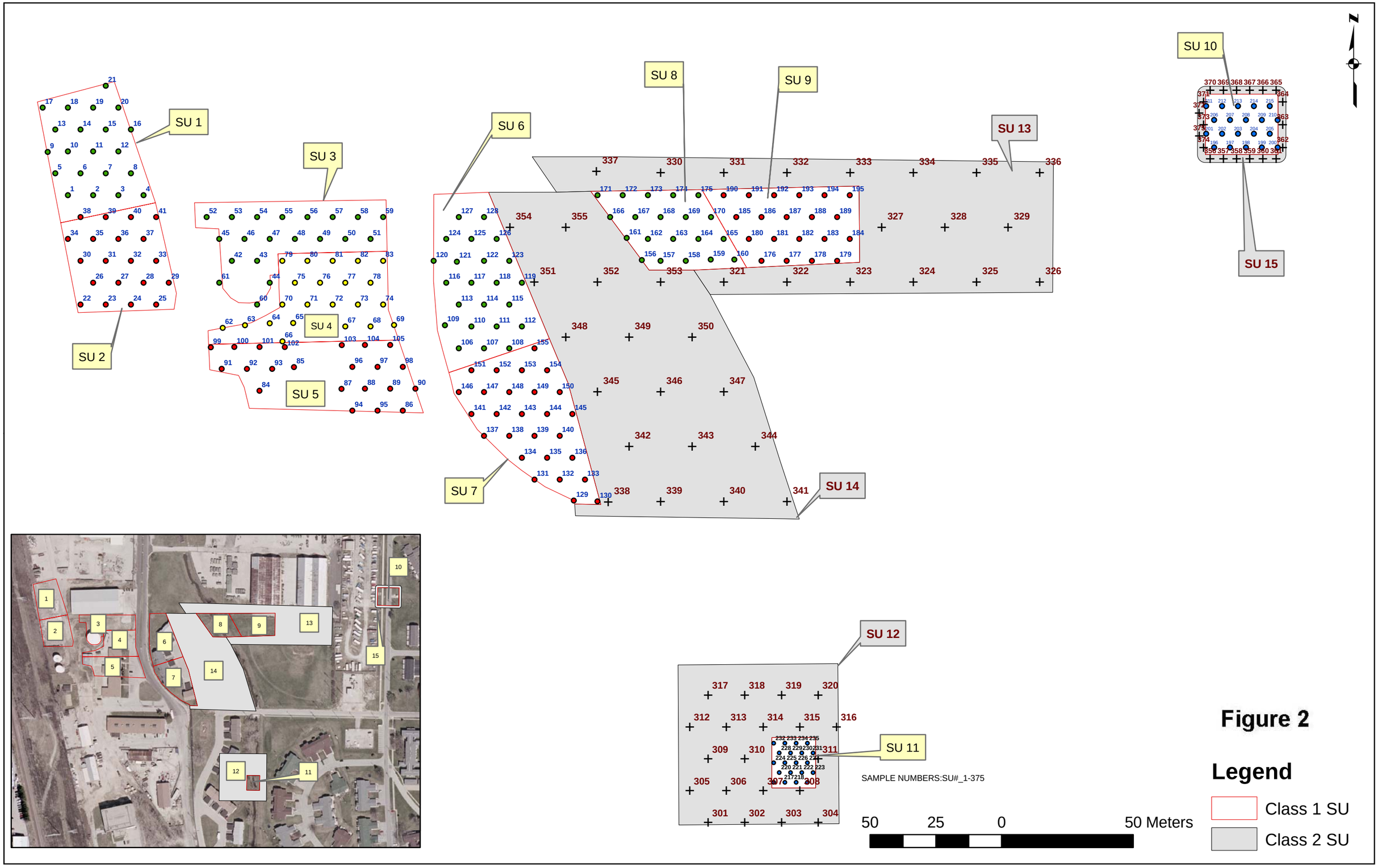
SU 1
SU 2
SU 3
SU 4
SU 5
SU 6
SU 7
SU 8
SU 9
SU 10
SU 11
SU 12
SU 13
SU 14
SU 15
SAMPLE NUMBERS:SU#_1-375
50 25 0 50 Meters
Legend
Class 1 SU
Class 2 SU

Figure 2

N

Meters

0 5 10 20

Legend

- Class1_SU1_2
- Class 1 SU
- Class 2 SU

Class 1 (SU1 and SU2)
Systmatic Sample Locations

Naval Station Great Lakes

Date: June, 2007 File Name: Fig.1

Project #: 05-3060.01 Prepared By: BP

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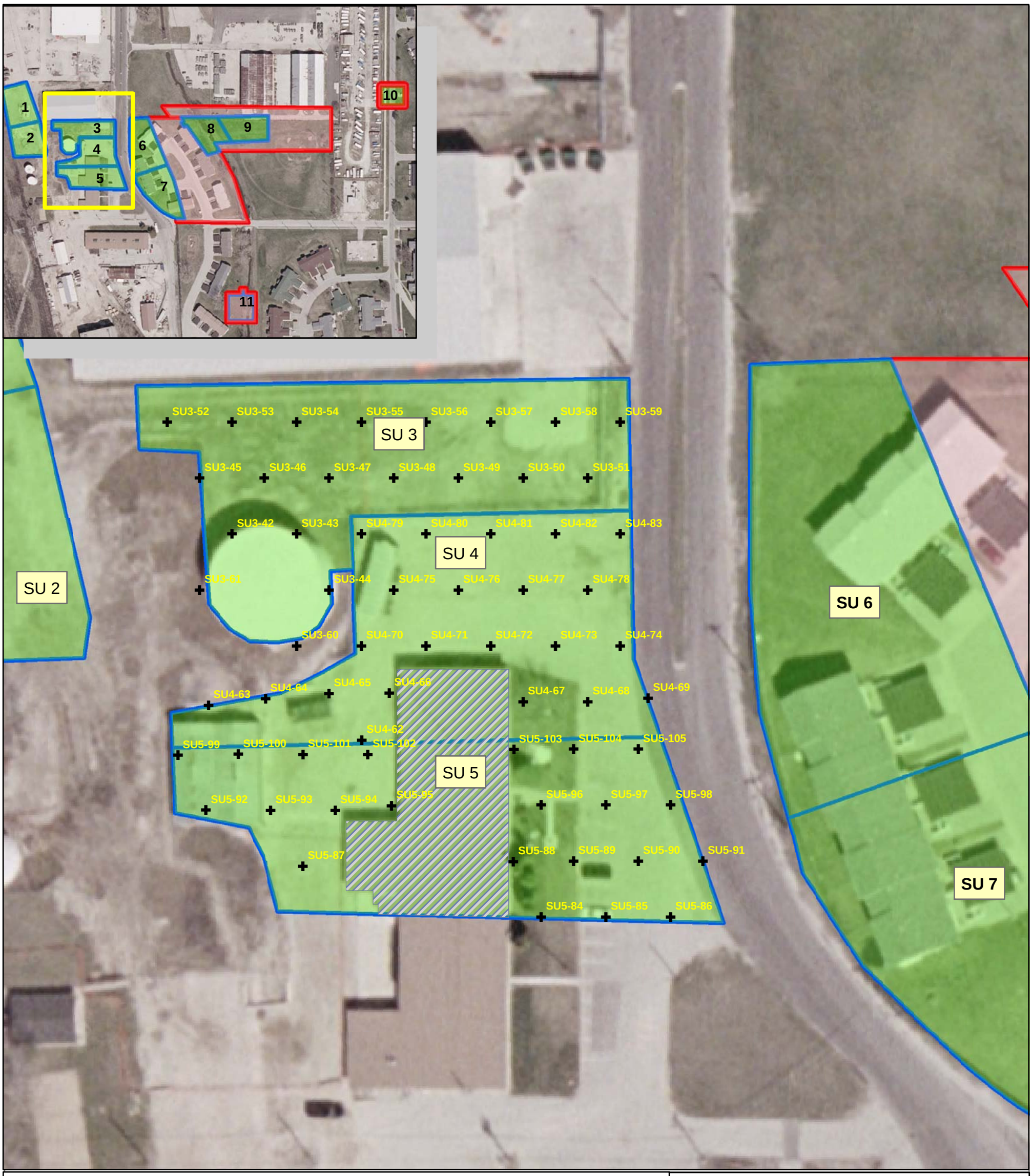
Figure 3



N

0 5 10 20 Meters

Legend

- Class1_SU3_4_5
- SU5_Building_footprint
- Class 1 SU
- Class 2 SU

Class 1 (SU3, SU4 and SU5)
Systmatic Sample Locations

Naval Station Great Lakes

Date: June, 2007 File Name: Fig.1

Project #: 05-3060.01 Prepared By: BP

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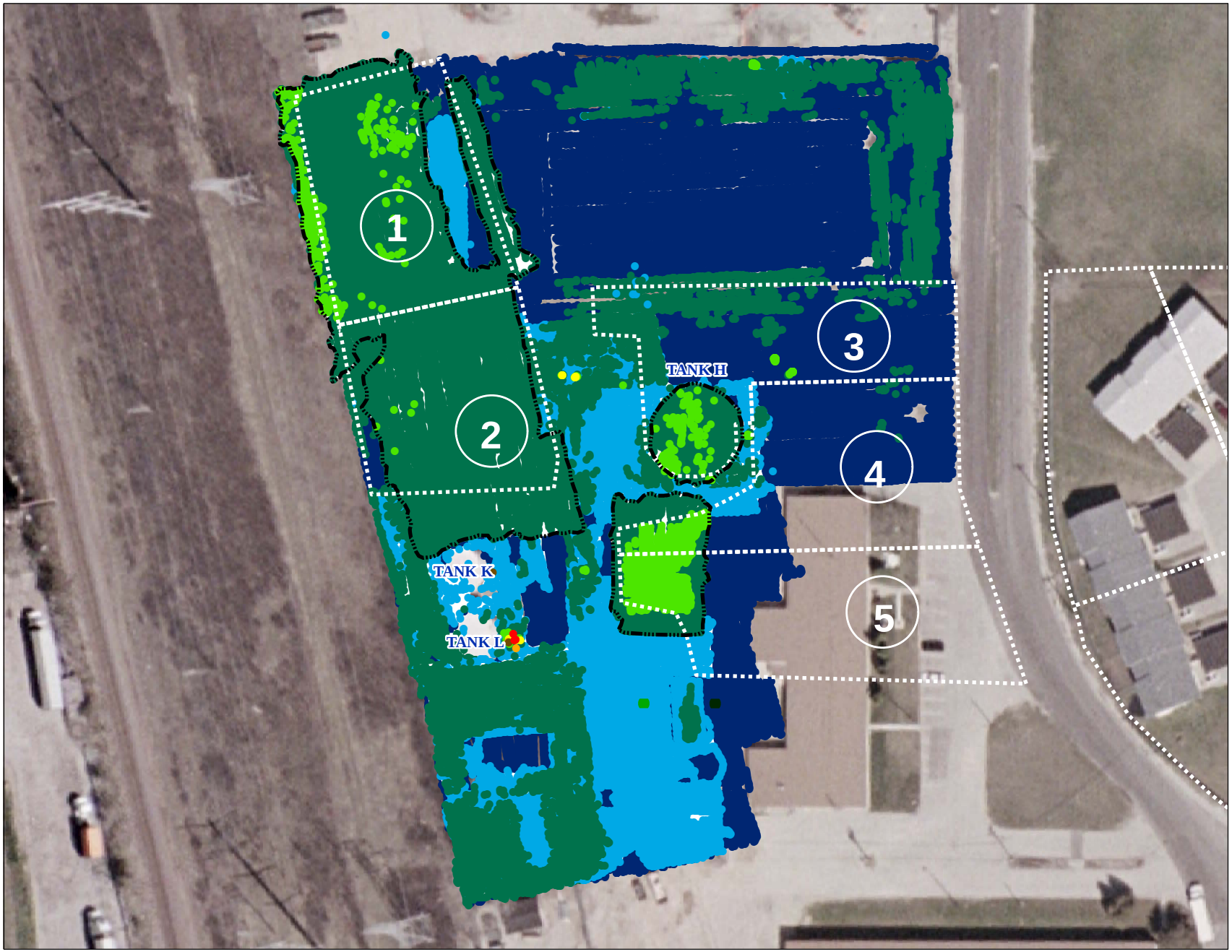
Figure 4



N

Legend

2007 Excavation Outline

CPM

- <10,000
- 10,000-20,000
- 20,000-30,000
- 30,000-40,000
- 40,000-50,000
- 50,000-60,000
- 60,000-70,000
- >70,000

PRE- AND POST- REMEDIAITON GWS RESULTS

Naval Station Great Lakes

Date: Sept, 2007

Project #: 05-3060.01

File Name: 03-3040.30_PPV

Prepared By: BP

Figure 5

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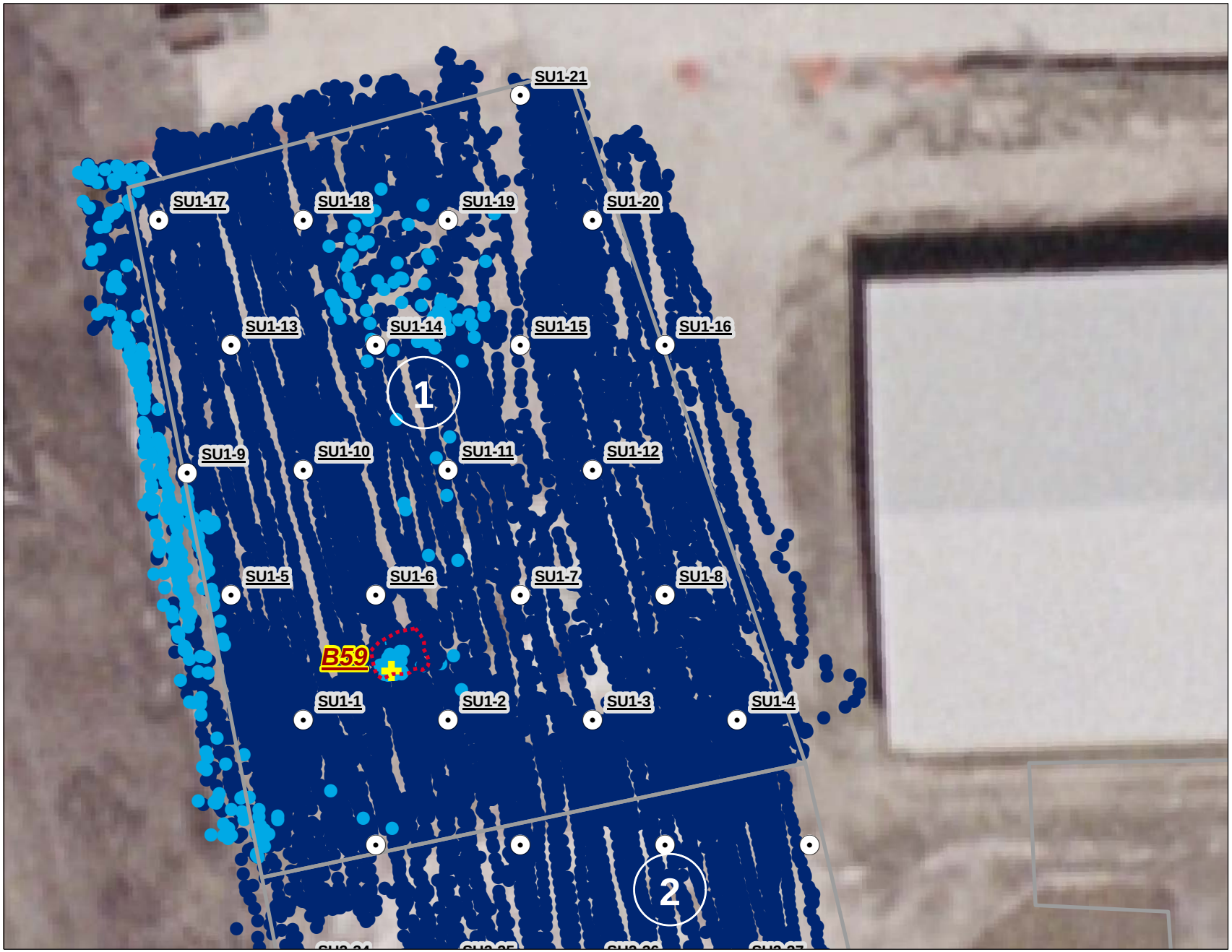

N

Legend

- Systematic Locations
- SU1 Biased Location
- Excavation Outline

CPM

- <10,000
- 10,000-20,000
- 20,000-30,000
- Survey Units

SU1 GWS RESULTS

Naval Station Great Lakes

Date: Dec, 2007
Project #: 05-3060.01
File Name: 03-3040.30_PPV
Prepared By: BP

Figure 6

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N

Legend

- Biased Locations
- Systematic Locations
- Excavation Outline
- Survey Units

CPM

- <10,000
- 10,000-20,000
- 20,000-30,000

SU3 GWS RESULTS

Naval Station Great Lakes

Date: Dec, 2007
Project #: 05-3060.01
File Name: 03-3040.30_PPV
Prepared By: BP

Figure 7

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N

Legend

- Biased Location
- Systematic Locations
- Excavation Outline
- Survey Units

CPM

- <10,000
- 10,000-20,000
- 20,000-30,000

SU4 GWS RESULTS

Naval Station Great Lakes

Date: Dec, 2007
Project #: 05-3060.01
File Name: 03-3040.30_PPV
Prepared By: BP

Figure 8

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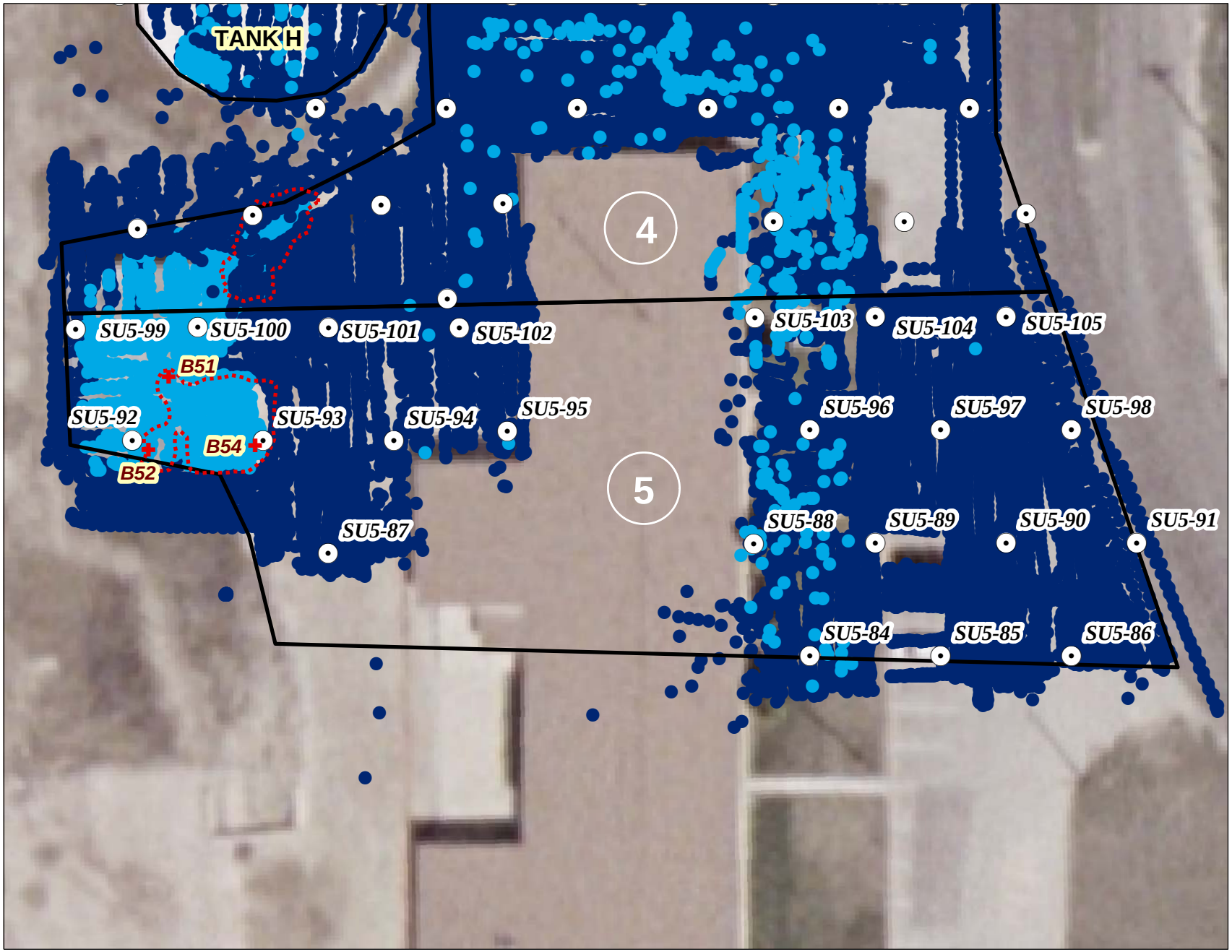

N

Legend

- Biased Locations
- Systematic Locations

CPM

- <10,000
- 10,000-20,000
- 20,000-30,000
- Excavation Outline
- Survey Units

SU5 GWS RESULTS

Naval Station Great Lakes

Date: Dec, 2007
Project #: 05-3060.01
File Name: 03-3040.30_PPV
Prepared By: BP

Figure 9

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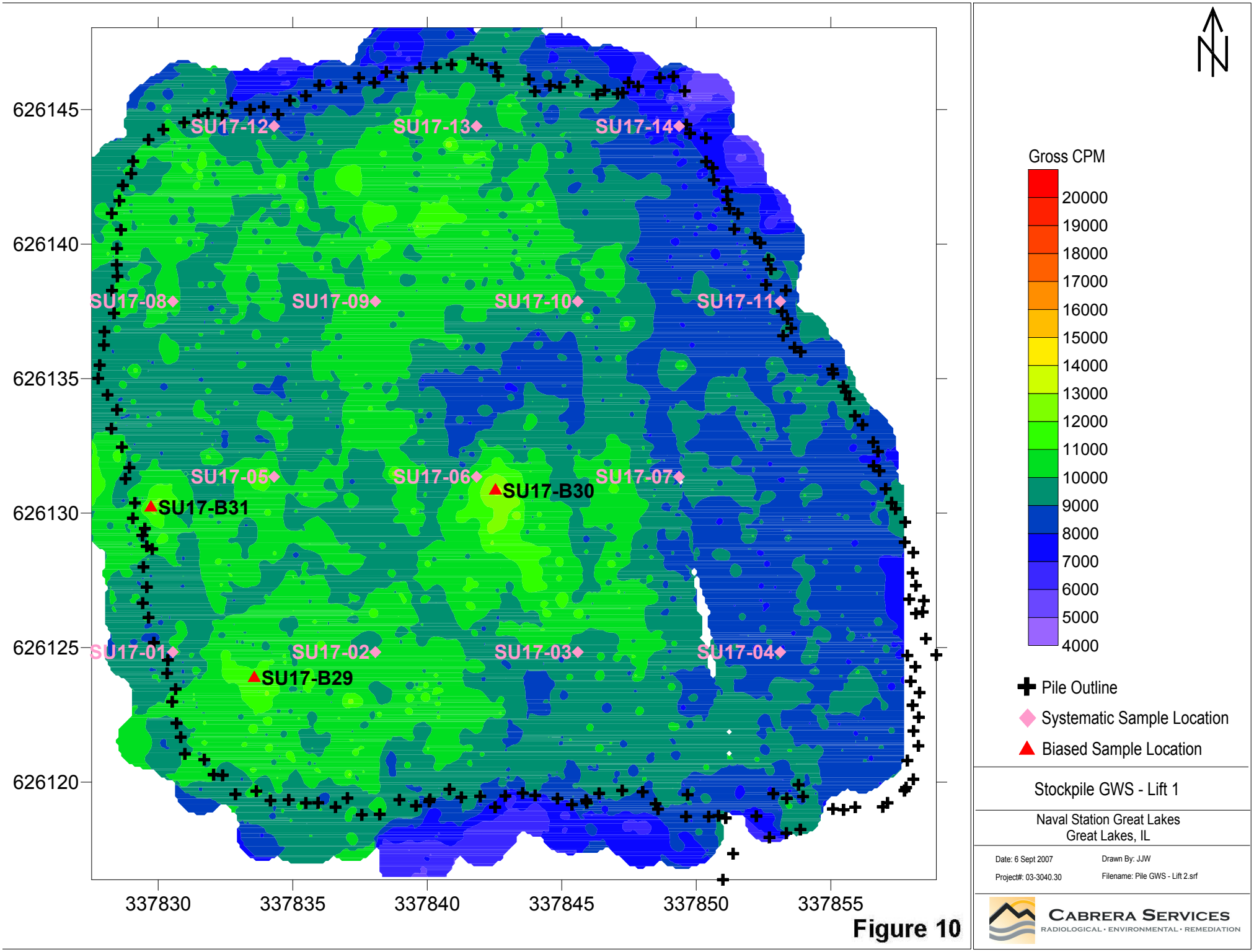
626145
626140
626135
626130
626125
626120
337830
337835
337840
337845
337850
337855
SU17-12
SU17-13
SU17-14
SU17-08
SU17-09
SU17-10
SU17-11
SU17-05
SU17-06
SU17-07
SU17-B30
SU17-B31
SU17-01
SU17-02
SU17-03
SU17-04
SU17-B29
Gross CPM
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
Pile Outline
Systematic Sample Location
Biased Sample Location
Stockpile GWS - Lift 1
Naval Station Great Lakes
Great Lakes, IL
Date: 6 Sept 2007
Drawn By: JJW
Project#: 03-3040.30
Filename: Pile GWS - Lift 2.srf
CABRERA SERVICES
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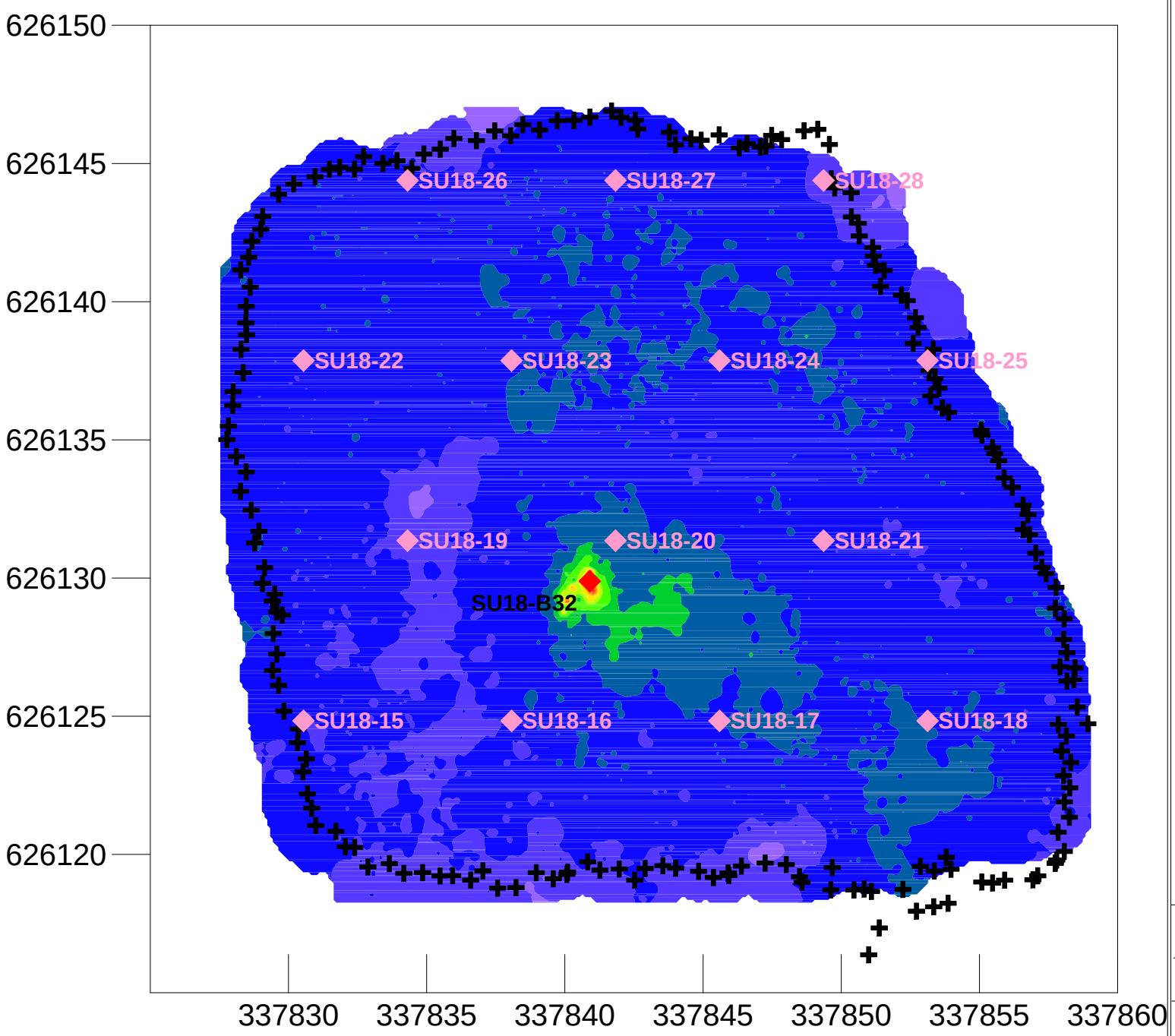
Figure 10



Gross CPM

26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000

Pile Outline
Systematic Sample Location
Biased Sample Location

Stockpile GWS - Lift 2

Naval Station Great Lakes
Great Lakes, IL

Date: 6 Sept 2007
Drawn By: JJW
Project#: 03-3040.30
Filename: Pile GWS - Lift 2.srf

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Figure 11

APPENDICES

APPENDIX A

SIGN TEST WORKSHEETS

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	1
MARSSIM Classification	1

Th-232 $DCGL_W$ (pCi/g)	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU1-1-PR	0.36	+/-	0.16	0.34	3.64	1
SU1-2-PR	0.42	+/-	0.11	0.16	3.58	1
SU1-3-PR	0.31	+/-	0.15	0.32	3.69	1
SU1-4-PR	0.05	+/-	0.14	0.30	3.95	1
SU1-5-PR	0.69	+/-	0.12	0.22	3.31	1
SU1-6-PR	0.25	+/-	0.09	0.14	3.75	1
SU1-7-PR	0.69	+/-	0.11	0.19	3.31	1
SU1-8-PR	0.10	+/-	0.09	0.20	3.90	1
SU1-9-PR	0.69	+/-	0.11	0.19	3.31	1
SU1-10-PR	0.38	+/-	0.09	0.16	3.62	1
SU1-11-PR	0.66	+/-	0.12	0.15	3.34	1
SU1-12-PR	0.34	+/-	0.14	0.31	3.66	1
SU1-13-PR	0.36	+/-	0.16	0.34	3.64	1
SU1-14-PR	0.99	+/-	0.16	0.27	3.01	1
SU1-15-PR	0.71	+/-	0.10	0.24	3.29	1
SU1-16-PR	0.53	+/-	0.19	0.40	3.47	1
SU1-17-PR	0.41	+/-	0.09	0.15	3.59	1
SU1-18-PR	0.31	+/-	0.19	0.41	3.69	1
SU1-19-PR	0.82	+/-	0.12	0.21	3.18	1
SU1-20-PR	0.18	+/-	0.13	0.28	3.82	1
SU1-21-PR	0.64	+/-	0.22	0.47	3.36	1

Mean	**0.47**	***Sign Test Statistics***	
Median	**0.41**		
Min	**0.05**	***Sum of Positive Signs***	**21**
Max	**0.99**	***Sign Test Critical Value for N = 21***	**14**
Std Dev (1 σ)	**0.25**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	2
MARSSIM Classification	1

Th-232 $DCGL_W$	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU2-22-PR	0.59	+/-	0.11	0.19	3.41	1
SU2-23-PR	0.34	+/-	0.10	0.18	3.66	1
SU2-24-PR	0.32	+/-	0.17	0.37	3.68	1
SU2-25-PR	1.29	+/-	0.14	0.23	2.71	1
SU2-26-PR	0.74	+/-	0.13	0.24	3.26	1
SU2-27-PR	1.10	+/-	0.13	0.18	2.90	1
SU2-28-PR	0.56	+/-	0.10	0.17	3.44	1
SU2-29-PR	0.24	+/-	0.16	0.34	3.76	1
SU2-30-PR	0.79	+/-	0.12	0.21	3.21	1
SU2-31-PR	0.98	+/-	0.12	0.17	3.02	1
SU2-32-PR	1.16	+/-	0.14	0.29	2.84	1
SU2-33-PR	0.18	+/-	0.06	0.15	3.82	1
SU2-34-PR	0.63	+/-	0.10	0.18	3.37	1
SU2-35-PR	0.96	+/-	0.11	0.22	3.04	1
SU2-36-PR	0.95	+/-	0.13	0.20	3.05	1
SU2-37-PR	1.33	+/-	0.15	0.23	2.67	1
SU2-38-PR	0.80	+/-	0.12	0.22	3.20	1
SU2-39-PR	0.68	+/-	0.11	0.23	3.32	1
SU2-40-PR	1.37	+/-	0.22	0.37	2.63	1
SU2-41-PR	1.23	+/-	0.14	0.19	2.77	1

Mean	**0.81**	***Sign Test Statistics***	
Median	**0.80**		
Min	**0.18**	***Sum of Positive Signs***	**20**
Max	**1.37**	***Sign Test Critical Value for N=20***	**14**
Std Dev (1 σ)	**0.37**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	3
MARSSIM Classification	1

Th-232 $DCGL_W$	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU3-42-1	0.69	+/-	0.13	0.23	3.31	1
SU3-43-1	1.70	+/-	0.23	0.44	2.30	1
SU3-44-1	1.21	+/-	0.16	0.32	2.79	1
SU3-45-1	1.07	+/-	0.18	0.28	2.93	1
SU3-46-1	0.66	+/-	0.14	0.25	3.34	1
SU3-47-1	0.84	+/-	0.12	0.28	3.16	1
SU3-48-1	1.01	+/-	0.15	0.26	2.99	1
SU3-49-1	0.57	+/-	0.12	0.20	3.43	1
SU3-50-1	0.72	+/-	0.17	0.27	3.28	1
SU3-51-1	0.93	+/-	0.16	0.26	3.07	1
SU3-52-1	1.12	+/-	0.17	0.25	2.88	1
SU3-53-1	0.84	+/-	0.14	0.22	3.16	1
SU3-54-1	0.87	+/-	0.17	0.32	3.13	1
SU3-55-1	1.59	+/-	0.16	0.25	2.41	1
SU3-56-1	0.79	+/-	0.15	0.26	3.21	1
SU3-57-1	0.71	+/-	0.13	0.23	3.29	1
SU3-58-1	0.62	+/-	0.11	0.22	3.38	1
SU3-59-1	0.56	+/-	0.13	0.22	3.44	1

Mean	**0.92**	***Sign Test Statistics***	
Median	**0.84**		
Min	**0.56**	***Sum of Positive Signs***	**18**
Max	**1.70**	***Sign Test Critical Value for N=18***	**12**
Std Dev (1 σ)	**0.32**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	4
MARSSIM Classification	1

Th-232 $DCGL_W$	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU4-62-1	0.54	+/-	0.15	0.28	3.46	1
SU4-64-1	0.96	+/-	0.14	0.24	3.04	1
SU4-65-1	1.11	+/-	0.18	0.25	2.89	1
SU4-66-1	0.61	+/-	0.13	0.23	3.39	1
SU4-67-1	0.94	+/-	0.15	0.25	3.06	1
SU4-68-1	0.68	+/-	0.16	0.26	3.32	1
SU4-69-1	0.27	+/-	0.12	0.21	3.73	1
SU4-70-1	0.99	+/-	0.17	0.31	3.01	1
SU4-71-1	0.81	+/-	0.16	0.30	3.19	1
SU4-72-1	0.92	+/-	0.15	0.25	3.08	1
SU4-73-1	0.78	+/-	0.17	0.33	3.22	1
SU4-74-1	0.59	+/-	0.14	0.28	3.41	1
SU4-75-1	0.67	+/-	0.00	0.66	3.33	1
SU4-76-1	1.61	+/-	0.17	0.28	2.39	1
SU4-77-1	0.68	+/-	0.13	0.21	3.32	1
SU4-78-1	0.66	+/-	0.15	0.31	3.34	1
SU4-79-1	1.05	+/-	0.15	0.25	2.95	1
SU4-80-1	0.42	+/-	0.00	0.48	3.58	1
SU4-81-1	0.45	+/-	0.15	0.26	3.55	1
SU4-82-1	0.69	+/-	0.12	0.22	3.31	1
SU4-83-1	0.34	+/-	0.13	0.22	3.66	1

Mean	**0.75**		***Sign Test Statistics***
Median	**0.68**		
Min	**0.27**	***Sum of Positive Signs***	**21**
Max	**1.61**	***Sign Test Critical Value for N=21***	**14**
Std Dev (1 σ)	**0.30**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	5
MARSSIM Classification	1

Th-232 $DCGL_W$	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU5-84-1	0.78	+/-	0.12	0.22	3.22	1
SU5-85-1	0.75	+/-	0.18	0.23	3.25	1
SU5-86-1	0.66	+/-	0.16	0.25	3.34	1
SU5-87-1	0.84	+/-	0.15	0.23	3.16	1
SU5-88-1	1.15	+/-	0.16	0.29	2.85	1
SU5-89-1	0.55	+/-	0.12	0.23	3.45	1
SU5-90-1	0.58	+/-	0.16	0.31	3.42	1
SU5-91-1	0.73	+/-	0.14	0.24	3.27	1
SU5-92-1	0.17	+/-	0.00	0.33	3.83	1
SU5-93-1	1.13	+/-	0.19	0.35	2.87	1
SU5-94-1	0.92	+/-	0.16	0.28	3.08	1
SU5-95-1	0.94	+/-	0.18	0.30	3.06	1
SU5-96-1	0.98	+/-	0.18	0.36	3.02	1
SU5-97-1	0.46	+/-	0.00	0.51	3.54	1
SU5-98-1	0.63	+/-	0.00	0.46	3.38	1
SU5-100-1	1.26	+/-	0.18	0.29	2.74	1
SU5-101-1	0.57	+/-	0.15	0.24	3.43	1
SU5-102-1	0.70	+/-	0.13	0.26	3.30	1
SU5-103-1	1.10	+/-	0.18	0.33	2.90	1
SU5-104-1	1.18	+/-	0.17	0.27	2.82	1
SU5-105-1	0.58	+/-	0.16	0.26	3.42	1

Mean	**0.79**		***Sign Test Statistics***
Median	**0.75**		
Min	**0.17**	***Sum of Positive Signs***	**21**
Max	**1.26**	***Sign Test Critical Value for N=21***	**14**
Std Dev (1 σ)	**0.28**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	17
MARSSIM Classification	1

Th-232 DCGL$_W$	4.0

	Th-232				
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU17-01-1	1.44	+/-	0.15	0.17	2.56	1
SU17-02-1	1.39	+/-	0.13	0.25	2.61	1
SU17-03-1	1.27	+/-	0.16	0.23	2.73	1
SU17-04-1	1.38	+/-	0.14	0.25	2.62	1
SU17-05-1	1.18	+/-	0.13	0.24	2.82	1
SU17-06-1	1.40	+/-	0.13	0.24	2.60	1
SU17-07-1	1.58	+/-	0.18	0.25	2.42	1
SU17-08-1	1.34	+/-	0.16	0.26	2.66	1
SU17-09-1	1.25	+/-	0.13	0.28	2.75	1
SU17-10-1	1.61	+/-	0.18	0.27	2.39	1
SU17-11-1	1.20	+/-	0.15	0.23	2.80	1
SU17-12-1	1.60	+/-	0.18	0.28	2.40	1
SU17-13-1	1.41	+/-	0.17	0.33	2.59	1
SU17-14-1	1.01	+/-	0.13	0.20	2.99	1

Mean	**1.36**	***Sign Test Statistics***	
Median	**1.38**		
Min	**1.01**	***Sum of Positive Signs***	**14**
Max	**1.61**	***Sign Test Critical Value for N=14***	**10**
Std Dev (1 σ)	**0.17**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

SURVEY UNIT DATA SUMMARY & SIGN TEST WORKSHEET

Year	2007
Survey Unit #	18
MARSSIM Classification	1

Th-232 $DCGL_W$	4.0

	Th-232					
Sample ID	**Gross Result (pCi/g)**			**MDA (pCi/g)**	**DCGLw-Result**	**Sign Test Parameter[1]**
SU18-01-1	1.39	+/-	0.15	0.25	2.61	1
SU18-02-1	1.17	+/-	0.15	0.23	2.83	1
SU18-03-1	1.14	+/-	0.15	0.29	2.86	1
SU18-04-1	1.59	+/-	0.17	0.25	2.41	1
SU18-05-1	1.26	+/-	0.15	0.23	2.74	1
SU18-06-1	1.93	+/-	0.16	0.27	2.07	1
SU18-07-1	1.07	+/-	0.16	0.22	2.93	1
SU18-08-1	1.37	+/-	0.15	0.29	2.63	1
SU18-09-1	1.15	+/-	0.15	0.26	2.85	1
SU18-10-1	1.02	+/-	0.14	0.23	2.98	1
SU18-11-1	1.01	+/-	0.15	0.25	2.99	1
SU18-12-1	1.10	+/-	0.15	0.23	2.90	1
SU18-13-1	1.14	+/-	0.15	0.23	2.86	1
SU18-14-1	1.17	+/-	0.15	0.23	2.83	1

Mean	**1.25**	***Sign Test Statistics***	
Median	**1.16**		
Min	**1.01**	***Sum of Positive Signs***	**14**
Max	**1.93**	***Sign Test Critical Value for N=14***	**10**
Std Dev (1 σ)	**0.25**	***Survey Unit Evaluation***	PASS

Notes: [1] If Th-232 result > DCGLw, then Sign = -1, otherwise Sign = 1

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03-3040.30
September 25, 2007

Mr. David Horton, Project Manager
U.S. Army Joint Munitions Command
1 Rock Island Arsenal
Rock Island IL 61299-6000

RE: Final Status Survey of Site 18 Stockpiled Soils

Dear Mr. Horton;

This letter presents the results of the Naval Station Great Lakes (NSGL) Site 18 stockpiled soil surveys and sampling performed to determine if any of this soil was below the recently developed derived concentration guideline level (DCGL) of 4 picocuries per gram (pCi/g) above background for thorium-232 (^{232}Th). The objective of this effort was to determine if any of this stockpiled soil could be further segregated for possible disposition at the NSGL without regard for the radioactive content, thus reducing the overall volume of soil requiring offsite disposal.

History

As the result of prior soil remediation at Site 18 during Phase IV, approximately 875 cubic yards (yd^3) was stockpiled at the NSGL awaiting disposition at a later date. During this time period, the DCGL for ^{232}Th, approved by the NSGL and applied during remediation, was 1.0 pCi/g above background. Removal of this soil from Site 18 was necessary since soil sample analytical results indicated the ^{232}Th concentrations in soil, above background, exceeded this DCGL.

In 2007, the NSGL developed a site-specific DCGL based on the most probable future land use scenario, a resident gardener. Using conservative input parameters for development of the resident gardener exposure model, the DCGL for ^{232}Th was determined to be 4 pCi/g, above background.

Following development of the site-specific DCGL, the NSGL suspected that some of the previously stockpiled soil at Site 18 may not exceed the newly developed site-specific DCGL and thus, may not require offsite disposal. This development could lead to a reduction in the overall cost of remediation as well as the unnecessary use of disposal space at the offsite facility.

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Survey Approach and Soil Stockpile Preparation

To determine if soil within this stockpile could be segregated and disposed without regard to radioactivity content (onsite use of soil as excavation backfill, etc.), a survey and sampling approach was designed in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* for Class 1 final status surveys (FSS). This required collection of systematic soil samples on a specified grid, performance of a 100% gamma walkover survey (GWS), and collection of biased soil samples, as required, based on the results of the GWS. It was determined these surveys would be performed over a maximum soil depth of 1 foot. To accomplish this, it was necessary to spread the existing soil stockpile to provide a consistently even surface for survey and sampling performance. This resulted in a "leveled" soil depth of approximately 2 feet across the entire footprint. To meet the 1 foot depth criterion, it was necessary to perform the surveys and soil sampling in two separate evolutions (lifts), with the footprint of each lift constituting a single Class 1 survey unit (SU). The Class 1 survey units for the two lifts were designated SU 17 and SU 18.

The top 1-foot layer of the flattened stockpile was considered SU 17. These soils were evaluated in their entirety prior to their removal (and/or segregation) based on direct comparison to the 4 pCi/g DCGL. Following removal of soil from this first lift, the remaining soils (lift 2) were evaluated using the same approach and techniques as SU 18. Segregation and removal of the soil in the second lift completed the evaluation of the soil stockpile.

Biased soil samples were collected at locations where the GWS count rates were shown to exceed a Z-Score of 3, meaning that the count rate exceeded the mean count rate in that SU by more than 3 standard deviations. These samples were collected to test for the presence of small pockets of contamination within the systematic sampling grid.

Results

A total of 14 systematic soil samples were collected from each of the stockpiled soil Class 1 survey units (lifts). Systematic sample locations were determined in accordance with MARSSIM guidance using a random start point and triangular grid layout. The GWS covered 100 percent of each Class 1 survey unit, with biased samples collected at locations of elevated GWS count rate. The results of the GWS and the systematic and biased sample locations for each of the two Class 1 soil stockpile survey units (SU 17 and SU 18) are shown in Figures 1 and 2, attached.

Soil samples were processed (dried and weighed) and analyzed in CABRERA's onsite gamma spectroscopy laboratory. Sample count times were sufficient to assure a minimum detectable concentration (MDC) not greater than 10 percent of the DCGL, or 0.4 pCi/g for actinium-228 (^{228}Ac), the surrogate radionuclide used to determine concentration of ^{232}Th in site soils. The actual analysis MDC for all soil samples had an average of 0.25 pCi/g. The raw results of the Onsite Lab counts are attached.

None of the systematic soil sample analytical results for both survey units (SU 17 and SU 18) exceeded the DCGL (4 pCi/g). Therefore, statistical analysis of the sample sets from each survey unit was not necessary. Sample analysis results summaries for both survey units are attached, with summary statistics provided in Table 1.

Table 1. Systematic Sample Summary Statistics for SUs 17 and 18. (All values in pCi/g)

Survey Unit	Mean	Median	Max	Standard Deviation
SU 17	1.36	1.38	1.61	0.17
SU 18	1.25	1.16	1.93	0.25

The GWS identified three areas of elevated activity in the first lift (SU 17). However, analysis of biased samples obtained from each of these locations did not identify ^{232}Th activity above 4 pCi/g. Therefore, it was concluded that none of the soil from the first lift (SU 17) required segregation for packaging and offsite disposal. The GWS in the second lift (SU 18) identified a single area of elevated activity. The biased soil sample obtained from this location did identify ^{232}Th activity above the DCGL of 4 pCi/g. A total of 10 yd^3 of soil from the second lift (SU 18) was removed and packaged for offsite disposal, with the remainder acceptable for onsite disposition. A summary of the biased sample results is provided in

Table 2. Results of SU 17 and 18 Biased Samples

Sample ID	^{232}Th (pCi/g)	2-σ Uncertainty (pCi/g)	Comments
SU17-B29	1.25	0.15	Concentration below DCGL.
SU17-B30	2.18	0.17	Concentration below DCGL.
SU17-B31	1.42	0.16	Concentration below DCGL.
SU18-B32	32.17	0.69	Collected at GWS hot spot. 10 yd^3 of soil removed.
SU18-B33	1.53	0.16	Taken beneath excavated soil area. Concentration below DCGL.

Summary and Conclusion

FSS activities were conducted on the Site 18 soil stockpile from the Phase 4 remediation activities. GWS as well as systematic and biased soil samples were collected as part of the FSS to evaluate these soils versus a newly developed ^{232}Th DCGL of 4 pCi/g above background. This evaluation resulted in the removal of 10 yd^3 of soil above the site-specific DCGL for ^{232}Th, requiring packaging and offsite disposal. As a result, approximately 865 yd^3 of previously stockpiled soil was determined acceptable for onsite disposition.

Should you have questions or comments, please contact me at 314.703.6784

Sincerely,

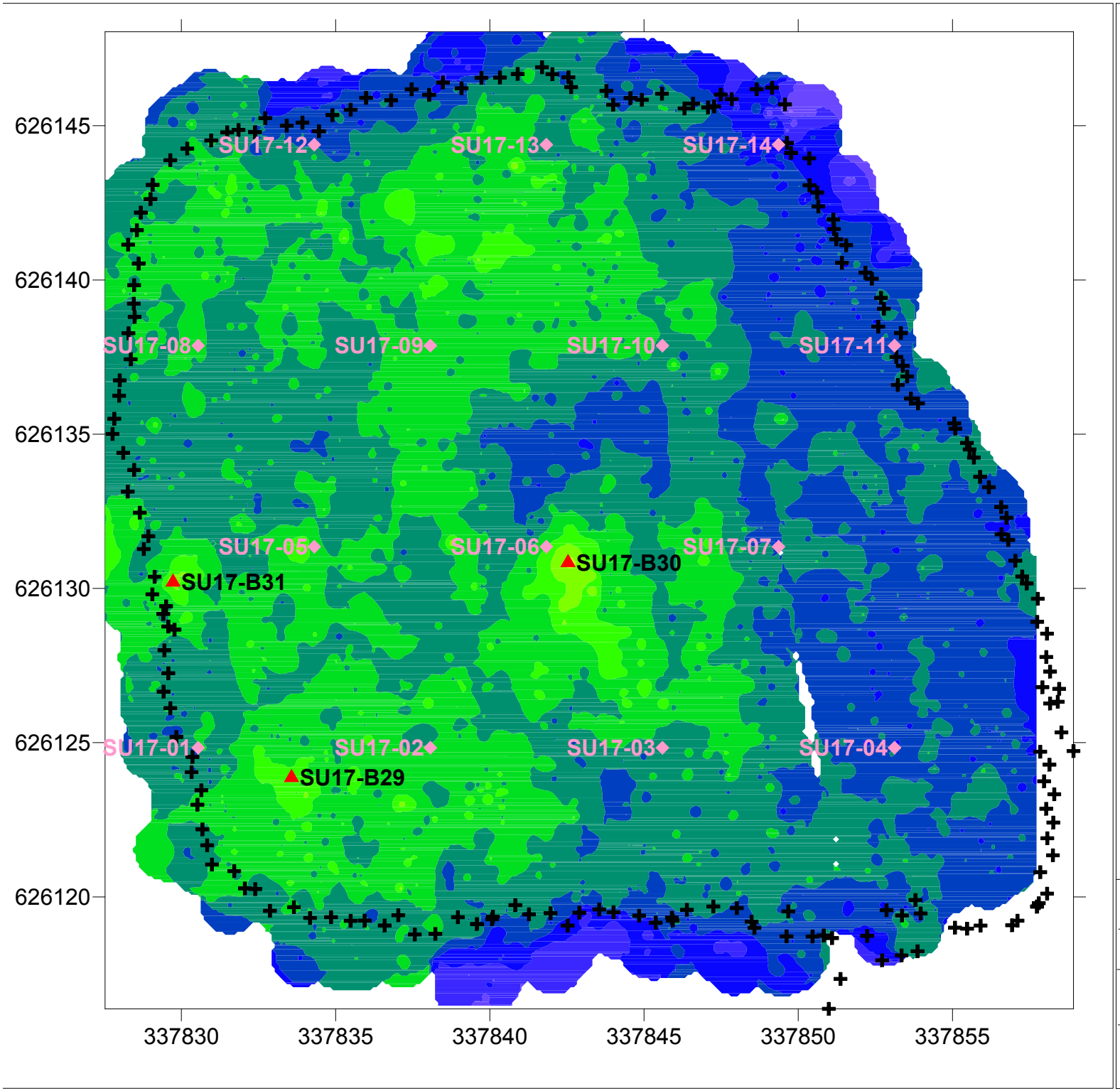
John Eberlin, PMP
Project Manager
Cabrera Services, Inc.

Attachment
cc: Project File

ATTCHMENTS

Gamma Walkover Survey Results Maps for SU 17 and SU 18

FSS Systematic Sample Data Summary Sheets



Gross CPM

20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000

Pile Outline

Systematic Sample Location

Biased Sample Location

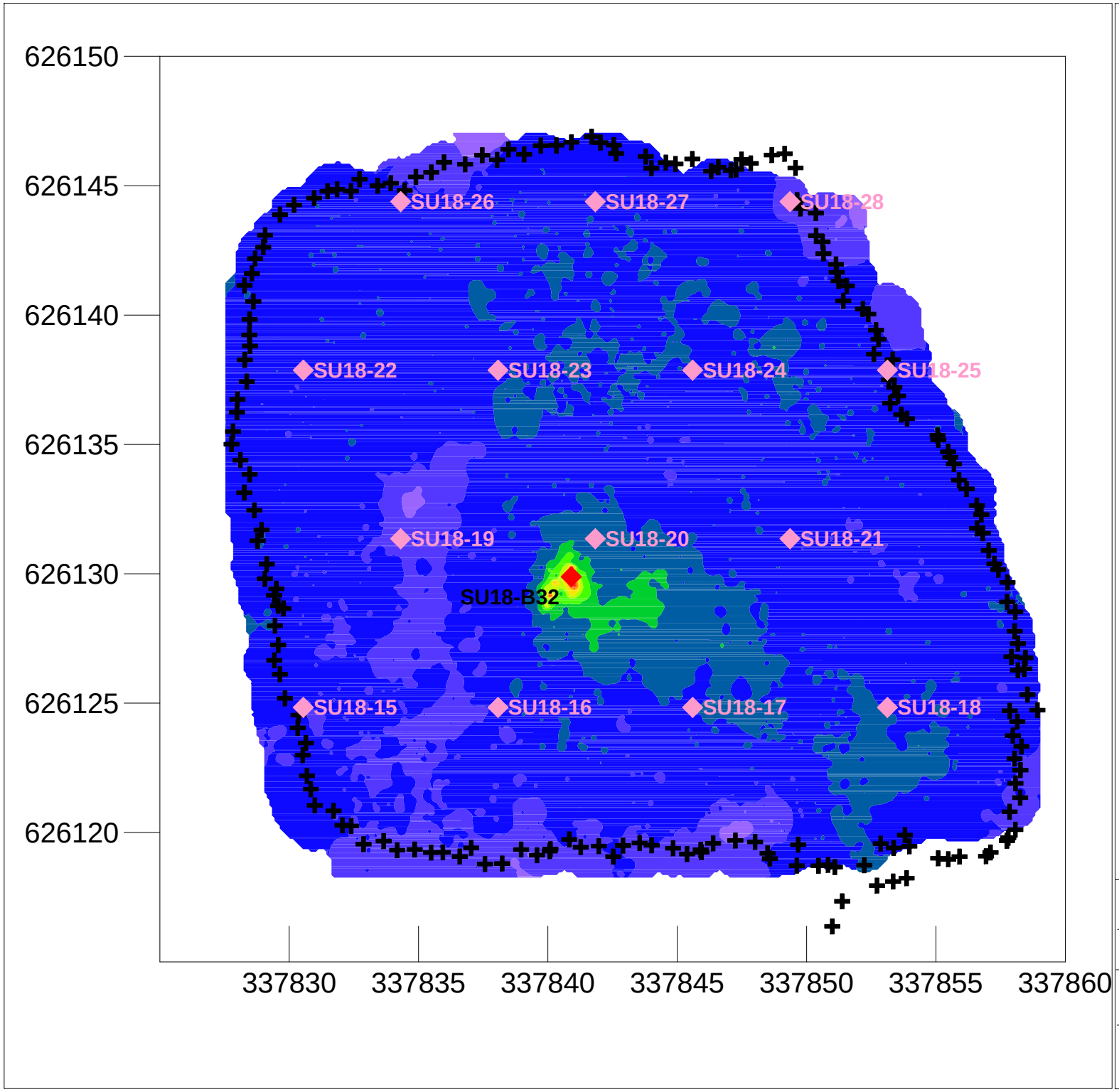
Stockpile GWS - Lift 1

Naval Station Great Lakes
Great Lakes, IL

Date: 6 Sept 2007 | Drawn By: JJW

Project#: 03-3040.30 | Filename: Pile GWS - Lift 2.srf

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION



Gross CPM

26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000

Pile Outline
Systematic Sample Location
Biased Sample Location

Stockpile GWS - Lift 2

Naval Station Great Lakes
Great Lakes, IL

Date: 6 Sept 2007
Drawn By: JJW
Project#: 03-3040.30
Filename: Pile GWS - Lift 2.srf

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

Survey Date:	8/29/07
Survey Unit #:	SU-17
FSS SU Classification:	1
SU DCGLw (pCi/g):	4.0
SU Description:	Stockpile Lift #1

GWS Ratemeter / Probe	Ratemeter S/N	Probe S/N	Cal Due Date
2221 / 44-10	218600	PR-166864	7/3/2008

1	2	3	4	5	6
Sample ID	**Sample Type**	**Th-232 Result (pCi/g)**	**Th-232 Uncertainty (pCi/g)**	**Th-232 MDC (pCi/g)**	**Sign Test Parameter**
SU17-01	SYS	1.44	0.15	0.17	-1
SU17-02	SYS	1.39	0.13	0.25	-1
SU17-03	SYS	1.27	0.16	0.23	-1
SU17-04	SYS	1.38	0.14	0.25	-1
SU17-05	SYS	1.18	0.13	0.24	-1
SU17-06	SYS	1.40	0.13	0.24	-1
SU17-07	SYS	1.58	0.18	0.25	-1
SU17-08	SYS	1.34	0.16	0.26	-1
SU17-09	SYS	1.25	0.13	0.28	-1
SU17-10	SYS	1.61	0.18	0.27	-1
SU17-11	SYS	1.20	0.15	0.23	-1
SU17-12	SYS	1.60	0.18	0.28	-1
SU17-13	SYS	1.41	0.17	0.33	-1
SU17-14	SYS	1.01	0.13	0.20	-1

Mean	**1.36**
Median	**1.38**
Std Dev (1 σ)	**0.17**
Range	**0.60**

MARSSIM SIGN TEST EVALUATION	
Sum of Positive Signs	**0**
Sign Test Critical Value (n=14)	**10**
Null Hypothesis Evaluation	**PASS**

NOTES:

1 Sample Type: SYS = Systematic Location B = Biased Location

2 MARSSIM Sign Test parameter. If Result > DCGLw, Sign = -1, otherwise 1.

Survey Date: 9/5/2007
Survey Unit #: SU-18
FSS SU Classification: 1
SU DCGLw (pCi/g): 4.0
SU Description: Stockpile Lift #2

GWS Ratemeter / Probe	Ratemeter S/N	Probe S/N	Cal Due Date
2221 / 44-10	218600	PR-166864	7/3/2008

1	2	3	4	5	6
Sample ID	**Sample Type**	**Th-232 Result (pCi/g)**	**Th-232 Uncertainty (pCi/g)**	**Th-232 MDC (pCi/g)**	**Sign Test Parameter**
SU18-15	SYS	1.39	0.15	0.25	-1
SU18-16	SYS	1.17	0.15	0.23	-1
SU18-17	SYS	1.14	0.15	0.29	-1
SU18-18	SYS	1.59	0.17	0.25	-1
SU18-19	SYS	1.26	0.15	0.23	-1
SU18-20	SYS	1.93	0.16	0.27	-1
SU18-21	SYS	1.07	0.16	0.22	-1
SU18-22	SYS	1.37	0.15	0.29	-1
SU18-23	SYS	1.15	0.15	0.26	-1
SU18-24	SYS	1.02	0.14	0.23	-1
SU18-25	SYS	1.01	0.15	0.25	-1
SU18-26	SYS	1.10	0.15	0.23	-1
SU18-27	SYS	1.14	0.15	0.23	-1
SU18-28	SYS	1.17	0.15	0.23	-1

Mean	**1.25**
Median	**1.16**
Std Dev (1 σ)	**0.25**
Range	**0.92**

MARSSIM SIGN TEST EVALUATION	
Sum of Positive Signs	**0**
Sign Test Critical Value (n=14)	**10**
Null Hypothesis Evaluation	**PASS**

NOTES:

1 Sample Type: SYS = Systematic Location B = Biased Location

2 MARSSIM Sign Test parameter. If Result > DCGLw, Sign = 1, otherwise -1.

APPENDIX B

HP INSTRUMENTATION QUALITY CONTROL

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:	Ludlum 2929	Detector:	Ludlum 43-10-1
Serial #:	163827	Serial #:	PR 171322
Calibration Date:	5/9/2007	12 month calibration:	OK
Detector Active Area or Area Covered by Smear (cm^2):	100		

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.3552	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.32	0.11	6925.6	77.64
Beta	0.2218	Tc-99	4003-02	21,800	6/26/2002	2.11E+04	21,796	1000	20	1	54.40	2.60	4835.5	94.63

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
7/7/2007	3	1122	6857	4969	0.2	56.1	6856.9	4912.9	PASS	PASS	PASS	PASS	12.12	127	Yes	Yes		SK
7/9/2007	7	1054	6852	4781	0.4	52.7	6851.7	4728.3	PASS	PASS	PASS	PASS	14.06	124	Yes	Yes		SK
7/10/2007	2	1075	7049	4752	0.1	53.8	7048.9	4698.3	PASS	PASS	PASS	PASS	11.45	125	Yes	Yes		SK
7/11/2007	7	1052	6832	4712	0.4	52.6	6831.7	4659.4	PASS	PASS	PASS	PASS	14.06	124	Yes	Yes		SK
7/12/2007	6	1048	6866	4825	0.3	52.4	6865.7	4772.6	PASS	PASS	PASS	PASS	13.65	124	Yes	Yes		SK
7/13/2007	4	1098	6963	4693	0.2	54.9	6962.8	4638.1	PASS	PASS	PASS	*QUESTION*	12.69	126	Yes	Yes		SK
7/16/2007	7	1071	6832	4860	0.4	53.6	6831.7	4806.5	PASS	PASS	PASS	PASS	14.06	125	Yes	Yes		SK
7/17/2007	1	1102	6998	4928	0.1	55.1	6998.0	4872.9	*QUESTION*	PASS	PASS	PASS	10.57	126	Yes	Yes		SK
7/18/2007	3	1148	6910	4759	0.2	57.4	6909.9	4701.6	PASS	PASS	PASS	PASS	12.12	129	Yes	Yes		SK
7/19/2007	7	1106	7028	4702	0.4	55.3	7027.7	4646.7	PASS	PASS	PASS	PASS	14.06	127	Yes	Yes		SK
7/20/2007	6	1070	6917	4912	0.3	53.5	6916.7	4858.5	PASS	PASS	PASS	PASS	13.65	125	Yes	Yes		SK
7/23/2007	0	1087	7017	4785	0.0	54.4	7017.0	4730.7	*QUESTION*	PASS	PASS	PASS	8.45	126	Yes	Yes		SK
7/24/2007	2	1119	6824	4776	0.1	56.0	6823.9	4720.1	PASS	PASS	PASS	PASS	11.45	127	Yes	Yes		SK
7/25/2007	8	1114	7023	4804	0.4	55.7	7022.6	4748.3	PASS	PASS	PASS	PASS	14.45	127	Yes	Yes		SK
7/26/2007	4	1108	6948	4864	0.2	55.4	6947.8	4808.6	PASS	PASS	PASS	PASS	12.69	127	Yes	Yes		SK
7/27/2007	4	1132	6900	4998	0.2	56.6	6899.8	4941.4	PASS	PASS	PASS	PASS	12.69	128	Yes	Yes		SK
7/28/2007	6	1141	6950	4722	0.3	57.1	6949.7	4665.0	PASS	PASS	PASS	PASS	13.65	128	Yes	Yes		SK
7/30/2007	0	1008	6991	4690	0.0	50.4	6991.0	4639.6	*QUESTION*	PASS	PASS	*QUESTION*	8.45	121	Yes	Yes		SK
7/31/2007	4	1102	6786	4730	0.2	55.1	6785.8	4674.9	PASS	PASS	PASS	PASS	12.69	126	Yes	Yes		SK
8/1/2007	4	1143	6757	4734	0.2	57.2	6756.8	4676.9	PASS	PASS	*QUESTION*	PASS	12.69	128	Yes	Yes		SK
8/2/2007	6	1125	6787	4803	0.3	56.3	6786.7	4746.8	PASS	PASS	PASS	PASS	13.65	128	Yes	Yes		SK
8/3/2007	6	1089	6808	4767	0.3	54.5	6807.7	4712.6	PASS	PASS	PASS	PASS	13.65	126	Yes	Yes		SK
8/6/2007	5	1074	6813	4790	0.3	53.7	6812.8	4736.3	PASS	PASS	PASS	PASS	13.19	125	Yes	Yes		SK
8/7/2007	6	1114	6993	4904	0.3	55.7	6992.7	4848.3	PASS	PASS	PASS	PASS	13.65	127	Yes	Yes		SK
8/8/2007	5	1074	7060	4992	0.3	53.7	7059.8	4938.3	PASS	PASS	PASS	PASS	13.19	125	Yes	Yes		SK
8/9/2007	2	1032	6856	4620	0.1	51.6	6855.9	4568.4	PASS	PASS	PASS	*QUESTION*	11.45	123	Yes	Yes		SK
8/13/2007	4	1008	6871	4972	0.2	50.4	6870.8	4921.6	PASS	PASS	PASS	PASS	12.69	121	Yes	Yes		SK
8/14/2007	3	1058	6858	4852	0.2	52.9	6857.9	4799.1	PASS	PASS	PASS	PASS	12.12	124	Yes	Yes		SK
8/15/2007	1	1089	7104	5245	0.1	54.5	7104.0	5190.6	*QUESTION*	PASS	*QUESTION*	**FAIL**	10.57	126	Yes	Yes		SK

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 2)

Counting Instrument:			Ludlum 2929		Detector:	Ludlum 43-10-1			Cal. Date:	9/7/2007								
Serial #:			163827		Serial #:	PR171322			Cal. Due Date OK?	WARNING								
Detector Active Area or Area Covered by Smear (cm^2):						100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3649	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.23	0.11	7114.7	95.95				
Beta	0.2385	Tc-99	4003-02	21,800	6/26/2002	2.11E+04	21,796	1000	20	1	58.37	1.86	5198.7	60.95				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
9/25/2007	3	1097	7177	5185	0.2	54.9	7176.9	5130.2	PASS	PASS	PASS	PASS	11.80	117	Yes	Yes		SK
9/26/2007	1	1201	7113	5303	0.1	60.1	7113.0	5243.0	PASS	PASS	PASS	PASS	10.29	122	Yes	Yes		SK
9/27/2007	3	1169	7156	5270	0.2	58.5	7155.9	5211.6	PASS	PASS	PASS	PASS	11.80	121	Yes	Yes		SK
10/2/2007	4	1269	7039	5326	0.2	63.5	7038.8	5262.6	PASS	*QUESTION*	PASS	PASS	12.35	125	Yes	Yes		SK

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:	Ludlum 43-10-1		Calibration Date:		9/7/2007								
Serial #:			163827		Serial #:	PR171322		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3649	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.22	0.13	7114.7	95.89				
Beta	0.2384	Tc-99	4003-02	21,800	6/26/2002	2.11E+04	21,796	1000	20	1	61.59	3.72	5195.5	62.15				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
10/4/2007	4	1304	7068	5261	0.2	65.2	7067.8	5195.8	PASS	PASS	PASS	PASS	12.35	127	Yes	Yes		SK
10/9/2007	6	1215	7282	5243	0.3	60.8	7281.7	5182.3	PASS	PASS	PASS	PASS	13.28	123	Yes	Yes		SK
10/10/2007	7	1271	6998	5309	0.4	63.6	6997.7	5245.5	PASS	PASS	PASS	PASS	13.69	125	Yes	Yes		SK
10/11/2007	5	1291	7051	5219	0.3	64.6	7050.8	5154.5	PASS	PASS	PASS	PASS	12.84	126	Yes	Yes		SK
10/12/2007	4	1332	7066	5293	0.2	66.6	7065.8	5226.4	PASS	PASS	PASS	PASS	12.35	128	Yes	Yes		SK
10/15/2007	2	1271	6972	5107	0.1	63.6	6971.9	5043.5	PASS	PASS	PASS	*QUESTION*	11.14	125	Yes	Yes		SK
10/16/2007	3	1203	7038	5255	0.2	60.2	7037.9	5194.9	PASS	PASS	PASS	PASS	11.80	122	Yes	Yes		SK
10/17/2007	6	1228	6929	5343	0.3	61.4	6928.7	5281.6	PASS	PASS	PASS	PASS	13.28	123	Yes	Yes		SK
10/18/2007	2	1265	7047	5174	0.1	63.3	7046.9	5110.8	PASS	PASS	PASS	PASS	11.14	125	Yes	Yes		SK
10/19/2007	2	1350	7108	5340	0.1	67.5	7107.9	5272.5	PASS	PASS	PASS	PASS	11.14	129	Yes	Yes		SK
10/22/2007	4	1137	7107	5281	0.2	56.9	7106.8	5224.2	PASS	PASS	PASS	PASS	12.35	119	Yes	Yes		SK
10/23/2007	4	1200	7073	5362	0.2	60.0	7072.8	5302.0	PASS	PASS	PASS	PASS	12.35	122	Yes	Yes		SK
10/24/2007	4	1253	7037	5305	0.2	62.7	7036.8	5242.4	PASS	PASS	PASS	PASS	12.35	125	Yes	Yes		SK
10/25/2007	5	1137	7092	5357	0.3	56.9	7091.8	5300.2	PASS	PASS	PASS	PASS	12.84	119	Yes	Yes		SK
10/26/2007	3	1272	7132	5283	0.2	63.6	7131.9	5219.4	PASS	PASS	PASS	PASS	11.80	125	Yes	Yes		SK
10/29/2007	1	1168	7027	5229	0.1	58.4	7027.0	5170.6	PASS	PASS	PASS	PASS	10.29	121	Yes	Yes		SK
10/30/2007	5	1166	6986	5277	0.3	58.3	6985.8	5218.7	PASS	PASS	PASS	PASS	12.84	121	Yes	Yes		SK
10/31/2007	3	1296	7126	5285	0.2	64.8	7125.9	5220.2	PASS	PASS	PASS	PASS	11.80	126	Yes	Yes		SK
11/1/2007	4	1156	7133	5291	0.2	57.8	7132.8	5233.2	PASS	PASS	PASS	PASS	12.35	120	Yes	Yes		SK
11/2/2007	4	1155	7002	5311	0.2	57.8	7001.8	5253.3	PASS	PASS	PASS	PASS	12.35	120	Yes	Yes		SK
11/5/2007	2	1329	7105	5347	0.1	66.5	7104.9	5280.6	PASS	PASS	PASS	PASS	11.14	128	Yes	Yes		SK
11/6/2007	6	1189	7146	5331	0.3	59.5	7145.7	5271.6	PASS	PASS	PASS	PASS	13.28	122	Yes	Yes		SK
11/7/2007	3	1224	6889	5368	0.2	61.2	6888.9	5306.8	PASS	PASS	*QUESTION*	PASS	11.80	123	Yes	Yes		SK
11/8/2007	2	1202	7004	5317	0.1	60.1	7003.9	5256.9	PASS	PASS	PASS	PASS	11.14	122	Yes	Yes		SK
11/9/2007	6	1158	7001	5297	0.3	57.9	7000.7	5239.1	PASS	PASS	PASS	PASS	13.28	120	Yes	Yes		SK
11/12/2007	2	1152	7026	5238	0.1	57.6	7025.9	5180.4	PASS	PASS	PASS	PASS	11.14	120	Yes	Yes		SK
11/13/2007	5	1174	6847	5320	0.3	58.7	6846.8	5261.3	PASS	PASS	*QUESTION*	PASS	12.84	121	Yes	Yes		SK
11/14/2007	4	1235	6983	5329	0.2	61.8	6982.8	5267.3	PASS	PASS	PASS	PASS	12.35	124	Yes	Yes		SK
11/15/2007	7	1245	6915	5400	0.4	62.3	6914.7	5337.8	PASS	PASS	*QUESTION*	*QUESTION*	13.69	124	Yes	Yes		SK
11/27/2007	6	1167	7071	5222	0.3	58.4	7070.7	5163.7	PASS	PASS	PASS	PASS	13.28	121	Yes	Yes		
11/28/2007	7	1113	6986	5172	0.4	55.7	6985.7	5116.4	PASS	PASS	PASS	PASS	13.69	118	Yes	Yes		
11/29/2007	3	1137	7073	5396	0.2	56.9	7072.9	5339.2	PASS	PASS	PASS	*QUESTION*	11.80	119	Yes	Yes		
11/30/2007	4	1230	6969	5336	0.2	61.5	6968.8	5274.5	PASS	PASS	PASS	PASS	12.35	123	Yes	Yes		
12/3/2007	6	1181	7095	5154	0.3	59.1	7094.7	5095.0	PASS	PASS	PASS	PASS	13.28	121	Yes	Yes		
12/4/2007	1	1124	7107	5408	0.1	56.2	7107.0	5351.8	PASS	PASS	PASS	*QUESTION*	10.29	119	Yes	Yes		
12/5/2007	4	1217	7036	5194	0.2	60.9	7035.8	5133.2	PASS	PASS	PASS	PASS	12.35	123	Yes	Yes		
12/6/2007	5	1166	6982	5267	0.3	58.3	6981.8	5208.7	PASS	PASS	PASS	PASS	12.84	121	Yes	Yes		
12/7/2007	3	1223	7139	5217	0.2	61.2	7138.9	5155.9	PASS	PASS	PASS	PASS	11.80	123	Yes	Yes		

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:	Ludlum 43-10-01		Calibration Date:		7/3/2007								
Serial #:			208319		Serial #:	PR215938		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3476	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.10	0.09	6777.8	54.04				
Beta	0.2473	TC-99	4003-02	21,800	6/26/2002	2.11E+05	21,800	1000	20	1	55.17	1.80	5335.2	90.85				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
7/10/2007	4	1014	6886	5415	0.2	50.7	6885.8	5364.3	PASS	*QUESTION*	PASS	PASS	12.97	109	Yes	Yes		SK
7/11/2007	4	1053	7116	5471	0.2	52.7	7115.8	5418.4	PASS	PASS	**FAIL**	PASS	12.97	111	Yes	Yes		SK
7/12/2007	3	1076	6852	5510	0.2	53.8	6851.9	5456.2	PASS	PASS	PASS	PASS	12.39	112	Yes	Yes		SK
7/13/2007	2	1088	6812	5300	0.1	54.4	6811.9	5245.6	PASS	PASS	PASS	PASS	11.70	113	Yes	Yes		SK
7/16/2007	5	1177	6812	5300	0.3	58.9	6811.8	5241.2	PASS	*QUESTION*	PASS	PASS	13.48	117	Yes	Yes		SK
7/17/2007	2	1079	6824	5349	0.1	54.0	6823.9	5295.1	PASS	PASS	PASS	PASS	11.70	112	Yes	Yes		SK
7/18/2007	3	1155	6704	5261	0.2	57.8	6703.9	5203.3	PASS	PASS	PASS	PASS	12.39	116	Yes	Yes		SK
7/19/2007	1	1073	6797	5376	0.1	53.7	6797.0	5322.4	PASS	PASS	PASS	PASS	10.80	112	Yes	Yes		SK
7/20/2007	1	1079	6716	5308	0.1	54.0	6716.0	5254.1	PASS	PASS	PASS	PASS	10.80	112	Yes	Yes		SK
7/23/2007	2	1170	6764	5480	0.1	58.5	6763.9	5421.5	PASS	PASS	PASS	PASS	11.70	116	Yes	Yes		SK
7/24/2007	0	1119	6705	5508	0.0	56.0	6705.0	5452.1	PASS	PASS	PASS	PASS	8.63	114	Yes	Yes		SK
7/25/2007	2	1111	6937	5425	0.1	55.6	6936.9	5369.5	PASS	PASS	*QUESTION*	PASS	11.70	114	Yes	Yes		SK
7/26/2007	5	1069	5201	5343	0.3	53.5	5200.8	5289.6	PASS	PASS	**FAIL**	PASS	13.48	112	Yes	Yes		SK
7/27/2007	3	1083	6685	5470	0.2	54.2	6684.9	5415.9	PASS	PASS	PASS	PASS	12.39	112	Yes	Yes		SK
7/30/2007	1	1038	6727	5318	0.1	51.9	6727.0	5266.1	PASS	PASS	PASS	PASS	10.80	110	Yes	Yes		SK
7/31/2007	1	1131	6842	5325	0.1	56.6	6842.0	5268.5	PASS	PASS	PASS	PASS	10.80	115	Yes	Yes		SK
8/1/2007	8	1073	6766	5172	0.4	53.7	6765.6	5118.4	**FAIL**	PASS	PASS	*QUESTION*	14.76	112	Yes	Yes		SK
8/2/2007	3	1091	6827	5347	0.2	54.6	6826.9	5292.5	PASS	PASS	PASS	PASS	12.39	113	Yes	Yes		SK
8/3/2007	4	1154	6827	5322	0.2	57.7	6826.8	5264.3	PASS	PASS	PASS	PASS	12.97	116	Yes	Yes		SK
8/6/2007	7	1063	6821	5542	0.4	53.2	6820.7	5488.9	*QUESTION*	PASS	PASS	PASS	14.37	112	Yes	Yes		SK
8/7/2007	0	1232	6631	5535	0.0	61.6	6631.0	5473.4	PASS	**FAIL**	*QUESTION*	PASS	8.63	119	Yes	Yes		SK
8/8/2007	0	1125	6648	5365	0.0	56.3	6648.0	5308.8	PASS	PASS	*QUESTION*	PASS	8.63	114	Yes	Yes		SK
8/9/2007	3	1072	6851	5378	0.2	53.6	6850.9	5324.4	PASS	PASS	PASS	PASS	12.39	112	Yes	Yes		SK
8/13/2007	2	972	6871	5362	0.1	48.6	6870.9	5313.4	PASS	**FAIL**	PASS	PASS	11.70	107	Yes	Yes		SK
8/15/2007	2	1002	6922	5232	0.1	50.1	6921.9	5181.9	PASS	*QUESTION*	*QUESTION*	PASS	11.70	109	Yes	Yes		SK

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:	Ludlum 2929	Detector:	Ludlum 43-10-1
Serial #:	208319	Serial #:	PR-215938
Detector Active Area or Area Covered by Smear (cm^2):	100		

Calibration Date: 7/3/2007
12 month calibration: OK

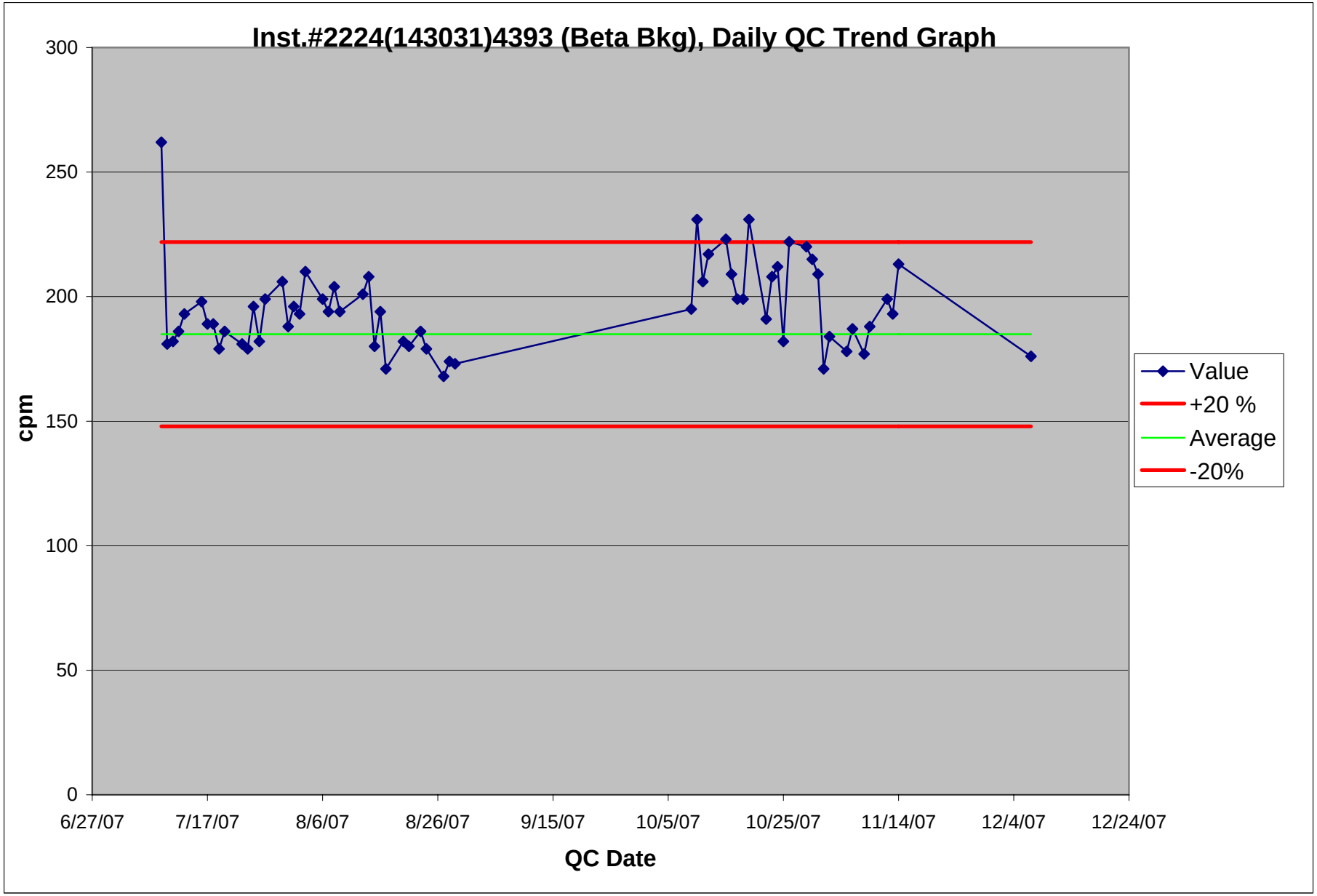
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.3449	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.07	0.06	6724.7	74.33
Beta	0.2014	Tc-99	4003-02	21,800	6/26/2002	2.11E+04	21,796	1000	20	1	43.68	1.58	4390.7	87.02

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
8/20/2007	0	869	6799	4497	0.0	43.5	6799.0	4453.6	PASS	PASS	PASS	PASS	8.70	125	Yes	Yes		SK
8/21/2007	1	890	6652	4386	0.1	44.5	6652.0	4341.5	PASS	PASS	PASS	PASS	10.88	127	Yes	Yes		SK
8/22/2007	2	929	6641	4520	0.1	46.5	6640.9	4473.6	PASS	PASS	PASS	PASS	11.79	129	Yes	Yes		SK
8/23/2007	0	856	6696	4402	0.0	42.8	6696.0	4359.2	PASS	PASS	PASS	PASS	8.70	124	Yes	Yes		SK
8/24/2007	2	866	6584	4514	0.1	43.3	6583.9	4470.7	PASS	PASS	PASS	PASS	11.79	125	Yes	Yes		SK
8/27/2007	1	865	6665	4364	0.1	43.3	6665.0	4320.8	PASS	PASS	PASS	PASS	10.88	125	Yes	Yes		SK
8/28/2007	1	847	6763	4506	0.1	42.4	6763.0	4463.7	PASS	PASS	PASS	PASS	10.88	124	Yes	Yes		SK
8/29/2007	0	846	6562	4421	0.0	42.3	6562.0	4378.7	PASS	PASS	*QUESTION*	PASS	8.70	124	Yes	Yes		SK
8/30/2007	4	872	6716	4493	0.2	43.6	6715.8	4449.4	*QUESTION*	PASS	PASS	PASS	13.07	125	Yes	Yes		SK
8/31/2007	3	880	6649	4344	0.2	44.0	6648.9	4300.0	PASS	PASS	PASS	PASS	12.48	126	Yes	Yes		SK
9/5/2007	1	844	6807	4623	0.1	42.2	6807.0	4580.8	PASS	PASS	PASS	*QUESTION*	10.88	124	Yes	Yes		SK
9/6/2007	0	877	6544	4496	0.0	43.9	6544.0	4452.2	PASS	PASS	*QUESTION*	PASS	8.70	126	Yes	Yes		SK
9/7/2007	0	929	6776	4361	0.0	46.5	6776.0	4314.6	PASS	PASS	PASS	PASS	8.70	129	Yes	Yes		SK
9/8/2007	2	856	6850	4466	0.1	42.8	6849.9	4423.2	PASS	PASS	PASS	PASS	11.79	124	Yes	Yes		SK
9/10/2007	2	862	6816	4585	0.1	43.1	6815.9	4541.9	PASS	PASS	PASS	PASS	11.79	125	Yes	Yes		SK
9/11/2007	3	906	6621	4528	0.2	45.3	6620.9	4482.7	PASS	PASS	PASS	PASS	12.48	128	Yes	Yes		SK
9/12/2007	0	856	6714	4591	0.0	42.8	6714.0	4548.2	PASS	PASS	PASS	PASS	8.70	124	Yes	Yes		SK
9/13/2007	3	886	6774	4484	0.2	44.3	6773.9	4439.7	PASS	PASS	PASS	PASS	12.48	126	Yes	Yes		SK
9/14/2007	1	871	6674	4439	0.1	43.6	6674.0	4395.5	PASS	PASS	PASS	PASS	10.88	125	Yes	Yes		SK
9/15/2007	0	852	6643	4586	0.0	42.6	6643.0	4543.4	PASS	PASS	PASS	PASS	8.70	124	Yes	Yes		SK
9/17/2007	0	845	6666	4499	0.0	42.3	6666.0	4456.8	PASS	PASS	PASS	PASS	8.70	124	Yes	Yes		SK
9/18/2007	2	939	6586	4517	0.1	47.0	6585.9	4470.1	PASS	*QUESTION*	PASS	PASS	11.79	130	Yes	Yes		SK
9/19/2007	0	832	6677	4395	0.0	41.6	6677.0	4353.4	PASS	PASS	PASS	PASS	8.70	123	Yes	Yes		SK
9/20/2007	2	887	6621	4503	0.1	44.4	6620.9	4458.7	PASS	PASS	PASS	PASS	11.79	126	Yes	Yes		SK
9/21/2007	3	923	6775	4591	0.2	46.2	6774.9	4544.9	PASS	PASS	PASS	PASS	12.48	129	Yes	Yes		SK
9/24/2007	2	879	6528	4544	0.1	44.0	6527.9	4500.1	PASS	PASS	*QUESTION*	PASS	11.79	126	Yes	Yes		SK
9/25/2007	2	873	6773	4357	0.1	43.7	6772.9	4313.4	PASS	PASS	PASS	PASS	11.79	125	Yes	Yes		SK
9/26/2007	2	856	6807	4460	0.1	42.8	6806.9	4417.2	PASS	PASS	PASS	PASS	11.79	124	Yes	Yes		SK
9/27/2007	3	908	6672	4647	0.2	45.4	6671.9	4601.6	PASS	PASS	PASS	*QUESTION*	12.48	128	Yes	Yes		SK
10/2/2007	3	958	6648	4468	0.2	47.9	6647.9	4420.1	PASS	*QUESTION*	PASS	PASS	12.48	131	Yes	Yes		SK
10/3/2007	3	966	6675	4516	0.2	48.3	6674.9	4467.7	PASS	*QUESTION*	PASS	PASS	12.48	131	Yes	Yes		

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			Ludlum 2929		Detector:	Ludlum 43-10-1		Calibration Date:		7/3/2007								
Serial #:			208319		Serial #:	PR-215938		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm				
Alpha	0.3430	Th-230	2126-96	19,500	5/17/1996	7.54E+04	19,498	100	20	1	0.12	0.10	6688.5	71.95				
Beta	0.2039	Tc-99	4003-02	21,800	6/26/2002	2.11E+04	21,796	1000	20	1	53.48	4.89	4443.2	65.26				

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
10/5/2007	1	1136	6615	4428	0.1	56.8	6615.0	4371.2	PASS	PASS	PASS	PASS	10.94	139	Yes	Yes		SK
10/9/2007	2	982	6634	4509	0.1	49.1	6633.9	4459.9	PASS	PASS	PASS	PASS	11.85	131	Yes	Yes		SK
10/10/2007	3	1000	6678	4475	0.2	50.0	6677.9	4425.0	PASS	PASS	PASS	PASS	12.55	132	Yes	Yes		SK
10/11/2007	4	987	6617	4437	0.2	49.4	6616.8	4387.7	PASS	PASS	PASS	PASS	13.14	131	Yes	Yes		SK
10/12/2007	1	952	6743	4549	0.1	47.6	6743.0	4501.4	PASS	PASS	PASS	PASS	10.94	129	Yes	Yes		SK
10/15/2007	1	992	6589	4512	0.1	49.6	6589.0	4462.4	PASS	PASS	PASS	PASS	10.94	131	Yes	Yes		SK
10/16/2007	1	963	6684	4480	0.1	48.2	6684.0	4431.9	PASS	PASS	PASS	PASS	10.94	129	Yes	Yes		SK
10/17/2007	3	970	6686	4469	0.2	48.5	6685.9	4420.5	PASS	PASS	PASS	PASS	12.55	130	Yes	Yes		SK
10/18/2007	2	1059	6652	4440	0.1	53.0	6651.9	4387.1	PASS	PASS	PASS	PASS	11.85	135	Yes	Yes		SK
10/19/2007	3	987	6811	4682	0.2	49.4	6810.9	4632.7	PASS	PASS	PASS	*QUESTION*	12.55	131	Yes	Yes		SK
10/22/2007	3	949	6549	4465	0.2	47.5	6548.9	4417.6	PASS	PASS	PASS	PASS	12.55	129	Yes	Yes		SK
10/23/2007	1	947	6567	4429	0.1	47.4	6567.0	4381.7	PASS	PASS	PASS	PASS	10.94	129	Yes	Yes		SK
10/24/2007	5	966	6667	4588	0.3	48.3	6666.8	4539.7	PASS	PASS	PASS	PASS	13.66	130	Yes	Yes		SK
10/25/2007	2	997	6686	4615	0.1	49.9	6685.9	4565.2	PASS	PASS	PASS	PASS	11.85	131	Yes	Yes		SK
10/26/2007	0	913	6574	4529	0.0	45.7	6574.0	4483.4	PASS	PASS	PASS	PASS	8.75	126	Yes	Yes		SK
10/29/2007	3	898	6691	4450	0.2	44.9	6690.9	4405.1	PASS	PASS	PASS	PASS	12.55	126	Yes	Yes		SK
10/30/2007	3	874	6487	4541	0.2	43.7	6486.9	4497.3	PASS	PASS	*QUESTION*	PASS	12.55	124	Yes	Yes		SK
10/31/2007	1	981	6632	4514	0.1	49.1	6632.0	4465.0	PASS	PASS	PASS	PASS	10.94	131	Yes	Yes		SK
11/1/2007	1	875	6590	4430	0.1	43.8	6590.0	4386.3	PASS	PASS	PASS	PASS	10.94	124	Yes	Yes		SK
11/2/2007	1	805	6649	4503	0.1	40.3	6649.0	4462.8	PASS	*QUESTION*	PASS	PASS	10.94	120	Yes	Yes		SK
11/5/2007	6	1019	6626	4536	0.3	51.0	6625.7	4485.1	PASS	PASS	PASS	PASS	14.13	133	Yes	Yes		SK
11/6/2007	2	869	6762	4543	0.1	43.5	6761.9	4499.6	PASS	*QUESTION*	PASS	PASS	11.85	124	Yes	Yes		SK
11/7/2007	3	933	6623	4434	0.2	46.7	6622.9	4387.4	PASS	PASS	PASS	PASS	12.55	128	Yes	Yes		SK
11/8/2007	2	918	6601	4451	0.1	45.9	6600.9	4405.1	PASS	PASS	PASS	PASS	11.85	127	Yes	Yes		SK
11/9/2007	6	921	6551	4514	0.3	46.1	6550.7	4468.0	PASS	PASS	PASS	PASS	14.13	127	Yes	Yes		SK
11/12/2007	4	937	6799	4516	0.2	46.9	6798.8	4469.2	PASS	PASS	PASS	PASS	13.14	128	Yes	Yes		SK
11/13/2007	2	871	6696	4541	0.1	43.6	6695.9	4497.5	PASS	*QUESTION*	PASS	PASS	11.85	124	Yes	Yes		SK
11/14/2007	6	994	6504	4570	0.3	49.7	6503.7	4520.3	PASS	PASS	*QUESTION*	PASS	14.13	131	Yes	Yes		SK
11/15/2007	4	908	6604	4449	0.2	45.4	6603.8	4403.6	PASS	PASS	PASS	PASS	13.14	126	Yes	Yes		SK
11/27/2007	5	854	6720	4467	0.3	42.7	6719.8	4424.3	PASS	*QUESTION*	PASS	PASS	13.66	123	Yes	Yes		SK
11/28/2007	5	854	6640	4488	0.3	42.7	6639.8	4445.3	PASS	*QUESTION*	PASS	PASS	13.66	123	Yes	Yes		SK
11/29/2007	3	907	6731	4612	0.2	45.4	6730.9	4566.7	PASS	PASS	PASS	PASS	12.55	126	Yes	Yes		SK
11/30/2007	2	911	6761	4659	0.1	45.6	6760.9	4613.5	PASS	PASS	PASS	*QUESTION*	11.85	126	Yes	Yes		SK
12/3/2007	3	861	6674	4535	0.2	43.1	6673.9	4492.0	PASS	*QUESTION*	PASS	PASS	12.55	123	Yes	Yes		SK
12/4/2007	4	901	6805	4614	0.2	45.1	6804.8	4569.0	PASS	PASS	PASS	PASS	13.14	126	Yes	Yes		SK
12/5/2007	3	916	6649	4574	0.2	45.8	6648.9	4528.2	PASS	PASS	PASS	PASS	12.55	127	Yes	Yes		SK
12/6/2007	5	850	6708	4509	0.3	42.5	6707.8	4466.5	PASS	*QUESTION*	PASS	PASS	13.66	123	Yes	Yes		SK
12/7/2007	4	937	6811	4454	0.2	46.9	6810.8	4407.2	PASS	PASS	PASS	PASS	13.14	128	Yes	Yes		SK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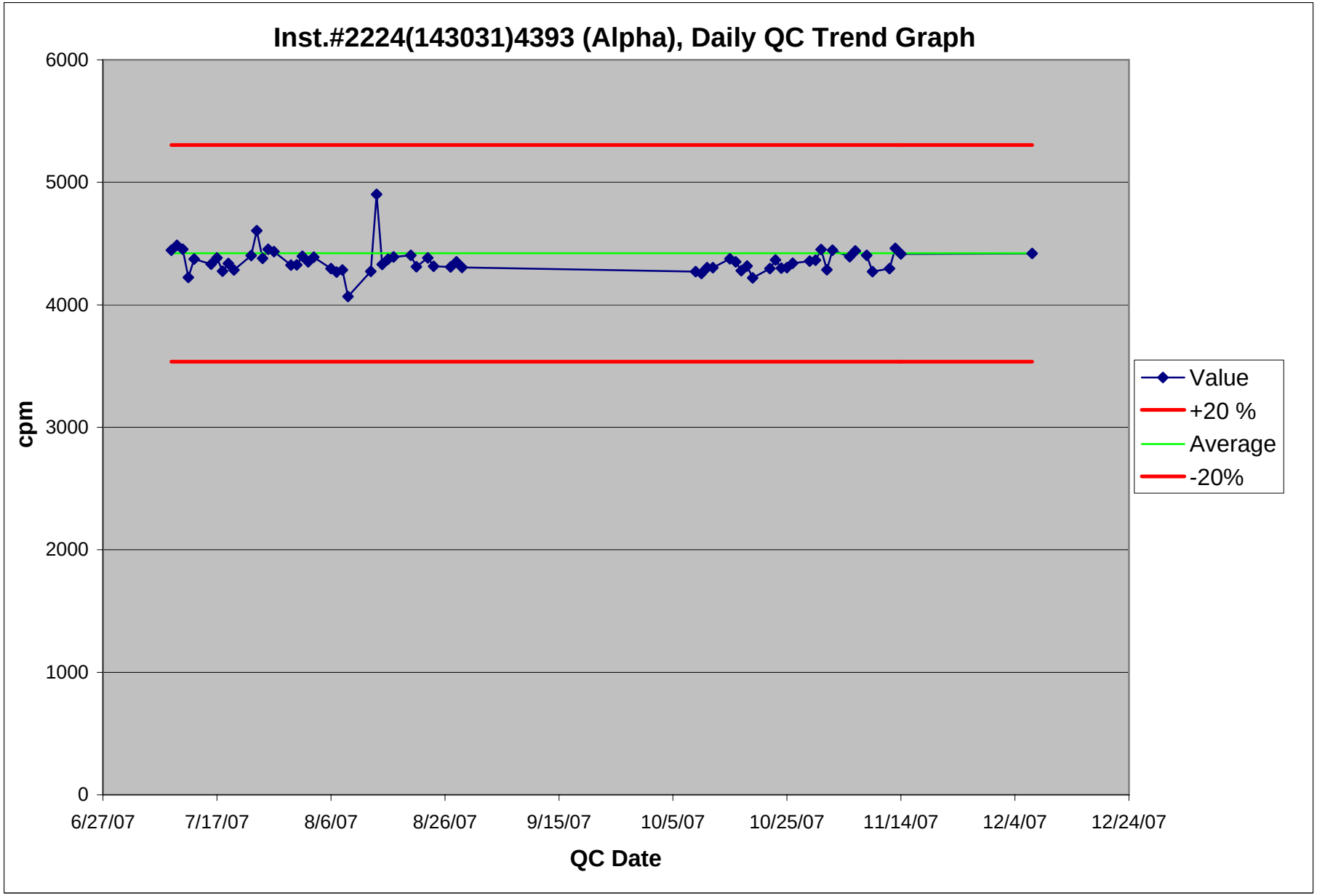
250
200
150
100
50
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%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5000
4000
3000
2000
1000
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
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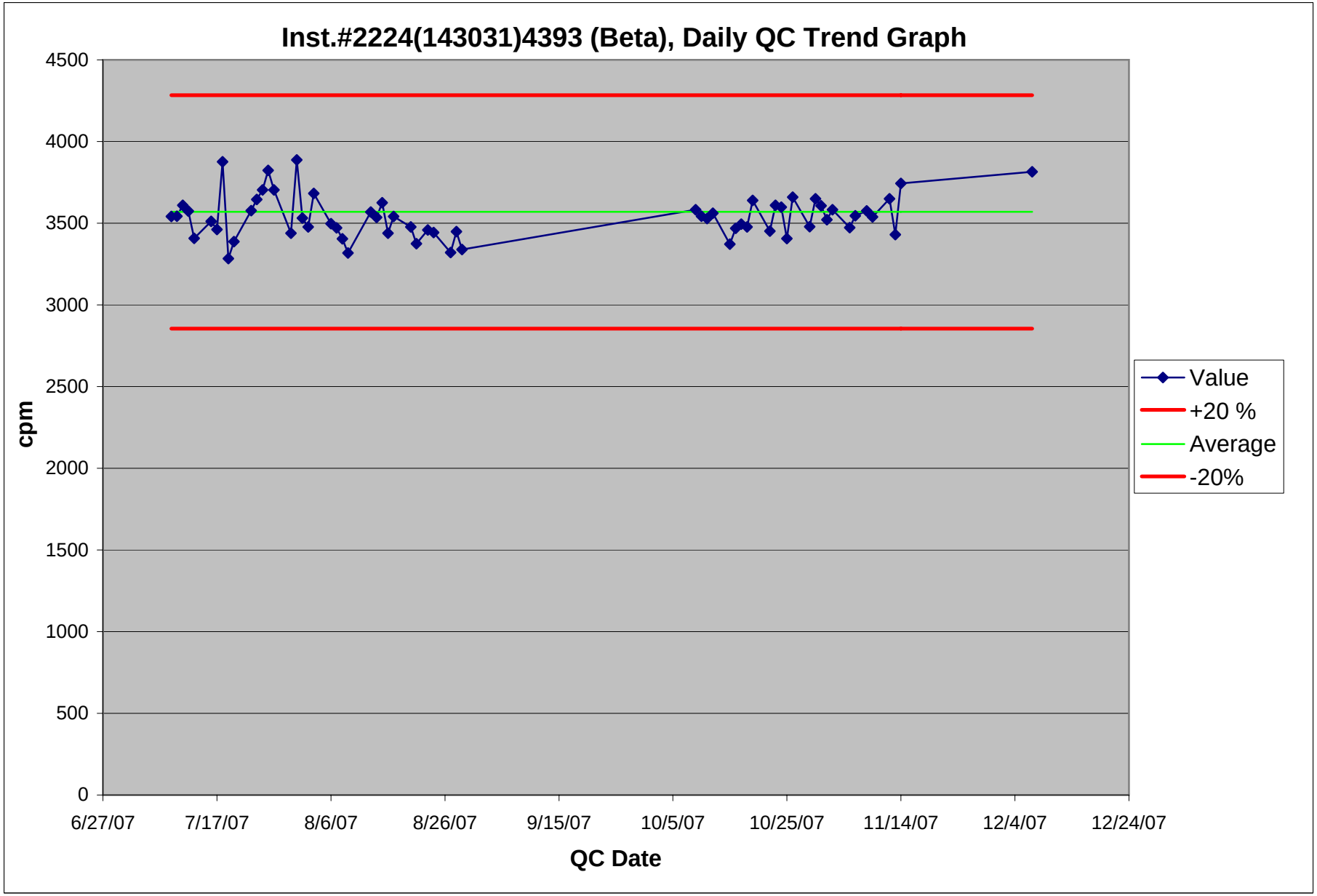
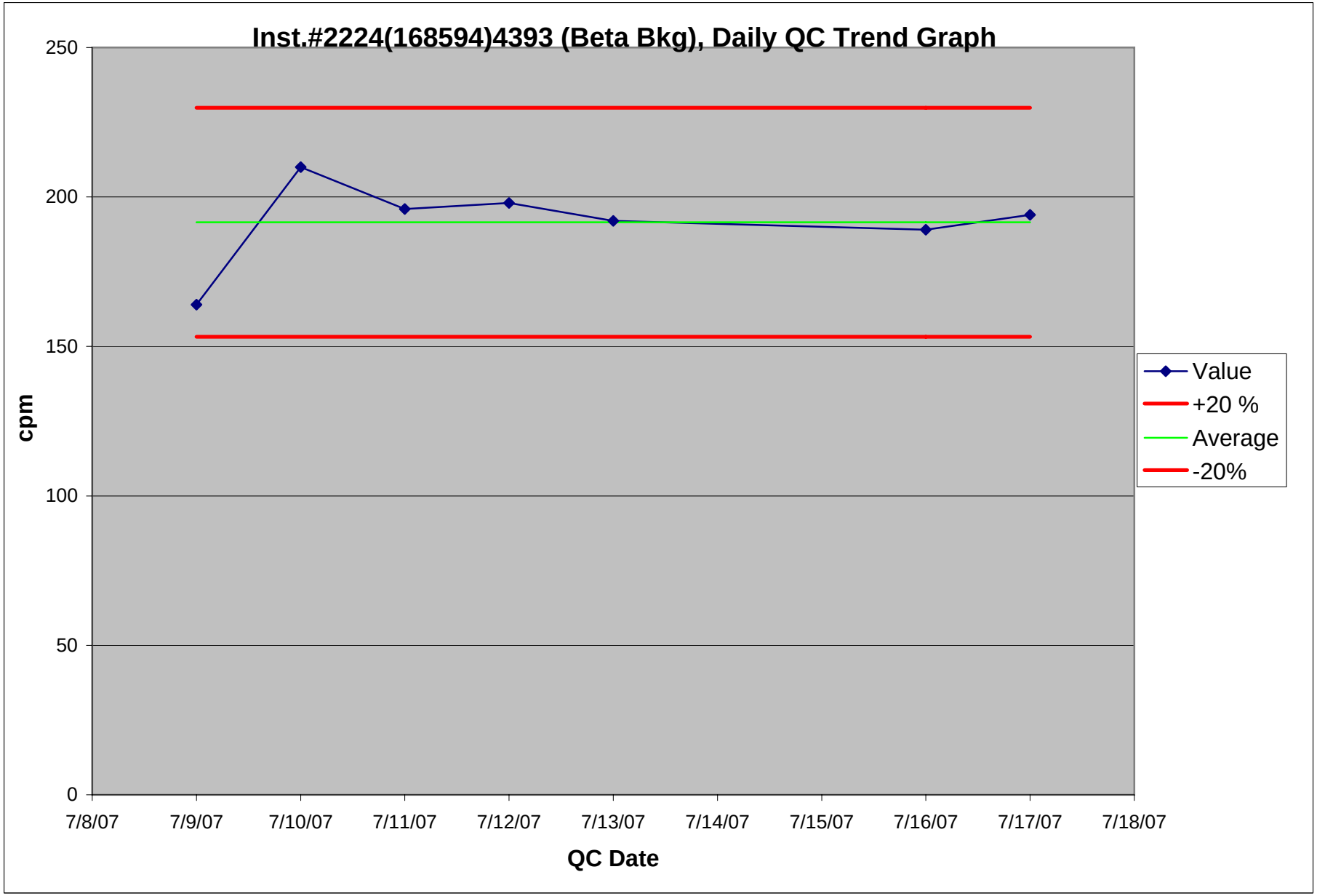
QC Date
Value
+20 %
Average
-20%


Inst.#2224(143031)4393 (Beta), Daily QC Trend Graph
4500
4000
3500
3000
2500
2000
1500
1000
500
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%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200
150
100
50
0
cpm
7/8/07
7/9/07
7/10/07
7/11/07
7/12/07
7/13/07
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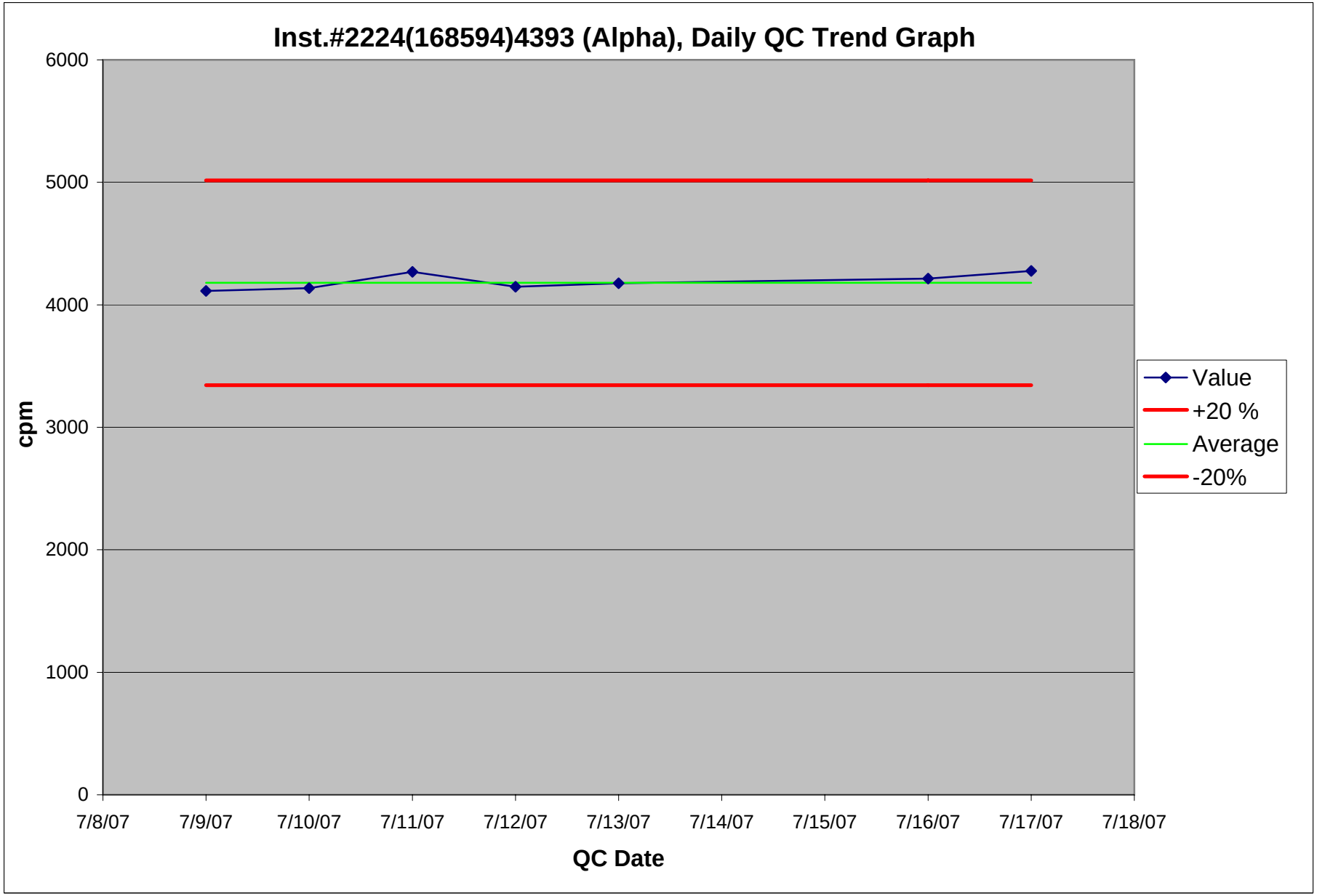
7/18/07
QC Date
Value
+20 %
Average
-20%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5000
4000
3000
2000
1000
0
cpm
7/8/07
7/9/07
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7/11/07
7/12/07
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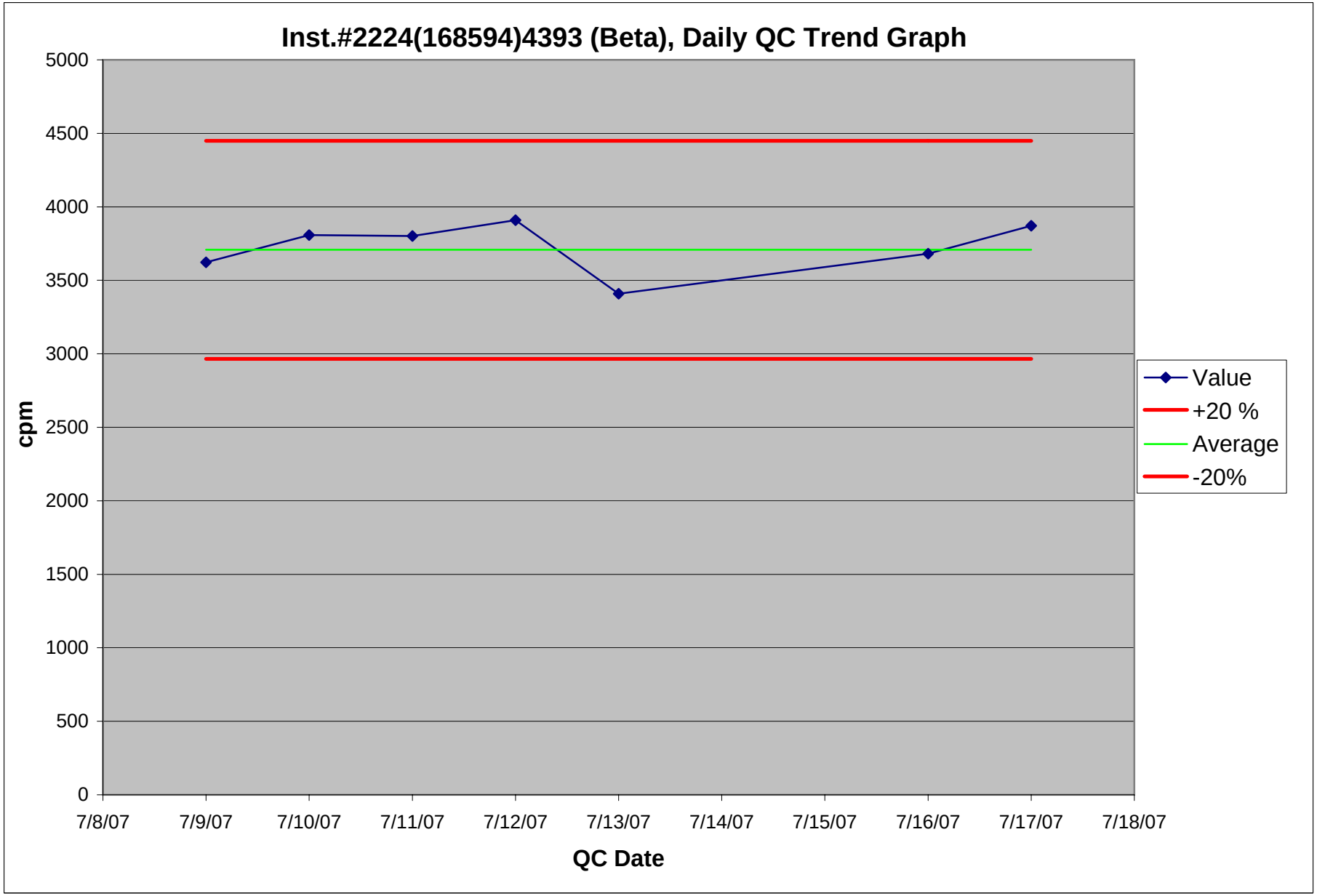
QC Date
Value
+20 %
Average
-20%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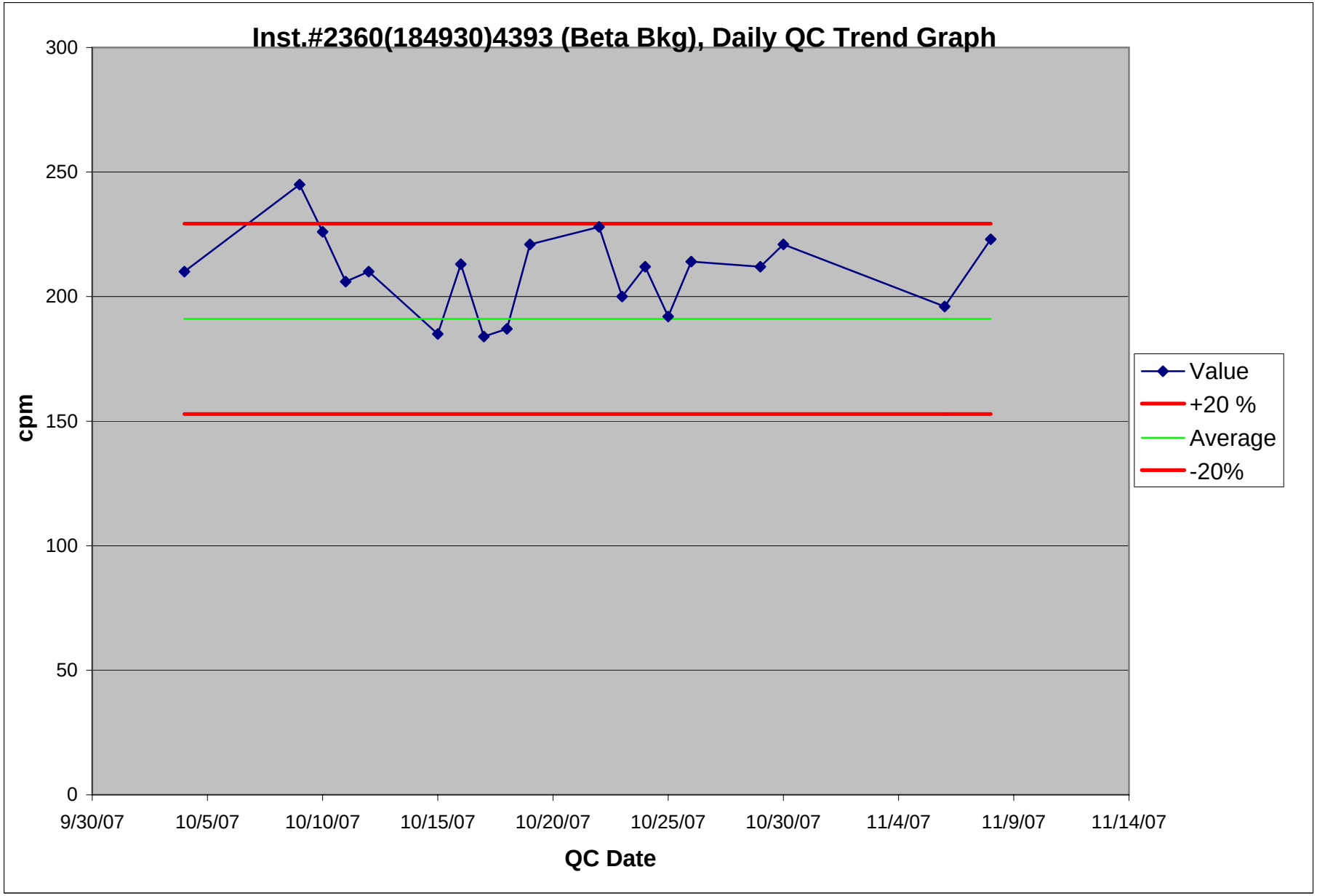
4500
4000
3500
3000
2500
2000
1500
1000
500
0
cpm
7/8/07
7/9/07
7/10/07
7/11/07
7/12/07
7/13/07
7/14/07
7/15/07
7/16/07
7/17/07
7/18/07
QC Date
Value
+20 %
Average
-20%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250
200
150
100
50
0
cpm
9/30/07
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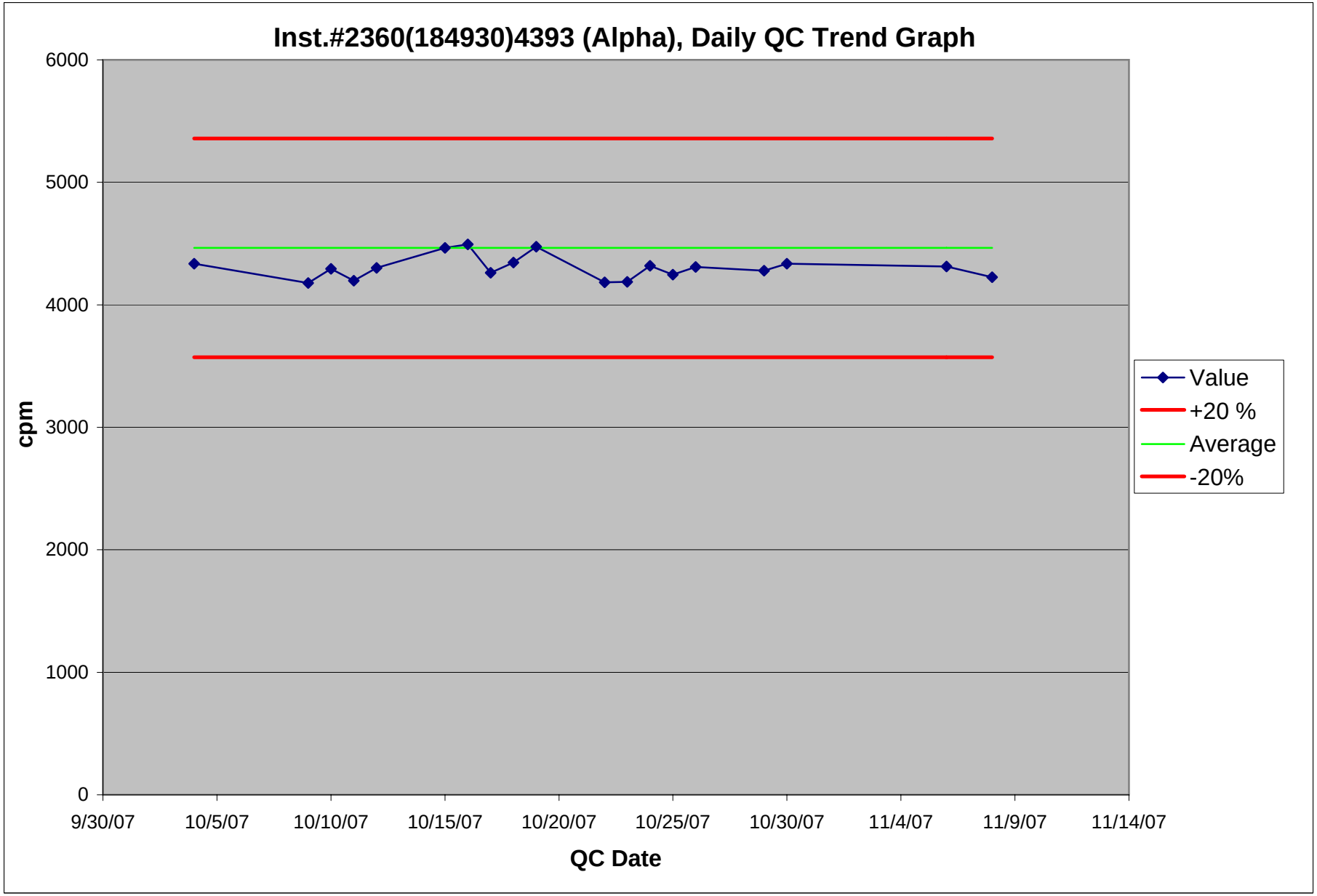
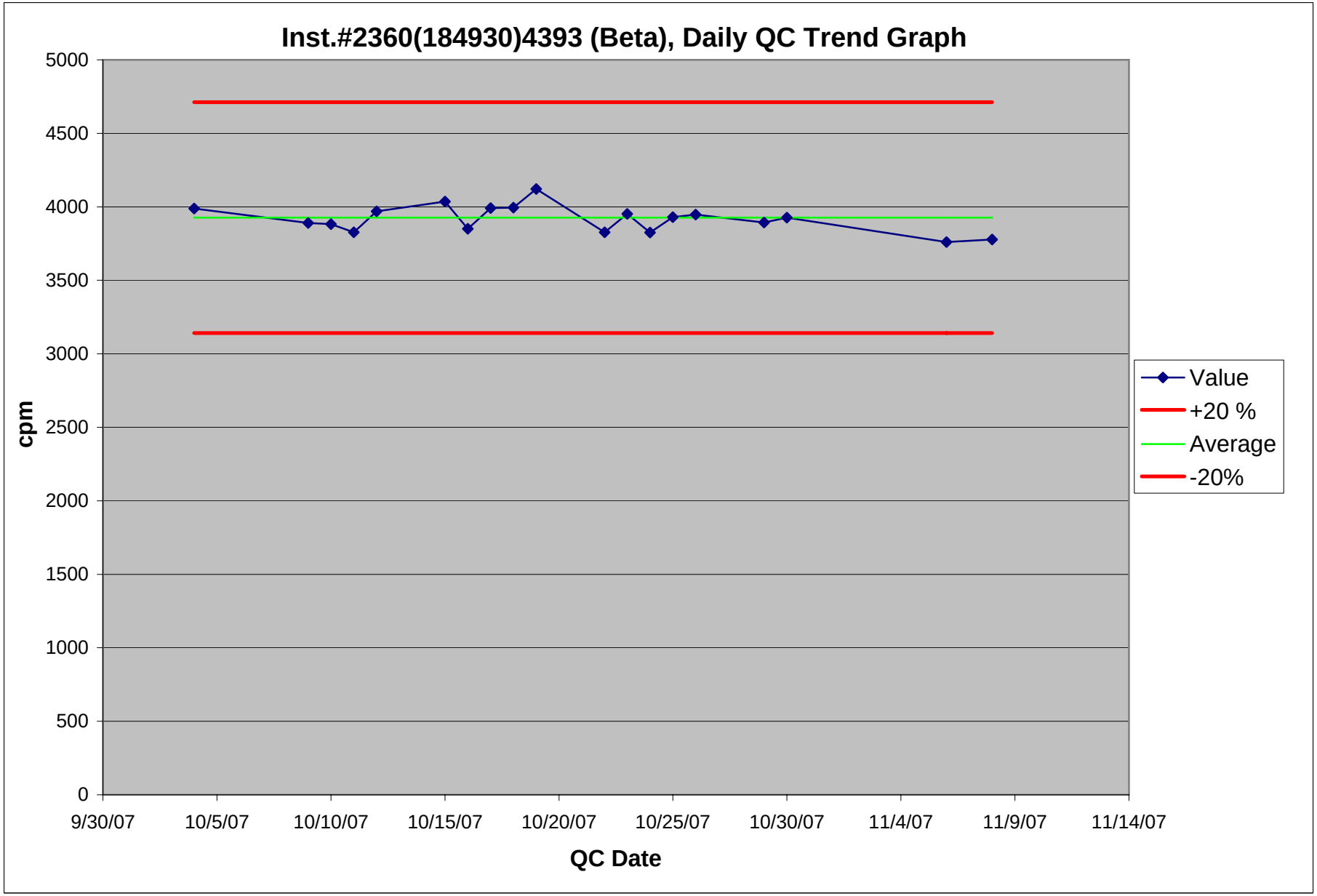
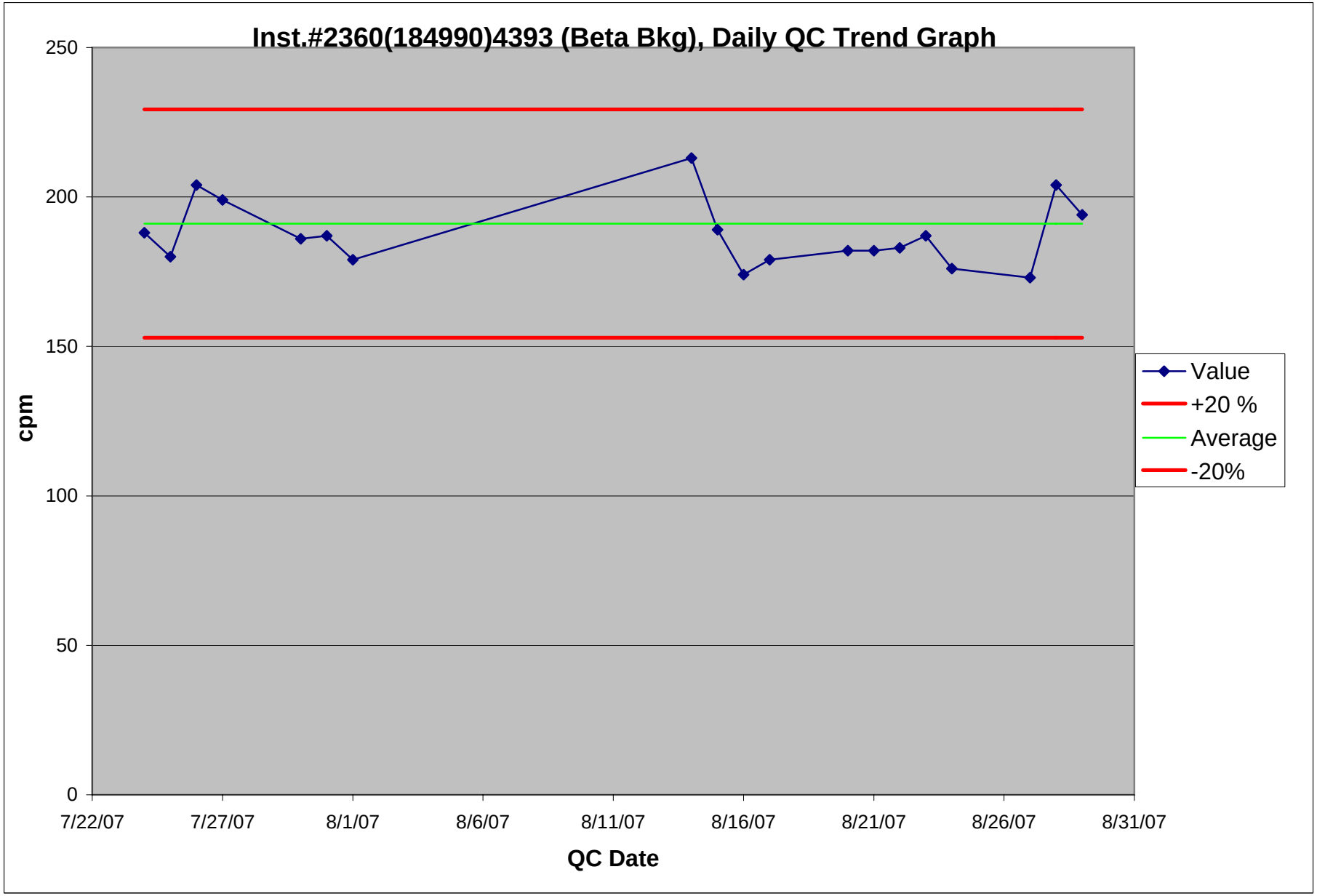
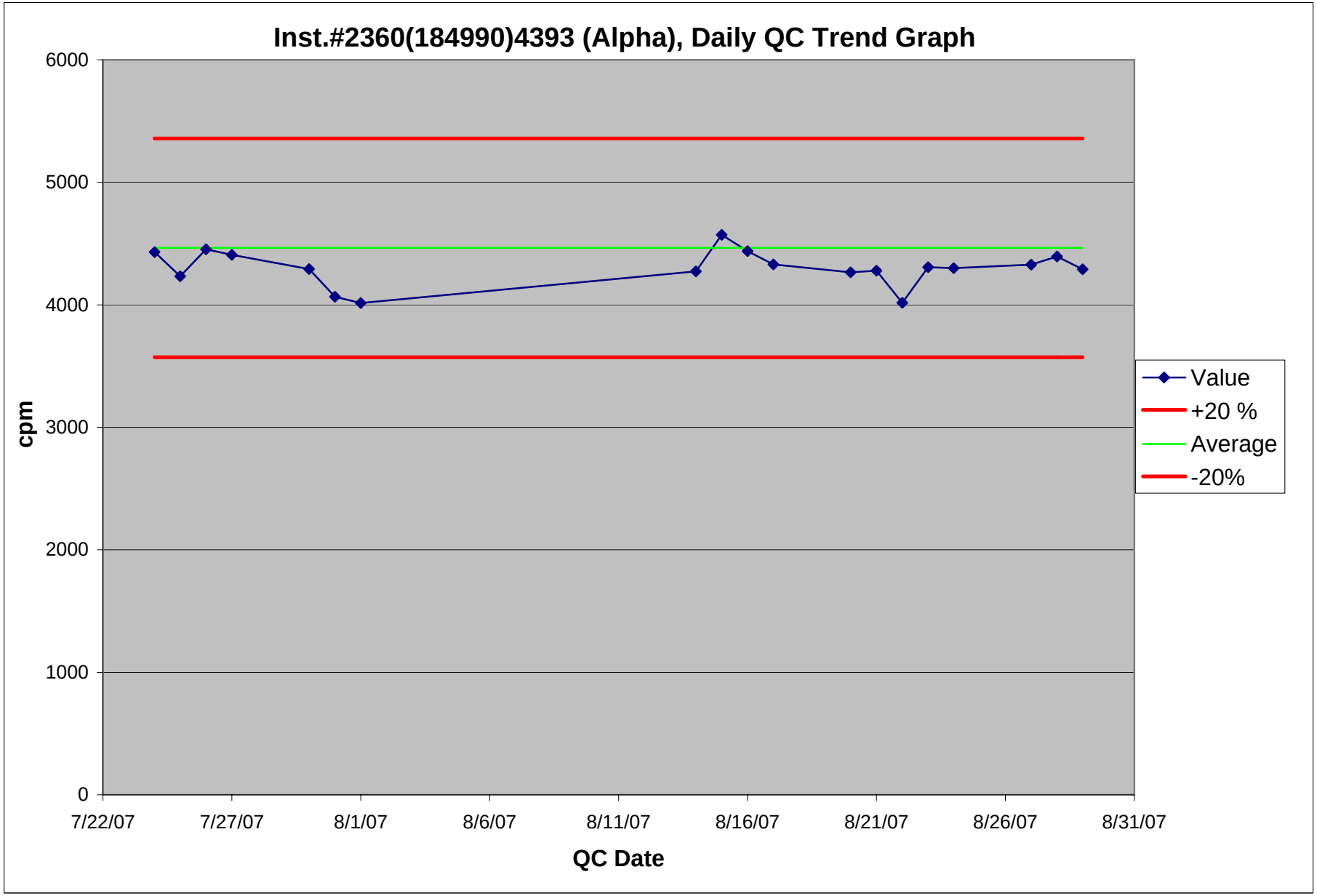
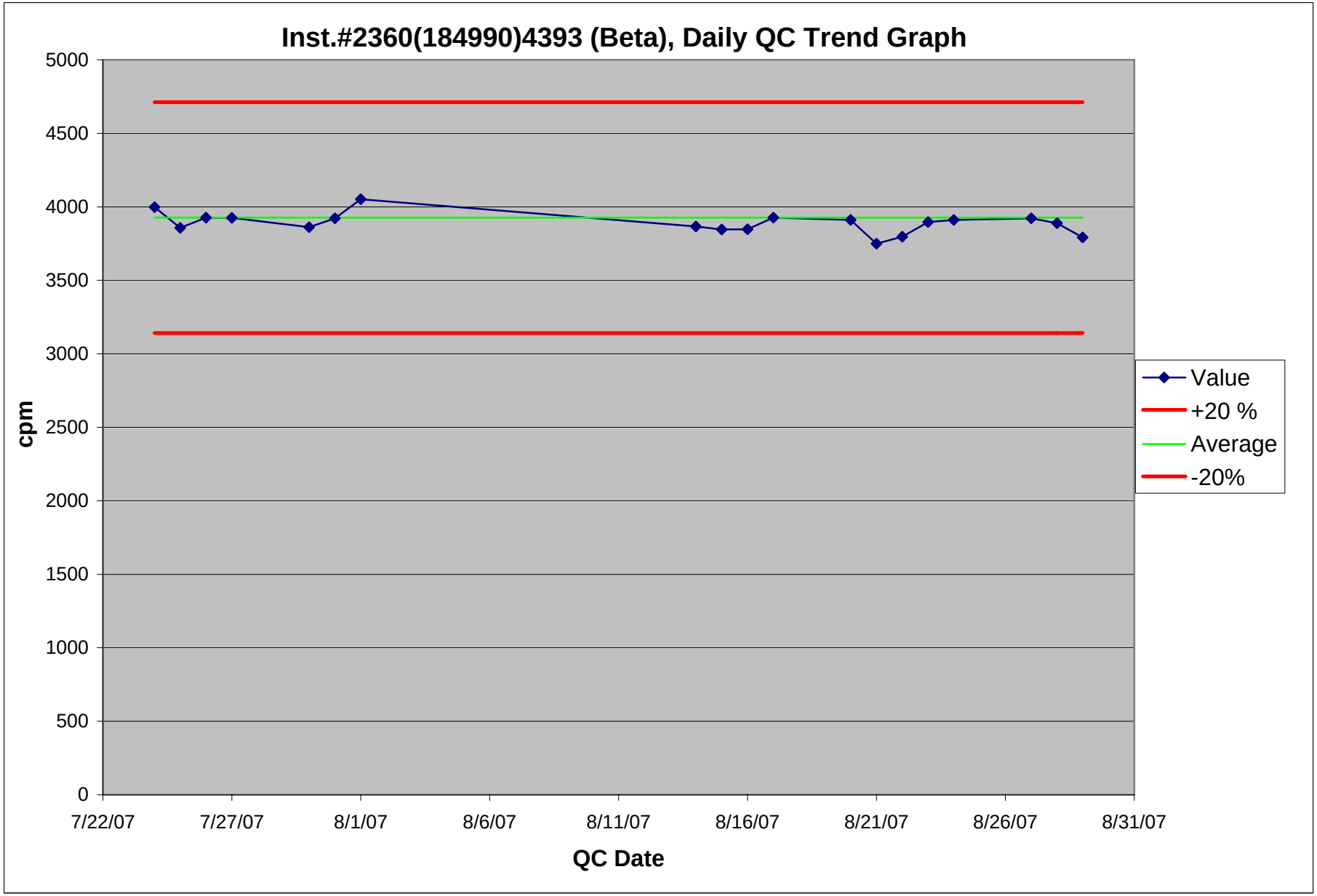
10/10/07
10/15/07
10/20/07
10/25/07
10/30/07
11/4/07
11/9/07
11/14/07
QC Date
Value
+20 %
Average
-20%

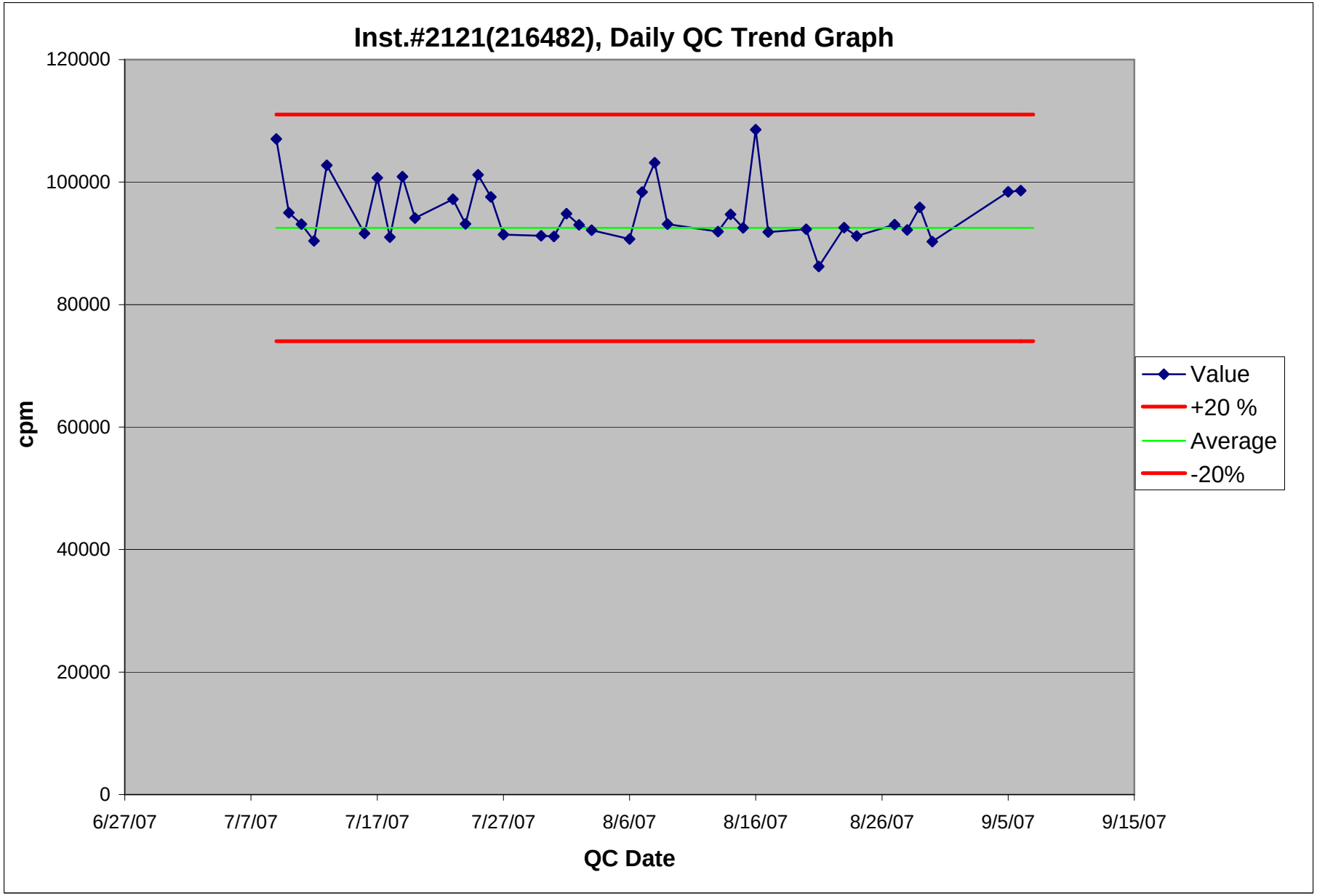

Inst.#2360(184930)4393 (Alpha), Daily QC Trend Graph
6000
5000
4000
3000
2000
1000
0
cpm
9/30/07
10/5/07
10/10/07
10/15/07
10/20/07
10/25/07
10/30/07
11/4/07
11/9/07
11/14/07
QC Date
Value
+20 %
Average
-20%

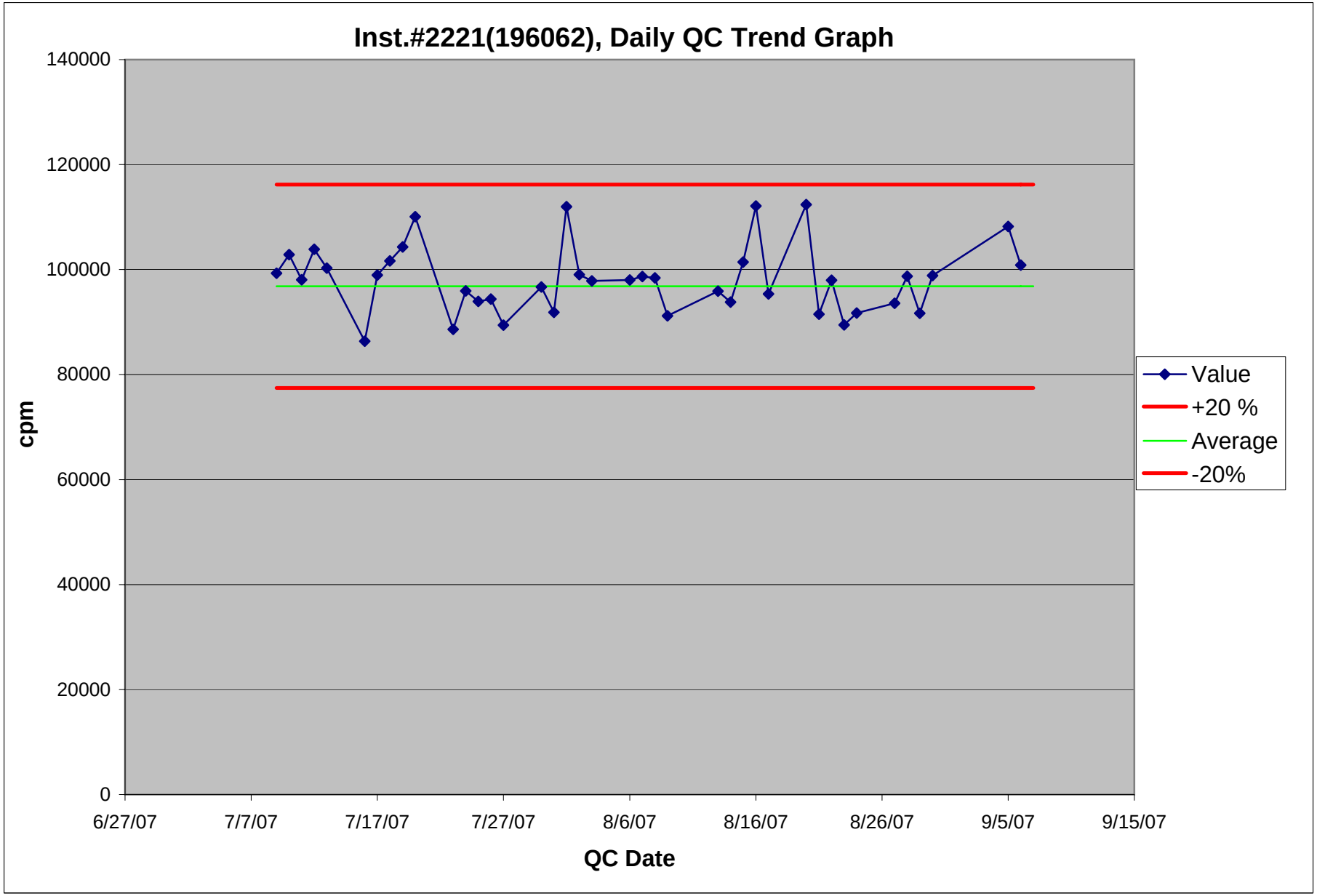

Inst.#2360(184930)4393 (Beta), Daily QC Trend Graph
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
cpm
9/30/07
10/5/07
10/10/07
10/15/07
10/20/07
10/25/07
10/30/07
11/4/07
11/9/07
11/14/07
QC Date
Value
+20 %
Average
-20%

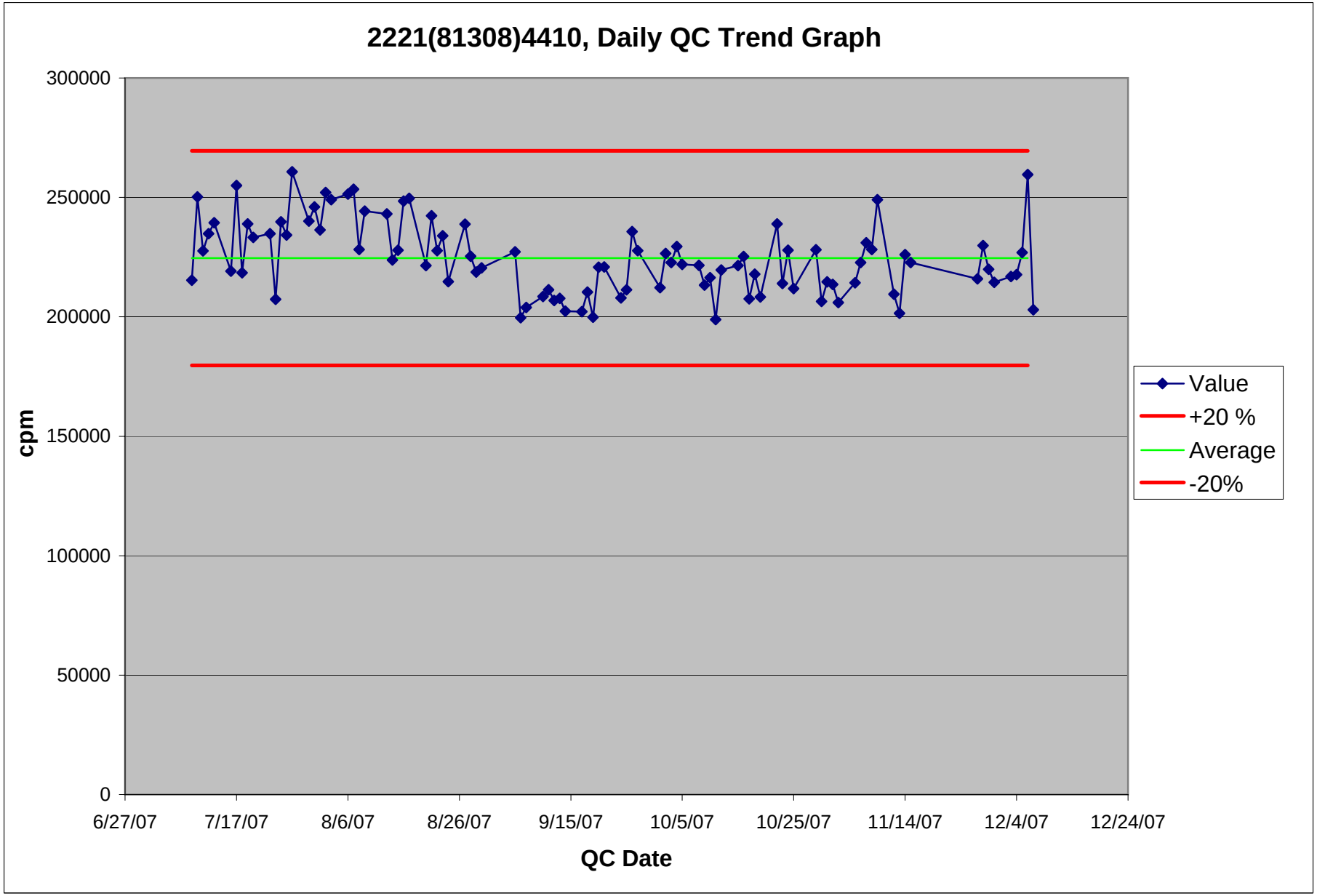

Inst.#2360(184990)4393 (Beta Bkg), Daily QC Trend Graph
250
200
150
100
50
0
cpm
7/22/07
7/27/07
8/1/07
8/6/07
8/11/07
8/16/07
8/21/07
8/26/07
8/31/07
QC Date
Value
+20 %
Average
-20%

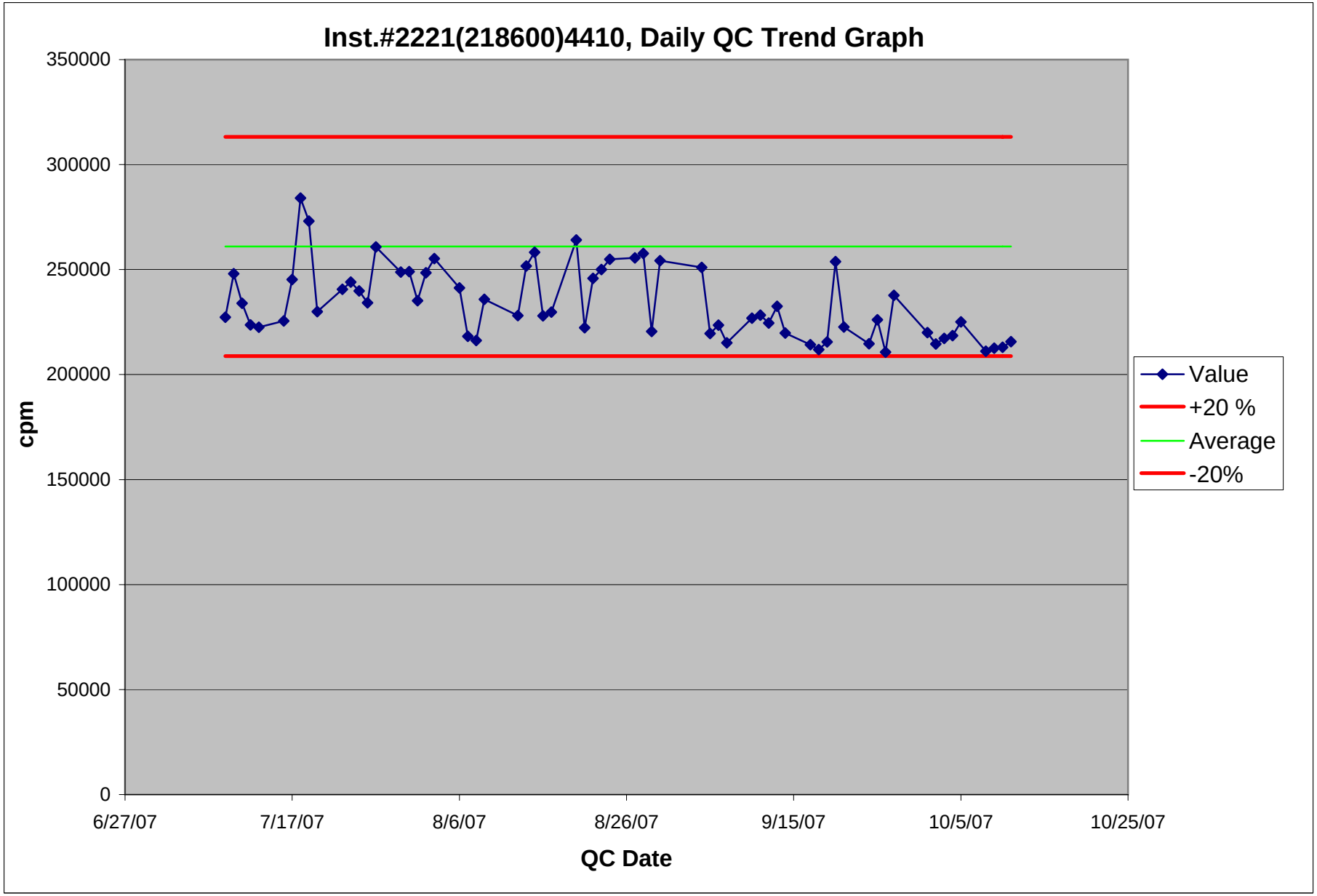

Inst.#2360(184990)4393 (Alpha), Daily QC Trend Graph
6000
5000
4000
3000
2000
1000
0
cpm
7/22/07
7/27/07
8/1/07
8/6/07
8/11/07
8/16/07
8/21/07
8/26/07
8/31/07
QC Date
Value
+20 %
Average
-20%

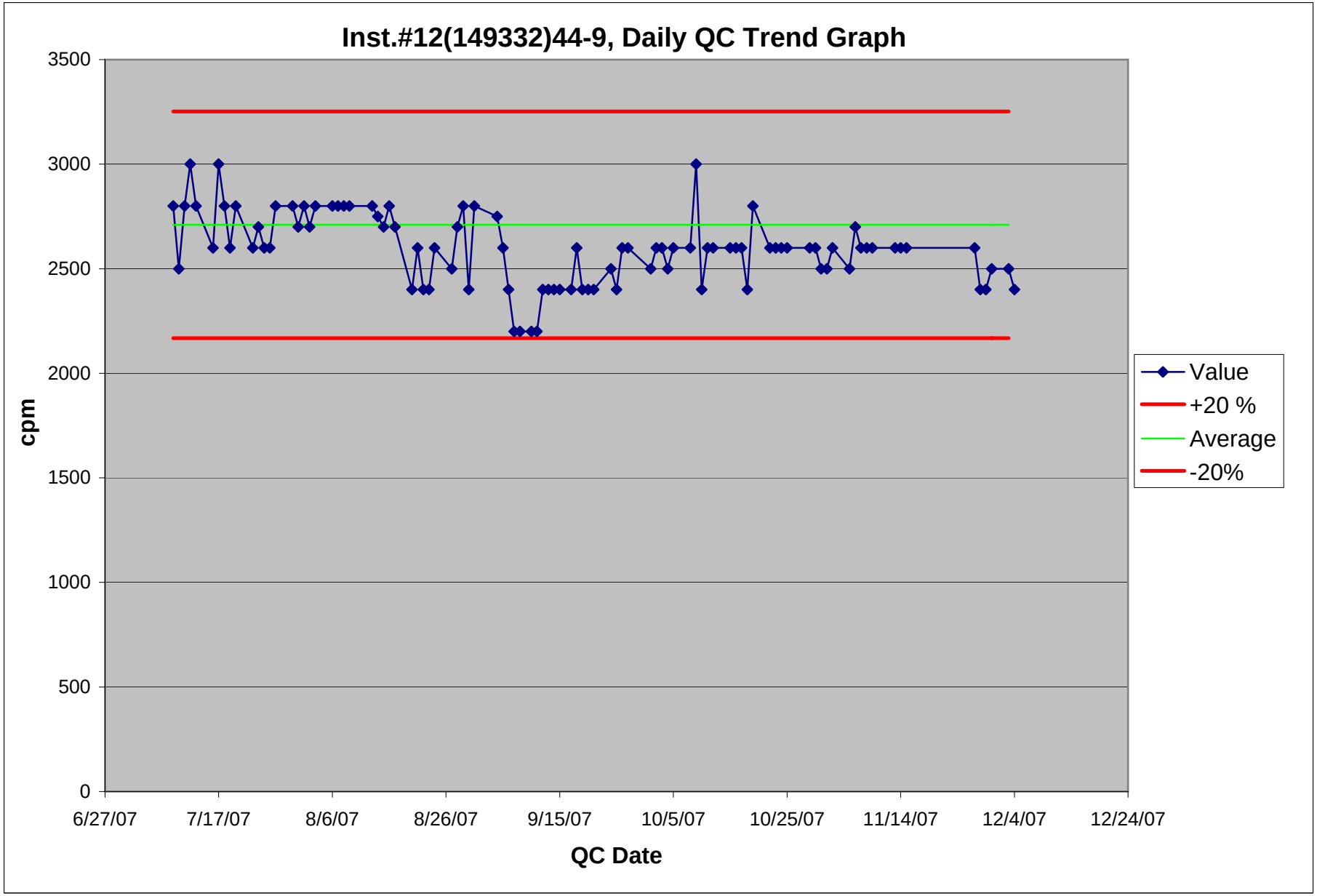

Inst.#2360(184990)4393 (Beta), Daily QC Trend Graph
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
cpm
7/22/07
7/27/07
8/1/07
8/6/07
8/11/07
8/16/07
8/21/07
8/26/07
8/31/07
QC Date
Value
+20 %
Average
-20%

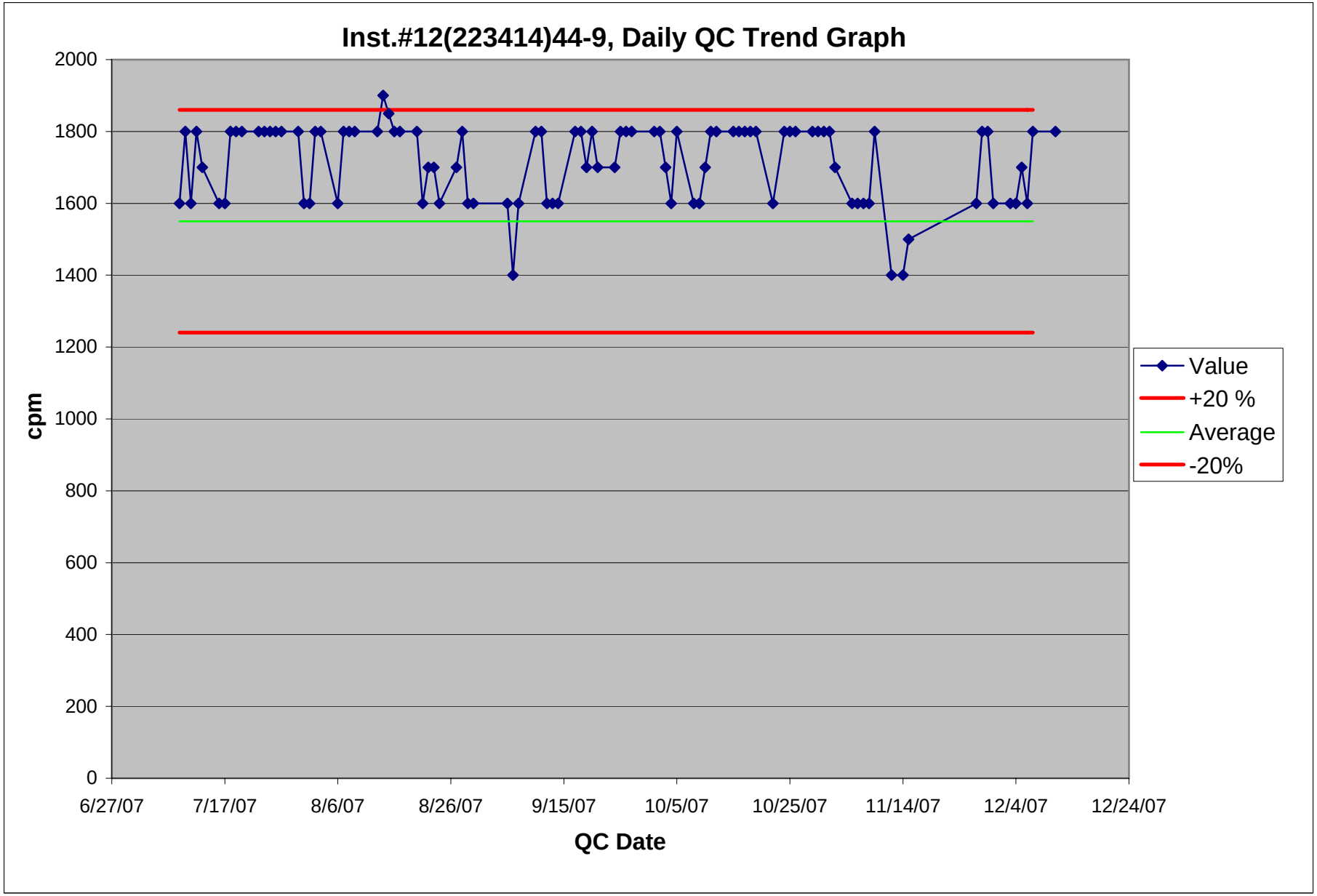

Inst.#2121(216482), Daily QC Trend Graph
120000
100000
80000
60000
40000
20000
0
cpm
6/27/07
7/7/07
7/17/07
7/27/07
8/6/07
8/16/07
8/26/07
9/5/07
9/15/07
QC Date
Value
+20 %
Average
-20%

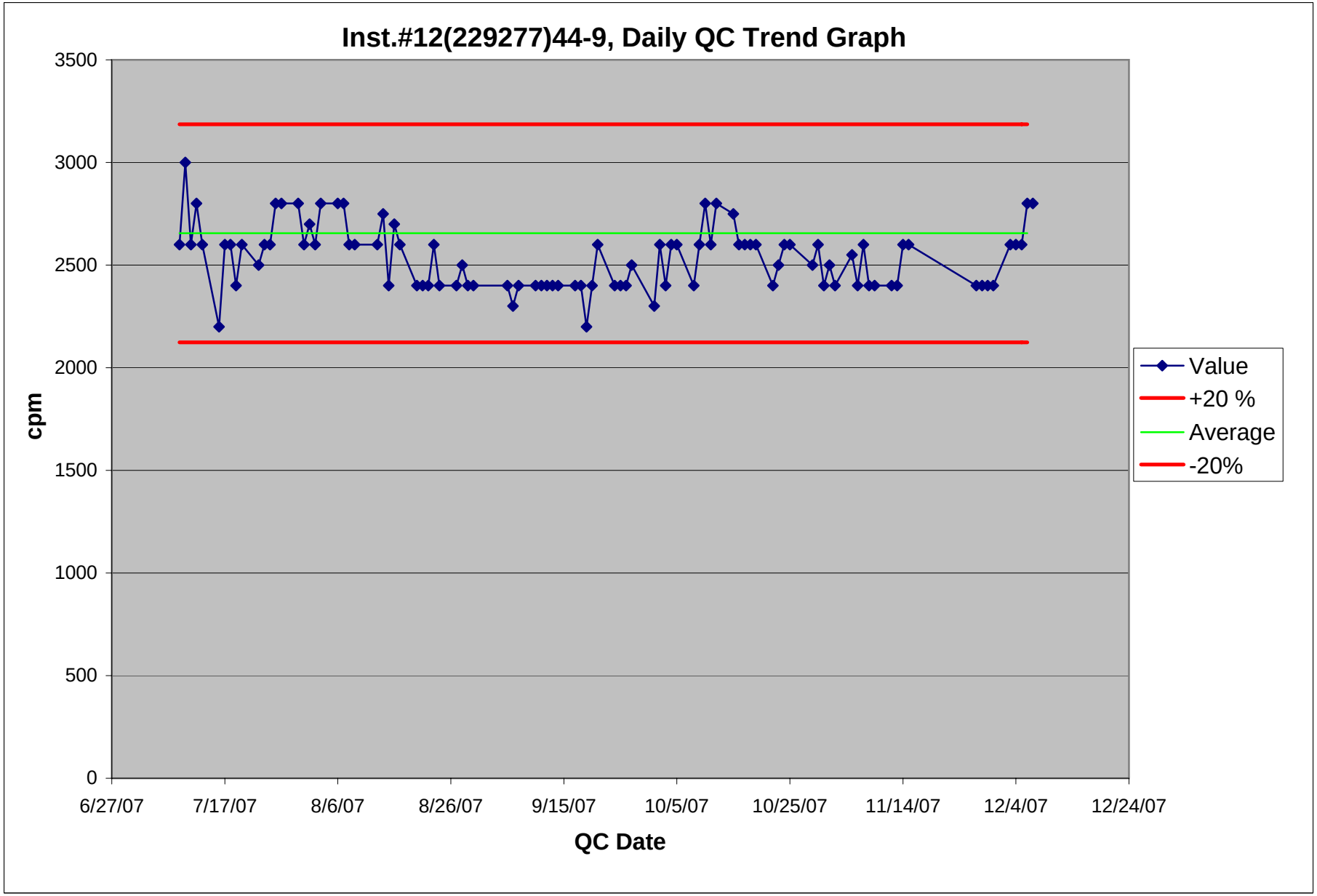

Inst.#2221(196062), Daily QC Trend Graph
140000
120000
100000
80000
60000
40000
20000
0
cpm
6/27/07
7/7/07
7/17/07
7/27/07
8/6/07
8/16/07
8/26/07
9/5/07
9/15/07
QC Date
Value
+20 %
Average
-20%

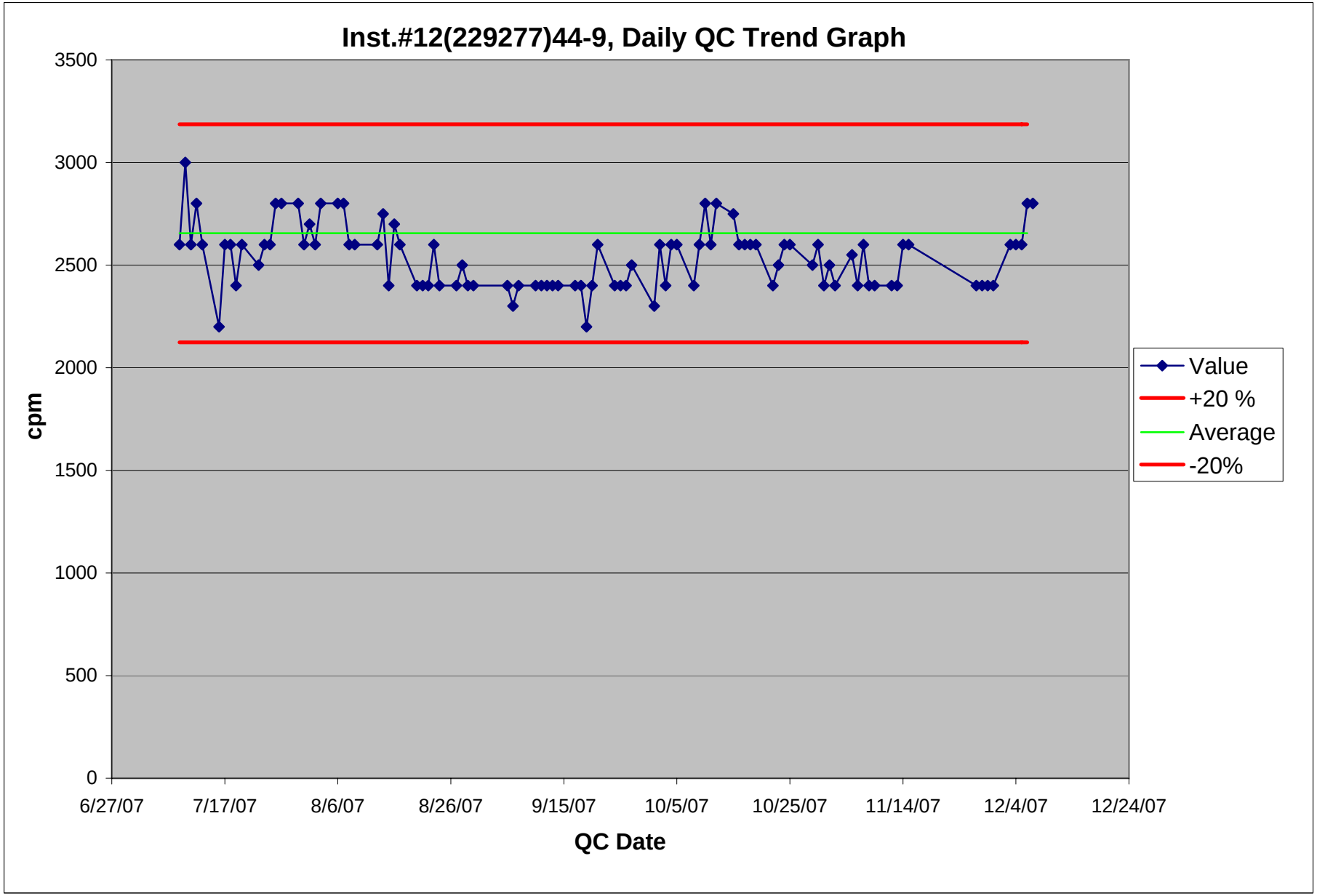

2221(81308)4410, Daily QC Trend Graph
300000
250000
200000
150000
100000
50000
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%


Inst.#2221(218600)4410, Daily QC Trend Graph
350000
300000
250000
200000
150000
100000
50000
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
QC Date
Value
+20 %
Average
-20%


Inst.#12(149332)44-9, Daily QC Trend Graph
3500
3000
2500
2000
1500
1000
500
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%


Inst.#12(223414)44-9, Daily QC Trend Graph
2000
1800
1600
1400
1200
1000
800
600
400
200
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%


Inst.#12(229277)44-9, Daily QC Trend Graph
3500
3000
2500
2000
1500
1000
500
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%


Inst.#12(229277)44-9, Daily QC Trend Graph
3500
3000
2500
2000
1500
1000
500
0
cpm
6/27/07
7/17/07
8/6/07
8/26/07
9/15/07
10/5/07
10/25/07
11/14/07
12/4/07
12/24/07
QC Date
Value
+20 %
Average
-20%

#1

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 276136/313051

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 163827

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR 171322

Cal. Date 9-May-07 Cal Due Date 9-May-08 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable Instr. and/or detector IAW mfg. spec. T. 73 °F RH 55 % Alt 700.8 mm Hg

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

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

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

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 850 V = 3.38 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 495 V Ref./Inst. 2000 / 1995 V

COMMENTS:

4pi Eff. for Ni63 ≈ 0.53%, Source Count= 1604 cpm, Background= 59 cpm, Source Size= 288947 dpm
4pi Eff. for Th230 ≈ 39.47%, Source Count= 7876 cpm, Background= 59 cpm, Source Size= 19800 dpm
4pi Eff. for Tc99 ≈ 29.47%, Source Count= 8548 cpm, Background= 59 cpm, Source Size= 28800 dpm
4pi Eff. for SrY90 ≈ 39.62%, Source Count= 22977 cpm, Background= 59 cpm, Source Size= 57834 dpm

Cal'd high voltage with detector connected.

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

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Alpha Channel Digital Readout	400K cpm	39949 (0)	39949 (0)
	40K cpm	3994	3994
	4K cpm	399	399
	400 cpm	40	40
	40 cpm	4	4

	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Beta/Gamma Channel Digital Readout	400K cpm	40055 (0)	40055 (0)
	40K cpm	4006	4006
	4K cpm	405	405
	400 cpm	40	40
	40 cpm	4	4

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230: S/N 121495 ☑ Beta S/N Tc99 S/N 5279, Ni-63 S/N 99Ni2204017, ☑ Other SrY90 S/N 99Sr2204016

☑ m 500 S/N 190566 ☐ Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrated By: Jason Flores Date 9-May-07

Reviewed By: Rhonda Harris Date 9 May 07

AC Inst. Only ☑ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

FORM C25 01/24/2007

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 171322

Order #. 276136/313051

Customer CABRERA SERVICES

Alpha Input Sensitivity 125 mV

Counter 2929 Serial No. 163827

Beta Input Sensitivity 4 mV

Count Time 1Minute

Beta Window 50 mV

Other

Distance Source to Detector TRAY

High Voltage	Background		Isotope Th230 Size 19800 dpm		Isotope Tc 99 Size 28800 dpm		Isotope Sr Y 90 Size 57834 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
800	0	53	7846	414	14	6694	2	22195
825	0	69	7828	497	16	7679	5	22663
850	0	59	7876	602	12	8548	2	22977
875	0	82	7984	778	10	8806	4	22888

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Jason Flores

Date 9-MAY-07

FORM C4B 04/09/2003

#1

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 282824 / 316758

Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 163827

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR-171322

Cal. Date 7-Sep-07 Cal Due Date 7-Sep-08 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 47 % Alt 697.8 mm Hg

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

☑ Mechanical ck. ☑ Window Operation

☑ Audio ck.

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

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 850 V = 3.48 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 481 V Ref./Inst. 2000 / 2006 V

COMMENTS:

4pi Efficiencies:
Th230: Source size = 19,800 dpm, Background = 1 cpm, Source count = 8,084 cpm, Efficiency ≈ 40.82%
Tc99: Source size = 33,200 dpm, Background = 50 cpm, Source count = 9,028 cpm, Efficiency ≈ 27.04%
Ni-63: Source size = 288,285 dpm, Background = 50 cpm, Source count = 6,995 cpm, Efficiency ≈ 2.41%
SrY90: Source size = 110,836 dpm, Background = 50 cpm, Source count = 48,727 cpm, Efficiency ≈ 43.92%

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

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	40071 (0)	40071 (0)
	40K cpm	4008	4008
	4K cpm	400	400
	400 cpm	40	40
	40 cpm	4	4

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	40048 (0)	40048 (0)
	40K cpm	4004	4004
	4K cpm	400	400
	400 cpm	40	40
	40 cpm	4	4

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

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394/1122 ☐ 1131 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230 s/n 121495 ☑ Beta S/N Tc99 s/n 5296, Ni-63 s/n 99NI2204017, SrY90 s/n 5281 ☐ Other

☑ m 500 S/N 114520 ☐ Oscilloscope S/N ☑ Multimeter S/N 78401030

Calibrated By: Sebastian Ceballos Date 07-Sep-07

Reviewed By: Rhonda Harris Date 9 Sep 07

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C25 01/24/2007

AC Inst. Only ☑ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR-171322

Customer CABRERA SERVICES

Counter 2929 Serial No. 163827

Count Time 1Minute

Other

Order #. 282824 / 316758

Alpha Input Sensitivity 175 mV

Beta Input Sensitivity 4 mV

Beta Window 50 mV

Distance Source to Detector tray

High Voltage	Background		Isotope Th230 Size 19,800 dpm		Isotope Tc99 Size 33,200 dpm		Isotope Sr90 Size 110,836 dpm		Isotope Ni-63 Size 288,285 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
825V	0	61	8,028	726	9	8,412	11	49,593	3	4,037
* 850	1	50	8,084	890	12	9,028	46	48,727	2	6,995
875	0	69	8,039	1,122	11	9,712	129	46,530	2	10,356

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Sebastn Ceballos Date 07-Sep-07

FORM C4B-1 04/08/2005

#2

Calibration Certificate
ID Number: C854F11890-0

Calibration Technology
A Division of RSCS, Inc.

Customer: Hank Siegrist
Cabrera Services, Inc.
473 Silver Lane
East Hartford, CT 06118-

Instrument
Bicron Model MicroRem

Serial Number
C854F

Precision Check				
Test 1	Test 2	Test 3	Mean	Results
4.00 mrem/hr	4.00 mrem/hr	4.00 mrem/hr	4.00 mrem/hr	Satisfactory

Accuracy Check			
Range	Target Value	As Found	As Left
X1000	160 mrem/hr	160 mrem/hr	160 mrem/hr
X1000	40 mrem/hr	40 mrem/hr	40 mrem/hr
X100	16 mrem/hr	16 mrem/hr	16 mrem/hr
X100	4 mrem/hr	4 mrem/hr	4 mrem/hr
X10	1.6 mrem/hr	1.7 mrem/hr	1.7 mrem/hr
X10	0.4 mrem/hr	0.4 mrem/hr	0.40 mrem/hr
X1	160 µrem/hr	160 µrem/hr	160 µrem/hr
X1	40 µrem/hr	40 µrem/hr #	40 µrem/hr #
X0.1	16 µrem/hr	11.5 µrem/hr # *	15 µrem/hr #
X0.1	4 µrem/hr	3.5 µrem/hr #	4 µrem/hr #

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10% of Target value
Readings with # indicate ranges where pulser was used.

MTE Instrument Type	Model	CalDueDate
Pulser	Ludlum 500-4 SN: 66151	01/15/2008

Outer Physical Check: *Pass*
Internal Check: *Pass*
Geotropism Check: *Pass*
Mechanical Zero: *Pass*
Tap Test: *Pass*

Calibrated by: QA Review:

Calibration Date: 05/17/2007
Expires: 05/17/2008

Atmospheric Conditions - Temperature: 76°F Humidity: 32% Barometric Pressure: 29.78"hg
This calibration was performed by RSCS Inc. 91 Portsmouth ave, Stratham NH 03885 using a NIST Traceable radiation source, in conformance to the following standards: ANSI N323A (1997). RSCS New Hampshire Radioactive Material License Number: 381R. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedure 2.4. This calibration certificate shall not be reproduced except in full without the express written consent of RSCS, Inc

Radiation Safety and Control Services, Inc.
91 Portsmouth Ave. Stratham, NH 03885
1-800-525-8339 (603) 778-2871 Fax (603) 778-6879 www.radsafety.com

#3

Calibration Technology
A Division of RSCS, Inc.

Calibration Certificate
ID Number: 21648211655-0

Customer: Chuck Mikaitis
Cabrera Services, Inc.
473 Silver Lane
East Hartford, CT 06118-

Instrument
Ludlum Model 2221

Serial Number
216482

Probe Model
Bicron G-1

Serial Number
C358C

Precision Check

Test 1	Test 2	Test 3	Mean	Results
9.95 Kcpm	**9.96 Kcpm**	**9.96 Kcpm**	**9.95 Kcpm**	**Satisfactory**

Accuracy Check

Range	Target Value	As Found	As Left
X1000	400 Kcpm	400.549 Kcpm #	400.549 Kcpm #
X1000	100 Kcpm	99.530 Kcpm #	99.530 Kcpm #
X100	40 Kcpm	40.016 Kcpm #	40.016 Kcpm #
X100	10 Kcpm	9.953 Kcpm #	9.953 Kcpm #
X10	4 Kcpm	4.010 Kcpm #	4.010 Kcpm #
X10	1 Kcpm	0.995 Kcpm #	0.995 Kcpm #
X1	400 cpm	400 cpm #	400 cpm #
X1	100 cpm	99 cpm #	99 cpm #

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10% of Target value
Readings with # indicate ranges were calibrated using a pulser

Probe Model & SN	Isotope	Efficiency	NIST Source ID	Geometry
G-1 C358C	Ba-133	0.1638 C/D	Ba-133 (SN: 380-39-1)	@1cm
G-1 C358C	Co-57	0.1404 C/D	Co-57 (SN: 14288)	@1cm
G-1 C358C	Cs-137	0.0427 C/D	Cs-137 (SN: 14290)	@1cm
G-1 C358C	I-129	0.0598 C/D	I-129 (SN: NES-186S)	@1cm

MTE Instrument Type	Model	CalDueDate
Pulser	Ludlum 500-4SN: 66151	01/15/2008

Outer Physical Check: *Pass*
Internal Check: *Pass*
Geotropism Check: *Pass*
Mechanical Zero: *Pass*
Tap Test: *Pass*

Electronics Checks	As Found	As Left
High Voltage	**945 Volts**	**945 Volts**
Low Level Discriminator #1	**10 mV**	**10 mV**
Window	**Out**	**Out**

Comments: Analog and digital displays reflect appropriate congruence.

Calibrated by: QA Review:

Date: 05/04/2007
Expires: 05/04/2008

Atmospheric Conditions - Temperature: 74° F Humidity: 21 % Barometric Pressure: 29.99 in/hg
This calibration was performed by RSCS using a NIST Traceable radiation source, in conformance to the following standards: ANSI N323A (1997). RSCS New Hampshire Radioactive Material License Number: 381R. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedure 2.4.
This calibration certificate shall not be reproduced except in full without the express written consent of RSCS, inc

Radiation Safety and Control Services, Inc.
91 Portsmouth Ave. Stratham, NH 03885
1-800-525-8339 (603) 778-2871 Fax (603) 778-6879 www.radsafety.com

#4

Calibration Certificate
ID Number: 19606211654-0

Calibration Technology
A Division of RSCS, Inc.

Customer: Chuck Mikaitis
Cabrera Services, Inc.
473 Silver Lane
East Hartford, CT 06118-

Instrument
Ludlum Model 2221

Serial Number
196062

Probe Model
Bicron G-1

Serial Number
C443E

Precision Check

Test 1	Test 2	Test 3	Mean	Results
9.99 Kcpm	**9.99 Kcpm**	**9.99 Kcpm**	**9.99 Kcpm**	**Satisfactory**

Accuracy Check

Range	Target Value	As Found	As Left
X1000	400 Kcpm	399.622 Kcpm #	399.622 Kcpm #
X1000	100 Kcpm	100.139 Kcpm #	100.139 Kcpm #
X100	40 Kcpm	39.987 Kcpm #	39.987 Kcpm #
X100	10 Kcpm	9.993 Kcpm #	9.993 Kcpm #
X10	4 Kcpm	4.007 Kcpm #	4.007 Kcpm #
X10	1 Kcpm	0.999 Kcpm #	0.999 Kcpm #
X1	400 cpm	401 cpm #	401 cpm #
X1	100 cpm	100 cpm #	100 cpm #

Readings with * indicate ranges where As-Found readings are >20% of Target value. Readings with ** indicate As-left readings are >10% of Target value
Readings with # indicate ranges were calibrated using a pulser

Probe Model & SN	Isotope	Efficiency	NIST Source ID	Geometry
G-1 C443E	Ba-133	0.1736 C/D	Ba-133 (SN: 380-39-1)	@1cm
G-1 C443E	Co-57	0.1515 C/D	Co-57 (SN: 14288)	@1cm
G-1 C443E	Cs-137	0.0450 C/D	Cs-137 (SN: 14290)	@1cm
G-1 C443E	I-129	0.0684 C/D	I-129 (SN: NES-186S)	@1cm

MTE Instrument Type	Model	CalDueDate
Pulser	Ludlum 500-4SN: 66151	01/15/2008

Outer Physical Check: *Pass*
Internal Check: *Pass*
Geotropism Check: *Pass*
Mechanical Zero: *Pass*
Tap Test: *Pass*

Electronics Checks	As Found	As Left
High Voltage	880 Volts	880 Volts
Low Level Discriminator #1	3.4 mV	10 mV
Window	In	Out

Comments: Analog and digital displays reflect appropriate congruence.

Calibrated by: D. C. L.

QA Review: M. Faith

Date: 05/04/2007
Expires: 05/04/2008

Atmospheric Conditions - Temperature: 74° F Humidity: 21 % Barometric Pressure: 29.99 in/hg
This calibration was performed by RSCS using a NIST Traceable radiation source, in conformance to the following standards: ANSI N323A (1997). RSCS New Hampshire Radioactive Material License Number: 381R. RSCS calibration services are performed in accordance with the RSCS Radiation Protection Program Manual and Standard Operating Procedure 2.4.
This calibration certificate shall not be reproduced except in full without the express written consent of RSCS, Inc

Radiation Safety and Control Services, Inc.
91 Portsmouth Ave. Stratham, NH 03885
1-800-525-8339 (603) 778-2871 Fax (603) 778-6879 www.radsafety.com

#5

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 44-10 Serial No.: PR144074

Counter Mfg.: Ludlum Model: 2221 Serial No.: 81308

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Counter Threshold Setting: 10 mV Cable Length: ☐ 39 inch, ☐ 5 foot, ☑ Other:

Detector geometry to source: ☐ Face, ☑ Side, ☐ Below, ☐ Other:

Distance to source: ☐ Contact, ☑ 6-Inches, ☐ Other:

Gamma Source : ☑ Cs-137 @ 5.81μCi (3/07/07) sn: 4097-03 ☐ Other:

Count Time: 1 Minute

High Voltage	Gross Source Counts	Background Counts
700	28828	
800	53554	
900	72162	
950	75953	
1000	77991	
1050	81009	
1100	83109	
1150	83366	9826
1200	84088	

Comments: Recommended Operating High Voltage: 1150 volts

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

Ratemeter / Scaler Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2221r Serial No.: 81308

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☑ F/S Response ck. ☑ Audio ck.

☑ THR/WIN ck. High Voltage ck.: ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Threshold Setting: 10 mV

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Calibration Point	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Reference Calibration Point	Instrument "As Found Reading"	Log Scale Count Rate	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	400 Kcpm	399186
40 Kcpm	+/- 10%	40 Kcpm	39920
4 Kcpm	+/- 10 %	4 Kcpm	3992
400 cpm	+/- 10%	400 cpm	399

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

ERG Form 1.02B

#6

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 44-10 Serial No.: PR066864

Counter Mfg.: Ludlum Model: 2221 Serial No.: 218600

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Counter Threshold Setting: 10 mV Cable Length: ☐ 39 inch, ☐ 5 foot, ☑ Other:

Detector geometry to source: ☐ Face, ☑ Side, ☐ Below, ☐ Other:

Distance to source: ☐ Contact, ☑ 6-Inches, ☐ Other:

Gamma Source : ☑ Cs-137 @ 5.81μCi (3/07/07) sn: 4097-03 ☐ Other:

Count Time: 1 Minute

High Voltage	Gross Source Counts	Background Counts
600	43416	
700	73070	
800	81172	
900	86445	
950	87178	10079
1000	87451	
1050	87879	
1100	88667	
1150	87465	

Comments: Recommended Operating High Voltage: 950 volts

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

Ratemeter / Scaler Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2221r Serial No.: 218600

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☑ F/S Response ck. ☑ Audio ck.

☑ THR/WIN ck. High Voltage ck.: ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Threshold Setting: 10 mV

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Calibration Point	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Reference Calibration Point	Instrument "As Found Reading"	Log Scale Count Rate	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	400 Kcpm	399158
40 Kcpm	+/- 10%	40 Kcpm	39918
4 Kcpm	+/- 10 %	4 Kcpm	3993
400 cpm	+/- 10%	400 cpm	399

Calibrated By: [signature] Calibration Date: 7.3.07

Calibration Due: 7.3.08

Reviewed By: [signature] Date: 7/3/07

#7

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washingtion St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2224 Serial No.: 143031

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ~~☐ F/S Response ck.~~ ☑ Audio ck.

~~☐ THR/WIN ck.~~ High Voltage ck. ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Alpha Threshold.: 120 mV Beta Threshold.: 4 mV Beta Window.: 30 mV

~~Internal Calibration Date Reset~~ ☐ Instrument found within tolerance (+/- 10%) Yes ☑ No ☐

Reference Setting	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Reference Setting	Instrument "As Found Reading"	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	399617
40 Kcpm	+/- 10%	39960
4 Kcpm	+/- 10%	3995
400 cpm	+/- 10%	400

Calibrated By: [signature] Calibration Date: 7-5-07

Calibration Due: 7-5-08

Reviewed By: [signature] Date: 7-5-07

ERG Form 1.02C

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 43-93 Serial No.: PR179869

Counter Mfg.: Ludlum Model: 2224 Serial No.: 143031

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Alpha Threshold: 120 mV Beta Threshold: 4 mV Beta Window: 30 mV

Detector geometry to source: ☑ Face, ☐ Side, ☐ Below, ☐ Other:

Distance to source: ☑ Contact, ☐ 6-Inches, ☐ Other:

Alpha Source : ☑ Th230 @ 13,300 dpm (1/19/07) sn: 4098-03 ☐ Other:

Beta Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Count Time: 1 Minute

High Voltage	Alpha Source Counts		Beta Source Counts		Background Counts	
	Alpha	Beta	Alpha	Beta	Alpha	Beta
700	1555	334	9	758	1	104
750	2596	511	8	2301	2	247
775	2751	578	9	2666	2	259
800	2900	677	12	3000	1	307

Comments: Recommended Operating High Voltage: 775 volts

Calibrated By: [signature] Calibration Date: 7-5-07

Calibration Due: 7-5-08

Reviewed By: [signature] Date: 7-5-07

#8

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washingtion St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2224 Serial No.: 168594

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☐ ~~F/S Response ck.~~ ☑ Audio ck.

☐ ~~THR/WIN ck.~~ High Voltage ck. ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Alpha Threshold.: 120 mV Beta Threshold.: 4 mV Beta Window.: 30 mV

~~Internal Calibration Date Reset~~ ☐ Instrument found within tolerance (+/- 10%) Yes ☑ No ☐

Reference Setting	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Reference Setting	Instrument "As Found Reading"	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	399241
40 Kcpm	+/- 10%	39930
4 Kcpm	+/- 10%	3993
400 cpm	+/- 10%	399

Calibrated By: [signature] Calibration Date: 7-5-07

Calibration Due: 7-5-08

Reviewed By: [signature] Date: 07/05/07

ERG Form 1.02C

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 43-93 Serial No.: PR199826

Counter Mfg.: Ludlum Model: 2224 Serial No.: 168594

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Alpha Threshold: 120 mV Beta Threshold: 4 mV Beta Window: 30 mV

Detector geometry to source: ☑ Face, ☐ Side, ☐ Below, ☐ Other:

Distance to source: ☑ Contact, ☐ 6-Inches, ☐ Other:

Alpha Source : ☑ Th230 @ 13,300 dpm (1/19/07) sn: 4098-03 ☐ Other:

Beta Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Count Time: 1 Minute

High Voltage	Alpha Source Counts		Beta Source Counts		Background Counts	
	Alpha	Beta	Alpha	Beta	Alpha	Beta
650	1739	322	26	577	0	68
700	2464	367	18	1993	3	170
750	2786	675	19	3088	2	241
800	2917	1243	21	4207	4	339

Comments: Recommended Operating High Voltage: 750 volts

Calibrated By: [signature] Calibration Date: 7-5-07

Calibration Due: 7-5-08

Reviewed By: [signature] Date: ~~7~~ 7/5/07

#9

Efficiency Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 44-9 Serial No: PR251740

Counter Mfg.: Ludlum Model: 12 Serial No: 149332

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

GM tube voltage: 900 volts Counter Threshold Setting: 40 mV

Cable Length: ☑ 39 inch, ☐ 5 foot, ☐ Other:

Detector geometry to source: ☑ Face, ☐ Planchett/In tray, ☐ Side, ☐ Other:

Distance to source: ☑ Contact, ☐ Planchett/In tray, ☐ 6 Inches, ☐ Other:

Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Gross source counts: 2500 cpm

Background counts: 60 cpm

Net source counts: 2440 cpm

Comments:

4π Efficiency for Cal Source: 14 %

Efficiency = Net source counts (cpm) / Source activity (cpm,dpm)

Calibrated By: Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: Date: 7/3/07

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 12 Serial No.: 149332

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☑ F/S Response ck. ☑ Audio ck.

☐ ~~THR/WIN~~ ck. High Voltage ck.: ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Threshold Setting: 40 mV

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Calibration Point	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Comments:

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

#10

Efficiency Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 44-9 Serial No: PR112210

Counter Mfg.: Ludlum Model: 12 Serial No: 223414

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

GM tube voltage: 900 volts Counter Threshold Setting: 40 mV

Cable Length: ☑ 39 inch, ☐ 5 foot, ☐ Other:

Detector geometry to source: ☑ Face, ☐ Planchett/In tray, ☐ Side, ☐ Other:

Distance to source: ☑ Contact, ☐ Planchett/In tray, ☐ 6 Inches, ☐ Other:

Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Gross source counts: 2000 cpm

Background counts: 60 cpm

Net source counts: 1940 cpm

Comments:

4π Efficiency for Cal Source: 11 %

Efficiency = Net source counts (cpm) / Source activity (cpm,dpm)

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 12 Serial No.: 223414

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☑ F/S Response ck. ☑ Audio ck.

☐ ~~THR/WIN~~ ck. High Voltage ck.: ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Threshold Setting: 40 mV

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Calibration Point	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Comments:

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

2 Channel Scaler Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2929 Serial No.: 208319

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: 97743 ☐ 201932 ☑

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☐ Meter Zeroed ☐ Geotropism ck. ☐ F/S Response ck. ☑ Audio ck.

☐ THR/WIN ck. High Voltage ck. ☑ 500v ☑ 1000v ☑ 1500v ☐ Battery ck. (min 4.4 vdc)

Alpha Threshold.: 170 mV Beta Threshold.: 4 mV Beta Window.: 50 mV

Voltage setting: 550 volts = 2.26 on HV Dial (Pot.)

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Setting	Alpha Channel Digital Readout		Beta Channel Digital Readout	
	Instrument "As Found Reading"	Integrated Counts (1-minute count)	Instrument "As Found Reading"	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	399305	+/- 10%	399347
40 Kcpm	+/- 10%	39936	+/- 10%	39936
4 Kcpm	+/- 10%	3994	+/- 10%	3994
400 cpm	+/- 10%	400	+/- 10%	399

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 43-10-1 Serial No.: PR215938

Counter Mfg.: Ludlum Model: 2929 Serial No.: 208319

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Alpha Threshold: 170 mV Beta Threshold: 4 mV Beta Window: 50 mV

Geometry / Distance to source: In planchett Cable Length: ☑ 39 inch ☐ Other:

Alpha Source : ☑ Th230 @ 13,300 dpm (1/19/07) sn: 4098-03 ☐ Other:

Beta Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Count Time: 1 minute(s)

High Voltage	Alpha Source Counts		Beta Source Counts		Background Counts		Pot. Setting
	Alpha	Beta	Alpha	Beta	Alpha	Beta	
450	3634	293	4	607	2	8	1.86
500	4646	234	2	2143	1	35	2.06
550	4819	376	3	3424	1	51	2.26
600	4817	699	3	4712	0	53	2.46
650	4878	1887	7	5084	1	88	2.66

Comments: Recommended Operating High Voltage: 550 volts

Calibrated By: Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: Date: 7/3/07

#11

Efficiency Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 44-9 Serial No: PR 248554

Counter Mfg.: Ludlum Model: 12 Serial No: 229277

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

GM tube voltage: 900 volts Counter Threshold Setting: 40 mV

Cable Length: ☑ 39 inch, ☐ 5 foot, ☐ Other:

Detector geometry to source: ☑ Face, ☐ Planchett/In tray, ☐ Side, ☐ Other:

Distance to source: ☑ Contact, ☐ Planchett/In tray, ☐ 6 Inches, ☐ Other:

Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Gross source counts: 2300 cpm

Background counts: 70 cpm

Net source counts: 2230 cpm

Comments:

4π Efficiency for Cal Source: 13 %

Efficiency = Net source counts (cpm) / Source activity (cpm,dpm)

Calibrated By: Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: Date: 7/3/07

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 12 Serial No.: 229277

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☑ F/S Response ck. ☑ Audio ck.

☐ ~~THR/WIN ck.~~ High Voltage ck.: ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Threshold Setting: 40 mV

Instrument found within tolerance (+/- 10%) ☑ Yes ☐ No

Reference Calibration Point	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Comments:

Calibrated By: [signature] Calibration Date: 7-3-07

Calibration Due: 7-3-08

Reviewed By: [signature] Date: 7/3/07

Certificate of Calibration

Ratemeter Certificate of Calibration

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Manufacturer: Ludlum Model: 2360 Serial No.: 184930

All Ranges Calibrated Electronically; Ludlum Pulser Generator Serial No.: ☐ 97743 ☑ 201932

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

☑ Mechanical ck. ☑ Meter Zeroed ☑ Geotropism ck. ☐ F/S Response ck. ☑ Audio ck.

☐ THR/WIN ck. High Voltage ck. ☑ 500v ☑ 1000v ☑ 1500v ☑ Battery ck. (min 4.4 vdc)

Alpha Threshold.: 120 mV Beta Threshold.: 4 mV Beta Window.: 30 mV

Internal Calibration Date Reset ☑ Instrument found within tolerance (+/- 10%) Yes ☑ No ☐

Reference Setting	Instrument "As Found Reading"	Instrument Meter Reading
400 Kcpm	+/- 10%	400 Kcpm
100 Kcpm	+/- 10%	100 Kcpm
40 Kcpm	+/- 10%	40 Kcpm
10 Kcpm	+/- 10%	10 Kcpm
4 Kcpm	+/- 10%	4 Kcpm
1 Kcpm	+/- 10%	1 Kcpm
400 cpm	+/- 10%	400 cpm
100 cpm	+/- 10%	100 cpm

Reference Setting	Instrument "As Found Reading"	Integrated Counts (1-minute count)
400 Kcpm	+/- 10%	399828
40 Kcpm	+/- 10%	39985
4 Kcpm	+/- 10%	3999
400 cpm	+/- 10%	400

Calibrated By: [signature] Calibration Date: 7-20-07

Calibration Due: 7-20-08

Reviewed By: [signature] Date: 7/20/07

ERG Form 1.02C

Certificate of Calibration

Voltage Plateau Form

ERG
Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224

Detector Mfg.: Ludlum Model: 43-93 Serial No.: PR199838

Counter Mfg.: Ludlum Model: 2360 Serial No.: 184930

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.
NMRCB Registration No. 481-3 • Calibration of Radiation Detection Instruments & Devices

Alpha Threshold: 120 mV Beta Threshold: 4 mV Beta Window: 30 mV

Detector geometry to source: ☑ Face, ☐ Side, ☐ Below, ☐ Other:

Distance to source: ☑ Contact, ☐ 6-Inches, ☐ Other:

Alpha Source : ☑ Th230 @ 13,300 dpm (1/19/07) sn: 4098-03 ☐ Other:

Beta Source: ☑ Tc99 @ 17,800 dpm (1/15/07) sn: 4099-03 ☐ Other:

Count Time: 1 Minute

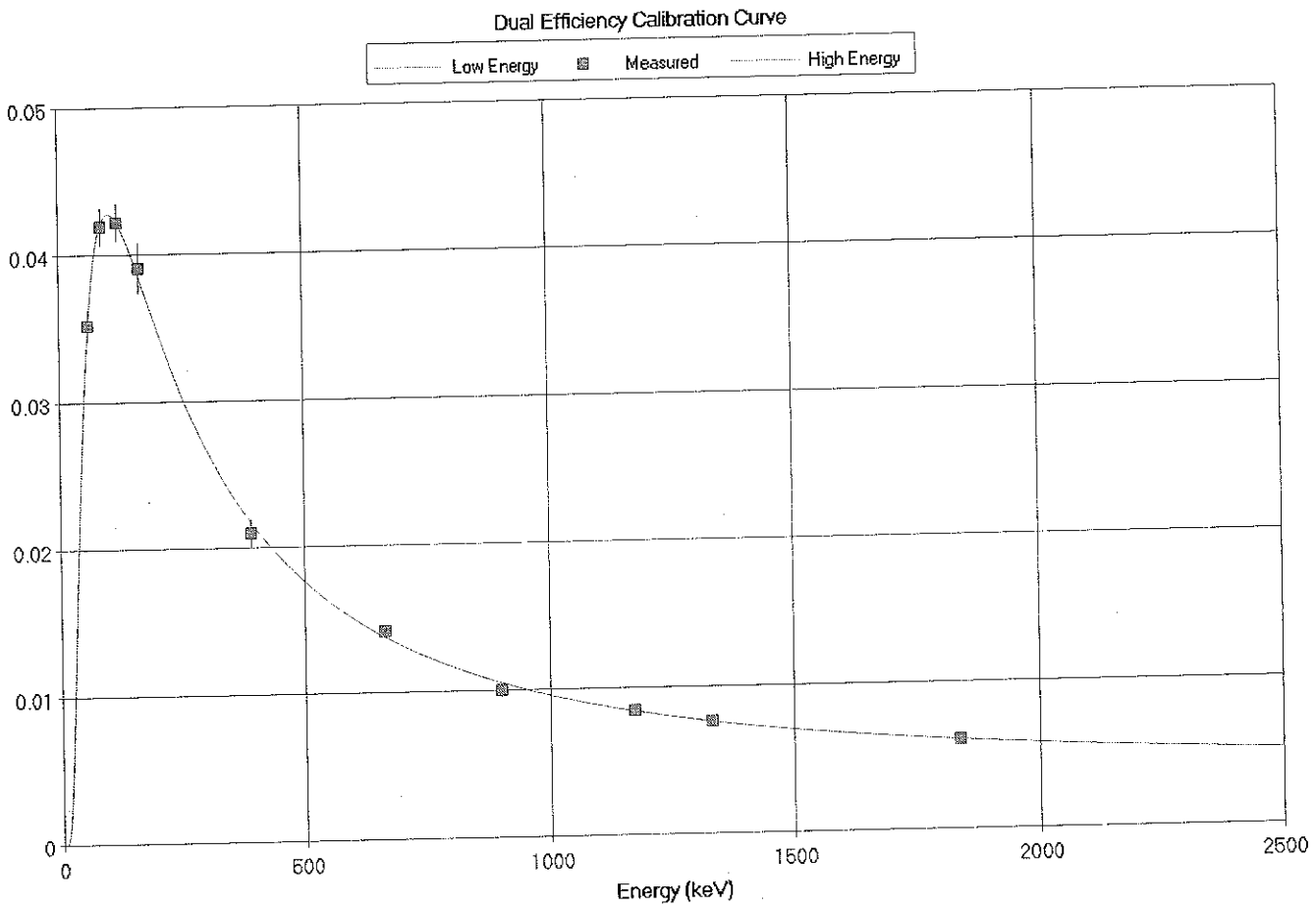
High Voltage	Alpha Source Counts		Beta Source Counts		Background Counts	
	Alpha	Beta	Alpha	Beta	Alpha	Beta
600	1877	253	5	327	0	51
650	2714	332	7	1801	2	165
700	2869	584	3	3112	3	276
725	2917	908	8	3913	4	624

Comments: Recommended Operating High Voltage: 700 volts

Calibrated By: [signature] Calibration Date: 7-20-07

Calibration Due: 7-20-08

Reviewed By: [signature] Date: 7/20/07



Datasource: C:\GENIE2K\Great Lakes Onsite Gamma Spec Laboratory\CNF Files\6340CAN Efficiency Cal 7-20-07.CNF

$$\ln(Eff) = -3.477e+001 + 1.971e+001*\ln(E) - 4.567e+000*\ln(E)^2 + 5.043e-001*\ln(E)^3 - 2.942e-002*\ln(E)^4 + 8.022e-004*\ln(E)^5$$

Certificate of Calibration

Air Sampler Calibration Form

ERG
Environmental Restoration Group, Inc.
8809 Washington. NE Suite 150
Albuquerque, NM 87113
(505) 298-4224

Sampler Model Number: RAS-1 Serial Number: 405400-40
Air Flow Calibrator: AFC-85L Serial Number: 6042
Temperature (°F): 70 °F Warm up time: 15 minutes
Barometric Press. (BP): 29.71 inches of Hg

Comments:

Sampler Rotometer (LPM)	Calibrator Flow Meter (LPM)	Corrected Flow (LPM)
10	10	9.96
20	20	19.93
30	30	29.89
40	40	39.86
50	50	49.82
60	69	68.76
70	71	70.75
		~~0.00~~

Corrected Flow = Calibrated Flow Meter * Correction Factor

Correction Factor = (A * B)^0.5 = 0.99647954

$$A = \frac{BP}{29.92}$$ Where BP is Barometric Pressure inches Hg.

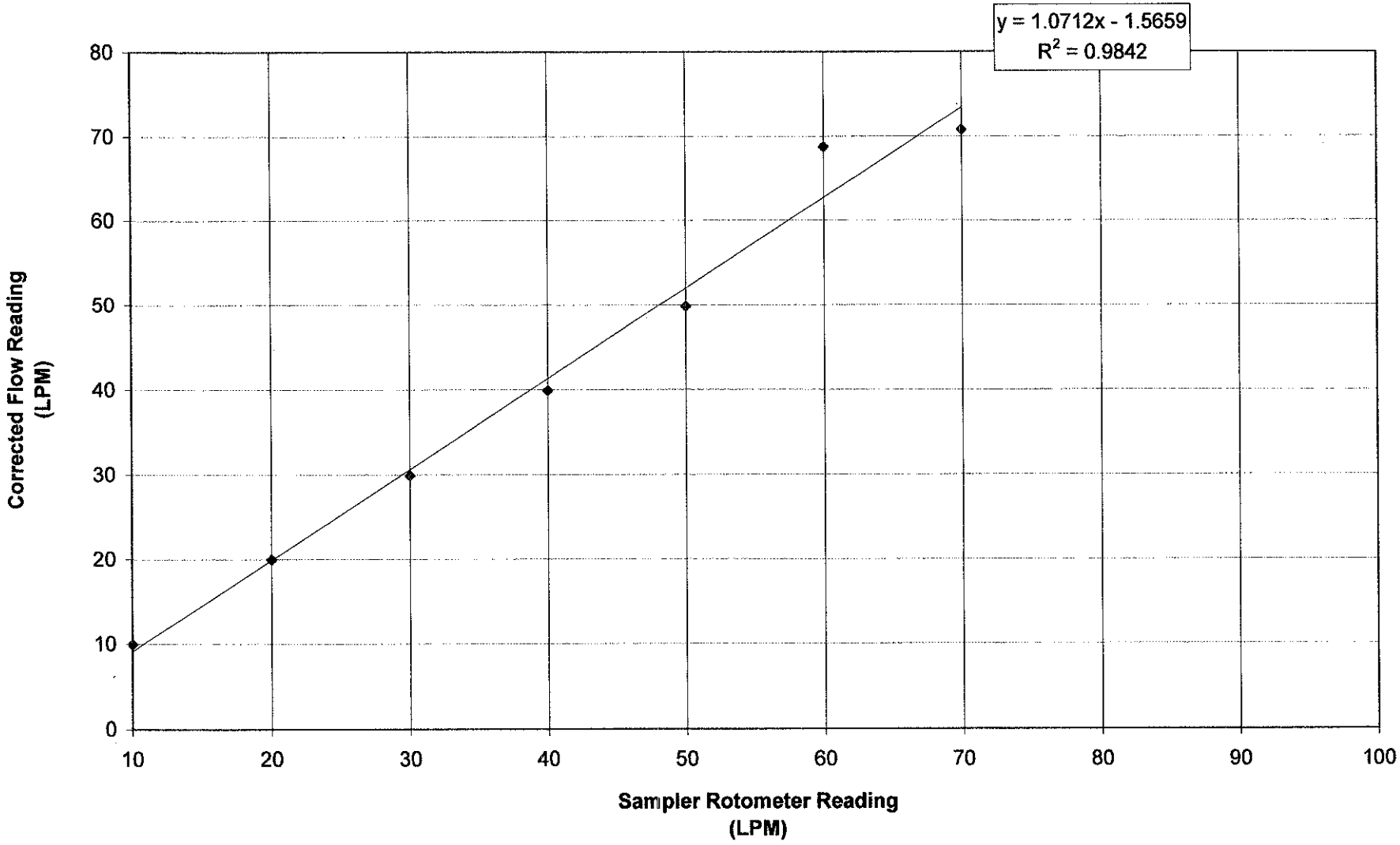
$$B = \frac{529.67}{459.67 + {}^\circ F} * \frac{181.87}{\mu g} \quad \text{Where } \mu_{air} = \frac{14.58\left(\frac{459.67 + {}^\circ F}{1.8}\right)^{3/2}}{110.4 + \left(\frac{459.67 + {}^\circ F}{1.8}\right)}$$

Calibrated By: [signature] Calibration Date: 7-3-07

Reviewed By: [signature] Calibration Due: 7-3-08

Fm1-20A

Calibration Chart for RAS-1
Serial Number: 405400-40



Certificate of Calibration

Air Sampler Calibration Form

ERG
Environmental Restoration Group, Inc.
8809 Washington. NE Suite 150
Albuquerque, NM 87113
(505) 298-4224

Sampler Model Number: RAS-1
Serial Number: 405669-25
Air Flow Calibrator: AFC-85L
Serial Number: 6042
Temperature (°F): 70 °F
Warm up time: 15 minutes
Barometric Press. (BP): 29.71 inches of Hg

Comments:

Sampler Rotometer (LPM)	Calibrator Flow Meter (LPM)	Corrected Flow (LPM)
10	10	9.96
20	20	19.93
30	30	29.89
40	40	39.86
50	47	46.83
60	54	53.81
70	65	64.77
		~~0.00~~

Corrected Flow = Calibrated Flow Meter * Correction Factor

Correction Factor = (A * B)^0.5 = 0.99647954

$$A = \frac{BP}{29.92}$$ Where BP is Barometric Pressure inches Hg.

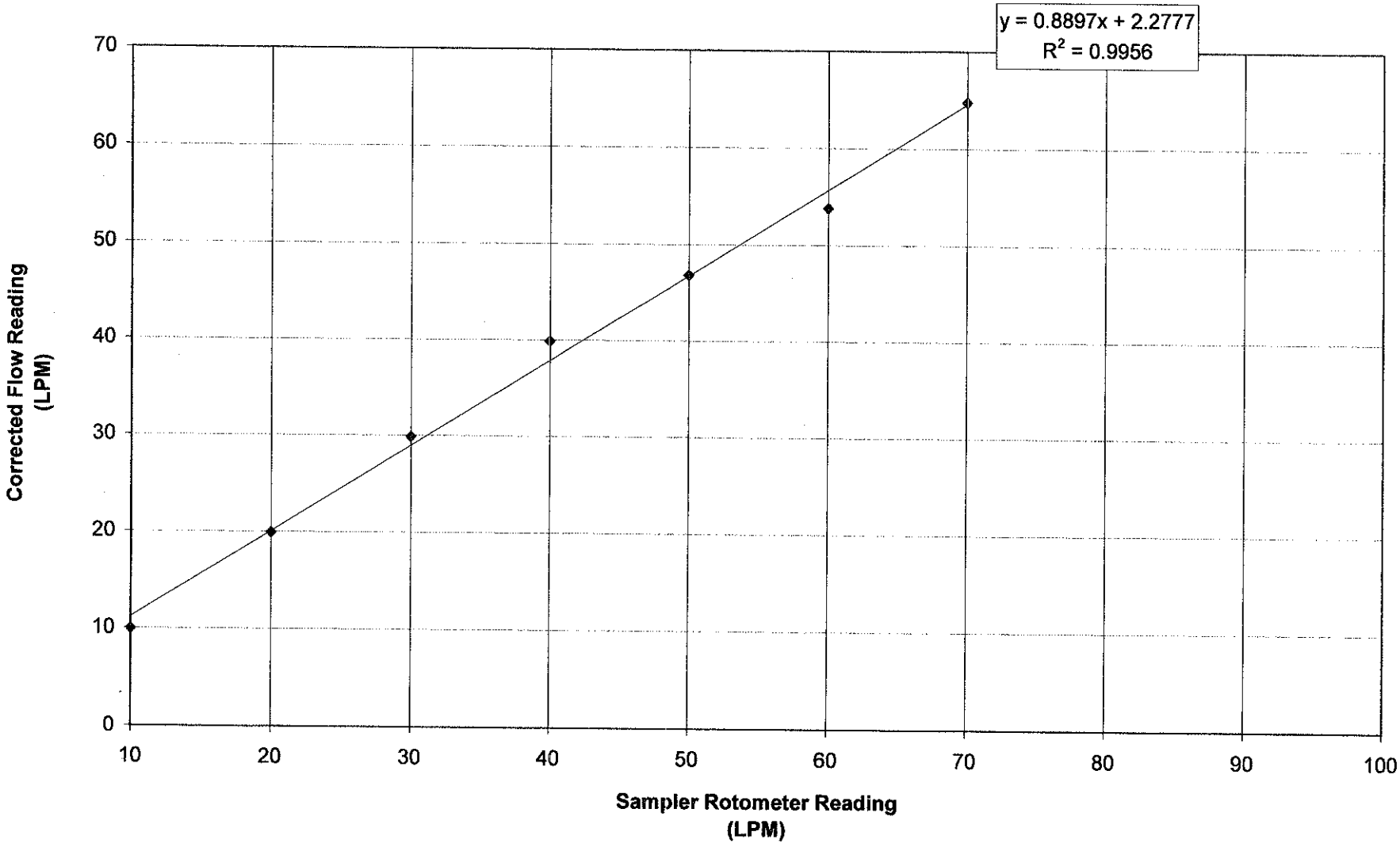
$$B = \frac{529.67}{459.67 + {}^\circ F} * \frac{181.87}{\mu g} \quad \text{Where } \mu_{air} = \frac{14.58\left(\frac{459.67 + {}^\circ F}{1.8}\right)^{3/2}}{110.4 + \left(\frac{459.67 + {}^\circ F}{1.8}\right)}$$

Calibrated By: [signature]
Calibration Date: 07-03-07

Reviewed By: [signature]
Calibration Due: 07-03-08

Fm1-20A

Calibration Chart for RAS-1
Serial Number: 405669-25



Certificate of Calibration

Air Sampler Calibration Form

ERG
Environmental Restoration Group, Inc.
8809 Washington. NE Suite 150
Albuquerque, NM 87113
(505) 298-4224

Sampler Model Number: RAS-I
Serial Number: 405649-11
Air Flow Calibrator: AFC-85L
Serial Number: 6042
Temperature (°F): 70 °F
Warm up time: 15 minutes
Barometric Press. (BP): 29.71 inches of Hg

Comments:

Sampler Rotometer (LPM)	Calibrator Flow Meter (LPM)	Corrected Flow (LPM)
10	10	9.96
20	20	19.93
30	30	29.89
40	40	39.86
50	49	48.83
60	56	55.80
70	66	65.77
80	73	72.74

Corrected Flow = Calibrated Flow Meter * Correction Factor

Correction Factor = (A * B)^0.5 = 0.99647954

$$A = \frac{BP}{29.92}$$ Where BP is Barometric Pressure inches Hg.

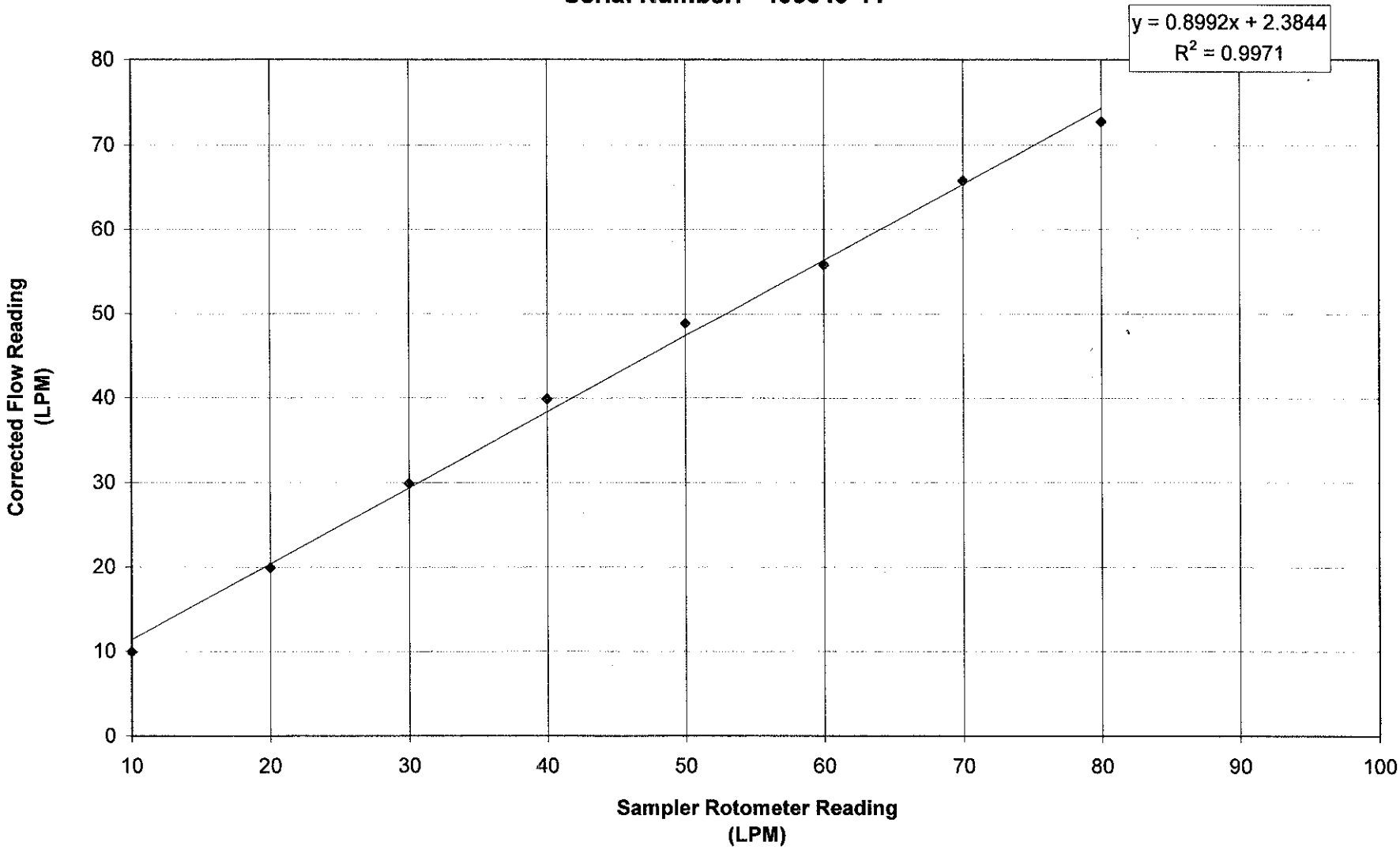
$$B = \frac{529.67}{459.67 + {}^\circ F} * \frac{181.87}{\mu g}$$ Where $$\mu_{air} = \frac{14.58\left(\frac{459.67 + {}^\circ F}{1.8}\right)^{3/2}}{110.4 + \left(\frac{459.67 + {}^\circ F}{1.8}\right)}$$

Calibrated By: [signature]
Calibration Date: 7-31-07

Reviewed By: [signature]
Calibration Due: 7-31-08

Fm1-20A

Calibration Chart for RAS-1
Serial Number: 405649-11



Thermo NUtech
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX (505) 761-5416

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# S-03098
P.O.# 96-0074

Description of Standard:

Model No. DNS-11 Serial No. 2126-96 Isotope Thorium-230

Electroplated on polished Stainless Steel disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2 pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 2393/91.

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was

9,760 ± 293

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was

19,500 ± 586 (0.00880 μCi)

The uncertainty of the measurement is 3 % which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Charles Lamborn

Calibration technician: Charles Lamborn

Calibration date: 5/17/96

Reviewed by: [illegible]

Q.A. Representative: Kathy Burnham

Reviewed date: 6-5-96

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 3905
P.O.# 0423

Description of Standard:

Model No. DNS-12 Serial No. 4003-02 Isotope Tc-99

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 2148/90.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

13,600 ± 409

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

21,800 ± 654 (0.00983 μCi)

The uncertainty of the measurement is 3 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by: [signature]

Calibration Technician: [signature] Q.A. Representative [signature]

Calibration Date: 6-26-2002 Reviewed Date: 6-27-02

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 3905
P.O.# 0423

Description of Standard:

Model No. DNS-12 Serial No. 4003-02 Isotope Tc-99

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 2148/90.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

13,600 ± 409

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

21,800 ± 654 (0.00983 μCi)

The uncertainty of the measurement is 3 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by: [signature]

Calibration Technician: [signature] Q.A. Representative [signature]

Calibration Date: 6-26-2002 Reviewed Date: 6-27-02

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

Thermo NUtech
7021 Pan American Hwy. NE
Albuquerque, NM 87109
(505) 345-3461 • FAX (505) 761-5416

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# S-03098
P.O.# 96-0074

Description of Standard:

Model No. DNS-11 Serial No. 2126-96 Isotope Thorium-230

Electroplated on polished Stainless Steel disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2 pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 2393/91.

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was

9,760 ± 293

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was

19,500 ± 586 (0.00880 μCi)

The uncertainty of the measurement is 3 % which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: Charles Lamborn

Calibration technician: Charles Lamborn

Calibration date: 5/17/96

Reviewed by: Arlen Sutton

Q.A. Representative: Kathy Burnham

Reviewed date: 6-5-96

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
MULTINUCLIDE STANDARD SOURCE

Customer: CABRERA SERVICES, INC.
P.O. No.: 08-1006
Catalog No.: EG-ML

Source No.: 1263-8-3
Reference Date: 1-Sep-07 12:00 PST
Contained Radioactivity: 3.093 µCi 114.4 kBq

Physical Description:

A. Capsule type: 1L Marinelli beaker (190G)
B. Nature of active deposit: Multinuclide distributed in 1.5 g/cc epoxy matrix
C. Active diameter/volume: Approximately 1000mL (1500 grams)
D. Backing: Plastic
E. Cover: Plastic

Gamma-Ray Energy (keV)	Nuclide	Half-life	Branching Ratio (%)	Activity (µCi)	Gammas per second	Total Uncert.
60	Am-241	432.17 ± 0.66 years	36.0	0.09017	1201	3.0 %
88	Cd-109	462.6 ± 0.7 days	3.63	1.273	1710	3.0 %
122	Co-57	271.79 ± 0.09 days	85.6	0.04716	1494	3.0 %
166	Ce-139	137.640 ± 0.023 days	79.9	0.06073	1795	3.0 %
279	Hg-203	46.595 ± 0.013 days	81.5	0.1809	5455	3.0 %
392	Sn-113	115.09 ± 0.04 days	64.9	0.2268	5446	3.0 %
514	Sr-85	64.849 ± 0.004 days	98.4	0.2885	10500	3.0 %
662	Cs-137	30.17 ± 0.16 years	85.1	0.1960	6171	3.0 %
898	Y-88	106.630 ± 0.025 days	94.0	0.4772	16600	3.0 %
1173	Co-60	5.272 ± 0.001 years	99.86	0.2523	9322	3.0 %
1333	Co-60	5.272 ± 0.001 years	99.98	0.2523	9333	3.0 %
1836	Y-88	106.630 ± 0.025 days	99.4	0.4772	17550	3.0 %

Method of Calibration:

This source was prepared from weighed aliquots of solutions whose concentrations in µCi/g were determined by gamma spectrometry.

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA-TECDOC-619, 1991.
- Overall uncertainty is calculated at the 99% confidence level.
- This source has a working life of 1 year.

Quality Control

26-Jul-07
Date

IPL Ref. No.: 1263-8

Isotope Products Laboratories
An Eckert & Ziegler Company
24937 Avenue Tibbitts
Valencia, California 91355
Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION MULTINUCLIDE STANDARD SOURCE

Customer: CABRERA SERVICES, INC.
P.O. No.: 05-183
Catalog No.: EG-ML

Source No.: 1088-82-2
Reference Date: 15-Jan-05 12:00 PST
Contained Radioactivity: 3.079 µCi 113.9 kBq

Physical Description:

A. Capsule type: 1L Marinelli beaker (190G)
B. Nature of active deposit: Multinuclide distributed in 1.5 g/cc epoxy matrix
C. Active diameter/volume: Approximately 1000mL (1501 grams)
D. Backing: Plastic
E. Cover: Plastic

Gamma-Ray Energy (keV)	Nuclide	Half-life	Branching Ratio (%)	Activity (µCi)	Gammas per second	Total Uncert.
60	Am-241	432.17 ± 0.66 years	36.0	0.08926	1189	3.0 %
88	Cd-109	462.6 ± 0.7 days	3.63	1.282	1722	3.0 %
122	Co-57	271.79 ± 0.09 days	85.6	0.04710	1492	3.0 %
166	Ce-139	137.640 ± 0.023 days	79.9	0.05646	1669	3.0 %
279	Hg-203	46.595 ± 0.013 days	81.5	0.1765	5322	3.1 %
392	Sn-113	115.09 ± 0.04 days	64.9	0.2239	5377	3.0 %
514	Sr-85	64.849 ± 0.004 days	98.4	0.2910	10590	3.0 %
662	Cs-137	30.17 ± 0.16 years	85.1	0.2017	6351	3.0 %
898	Y-88	106.630 ± 0.025 days	94.0	0.4644	16150	3.0 %
1173	Co-60	5.272 ± 0.001 years	99.86	0.2464	9104	3.0 %
1333	Co-60	5.272 ± 0.001 years	99.98	0.2464	9115	3.0 %
1836	Y-88	106.630 ± 0.025 days	99.4	0.4644	17080	3.0 %

Method of Calibration:

This source was prepared from weighed aliquots of solutions whose concentrations in µCi/g were determined by gamma spectrometry.

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA-TECDOC-619, 1991.
- This source has a working life of 1 year.

Daniel James Van Dalsem
Quality Control

28-Jan-05
Date

IPL Ref. No.: 1088-82

APPENDIX C

CABRERA LABORATORY RAW RESULTS

Project Name: Great Lakes PPV
Project Number: 03-3040.30
Operator: Michael Withers

ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU10-208-1	1239	7/23/2007	8:54	238.53	1461.09	0.72	0.22	0.00	1.39	0.00	16.50	MPW
SU10-208-2	1212	7/23/2007	9:22	238.52	1461.09	0.32	0.25	0.00	1.23	0.00	14.40	MPW
SU10-200-1	705	7/23/2007	9:40	238.54	1461.08	1.00	0.31	1.80	2.11	0.00	25.60	MPW
SU10-200-3	1044	7/23/2007	10:12	238.48	1461.06	0.92	0.32	0.00	1.78	0.00	21.20	MPW
SU10-205-1	771	7/23/2007	10:21	238.51	1461.09	1.19	0.29	0.00	2.07	0.00	26.20	MPW
SU10-205-2	1016	7/23/2007	10:38	238.49	1461.00	0.94	0.31	0.00	1.70	0.00	20.60	MPW
SU10-210-1	711	7/23/2007	10:57	238.56	1461.04	0.00	0.73	0.00	1.80	0.00	22.50	MPW
SU10-210-3	900	7/23/2007	11:17	238.51	1461.08	0.88	0.35	0.00	1.85	0.00	22.20	MPW
SU10-215-1	876	7/23/2007	11:36	238.51	1461.16	1.11	0.31	0.00	1.83	0.00	23.30	MPW
SU10-215-2	1211	7/23/2007	11:56	238.53	1461.23	0.75	0.26	0.72	1.12	0.00	17.60	MPW
SU10-214-1	1113	7/23/2007	12:14	238.52	1461.23	0.80	0.29	0.70	1.19	0.00	20.10	MPW
SU10-214-3	1270	7/23/2007	12:31	238.52	1461.11	0.64	0.32	0.67	1.08	0.00	18.60	MPW
SU10-209-1	774	7/23/2007	12:51	238.46	1461.15	0.00	0.53	0.00	1.37	0.00	15.50	MPW
SU10-209-2	994	7/23/2007	13:09	238.55	1461.26	1.12	0.29	0.00	1.83	0.00	22.10	MPW
SU10-199-1	1122	7/23/2007	13:27	238.51	1461.14	1.02	0.28	1.02	1.35	0.00	18.60	MPW
SU10-199-2	1017	7/23/2007	13:44	238.55	1461.22	1.14	0.33	0.00	1.72	0.00	20.40	MPW
SU10-204-1	1098	7/23/2007	14:03	238.58	1461.29	0.00	0.60	0.00	1.45	0.00	18.10	MPW
SU10-204-2	1404	7/23/2007	14:20	238.55	1461.23	0.61	0.20	0.00	1.20	0.00	14.60	MPW
SU10-198-1	1010	7/23/2007	14:37	238.56	1461.23	1.57	0.34	0.92	1.84	0.00	23.00	MPW
SU10-198-3	1009	7/23/2007	14:54	238.57	1461.22	1.10	0.30	1.93	1.86	0.00	20.80	MPW
SU10-198-3	1009	7/23/2007	14:54	238.57	1461.22	1.10	0.30	1.93	1.86	0.00	20.80	MPW
SU10-197-1	1243	7/23/2007	15:13	238.53	1461.23	2.36	0.32	0.00	1.85	0.00	23.20	MPW
SU10-197-3	1042	7/23/2007	15:36	238.55	1461.52	1.03	0.30	1.42	2.14	0.00	21.60	MPW
SU10-202-1	1095	7/23/2007	15:54	238.58	1461.36	6.42	0.49	0.00	2.92	0.00	35.60	MPW
SU10-202-2	1261	7/23/2007	16:20	238.59	1461.48	0.83	0.26	0.00	1.52	0.00	17.70	MPW
SU10-207-1	723	7/23/2007	16:39	238.54	1461.44	0.97	0.40	1.18	1.79	0.00	25.50	MPW
SU10-207-3	1081	7/23/2007	17:01	238.61	1461.41	0.72	0.30	1.34	1.48	0.00	18.60	MPW
SU6-106-1	1046	7/24/2007	7:13	238.59	1461.23	0.95	0.41	0.00	1.85	0.00	20.90	MPW
SU6-106-3	1436	7/24/2007	7:31	238.53	1461.31	1.20	0.30	0.00	1.48	0.00	18.30	MPW
SU10-212-1	1196	7/24/2007	8:25	238.52	1461.36	1.53	0.35	1.85	2.22	0.00	23.90	MPW
SU10-212-3	1169	7/24/2007	8:44	238.51	1461.05	0.71	0.32	0.00	1.54	0.00	18.90	MPW
SU6-119-1	1546	7/24/2007	9:01	238.55	1461.21	0.58	0.15	0.00	1.07	0.00	13.60	MPW

Project Name: Great Lakes PPV
Project Number: 03-3040.30
Operator: Michael Withers

ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU6-119-4	1500	7/24/2007	9:18	238.52	1461.15	2.49	0.30	0.00	1.87	0.00	22.30	MPW
SU6-107-1	1477	7/24/2007	9:36	238.49	1461.26	0.98	0.23	0.00	1.35	0.00	16.00	MPW
SU6-107-2	1650	7/24/2007	9:56	238.56	1461.21	0.89	0.26	0.00	1.34	0.00	16.00	MPW
SU7-155-1	1518	7/24/2007	10:13	238.51	1461.25	0.00	0.42	0.67	0.90	0.00	12.70	MPW
SU7-155-3	1589	7/24/2007	10:33	238.58	1461.20	0.39	0.18	0.80	0.67	0.00	13.00	MPW
SU7-150-1	1358	7/24/2007	10:53	238.53	1461.25	0.00	0.45	0.00	1.23	0.00	14.20	MPW
SU7-150-2	1108	7/24/2007	11:25	238.54	1461.36	0.96	0.27	0.00	1.77	0.00	21.10	MPW
SU6-108-1	1724	7/24/2007	11:41	238.54	1461.32	9.37	0.44	0.00	2.70	0.00	33.60	MPW
SU7-108-2	1759	7/24/2007	11:59	238.49	1461.34	0.58	0.18	0.00	1.13	0.00	13.90	MPW
SU7-153-1	1562	7/24/2007	12:16	238.58	1461.24	5.54	0.38	1.22	1.22	0.00	27.00	MPW
SU7-153-2	1526	7/24/2007	12:34	238.57	1461.31	4.79	0.39	0.00	2.13	0.00	27.00	MPW
SU6-109-1	958	7/24/2007	12:52	238.56	1461.28	1.22	0.42	0.00	1.98	0.00	23.00	MPW
SU6-109-2	1192	7/24/2007	13:09	238.56	1461.43	0.89	0.30	0.00	1.65	0.00	19.10	MPW
SU6-113-1	1192	7/24/2007	13:28	238.56	1461.34	2.91	0.37	0.00	2.06	0.00	24.90	MPW
SU6-113-2	1510	7/24/2007	13:51	238.55	1461.30	3.13	0.34	0.00	1.89	0.00	23.20	MPW
SU7-146-1	789	7/24/2007	14:09	238.59	1461.46	0.99	0.36	0.80	1.65	0.00	24.70	MPW
SU7-146-2	1534	7/24/2007	14:26	238.60	1461.49	0.82	0.24	0.69	0.79	0.00	15.10	MPW
SU7-151-1	1290	7/24/2007	14:43	238.56	1461.46	1.01	0.33	0.00	1.54	0.00	18.80	MPW
SU7-151-2	1481	7/24/2007	15:00	238.55	1461.50	0.76	0.21	0.64	1.11	0.00	16.40	MPW
SU7-147-1	1044	7/24/2007	15:18	238.61	1461.54	1.10	0.29	0.00	1.86	0.00	22.00	MPW
SU7-147-2	1371	7/24/2007	15:35	238.58	1461.57	0.71	0.24	1.08	1.10	0.00	17.00	MPW
SU6-114-1	1161	7/24/2007	15:52	238.58	1461.71	4.89	0.41	0.00	2.44	0.00	30.70	MPW
SU6-114-2	1668	7/24/2007	16:10	238.58	1461.50	3.70	0.30	0.00	1.83	0.00	23.10	MPW
SU6-110-1	1039	7/24/2007	16:29	238.60	1461.63	0.96	0.37	0.00	1.81	0.00	21.60	MPW
SU6-110-2	1232	7/24/2007	16:46	238.62	1461.70	0.81	0.32	0.00	1.66	0.00	19.60	MPW
SU7-154-1	1709	7/25/2007	7:29	238.57	1461.13	0.36	0.14	0.00	0.93	0.00	11.30	MPW
SU7-154-4	1445	7/25/2007	7:46	238.51	1461.03	0.97	0.25	0.00	1.45	0.00	17.60	MPW
SU6-118-1	1636	7/25/2007	8:04	238.48	1461.13	0.62	0.26	0.00	1.18	0.00	14.10	MPW
SU6-118-3	1649	7/25/2007	8:22	238.52	1460.98	0.58	0.24	0.00	1.28	0.00	15.90	MPW
SU6-112-1	1918	7/25/2007	8:40	238.54	1461.08	0.32	0.13	0.00	0.85	0.00	10.30	MPW
SU6-112-2	1346	7/25/2007	8:56	238.48	1460.80	0.95	0.29	1.20	1.48	0.00	17.80	MPW
SU6-111-4	1315	7/25/2007	9:11	238.54	1461.00	0.79	0.26	0.98	1.81	0.00	19.00	MPW

Project Name: Great Lakes PPV
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU6-111-1	1375	7/25/2007	9:16	238.52	1461.00	1.36	0.31	0.00	1.54	0.00	19.20	MPW
SU6-115-1	1201	7/25/2007	9:50	238.51	1461.09	1.96	0.36	1.90	1.76	0.00	21.90	MPW
SU6-115-2	1808	7/25/2007	10:06	238.50	1461.14	3.20	0.28	0.51	0.99	0.00	20.90	MPW
SU8-156-1	1259	7/25/2007	10:31	238.51	1461.13	0.92	0.25	0.00	1.53	0.00	19.10	MPW
SU8-156-4	1234	7/25/2007	10:59	238.48	1461.06	0.87	0.36	1.06	1.42	0.00	19.70	MPW
SU8-167-1	1446	7/25/2007	11:49	238.55	1461.09	0.66	0.23	0.00	1.15	0.00	14.30	MPW
SU8-167-3	1338	7/25/2007	12:22	238.52	1461.00	0.99	0.33	1.86	1.80	0.00	17.60	MPW
SU6-117-1	1454	7/25/2007	12:39	238.52	1461.02	1.34	0.25	0.00	1.53	0.00	18.20	MPW
SU6-117-3	1469	7/25/2007	12:56	238.54	1461.10	0.93	0.23	0.00	1.42	0.00	17.20	MPW
SU8-161-3	1495	7/25/2007	13:34	238.50	1461.05	1.81	0.34	1.23	1.81	0.00	20.10	MPW
SU7-149-1	1648	7/25/2007	13:51	238.52	1461.16	1.07	0.19	0.00	1.28	0.00	15.20	MPW
SU7-149-2	1596	7/25/2007	14:09	238.53	1461.04	0.77	0.23	0.00	1.33	0.00	15.40	MPW
SU6-116-1	971	7/25/2007	14:26	238.53	1461.19	1.94	0.44	0.00	2.10	0.00	25.30	MPW
SU6-116-2	1300	7/25/2007	14:42	238.53	1461.20	1.33	0.28	1.28	1.34	0.00	19.30	MPW
SU8-161-1	949	7/25/2007	15:13	238.51	1461.01	1.14	0.34	0.00	1.91	0.00	21.50	MPW
SU8-157-1	1177	7/25/2007	15:22	238.52	1461.04	2.10	0.33	0.00	2.03	0.00	23.90	MPW
SU8-157-3	1713	7/25/2007	15:40	238.55	1461.17	1.55	0.25	0.00	1.44	0.00	17.30	MPW
SU8-162-1	1000	7/25/2007	16:08	238.50	1461.23	1.10	0.27	0.00	1.68	0.00	19.40	MPW
SU8-162-3	1493	7/25/2007	16:25	238.54	1461.26	1.24	0.28	0.00	1.48	0.00	18.00	MPW
Storm Drain Inv SP-1	1400	7/25/2007	16:42	238.54	1461.23	23.34	0.77	0.00	4.30	0.00	51.10	MPW
SD-1-1	1088	7/25/2007	17:02	238.55	1461.35	0.99	0.28	0.00	1.72	0.00	19.40	MPW
SD-2-1	1123	7/26/2007	7:35	238.52	1461.27	0.67	0.30	0.00	1.62	0.00	19.00	MPW
SD-3-1	1489	7/26/2007	8:28	238.62	1461.28	0.73	0.23	0.00	1.33	0.00	15.30	MPW
SD-4-1	1350	7/26/2007	8:45	238.59	1461.38	0.63	0.25	0.00	1.39	0.00	17.30	MPW
SD-5-1	1126	7/26/2007	9:04	238.57	1461.54	0.74	0.26	0.70	1.12	0.00	18.80	MPW
SD-6-1	849	7/26/2007	9:25	238.59	1461.36	0.00	0.75	1.40	1.62	0.00	23.50	MPW
SD-7-1	1421	7/26/2007	9:43	238.58	1461.37	1.46	0.28	0.78	1.37	0.00	20.10	MPW
SD-8-1	1393	7/26/2007	10:00	238.60	1461.42	1.19	0.26	0.94	1.10	0.00	17.70	MPW
SD-9-1	1202	7/26/2007	10:18	238.62	1461.40	1.41	0.28	1.14	1.82	0.00	19.60	MPW
SD-10-1	1019	7/26/2007	10:35	238.57	1461.41	1.03	0.34	0.00	1.87	0.00	22.10	MPW
SD-11-1	962	7/26/2007	10:52	238.56	1461.46	1.15	0.33	0.00	1.89	0.00	21.50	MPW
SD-12-1	1719	7/26/2007	11:09	238.59	1461.51	1.45	0.27	0.68	1.32	0.00	16.70	MPW

Project Name: Great Lakes PPV
Project Number: 03-3040.30
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SD-13-1	1997	7/26/2007	11:27	238.61	1461.38	0.33	0.15	0.00	0.83	0.00	10.60	MPW
SD-14-1	1406	7/26/2007	11:44	238.61	1461.46	0.79	0.21	0.00	1.30	0.00	16.20	MPW
SD-15-1	1302	7/26/2007	12:00	238.57	1461.45	0.94	0.21	0.00	1.46	0.00	16.50	MPW
SD-16-1	1288	7/26/2007	12:21	238.58	1461.41	1.05	0.29	1.17	1.36	0.00	18.20	MPW
SD-17-1	1224	7/26/2007	12:38	238.61	1461.38	1.05	0.27	0.00	1.51	0.00	17.80	MPW
SD-18-1	1059	7/26/2007	12:56	238.55	1461.47	1.35	0.28	0.00	1.74	0.00	21.70	MPW
SD-19-1	1345	7/26/2007	13:13	238.56	1461.43	0.92	0.28	0.00	1.38	0.00	17.30	MPW
SD-20-1	1496	7/26/2007	13:40	238.61	1461.51	0.70	0.23	0.00	1.29	0.00	14.70	MPW
SD-21-1	1417	7/26/2007	14:01	238.58	1461.51	0.84	0.24	0.00	1.36	0.00	15.90	MPW
SD-22-1	1688	7/26/2007	14:17	238.59	1461.58	0.88	0.19	0.00	1.16	0.00	14.30	MPW
SD-23-1	1391	7/26/2007	14:34	238.63	1461.57	0.80	0.24	1.02	1.51	0.00	16.00	MPW
East Roadway SP-1	1642	7/26/2007	14:52	238.63	1461.58	0.61	0.27	0.00	1.27	0.00	15.10	MPW
West Roadway SP-2	1378	7/26/2007	15:09	238.59	1461.64	0.94	0.26	0.00	1.51	0.00	17.60	MPW
U13-SP-321	1431	7/26/2007	15:27	238.60	1461.47	0.88	0.24	0.00	1.39	0.00	15.80	MPW
U13-SP-322	1644	7/26/2007	15:44	238.63	1461.59	0.44	0.22	0.00	1.17	0.00	13.40	MPW
U13-SP-323	1434	7/26/2007	16:01	238.64	1461.63	0.45	0.23	0.00	1.26	0.00	15.10	MPW
U13-SP-324	1629	7/26/2007	16:18	238.60	1461.76	0.36	0.19	0.00	0.98	0.00	11.60	MPW
U13-SP-325	1509	7/26/2007	16:35	238.67	1461.61	0.29	0.21	0.49	0.71	0.00	12.20	MPW
SU8-166-1	959	7/26/2007	16:51	238.63	1461.69	1.43	0.36	0.97	1.45	0.00	23.10	MPW
SU8-166-3	1440	7/26/2007	17:08	238.62	1461.77	9.67	0.46	0.00	3.03	0.00	37.30	MPW
PI-3-1	1608	7/27/2007	7:39	238.51	1461.06	0.69	0.25	0.00	1.32	0.00	15.20	SK
PI-3-2	1755	7/27/2007	8:08	238.51	1461.17	0.78	0.23	0.87	1.41	0.00	15.00	SK
PI-1-1	1581	7/27/2007	8:34	238.56	1461.21	0.60	0.25	0.00	1.28	0.00	16.00	SK
SU14-354-1	1517	7/27/2007	8:58	238.49	1461.27	0.87	0.27	1.20	1.36	0.00	15.70	SK
SU14-354-3	1700	7/27/2007	9:16	238.50	1461.24	0.73	0.24	0.00	1.26	0.00	15.40	SK
SU14-353-1	1384	7/27/2007	9:34	238.57	1461.23	0.93	0.28	0.00	1.48	0.00	17.20	SK
SU14-353-3	1616	7/27/2007	9:54	238.55	1461.34	0.90	0.23	0.00	1.32	0.00	15.80	SK
SU14-340-1	1305	7/27/2007	10:12	238.56	1461.33	0.72	0.29	0.00	1.50	0.00	17.20	SK
SU14-340-2	1455	7/27/2007	10:30	238.58	1461.44	0.81	0.27	1.12	1.22	0.00	17.30	SK
SU14-347-1	1459	7/27/2007	10:48	238.59	1461.32	0.76	0.29	0.00	1.38	0.00	17.00	SK
SU14-347-4	1524	7/27/2007	11:07	238.62	1461.33	0.81	0.26	0.00	1.29	0.00	16.50	SK
SU14-344-1	1205	7/27/2007	11:26	238.55	1461.32	1.05	0.33	0.00	1.67	0.00	19.10	MPW

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU14-344-3	1510	7/27/2007	11:42	238.58	1461.40	0.86	0.25	0.62	0.94	0.00	17.90	MPW
SU14-355-1	1109	7/27/2007	12:09	238.57	1461.43	0.81	0.31	0.00	1.71	0.00	20.70	MPW
SU14-355-4	1630	7/27/2007	12:26	238.59	1461.45	0.72	0.24	0.00	1.24	0.00	15.10	SK
SU14-346-1	1466	7/27/2007	12:44	238.55	1461.51	0.71	0.25	0.00	1.31	0.00	15.40	SK
SU14-346-2	1648	7/27/2007	13:03	238.57	1461.38	1.02	0.24	0.79	1.09	0.00	15.60	SK
SU14-352-1	1346	7/27/2007	13:24	238.56	1461.57	0.57	0.29	0.00	1.31	0.00	16.00	SK
SU14-352-3	1438	7/27/2007	13:42	238.57	1461.33	1.00	0.28	1.44	1.55	0.00	17.40	SK
SU14-351-2	1470	7/27/2007	14:00	238.62	1461.46	0.60	0.24	0.00	1.20	0.00	14.50	SK
SU14-351-3	1454	7/27/2007	14:19	238.58	1461.46	1.34	0.33	1.36	1.17	0.00	18.50	SK
SU14-348-1	1006	7/27/2007	14:39	238.60	1461.56	2.04	0.38	0.00	2.12	0.00	25.30	SK
SU14-348-4	1419	7/27/2007	14:55	238.61	1461.60	0.74	0.27	0.00	1.35	0.00	16.20	SK
SU14-349-1	1603	7/27/2007	15:12	238.61	14.61.57	0.60	0.25	0.00	1.25	0.00	14.60	SK
SU14-349-3	1535	7/27/2007	15:30	238.60	1461.54	1.29	0.30	0.00	1.45	0.00	17.00	SK
SU12-302-1	1047	7/27/2007	15:49	238.62	1461.58	1.04	0.30	2.42	2.42	0.00	23.30	MPW
SU12-302-2	1223	7/27/2007	16:11	238.61	1461.64	1.08	0.36	0.00	1.69	0.00	19.70	MPW
SU14-342-1	1284	7/27/2007	16:28	238.64	1461.64	0.74	0.26	1.43	1.41	0.00	18.00	MPW
SU14-342-3	1522	7/27/2007	16:44	238.57	1461.61	0.90	0.25	1.39	1.36	0.00	15.80	MPW
SU14-338-1	1559	7/27/2007	17:08	238.68	1461.74	0.81	0.25	0.00	1.35	0.00	15.80	MPW
SU14-338-3	1472	7/27/2007	17:24	238.65	1461.77	0.56	0.25	0.00	1.23	0.00	14.10	MPW
SU12-318-1	1240	7/28/2007	9:20	238.51	1461.08	1.03	0.30	1.57	1.97	0.00	18.90	SK
SU12-318-4	1432	7/28/2007	9:37	238.53	1461.09	0.91	0.26	0.00	1.51	0.00	17.50	SK
SU13-328-1	870	7/28/2007	9:56	238.51	1461.05	0.97	0.42	1.63	1.31	0.00	27.20	SK
SU13-328-2	1343	7/28/2007	10:13	238.50	1461.14	1.06	0.35	2.98	1.83	0.00	22.40	SK
SU12-301-1	1279	7/28/2007	10:30	238.52	1461.28	0.94	0.28	1.23	1.67	0.00	18.60	MPW
SU12-301-4	1555	7/28/2007	10:47	238.54	1461.20	0.71	0.26	0.77	1.21	0.00	16.30	SK
SU14-350-1	1371	7/28/2007	11:03	238.58	1461.21	1.03	0.28	0.91	1.36	0.00	16.70	SK
SU14-350-4	1236	7/28/2007	11:19	238.53	1461.12	0.97	0.29	0.00	1.61	0.00	19.60	SK
SU12-317-1	1341	7/28/2007	11:37	238.53	1462.22	0.71	0.25	0.00	1.39	0.00	15.70	SK
SU12-317-3	1532	7/28/2007	11:52	238.51	1461.09	0.86	0.22	0.00	1.39	0.00	16.20	SK
SU12-313-1	1080	7/28/2007	12:09	238.50	1461.24	0.97	0.36	0.00	1.76	0.00	21.50	SK
SU12-313-4	1127	7/28/2007	12:25	238.51	1461.10	1.07	0.28	2.32	2.07	0.00	20.90	SK
SU14-339-1	1719	7/28/2007	12:42	238.49	1461.24	0.63	0.14	0.00	1.01	0.00	11.70	SK

Project Name: Great Lakes PPV
Project Number: 03-3040.30
Operator: Michael Withers

ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU14-339-4	1518	7/28/2007	12:58	238.58	1461.13	0.80	0.23	0.00	1.31	0.00	15.70	MPW
SU14-345-1	1362	7/28/2007	13:15	238.61	1461.22	0.61	0.24	0.00	1.22	0.00	14.20	SK
SU14-345-4	1341	7/28/2007	13:32	238.49	1461.14	1.01	0.22	0.00	1.57	0.00	18.20	MPW
SU14-343-1	1431	7/28/2007	13:48	238.51	1461.01	0.39	0.19	0.00	1.18	0.00	15.10	MPW
SU14-343-3	1499	7/28/2007	14:04	238.52	1461.16	0.96	0.26	0.00	1.44	0.00	16.70	MPW
SU12-307-1	1173	7/28/2007	14:21	238.54	1461.23	4.29	0.43	0.00	2.38	0.00	28.90	SK
SU12-307-2	1390	7/28/2007	14:40	238.54	1461.32	4.77	0.40	1.97	2.23	0.00	27.00	SK
SU12-306-1	1258	7/28/2007	14:57	238.55	1461.30	1.01	0.31	0.90	1.20	0.00	19.00	SK
SU12-306-2	1720	7/28/2007	15:15	238.50	1461.17	0.89	0.23	0.00	1.27	0.00	15.10	SK
SU13-334-1	1292	7/28/2007	15:32	238.54	1461.13	0.54	0.22	0.00	1.22	0.00	14.20	SK
SU13-334-4	1590	7/28/2007	15:49	238.55	1461.23	0.78	0.26	0.00	1.31	0.00	15.60	SK
SU13-327-1	1214	7/28/2007	16:06	238.51	1461.20	0.78	0.26	0.00	1.53	0.00	17.70	SK
SU13-327-3	1679	7/28/2007	16:23	238.54	1461.19	0.76	0.20	0.00	1.24	0.00	14.40	MPW
SU13-335-1	1092	7/28/2007	16:43	238.55	1461.27	0.79	0.31	1.31	1.51	0.00	18.30	MPW
SU13-335-4	1515	7/28/2007	16:59	238.53	1461.25	0.69	0.22	0.87	1.46	0.00	15.10	MPW
SU13-332-1	624	7/28/2007	17:19	238.39	1461.40	0.00	0.69	0.00	1.79	0.00	22.50	MPW
SU13-332-2	1583	7/28/2007	17:36	238.51	1461.23	0.70	0.23	1.06	1.07	0.00	15.10	MPW
SU13-333-1	1623	7/30/2007	8:32	238.53	1461.07	0.76	0.22	0.00	1.21	0.00	15.30	MPW
SU13-333-4	1416	7/30/2007	8:49	238.54	1461.00	0.86	0.28	1.27	1.14	0.00	17.00	MPW
SU14-341-1	1138	7/30/2007	9:06	238.50	1461-08	0.61	0.26	0.00	1.54	0.00	17.90	MPW
SU14-341-3	1629	7/30/2007	9:24	238.52	1461.14	0.79	0.24	0.00	1.31	0.00	16.10	MPW
SU12-303-1	1071	7/30/2007	9:40	238.53	1461.11	1.43	0.37	0.00	1.88	0.00	22.40	MPW
SU12-303-3	1343	7/30/2007	9:58	238.48	1461.12	1.39	0.25	0.00	1.61	0.00	18.50	MPW
SU12-312-1	1418	7/30/2007	10:18	238.52	1461.12	0.59	0.26	0.00	1.43	0.00	16.50	MPW
SU12-312-2	1648	7/30/2007	11:08	238.48	1460.94	0.81	0.21	0.00	1.23	0.00	15.00	MPW
SU12-309-1	1148	7/30/2007	11:31	238.50	1460.83	0.93	0.31	0.00	1.66	0.00	19.40	MPW
SU12-309-4	1309	7/30/2007	11:48	238.49	1460.85	1.01	0.26	1.15	1.38	0.00	19.00	MPW
SU12-310-1	1438	7/30/2007	12:04	238.48	1460.87	0.73	0.26	0.00	1.40	0.00	16.60	MPW
SU12-319-1	1435	7/30/2007	12:41	238.50	1460.98	0.87	0.27	0.92	1.14	0.00	16.60	MPW
SU12-319-4	1354	7/30/2007	12:58	238.49	1461.01	0.78	0.28	0.94	1.11	0.00	17.50	MPW
SU13-326-1	1331	7/30/2007	13:15	238.52	1460.95	0.66	0.25	1.01	1.67	0.00	16.60	MPW
SU13-326-4	1606	7/30/2007	13:31	238.51	1461.03	0.62	0.24	1.29	1.07	0.00	15.40	MPW

Project Name: Great Lakes PPV
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU13-331-1	1379	7/30/2007	13:48	238.52	1461.05	0.84	0.24	0.00	1.42	0.00	16.80	MPW
SU13-331-3	1247	7/30/2007	14:07	238.49	1461.03	0.86	0.22	0.00	1.61	0.00	18.70	MPW
SU13-336-1	1066	7/30/2007	14:25	238.54	1461.17	0.89	0.29	0.00	1.74	0.00	19.20	MPW
SU13-336-2	1862	7/30/2007	14:42	238.46	1461.06	0.52	0.16	0.00	1.03	0.00	12.20	MPW
SU13-329-1	693	7/30/2007	15:06	238.50	1461.15	1.48	0.39	0.00	2.61	0.00	29.60	MPW
SU13-329-2	1427	7/30/2007	15:22	238.53	1461.16	0.83	0.30	1.21	1.23	0.00	19.80	MPW
SU12-305-1	1380	7/30/2007	15:42	238.54	1461.14	0.93	0.26	0.77	1.13	0.00	17.80	MPW
SU12-305-2	1255	7/30/2007	16:00	238.57	1461.17	1.04	0.30	0.00	1.68	0.00	19.50	SK
PI-2-1	1472	7/30/2007	16:19	238.53	1461.14	0.92	0.24	0.00	1.49	0.00	17.00	SK
PI-2-2	1531	7/30/2007	16:38	238.53	1461.15	0.96	0.26	0.00	1.44	0.00	17.30	SK
PI-1-2	1685	7/30/2007	17:04	238.52	1461.32	0.80	0.23	1.08	0.90	0.00	15.70	SK
PI-1-3	1699	7/30/2007	17:32	238.49	1461.27	0.75	0.17	1.14	1.10	0.00	14.80	SK
SU12-314-1	1509	7/30/2007	18:00	238.55	1461.29	0.79	0.21	0.69	1.08	0.00	16.50	SK
SU14-314-3	1575	7/30/2007	18:18	238.54	1461.31	0.72	0.24	0.00	1.33	0.00	15.80	SK
PI-2-3	1687	7/30/2007	18:37	238.51	1461.33	0.88	0.21	0.00	1.30	0.00	15.90	SK
PI-2-4	1705	7/30/2007	18:55	238.56	1461.31	0.88	0.22	0.00	1.24	0.00	15.20	SK
SU6-120-1	941	7/30/2007	19:13	238.57	1461.44	1.02	0.31	0.00	1.95	0.00	22.10	SK
SU6-120-2	1380	7/30/2007	19:31	238.53	1461.39	0.00	0.44	0.76	0.77	0.00	12.60	SK
PI-3-3	1728	7/30/2007	19:49	238.58	1461.37	0.75	0.23	0.00	1.32	0.00	15.30	SK
PI-3-4	1781	7/30/2007	20:07	238.52	1461.41	0.84	0.26	0.73	1.22	0.00	15.40	SK
SU7-129-1	1422	7/30/2007	20:25	238.57	1461.36	0.00	0.38	0.00	1.00	0.00	12.10	SK
SU7-129-2	1639	7/30/2007	20:43	238.56	1461.41	1.06	0.23	0.00	1.33	0.00	16.50	SK
SU6-126-1	1379	7/30/2007	21:00	238.58	1461.33	0.87	0.24	0.96	1.44	0.00	17.60	SK
SU6-126-4	1339	7/30/2007	21:18	238.51	1461.34	0.40	0.22	0.00	1.18	0.00	13.80	SK
SU7-133-1	1206	7/30/2007	21:36	238.58	1461.37	1.39	0.32	1.39	1.12	0.00	20.40	SK
SU7-133-2	1459	7/30/2007	21:54	238.54	1461.27	1.18	0.23	1.39	1.48	0.00	18.90	SK
PI-2-5	1548	7/30/2007	22:13	238.55	1461.31	0.77	0.24	0.64	0.93	0.00	16.30	SK
SU7-140-1	1368	7/30/2007	22:32	238.57	1461.26	0.69	0.23	0.00	1.29	0.00	15.40	SK
SU7-140-2	1449	7/30/2007	22:49	238.55	1461.20	0.89	0.28	0.00	1.41	0.00	16.90	SK
SU6-128-1	1199	7/30/2007	23:06	238.56	1461.27	1.34	0.29	0.00	1.76	0.00	21.10	SK
SU6-128-4	1142	7/30/2007	23:23	238.51	1461.24	1.36	0.38	0.00	1.82	0.00	22.00	SK
SU7-139-1	1099	7/30/2007	23:40	238.53	1461.25	1.24	0.39	0.00	1.75	0.00	21.00	SK

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU12-310-4	1476	7/30/2007	5:02	238.45	1461.08	0.79	0.24	0.00	1.34	0.00	16.10	MPW
SU7-139-3	1503	7/31/2007	7:29	238.51	1460.99	0.75	0.26	1.48	1.28	0.00	16.40	MPW
SU7-141-2	1358	7/31/2007	8:15	238.46	1461.02	0.81	0.30	0.00	1.35	0.00	15.60	MPW
SU6-124-1	1062	7/31/2007	8:33	238.54	1461.00	0.84	0.30	0.00	1.68	0.00	20.00	MPW
SU6-124-4	1136	7/31/2007	8:50	238.52	1461.17	0.83	0.23	0.00	1.50	0.00	18.30	MPW
SU7-132-1	1338	7/31/2007	9:11	238.52	1461.02	1.05	0.26	0.00	1.35	0.00	16.90	MPW
SU7-141-1	1008	7/31/2007	9:28	238.49	1461.06	0.35	0.27	0.00	1.27	0.00	16.20	MPW
SU6-125-1	1431	7/31/2007	9:45	238.52	1461.08	1.12	0.32	0.00	1.49	0.00	17.20	MPW
SU6-125-4	1719	7/31/2007	10:02	238.54	1461.01	0.54	0.20	0.64	0.96	0.00	14.10	MPW
SU6-127-1	1201	7/31/2007	10:19	238.53	1461.04	1.37	0.32	1.01	1.84	0.00	21.10	MPW
SU6-127-3	1643	7/31/2007	10:42	238.54	1461.17	0.71	0.25	1.44	1.14	0.00	15.60	MPW
SU7-135-1	1479	7/31/2007	10:59	238.54	1461.10	1.65	0.27	0.00	1.60	0.00	19.40	MPW
SU7-135-3	1445	7/31/2007	11:16	238.54	1461.13	1.08	0.28	1.01	1.61	0.00	18.70	MPW
SU6-121-1	1128	7/31/2007	11:33	238.52	1461.15	1.55	0.26	0.00	1.81	0.00	21.50	MPW
SU6-121-4	1386	7/31/2007	11:49	238.54	1461.13	0.72	0.24	0.00	1.42	0.00	16.30	MPW
SU7-132-2	1500	7/31/2007	12:06	238.56	1461.22	0.95	0.21	0.00	1.44	0.00	17.50	MPW
SU9-194-1	1068	7/31/2007	12:24	238.53	1461.37	0.46	0.30	0.00	1.44	0.00	16.80	MPW
SU9-194-4	1597	7/31/2007	12:40	238.57	1461.25	0.80	0.17	0.91	1.15	0.00	15.50	MPW
SU8-164-1	1337	7/31/2007	12:57	238.55	1461.31	1.23	0.30	0.98	1.38	0.00	19.30	MPW
SU8-164-2	1571	7/31/2007	13:19	238.58	1461.44	1.85	0.30	1.13	1.60	0.00	19.40	MPW
SU9-183-2	932	7/31/2007	13:36	238.56	1461.45	1.10	0.37	2.37	2.29	0.00	25.60	MPW
SU9-183-1	544	7/31/2007	13:55	238.59	1461.45	1.77	0.57	6.27	3.43	0.00	41.70	MPW
SU9-184-1	688	7/31/2007	14:12	238.59	1461.55	1.24	0.48	1.70	2.06	0.00	30.70	MPW
SU9-184-2	1291	7/31/2007	14:32	238.57	1461.57	0.94	0.31	2.30	2.63	0.00	22.00	MPW
SU9-189-1	1100	7/31/2007	14:50	238.62	1461.46	0.91	0.29	0.00	1.76	0.00	20.40	SK
SU9-189-4	1602	7/31/2007	15:07	238.58	1461.51	0.83	0.24	0.00	1.31	0.00	16.00	SK
SU9-182-1	1023	7/31/2007	15:25	238.58	1461.45	1.41	0.37	1.62	1.66	0.00	26.00	SK
SU9-182-2	1534	7/31/2007	15:43	238.59	1461.59	0.91	0.21	0.83	0.95	0.00	16.30	SK
SU8-165-1	1076	7/31/2007	16:00	238.56	1461.48	0.69	0.31	0.00	1.56	0.00	19.10	SK
SU8-165-3	1488	7/31/2007	16:18	238.60	1461.45	0.72	0.24	0.66	1.19	0.00	16.40	SK
SU9-186-1	1020	7/31/2007	16:36	238.55	1461.45	1.17	0.37	1.57	1.28	0.00	21.80	SK
SU9-186-2	1447	7/31/2007	16:53	238.61	1461.56	0.91	0.24	0.00	1.47	0.00	17.70	SK

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

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SU4-66-1	1144	7/31/2007	17:11	238.66	1461.54	0.50	0.24	0.00	1.44	0.00	16.50	SK
SU4-66-3	1576	7/31/2007	17:32	238.56	1461.67	0.79	0.21	0.00	1.25	0.00	15.00	SK
SU8-170-1	1510	7/31/2007	17:55	238.61	1461.56	0.75	0.20	0.00	1.37	0.00	16.20	SK
SU8-170-2	1558	7/31/2007	18:18	238.62	1461.72	0.78	0.28	1.10	1.29	0.00	15.80	SK
SU9-181-1	792	7/31/2007	18:35	238.60	1461.56	1.83	0.44	3.65	3.12	0.00	33.50	SK
SU9-181-2	1450	7/31/2007	18:56	238.58	1461.57	0.66	0.24	0.85	1.27	0.00	17.60	SK
SU5-94-1	1136	7/31/2007	19:13	238.60	1461.69	0.90	0.29	0.00	1.55	0.00	18.40	SK
SU5-94-2	1775	7/31/2007	19:31	238.56	1461.57	0.72	0.20	0.00	1.09	0.00	13.00	SK
SU5-92-1	1506	7/31/2007	19:55	238.60	1461.65	0.21	0.16	0.00	0.85	0.00	10.20	SK
SU5-92-4	1539	7/31/2007	20:12	238.62	1461.70	0.64	0.21	0.00	1.22	0.00	13.90	SK
SU5-102-1	1520	7/31/2007	20:33	238.58	1461.70	0.68	0.20	0.00	1.19	0.00	14.30	SK
SU5-102-3	1303	7/31/2007	20:50	238.61	1461.62	1.11	0.30	0.00	1.55	0.00	17.50	SK
SU5-95-1	1128	7/31/2007	21:08	238.54	1461.66	0.95	0.30	0.00	1.65	0.00	18.80	SK
SU5-95-4	1468	7/31/2007	21:25	238.54	1461.54	1.02	0.23	0.77	1.24	0.00	16.20	SK
SU8-169-1	1255	7/31/2007	21:42	238.63	1461.56	0.89	0.30	0.96	1.40	0.00	18.60	SK
SU8-169-4	1521	7/31/2007	22:00	238.61	1461.60	0.95	0.23	0.00	1.38	0.00	17.40	SK
SU9-185-1	1546	7/31/2007	22:18	238.62	1461.54	0.82	0.24	1.12	1.08	0.00	16.30	SK
SU9-185-2	1504	7/31/2007	22:37	238.59	1461.48	0.74	0.27	0.00	1.33	0.00	16.50	SK
SU9-180-1	1138	7/31/2007	22:54	238.57	1461.48	1.11	0.37	2.43	1.74	0.00	25.50	SK
SU9-180-2	1523	7/31/2007	23:12	238.61	1461.49	0.76	0.24	0.00	1.38	0.00	16.10	SK
SU9-187-1	1212	7/31/2007	23:29	238.59	1461.47	0.96	0.32	1.32	1.55	0.00	20.20	SK
SU9-187-2	1547	8/1/2007	7:56	238.51	1461.02	0.70	0.28	0.00	1.34	0.00	16.60	MPW
SU9-195-1	1568	8/1/2007	8:37	238.50	1461.05	0.38	0.21	0.83	1.03	0.00	14.80	MPW
SU9-195-4	1444	8/1/2007	8:54	238.52	1461.05	0.88	0.23	0.88	1.76	0.00	16.90	MPW
SU7-136-1	1412	8/1/2007	9:11	238.53	1461.19	0.00	0.52	1.14	1.08	0.00	16.20	MPW
SU7-136-3	1424	8/1/2007	9:27	238.55	1461.05	1.01	0.23	0.96	1.48	0.00	17.20	MPW
SU9-191-1	1157	8/1/2007	9:44	238.51	1461.24	0.72	0.27	0.00	1.56	0.00	19.60	MPW
SU9-191-4	1504	8/1/2007	10:01	238.55	1461.15	0.791	0.243	0	1.43	0.00	16.9	MPW
SU9-193-3	1369	8/1/2007	10:19	238.53	1461.36	0.79	0.21	0.95	1.04	0.00	16.50	MPW
SU9-193-1	1857	8/1/2007	10:35	238.54	1461.22	0.64	1.50	0.48	0.64	0.00	12.60	MPW
SU6-122-1	1266	8/1/2007	10:54	238.55	1461.30	0.96	0.31	0.00	1.60	0.00	19.00	MPW
SU6-122-4	1509	8/1/2007	11:12	238.57	1461.28	0.82	0.23	0.00	1.32	0.00	15.90	MPW

Project Name: Great Lakes PPV
Project Number: 03-3040.30
Operator: Michael Withers

ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU7-130-1	1241	8/1/2007	11:29	238.53	1461.38	0.46	0.20	0.58	0.77	0.00	14.00	MPW
SU7-130-3	1438	8/1/2007	11:45	238.52	1461.30	1.06	0.21	0.00	1.57	0.00	18.80	MPW
SU8-175-1	1191	8/1/2007	12:03	238.51	1461.33	0.93	0.29	0.00	1.74	0.00	19.70	MPW
SU8-175-2	1560	8/1/2007	12:20	238.57	1461.26	0.78	0.24	0.00	1.35	0.00	15.70	MPW
SU7-131-1	1117	8/1/2007	12:37	238.50	1461.38	0.00	0.52	0.67	1.10	0.00	15.60	MPW
SU7-131-4	1585	8/1/2007	12:54	238.55	1461.36	0.63	0.23	0.00	1.21	0.00	14.40	MPW
SU7-134-1	1041	8/1/2007	13:11	238.54	1461.41	1.19	0.32	0.00	1.75	0.00	20.50	MPW
SU7-134-2	1224	8/1/2007	13:28	238.56	1461.32	1.01	0.28	1.76	1.54	0.00	19.70	MPW
SU6-123-1	1025	8/1/2007	13:46	238.55	1461.35	0.94	0.29	0.00	1.73	0.00	20.70	MPW
SU6-123-4	1460	8/1/2007	14:03	238.57	1461.41	0.93	0.30	0.00	1.38	0.00	16.40	MPW
SU7-138-1	1036	8/1/2007	14:20	238.58	1461.41	0.90	0.32	1.44	1.46	0.00	19.60	MPW
SU7-138-2	1300	8/1/2007	14:40	238.57	1461.38	2.06	0.31	1.48	1.54	0.00	22.60	MPW
SU9-188-1	982	8/1/2007	14:57	238.57	1461.49	0.81	0.31	0.00	1.79	0.00	21.40	MPW
SU9-188-4	1697	8/1/2007	15:14	238.58	1461.59	0.95	0.21	1.35	1.41	0.00	15.50	MPW
SU9-190-1	1591	8/1/2007	15:30	238.61	1461.55	0.77	0.19	0.95	0.88	0.00	15.50	SK
SU9-190-4	1576	8/1/2007	15:48	238.56	1461.54	0.76	0.22	0.00	1.24	0.00	15.20	SK
SU9-192-1	1047	8/1/2007	16:05	238.61	1461.59	0.65	0.28	0.00	1.53	0.00	18.10	SK
SU9-192-3	1566	8/1/2007	16:23	238.66	1461.65	0.65	0.24	0.00	1.27	0.00	15.90	SK
SU7-137-1	1410	8/1/2007	16:41	238.59	1461.61	0.43	0.23	0.00	1.19	0.00	14.40	SK
SU7-137-3	1495	8/1/2007	16:58	238.61	1461.69	0.88	0.27	0.00	1.43	0.00	17.40	SK
SU4-77-1	1587	8/1/2007	17:16	238.61	1461.70	0.68	0.21	1.02	1.21	0.00	14.70	SK
SU4-77-4	1575	8/1/2007	17:36	238.61	1461.61	0.97	0.29	0.00	1.38	0.00	16.70	SK
SU4-75-1	807	8/1/2007	17:53	238.58	1461.69	0.00	0.66	0.00	1.48	0.00	17.90	SK
SU4-75-2	1212	8/1/2007	18:10	238.62	1461.62	0.75	0.22	0.00	1.46	0.00	16.10	SK
SU4-78-1	1041	8/1/2007	18:27	238.62	1461.65	0.66	0.31	0.00	1.55	0.00	17.50	SK
SU4-78-2	1560	8/1/2007	18:50	238.63	1461.77	0.94	0.24	0.56	1.03	0.00	16.20	SK
SU4-80-1	1140	8/1/2007	19:09	238.65	1461.81	0.00	0.48	0.67	0.85	0.00	15.30	SK
SU4-80-4	1317	8/1/2007	19:26	238.60	1461.71	0.99	0.27	1.29	1.41	0.00	19.00	SK
SU3-50-1	1312	8/1/2007	19:43	238.64	1461.66	0.72	0.27	0.00	1.46	0.00	17.40	SK
SU3-50-4	1268	8/1/2007	20:01	238.63	1461.55	0.96	0.25	0.00	1.51	0.00	18.10	SK
SU5-101-1	1098	8/1/2007	20:19	238.63	1461.74	0.57	0.24	0.00	1.43	0.00	16.80	SK
SU5-101-2	1359	8/1/2007	20:37	238.61	1461.63	0.85	0.24	0.00	1.33	0.00	16.20	SK

Project Name: Great Lakes PPV
Project Number: 03-3040.30
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU9-176-1	1343	8/1/2007	20:55	238.61	1461.59	0.86	0.21	1.58	1.14	0.00	17.30	SK
SU4-82-1	1366	8/1/2007	21:13	238.61	1461.62	0.69	0.22	0.00	1.29	0.00	15.10	SK
SU4-82-3	1335	8/1/2007	21:34	238.63	1461.62	0.99	0.23	0.00	1.51	0.00	17.10	SK
SU9-179-1	1400	8/1/2007	21:53	238.57	1461.69	0.85	0.24	0.00	1.46	0.00	17.30	SK
SU4-76-1	1356	8/1/2007	22:12	238.60	1461.65	1.61	0.28	0.98	1.14	0.00	19.90	SK
SU4-76-2	1339	8/1/2007	22:29	238.61	1461.74	0.92	0.28	0.00	1.55	0.00	17.60	SK
SU5-87-1	1207	8/1/2007	22:46	238.61	1461.47	0.84	0.23	0.00	1.51	0.00	18.00	SK
SU5-87-4	1289	8/1/2007	23:03	238.61	1461.63	1.08	0.26	0.00	1.60	0.00	18.90	SK
SU4-72-1	1233	8/1/2007	23:22	238.66	1461.67	0.92	0.25	0.00	1.52	0.00	17.20	SK
SU4-72-4	1328	8/2/2007	7:28	238.52	1461.14	1.04	0.30	0.00	1.52	0.00	17.90	MPW
SU4-71-1	1168	8/2/2007	7:46	238.51	1461.03	0.81	0.30	0.00	1.53	0.00	17.50	MPW
SU4-71-4	1599	8/2/2007	8:03	238.55	1461.01	0.74	0.22	0.00	1.25	0.00	15.50	MPW
SU4-70-1	1278	8/2/2007	8:19	238.47	1460.99	0.99	0.31	0.00	1.40	0.00	16.60	MPW
SU4-70-3	1424	8/2/2007	8:47	238.51	1461.10	1.27	0.22	0.00	1.55	0.00	17.90	MPW
SU4-62-1	961	8/2/2007	9:05	238.60	1461.04	0.54	0.28	0.00	1.44	0.00	17.50	MPW
SU4-62-2	1004	8/2/2007	9:23	238.49	1461.06	0.45	0.20	0.00	1.35	0.00	15.30	MPW
SU4-65-1	841	8/2/2007	9:40	238.53	1460.99	1.11	0.25	0.00	1.70	0.00	22.10	MPW
SU4-65-3	1176	8/2/2007	9:57	238.51	1461.21	1.18	0.21	0.00	1.57	0.00	18.70	MPW
SU5-93-1	1170	8/2/2007	10:13	238.55	1461.08	1.26	0.29	0.00	1.58	0.00	19.10	MPW
SU5-93-3	1527	8/2/2007	10:30	238.51	1461.14	0.94	0.26	1.00	1.59	0.00	16.90	MPW
SU4-79-1	1207	8/2/2007	10:51	238.56	1461.08	1.05	0.25	0.00	1.46	0.00	16.90	MPW
SU4-79-3	1405	8/2/2007	11:12	238.58	1461.19	1.24	0.29	0.00	1.56	0.00	18.50	MPW
SU4-81-1	1225	8/2/2007	11:33	238.50	1461.30	0.45	0.26	0.00	1.31	0.00	16.80	MPW
SU4-81-4	1346	8/2/2007	11:55	238.56	1461.21	0.80	0.27	1.04	1.42	0.00	17.90	MPW
SU3-53-1	1481	8/2/2007	12:12	238.54	1461.31	0.84	0.22	0.53	0.72	0.00	16.20	MPW
SU3-53-3	1378	8/2/2007	12:29	238.57	1461.30	0.77	0.23	0.00	1.41	0.00	17.00	MPW
SU3-46-1	1181	8/2/2007	12:51	238.49	1461.22	0.66	0.25	0.00	1.34	0.00	16.90	MPW
SU3-46-3	1503	8/2/2007	13:08	238.56	1461.25	0.56	0.22	0.00	1.17	0.00	14.30	MPW
SU4-73-1	879	8/2/2007	13:27	238.52	1461.26	0.78	0.33	0.00	1.73	0.00	18.60	MPW
SU4-73-3	1396	8/2/2007	13:44	238.59	1461.35	0.51	0.26	0.00	1.37	0.00	16.30	MPW
SU3-52-1	1228	8/2/2007	14:03	238.55	1461.20	1.12	0.25	0.00	1.49	0.00	17.60	MPW
SU3-52-2	1199	8/2/2007	14:20	238.62	1461.41	1.36	0.32	0.00	1.69	0.00	20.60	MPW

Project Name: Great Lakes PPV
Project Number: 03-3040.30
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU3-49-1	1507	8/2/2007	14:36	238.58	1461.50	0.57	0.20	0.48	0.84	0.00	15.30	MPW
SU3-49-3	1360	8/2/2007	14:54	238.56	1461.50	1.06	0.28	0.00	1.49	0.00	17.30	SK
SU3-57-1	1394	8/2/2007	15:12	238.62	1461.47	0.71	0.23	0.00	1.32	0.00	15.80	SK
SU3-57-3	1143	8/2/2007	15:30	238.57	1461.52	0.85	0.34	0.00	1.65	0.00	19.30	SK
SU3-42-1	1358	8/2/2007	16:10	238.57	1461.68	0.69	0.23	0.00	1.40	0.00	16.60	SK
SU3-42-2	1154	8/2/2007	16:27	238.64	1461.64	0.94	0.28	1.42	1.92	0.00	20.00	SK
SU3-48-1	1117	8/2/2007	16:46	238.60	1461.67	1.01	0.26	0.00	1.59	0.00	19.30	SK
SU3-48-3	1107	8/2/2007	17:04	238.61	1461.80	1.24	0.29	0.00	1.73	0.00	20.30	SK
SU13-337-1	1332	8/2/2007	17:25	238.61	1461.72	0.89	0.31	0.00	1.45	0.00	17.60	SK
SU13-337-4	1300	8/2/2007	17:43	238.62	1461.69	0.96	0.28	0.00	1.53	0.00	18.40	SK
SU3-51-1	1349	8/2/2007	18:01	238.62	1461.72	0.93	0.26	1.68	1.48	0.00	18.20	SK
SU3-51-3	1334	8/2/2007	18:20	238.56	1461.70	0.94	0.25	0.85	1.56	0.00	18.10	SK
SU3-54-1	1102	8/2/2007	18:37	238.62	1461.75	0.87	0.32	0.00	1.57	0.00	19.00	SK
SU3-54-3	1367	8/2/2007	18:54	238.63	1461.76	0.77	0.26	0.00	1.46	0.00	17.50	SK
SU3-56-1	1198	8/2/2007	19:12	238.59	1461.71	0.79	0.26	0.71	1.09	0.00	17.00	SK
SU3-56-4	1493	8/2/2007	19:30	238.62	1461.70	0.70	0.24	0.00	1.33	0.00	15.40	SK
SU3-43-1	872	8/2/2007	19:50	238.62	1461.71	1.70	0.44	0.00	2.17	0.00	25.40	SK
SU3-43-2	1467	8/2/2007	20:07	238.58	1461.67	0.88	0.27	0.00	1.30	0.00	16.10	SK
SU3-58-1	1327	8/2/2007	20:25	238.59	1461.69	0.62	0.22	0.00	1.33	0.00	15.40	SK
SU3-58-3	1234	8/2/2007	20:42	238.62	1461.80	0.93	0.24	0.00	1.54	0.00	18.60	SK
SU3-45-1	1153	8/2/2007	21:03	238.56	1461.60	1.07	0.28	0.86	1.20	0.00	19.30	SK
SU3-45-4	1374	8/2/2007	21:20	238.62	1461.71	0.93	0.26	0.00	1.49	0.00	18.00	SK
SU3-55-1	1291	8/2/2007	21:37	238.59	1461.75	1.59	0.25	1.53	1.81	0.00	18.60	SK
SU3-55-3	1310	8/2/2007	21:54	238.62	1461.70	0.68	0.30	0.00	1.50	0.00	18.10	SK
SU3-47-1	1394	8/2/2007	22:12	238.64	1461.57	0.84	0.28	0.63	1.03	0.00	16.00	SK
SU3-47-3	1158	8/2/2007	22:28	238.61	1461.66	0.84	0.24	0.89	1.60	0.00	18.40	SK
SU4-74-1	1194	8/3/2007	9:23	238.53	1461.02	0.59	0.28	0.00	1.39	0.00	17.50	MPW
SU4-74-3	863	8/3/2007	9:40	238.48	1460.99	0.95	0.33	0.00	1.84	0.00	21.80	MPW
SU8-171-1	1219	8/3/2007	9:57	238.49	1460.95	0.90	0.31	1.37	1.73	0.00	19.00	MPW
SU8-171-4	1456	8/3/2007	10:14	238.54	1461.08	0.77	0.23	0.62	1.26	0.00	15.80	MPW
SU5-88-1	1263	8/3/2007	10:31	238.52	1461.07	1.15	0.29	0.00	1.56	0.00	18.50	MPW
SU5-88-2	1387	8/3/2007	10:47	238.54	1461.06	0.79	0.30	0.00	1.41	0.00	16.20	MPW

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU4-69-1	1010	8/3/2007	11:05	238.47	1461.15	0.27	0.21	0.00	1.08	0.00	12.60	MPW
SU4-69-3	1383	8/3/2007	11:23	238.50	1461.03	0.71	0.24	0.00	1.32	0.00	15.20	MPW
SU4-64-1	1334	8/3/2007	11:41	238.52	1460.98	0.96	0.24	0.00	1.27	0.00	16.20	MPW
SU4-64-2	1100	8/3/2007	11:57	238.50	1461.19	1.63	0.29	0.00	1.63	0.00	19.00	MPW
SU4-83-1	1218	8/3/2007	12:15	238.51	1461.03	0.34	0.22	0.00	1.21	0.00	14.50	MPW
SU5-85-1	869	8/3/2007	12:49	238.53	1461.11	0.75	0.23	0.00	1.62	0.00	19.20	MPW
SU5-85-3	1019	8/3/2007	13:11	238.53	1461.00	1.21	0.35	1.06	1.69	0.00	21.80	MPW
SU15-362-1	1347	8/3/2007	13:30	238.53	1461.05	0.78	0.22	0.57	0.89	0.00	16.80	MPW
SU4-83-4	1213	8/3/2007	13:32	238.54	1461.03	0.67	0.24	0.00	1.42	0.00	17.10	MPW
SU15-362-3	1452	8/3/2007	13:47	238.49	1461.02	0.85	0.24	1.05	1.56	0.00	16.80	MPW
SU5-98-1	1056	8/3/2007	14:04	238.44	1460.97	0.00	0.46	0.00	1.11	0.00	13.50	MPW
SU5-98-3	1116	8/3/2007	14:23	238.56	1461.07	0.76	0.27	0.89	1.16	0.00	17.10	MPW
SU3-44-1	1127	8/3/2007	14:41	238.51	1461.07	1.21	0.32	0.00	1.59	0.00	19.30	MPW
SU3-44-2	1563	8/3/2007	14:58	238.50	1461.11	0.76	0.25	1.16	1.18	0.00	15.10	SK
SU5-103-1	1277	8/3/2007	15:18	238.52	1461.15	1.10	0.33	0.00	1.70	0.00	19.90	SK
SU5-103-2	1451	8/3/2007	15:38	238.56	1461.28	0.92	0.24	0.00	1.44	0.00	16.70	SK
SU5-104-1	1273	8/3/2007	15:56	238.55	1461.31	1.18	0.27	1.10	1.15	0.00	19.10	SK
SU5-104-2	1327	8/3/2007	16:14	238.54	1461.29	1.07	0.25	1.20	1.89	0.00	19.10	SK
SU3-59-1	1138	8/3/2007	16:31	238.50	1461.09	0.56	0.22	0.00	1.45	0.00	17.20	SK
SU3-59-3	1500	8/3/2007	16:48	238.50	1461.20	0.58	0.25	0.00	1.29	0.00	15.30	SK
SU5-84-1	1539	8/3/2007	17:09	238.51	1461.25	0.78	0.22	0.48	0.95	0.00	15.20	SK
SU5-84-4	1595	8/3/2007	17:29	238.53	1461.22	0.67	0.20	0.00	1.21	0.00	14.70	SK
SU4-67-1	1448	8/3/2007	17:48	238.53	1461.23	0.94	0.25	0.00	1.42	0.00	17.00	SK
SU4-67-2	1522	8/3/2007	18:06	238.56	1461.27	1.03	0.29	1.15	1.11	0.00	16.90	SK
SU5-96-1	1066	8/3/2007	18:25	238.51	1461.23	0.98	0.36	0.00	1.77	0.00	20.40	SK
SU5-96-2	1455	8/3/2007	18:42	238.53	1461.21	0.81	0.25	0.00	1.40	0.00	16.00	SK
SU8-172-1	1329	8/3/2007	19:00	238.52	1461.15	0.80	0.28	0.00	1.34	0.00	16.80	SK
SU8-172-2	1490	8/3/2007	19:18	238.53	1461.19	0.75	0.25	0.00	1.36	0.00	16.10	SK
SU9-177-1	1289	8/3/2007	19:37	238.51	1461.25	0.91	0.22	0.00	1.55	0.00	18.70	SK
SU8-160-1	1176	8/3/2007	19:58	238.60	1461.24	1.41	0.28	0.00	1.75	0.00	20.80	SK
SU9-178-1	1321	8/3/2007	20:20	238.59	1461.20	0.84	0.26	1.71	1.57	0.00	17.70	SK
SU8-159-1	1380	8/3/2007	20:37	238.52	1461.19	1.96	0.29	0.00	1.72	0.00	21.20	SK

Project Name: Great Lakes PPV
Project Number: 03-3040.30
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU5-86-1	885	8/3/2007	20:55	238.64	1461.26	0.66	0.25	0.00	1.57	0.00	19.20	SK
SU5-86-3	1403	8/3/2007	21:12	238.57	1461.22	0.55	0.24	0.00	1.34	0.00	16.70	SK
SU5-90-1	968	8/3/2007	21:32	238.55	1461.21	0.58	0.31	0.00	1.40	0.00	16.10	SK
SU5-90-2	1167	8/3/2007	21:49	238.48	1461.25	0.76	0.29	0.00	1.53	0.00	18.70	SK
SU5-105-1	1161	8/3/2007	22:12	238.50	1461.10	0.58	0.26	0.00	1.32	0.00	15.80	SK
SU5-105-3	1371	8/3/2007	22:30	238.55	1461.27	0.93	0.30	0.00	1.55	0.00	18.40	SK
SU5-97-1	949	8/3/2007	22:52	238.58	1461.05	0.00	0.51	0.00	1.26	0.00	14.40	SK
SU5-97-4	1226	8/3/2007	23:12	238.55	1461.18	0.65	0.29	1.89	1.36	0.00	18.20	SK
SU8-Bias SU-159-160	1337	8/3/2007	23:30	238.52	1461.13	9.63	0.51	0.00	3.16	0.00	39.00	SK
SU15-357-1	1415	8/4/2007	7:51	238.53	1461.16	1.48	0.19	0.00	1.56	0.00	18.40	MPW
SU15-357-3	1661	8/4/2007	8:08	238.51	1461.16	0.76	0.22	0.00	1.26	0.00	1.43	MPW
SU15-372-1	791	8/4/2007	8:25	238.55	1461.13	1.03	0.39	1.50	1.77	0.00	25.30	MPW
SU15-372-4	1209	8/4/2007	8:41	238.50	1461.15	0.90	0.33	0.00	1.67	0.00	18.30	MPW
SU12-320-1	803	8/4/2007	8:58	238.58	1461.13	1.03	0.38	2.49	1.67	0.00	24.50	MPW
SU12-320-2	1054	8/4/2007	9:16	238.55	1461.14	0.93	0.30	0.00	1.74	0.00	19.80	MPW
SU5-89-1	1221	8/4/2007	9:38	238.54	1461.21	0.55	0.23	0.00	1.31	0.00	15.00	MPW
SU5-89-2	1230	8/4/2007	9:55	238.54	1461.02	0.68	0.26	0.00	1.39	0.00	16.60	MPW
SU15-359-1	1471	8/4/2007	10:11	238.56	1461.10	1.04	0.25	0.49	0.88	0.00	17.40	MPW
SU15-359-2	1421	8/4/2007	10:28	238.53	1461.18	0.93	0.24	0.00	1.40	0.00	17.30	MPW
SU15-367-1	1746	8/4/2007	10:45	238.51	1461.09	0.76	0.22	1.06	1.29	0.00	13.70	MPW
SU15-367-3	1478	8/4/2007	11:01	238.55	1461.25	0.80	0.25	0.00	1.36	0.00	16.00	MPW
SU4-68-1	892	8/4/2007	11:18	238.59	1461.20	0.68	0.26	0.00	1.58	0.00	19.20	MPW
SU4-68-2	1215	8/4/2007	11:34	238.58	1461.23	1.04	0.28	0.81	1.53	0.00	20.00	MPW
SU12-316-2	1236	8/4/2007	11:51	238.53	1461.28	0.97	0.31	0.00	1.79	0.00	20.80	MPW
SU12-316-1	1245	8/4/2007	12:12	238.57	1461.31	0.97	0.30	0.00	1.68	0.00	19.70	MPW
SU15-361-1	1437	8/4/2007	12:35	238.55	1461.37	0.68	0.24	0.00	1.35	0.00	16.00	MPW
SU15-361-4	1411	8/4/2007	12:51	238.56	1461.33	0.86	0.22	0.00	1.41	0.00	16.40	MPW
SU15-370-1	1211	8/4/2007	13:08	238.46	1461.37	0.82	0.27	1.32	1.37	0.00	19.30	MPW
SU15-370-3	1303	8/4/2007	13:25	238.53	1461.34	0.90	0.27	0.00	1.50	0.00	17.50	MPW
SU15-369-1	1309	8/4/2007	13:41	238.57	1461.37	0.97	0.24	0.00	1.38	0.00	17.60	MPW
SU15-369-4	1312	8/4/2007	14:04	238.56	1461.34	0.67	0.27	0.00	1.45	0.00	17.60	MPW
SU15-364-1	1125	8/4/2007	14:29	238.53	1461.33	0.85	0.33	1.03	1.70	0.00	19.20	MPW

Project Name: Great Lakes PPV
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU15-364-3	1189	8/4/2007	14:46	238.57	1461.37	0.83	0.28	1.15	1.32	0.00	17.70	MPW
SU15-363-1	1666	8/4/2007	15:05	238.53	1461.47	0.81	0.21	0.90	0.91	0.00	14.70	MPW
SU15-363-3	1254	8/4/2007	15:22	238.57	1461.44	1.05	0.27	0.64	1.15	0.00	18.80	MPW
SU15-360-1	1507	8/4/2007	15:39	238.56	1461.37	0.71	0.20	0.00	1.28	0.00	15.70	MPW
SU15-360-4	1375	8/4/2007	15:56	238.59	1461.48	0.81	0.30	0.00	1.47	0.00	16.80	MPW
SU12-304-1	1529	8/4/2007	16:13	238.55	1461.38	0.78	0.25	0.97	1.36	0.00	16.10	MPW
SU12-304-3	1425	8/4/2007	16:30	238.59	1461.49	0.83	0.23	0.00	1.48	0.00	17.10	MPW
SU11-232-4	1457	8/4/2007	16:50	238.57	1461.46	0.73	1.71	0.00	1.34	0.00	16.00	MPW
SU11-232-1	1559	8/4/2007	17:08	238.59	1461.47	0.87	0.23	0.00	1.27	0.00	15.70	MPW
SU11-235-1	1466	8/6/2007	8:07	238.56	1461.19	0.79	0.24	1.46	1.73	0.00	16.70	MPW
SU11-235-2	1402	8/6/2007	8:23	238.52	1461.20	0.79	0.25	1.08	1.12	0.00	17.30	MPW
SU15-356-4	1190	8/6/2007	8:40	238.51	1461.31	1.03	0.27	0.00	1.57	0.00	18.80	MPW
SU15-356-1	1086	8/6/2007	8:57	238.51	1461.26	1.06	0.30	0.00	1.62	0.00	19.20	MPW
SU11-224-2	1625	8/6/2007	9:13	238.53	1461.17	1.27	0.22	0.00	1.43	0.00	17.20	MPW
SU11-224-1	1769	8/6/2007	9:31	238.57	1461.12	0.76	0.22	1.17	1.35	0.00	14.20	MPW
SU11-216-2	1269	8/6/2007	9:47	238.56	1461.15	1.36	0.29	0.00	1.68	0.00	20.00	MPW
SU11-216-1	1539	8/6/2007	10:03	238.55	1461.20	1.12	0.25	1.15	1.25	0.00	16.50	MPW
SU15-371-1	1621	8/6/2007	10:20	238.60	1461.17	0.72	0.21	0.75	1.00	0.00	15.00	MPW
SU15-371-4	1235	8/6/2007	10:38	238.53	1461.24	0.98	0.29	1.41	1.49	0.00	18.20	MPW
SU15-365-1	1412	8/6/2007	10:54	238.58	1461.27	0.64	0.27	1.81	1.45	0.00	15.60	MPW
SU15-365-4	1577	8/6/2007	11:12	238.52	1461.23	0.82	0.23	0.57	1.03	0.00	15.80	MPW
SU15-374-1	1689	8/6/2007	11:29	238.58	1461.28	0.62	0.22	0.50	0.90	0.00	13.90	MPW
SU15-374-2	1566	8/6/2007	11:45	238.60	1461.27	0.71	0.21	0.00	1.24	0.00	15.00	MPW
SU11-233-4	1748	8/6/2007	12:02	238.60	1461.40	0.37	0.18	0.83	1.13	0.00	12.40	MPW
SU11-233-1	1775	8/6/2007	12:19	238.54	1461.26	0.69	0.23	1.04	0.86	0.00	14.00	MPW
SU11-225-1	1522	8/6/2007	12:35	238.55	1461.39	0.77	0.26	0.00	1.38	0.00	15.80	MPW
SU11-225-2	1557	8/6/2007	12:52	238.52	1461.33	0.81	0.25	0.00	1.35	0.00	15.70	MPW
SU15-366-3	1401	8/6/2007	13:09	238.55	1461.31	0.70	0.26	2.76	1.93	0.00	16.30	MPW
SU15-366-1	1571	8/6/2007	13:26	238.58	1461.50	0.87	0.26	0.00	1.25	0.00	15.00	MPW
SU12-311-1	1267	8/6/2007	13:42	238.61	1461.60	0.97	0.32	1.86	1.62	0.00	19.50	MPW
SU12-311-4	1353	8/6/2007	13:59	238.64	1461.68	1.12	0.28	0.00	1.57	0.00	18.40	MPW
SU15-373-2	1644	8/6/2007	14:16	238.29	1461.58	0.74	0.18	0.00	1.25	0.00	14.40	MPW

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU15-373-1	1447	8/6/2007	14:32	238.60	1461.64	0.79	0.21	0.85	1.36	0.00	16.20	MPW
SU11-223-1	1531	8/6/2007	14:49	238.58	1461.60	0.84	0.26	0.00	1.37	0.00	16.80	MPW
SU11-223-3	1642	8/6/2007	15:07	238.63	1461.69	1.06	0.28	1.42	1.05	0.00	17.00	MPW
SU15-275-1	1599	8/6/2007	15:25	238.62	1461.80	0.71	0.26	0.00	1.68	0.00	14.80	MPW
SU15-275-2	1170	8/6/2007	15:41	238.64	1461.80	0.93	0.29	1.11	1.44	0.00	19.00	MPW
SU11-226-1	1162	8/6/2007	15:48	238.66	1461.85	0.78	0.28	1.08	1.37	0.00	17.80	MPW
SU11-229-1	1323	8/6/2007	16:15	238.64	1461.91	0.69	0.28	1.03	1.28	0.00	17.60	MPW
SU11-219-1	1116	8/6/2007	16:32	238.55	1461.86	0.86	0.31	1.39	1.46	0.00	19.10	MPW
SU11-230-1	932	8/6/2007	16:50	238.63	1461.83	1.03	0.34	1.78	2.09	0.00	20.50	MPW
SU11-220-1	942	8/6/2007	17:07	238.64	1461.86	3.33	0.36	0.00	2.32	0.00	27.50	MPW
SU12-308-1	666	8/7/2007	7:16	238.56	1461.02	0.82	0.52	0.00	2.24	0.00	27.20	MPW
SU11-228-1	1055	8/7/2007	7:33	238.50	1461.05	1.14	0.36	0.00	1.86	0.00	21.80	MPW
SU11-231-1	1068	8/7/2007	7:50	238.52	1461.03	0.72	0.32	1.16	1.73	0.00	21.00	MPW
SU11-227-1	973	8/7/2007	8:08	238.53	1461.07	1.16	0.32	2.21	2.25	0.00	23.40	MPW
SU11-231-3	1045	8/7/2007	8:28	238.48	1461.12	0.69	0.33	1.56	1.76	0.00	20.20	MPW
SU11-221-1	1028	8/7/2007	8:45	238.55	1461.16	0.99	0.31	0.00	1.68	0.00	20.10	MPW
SU7-123-1	1574	8/7/2007	9:01	238.55	1461.11	0.94	0.25	0.71	1.00	0.00	16.40	MPW
SU11-222-1	1275	8/7/2007	9:18	238.53	1461.15	0.83	0.27	0.00	1.44	0.00	16.70	MPW
SU7-144-1	1342	8/7/2007	9:36	238.53	1461.28	0.91	0.23	0.00	1.38	0.00	16.40	MPW
SU5-91-1	1384	8/7/2007	9:53	238.56	1461.35	0.73	0.24	0.00	1.30	0.00	15.20	MPW
SU5-91-3	1430	8/7/2007	10:09	238.52	1461.20	0.65	0.25	0.00	1.39	0.00	15.70	MPW
SU11-227-3	1650	8/7/2007	10:26	235.51	1461.24	0.95	0.22	0.00	1.25	0.00	15.40	MPW
SU7-145-1	890	8/7/2007	10:45	238.61	1461.27	0.00	0.47	0.00	1.10	0.00	14.10	MPW
SU7-145-2	1591	8/7/2007	11:01	238.55	1461.28	0.86	0.23	0.00	1.25	0.00	14.80	MPW
SU12-315-1	1533	8/7/2007	11:17	238.56	1461.35	0.81	0.21	0.00	1.35	0.00	15.10	MPW
SU12-315-2	1392	8/7/2007	11:34	238.53	1461.38	0.81	0.25	0.00	1.42	0.00	16.30	MPW
SU11-228-2	1270	8/7/2007	11:50	238.54	1461.38	0.85	0.29	0.92	1.43	0.00	18.10	MPW
SU11-230-3	1583	8/7/2007	12:07	238.57	1461.38	0.69	0.24	0.00	1.35	0.00	15.60	MPW
SU11-219-2	1586	8/7/2007	12:23	238.56	1461.45	1.09	0.22	0.00	1.37	0.00	16.30	MPW
SU11-217-1	1617	8/7/2007	12:40	238.53	1461.40	0.76	0.23	1.10	1.22	0.00	15.50	MPW
SU11-217-2	1608	8/7/2007	12:56	238.58	1461.55	0.64	0.22	0.00	1.22	0.00	14.70	MPW
SU11-234-1	1394	8/7/2007	13:18	238.61	1461.66	0.61	0.21	0.00	1.27	0.00	15.00	MPW

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SU11-234-2	1213	8/7/2007	13:34	238.57	1461.76	0.74	0.26	0.00	1.38	0.00	16.00	MPW
SU11-218-1	1019	8/7/2007	13:51	238.63	1461.65	0.93	0.29	0.00	1.67	0.00	19.00	MPW
SU11-218-2	1202	8/7/2007	14:07	238.64	1461.61	0.84	0.25	0.00	1.53	0.00	18.50	MPW
SU5-93-1	1001	8/7/2007	14:24	238.62	1461.73	1.13	0.35	0.00	1.73	0.00	20.40	MPW
SU5-93-2	1275	8/7/2007	14:42	238.64	1461.69	1.02	0.28	0.00	1.60	0.00	18.70	MPW
SU8-02 West Bias 2-3	1356	8/21/2007	8:08	238.53	1461.09	6.93	0.39	0.00	2.65	0.00	33.20	MPW
SU8-03 West Bias 3-4	1246	8/21/2007	8:36	238.54	1461.24	3.54	0.40	0.00	2.09	0.00	25.10	MPW
SU8-04 East Bias 0-1	1407	8/21/2007	8:56	238.55	1461.26	11.87	0.50	1.60	2.68	0.00	41.50	MPW
SU8-05 East Bias 0-1	1179	8/21/2007	9:17	238.54	1461.27	3.91	0.37	0.00	2.32	0.00	28.00	MPW
SU6-Bias 1 0-1	1576	8/22/2007	7:37	238.52	1460.95	9.74	0.41	0.00	2.81	0.00	34.90	MPW
SU6-Bias 2	1334	8/22/2007	8:05	238.50	1460.92	54.66	1.05	9.34	8.40	0.00	79.90	MPW
SU7-Bias 1 0-1	1312	8/22/2007	8:24	238.50	1460.92	52.62	1.03	7.61	7.94	0.00	79.30	MPW
SU7-Bias 2 0-1	1556	8/22/2007	8:41	238.52	1460.10	42.29	0.91	4.31	5.86	0.00	67.70	MPW
SU9-Bias 0-1	1344	8/22/2007	9:00	238.54	1461.19	1.49	0.36	4.40	2.51	0.00	26.50	MPW
SU10-Bias 0-1	1628	8/22/2007	9:17	238.52	1461.18	7.15	0.26	1.40	2.32	0.00	28.70	MPW
SU12-Bias 1 0-1	1707	8/22/2007	9:35	238.53	1461.12	1.08	0.24	0.00	1.31	0.00	15.70	MPW
SU12-Bias 1 1-2	1602	8/22/2007	9:56	238.55	1461.14	1.62	0.28	1.97	2.10	0.00	17.30	MPW
SU12-Bias 1 2-3	1538	8/22/2007	10:12	238.53	1460.94	106.28	0.91	5.96	10.40	0.00	104.00	MPW
SU12-Bias 2 0-1	1442	8/22/2007	10:35	238.54	1461.23	4.15	0.39	0.00	2.08	0.00	25.30	MPW
SU12-Bias 2 1-2	1631	8/22/2007	10:56	238.54	1461.21	5.39	0.36	0.00	2.17	0.00	26.40	MPW
SU12-Bias 3 0-1	1429	8/22/2007	11:13	238.55	1461.29	4.39	0.35	0.00	2.11	0.00	25.90	MPW
SU12-Bias 3 1-2	1329	8/22/2007	11:30	238.57	1461.23	2.39	0.32	0.00	1.84	0.00	21.90	MPW
SU14-Bias 1 0-1	1471	8/22/2007	11:47	238.56	1461.29	15.57	0.61	0.00	3.45	0.00	43.20	MPW
SU14-Bias 1 1-2	1657	8/22/2007	12:04	238.55	1461.35	0.81	0.20	0.00	1.28	0.00	15.20	MPW
SU14-Bias 2 0-1	1799	8/22/2007	12:21	238.56	1461.30	1.40	0.21	0.00	1.25	0.00	15.20	MPW
SU14-Bias 2 1-2	1528	8/22/2007	12:38	238.60	1461.50	0.83	0.24	0.00	1.34	0.00	15.90	MPW
SU8-B17-1	1591	8/23/2007	9:45	238.53	1461.21	0.50	0.35	0.00	2.18	0.00	26.80	MPW
SU8-B17-2	1680	8/23/2007	10:05	238.56	1461.25	0.84	0.27	0.00	1.28	0.00	14.90	MPW
SU13-B18-1	1432	8/23/2007	10:27	238.52	1461.17	2.36	0.32	0.00	1.78	0.00	21.70	MPW
SU13-B18-2	1403	8/23/2007	10:50	238.54	1461.25	0.89	0.28	0.00	1.43	0.00	17.00	MPW
SU13-B18-3	1506	8/23/2007	11:09	238.53	1461.32	0.94	0.25	0.69	1.08	0.00	17.10	MPW
SU13-B19-1	1200	8/23/2007	11:33	238.59	1461.33	1.39	0.35	5.47	3.17	0.00	29.60	MPW

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU13-B20-1	1214	8/23/2007	11:50	238.60	1461.14	1.16	0.36	5.13	1.98	0.00	29.30	MPW
SU13-B20-2	1478	8/23/2007	12:07	238.58	1461.40	0.81	0.29	2.77	1.63	0.00	20.10	MPW
SU13-B21-1	1284	8/23/2007	13:59	238.62	1461.67	1.30	0.38	3.19	2.28	0.00	24.80	MPW
SU13-B21-2	1726	8/23/2007	14:19	238.58	1461.63	0.67	0.19	1.27	1.24	0.00	15.20	MPW
SU13-B22-1	1320	8/23/2007	14:44	238.62	1461.75	1.08	0.30	2.03	1.60	0.00	21.30	MPW
SU7-B25-1	1568	8/24/2007	8:38	238.52	1461.00	3.79	0.32	0.00	1.94	0.00	24.00	MPW
SU14-B23-1	1296	8/24/2007	8:59	238.55	1461.07	1.34	0.34	3.61	2.49	0.00	26.30	MPW
SU14-B23-2	1485	8/24/2007	9:19	238.53	1461.15	1.15	0.31	4.48	2.35	0.00	23.80	MPW
SU14-B24-1	1558	8/24/2007	9:36	238.52	1461.25	0.79	0.22	0.00	1.34	0.00	10.50	MPW
SU11-B26-1	1509	8/24/2007	9:53	238.54	1461.18	0.87	0.26	1.52	1.47	0.00	17.20	MPW
SU8-B27-1	1698	8/24/2007	10:10	238.55	1461.42	2.25	0.26	0.71	1.30	0.00	20.10	MPW
SU13-B28-1	1422	8/24/2007	10:28	238.56	1461.40	2.80	0.28	0.00	1.79	0.00	22.10	MPW
SU17-01-1	1594	8/29/2007	15:37	238.62	1461.75	1.44	0.17	0.00	1.43	0.00	17.10	MPW
SU17-02-1	1661	8/29/2007	16:00	238.62	1461.90	1.39	0.25	0.80	1.03	0.00	17.10	BMM
SU17-03-1	1395	8/29/2007	16:21	238.62	1461.82	1.27	0.23	0.00	1.47	0.00	17.20	MPW
SU17-04-1	1451	8/29/2007	16:53	238.51	1461.11	1.38	0.25	0.00	1.52	0.00	18.50	MPW
SU17-05-1	1608	8/29/2007	17:11	238.51	1461.15	1.18	0.24	1.62	1.41	0.00	16.40	BMM
SU17-06-1	1517	8/29/2007	17:33	238.55	1461.17	1.40	0.24	0.00	1.44	0.00	17.40	BMM
SU17-07-1	1477	8/29/2007	18:01	238.52	1461.06	1.58	0.25	1.11	1.24	0.00	18.40	BMM
SU17-08-1	1430	8/29/2007	18:19	238.50	1461.10	1.34	0.26	0.00	1.46	0.00	17.70	BMM
SU17-09-1	1558	8/29/2007	18:41	238.52	1461.04	1.25	0.28	0.00	1.43	0.00	17.10	BMM
SU17-10-1	1379	8/29/2007	18:58	238.52	1461.02	1.61	0.27	0.00	1.62	0.00	20.10	BMM
SU17-11-1	1609	8/29/2007	19:17	238.48	1460.92	1.20	0.23	0.00	1.38	0.00	16.30	BMM
SU17-12-1	1457	8/29/2007	19:36	238.44	1460.93	1.60	0.28	0.00	1.50	0.00	0.19	BMM
SU17-13-1	1493	8/29/2007	19:53	238.45	1460.70	1.41	0.33	1.05	1.60	0.00	18.60	BMM
SU17-14-1	1606	8/29/2007	20:11	238.47	1460.73	1.01	0.20	0.00	1.26	0.00	15.30	BMM
SU17-B29-1	1551	8/29/2007	20:30	238.45	1460.70	1.25	0.26	0.00	1.41	0.00	17.00	BMM
SU17-B30-1	1604	8/29/2007	20:53	238.44	1460.64	2.18	0.29	0.00	1.64	0.00	19.20	BMM
SU17-B31-1	1521	8/29/2007	21:12	238.46	1460.58	1.42	0.28	0.00	1.47	0.00	17.90	BMM
SU17-10-1-Dup	1414	8/29/2007	21:31	238.47	1460.56	1.30	0.28	0.00	1.47	0.00	18.50	BMM
SU17-14-1-Dup	1664	8/29/2007	21:49	238.43	1460.62	1.00	0.25	0.00	1.27	0.00	15.70	BMM
SU18-05-1	1609	9/5/2007	9:51	238.51	1461.12	1.26	0.23	0.00	1.36	0.00	16.30	MPW

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SU18-05-1 Dup	1327	9/5/2007	10:08	238.56	1461.10	1.29	0.27	0.00	1.48	0.00	18.50	MPW
SU18-08-1	1509	9/5/2007	10:26	238.49	1461.05	1.37	0.29	0.00	1.45	0.00	17.30	MPW
SU18-09-1	1559	9/5/2007	10:43	238.52	1461.10	1.15	0.26	0.00	1.44	0.00	16.80	MPW
SU18-10-1	1673	9/5/2007	11:02	238.55	1461.17	1.02	0.23	1.35	1.39	0.00	16.50	MPW
SU18-11-1	1509	9/5/2007	11:19	238.52	1461.16	1.01	0.25	0.00	1.47	0.00	17.80	MPW
SU18-12-1	1398	9/5/2007	11:37	238.53	1461.20	1.10	0.23	0.93	1.29	0.00	17.80	MPW
SU18-13-1	1597	9/5/2007	11:54	238.52	1461.08	1.14	0.23	0.00	1.36	0.00	16.60	MPW
SU18-13-1 Dup	1580	9/5/2007	12:11	238.51	1461.10	1.14	0.27	0.00	1.35	0.00	16.70	MPW
SU18-14-1	1552	9/5/2007	12:29	238.50	1461.02	1.17	0.23	0.00	1.40	0.00	16.80	MPW
SU18-01-1	1574	9/5/2007	12:56	238.53	1461.24	1.39	0.25	0.00	1.41	0.00	16.90	MPW
SU18-02-1	1498	9/5/2007	13:26	238.52	1461.22	1.17	0.23	1.26	1.34	0.00	16.80	MPW
SU18-03-1	1559	9/5/2007	14:21	238.51	1461.21	1.14	0.29	1.42	1.35	0.00	16.50	MPW
SU18-04-1	1438	9/5/2007	14:38	238.55	1461.42	1.59	0.25	0.00	1.57	0.00	19.10	MPW
SU18-06-1	1668	9/5/2007	14:56	238.52	1461.19	1.93	0.27	0.00	1.45	0.00	18.70	MPW
SU18-07-1	1363	9/5/2007	15:14	238.57	1461.37	1.07	0.22	0.00	1.41	0.00	17.00	MPW
SU4X-01-2	1520	9/6/2007	8:13	238.51	1461.12	1.42	0.26	1.34	1.33	0.00	18.80	MPW
SU4X-02-2	1547	9/6/2007	8:30	238.51	1461.05	1.15	0.24	0.00	1.41	0.00	16.70	MPW
SU4X-03-1	1373	9/6/2007	8:48	238.51	1461.20	14.79	0.59	0.00	3.58	0.00	44.60	MPW
SU4X-04-1	1563	9/6/2007	9:07	238.52	1461.18	1.62	0.28	0.00	1.52	0.00	18.20	MPW
SU4X-05-1	1639	9/6/2007	11:17	238.58	1461.49	22.52	0.68	0.00	3.94	0.00	49.70	MPW
SU18-B32-1	1786	9/7/2007	7:52	238.49	1460.95	34.09	0.76	0.00	4.53	0.00	57.40	MPW
SU3X-06-1	1555	9/7/2007	8:10	238.49	1460.88	19.20	0.64	0.00	3.72	0.00	47.10	MPW
SU3X-07-1	1571	9/7/2007	8:30	238.50	1461.01	11.57	0.48	0.00	2.90	0.00	36.50	MPW
SU18-B33-1	1679	9/10/2007	8:52	238.48	1460.85	1.53	0.26	1.56	1.12	0.00	17.80	MPW
SU12X008-3	1852	9/18/2007	8:13	238.53	1461.14	49.99	0.91	0.00	5.37	0.00	68.50	SK
SU12X009-	1801	9/18/2007	8:32	238.54	1461.26	5.93	0.33	0.81	1.09	0.00	26.40	SK
SU12X010-3	1815	9/18/2007	9:00	238.55	1461.08	66.05	1.11	7.57	8.85	0.00	76.80	SK
SU12X011-4	1766	9/18/2007	9:22	238.56	1461.17	21.02	0.63	3.61	4.07	0.00	47.00	SK
SU12X012-3	1982	9/18/2007	9:43	238.57	1461.31	17.28	0.54	0.00	3.21	0.00	40.20	SK
SU12X013-3	1578	9/18/2007	10:01	238.57	1461.31	60.73	0.71	5.06	8.31	0.00	78.50	SK
SU6X-016-2	1819	9/20/2007	17:33	238.53	1461.22	9.58	0.47	0.00	2.58	0.00	32.40	MPW
SU6X-014-2	1666	9/20/2007	18:02	238.54	1461.29	12.11	0.51	0.00	2.95	0.00	27.30	MPW

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SU6X-015-2	1734	9/20/2007	18:26	238.55	1461.22	10.24	0.41	0.00	2.70	0.00	33.40	MPW
SU11X-018-2	1866	9/21/2007	13:56	238.51	1461.12	26.88	0.47	5.50	5.47	0.00	50.30	MPW
SU06X-019-2	1788	9/21/2007	14:27	238.51	1461.02	8.62	0.40	0.00	2.53	0.00	31.10	MPW
SU06X-020-2	1729	9/21/2007	15:01	238.53	1461.23	2.44	0.31	0.00	1.92	0.00	23.50	MPW
SU11X-017-2	1898	9/21/2007	15:20	238.54	1461.18	7.25	0.37	0.00	2.24	0.00	27.80	MPW
SU7X-021-1	1675	9/25/2007	11:04	238.51	1460.95	60.92	0.98	0.00	6.06	0.00	76.80	MPW
SU7X-022-2	1511	9/25/2007	11:26	238.52	1460.65	137.80	1.61	6.61	8.24	0.00	115.00	MPW
SU6X-023-2	1623	9/25/2007	11:47	238.52	1461.05	26.09	0.69	0.00	4.33	0.00	54.20	MPW
SU6X-024-1	1519	9/25/2007	12:07	238.53	1461.20	18.19	0.24	0.00	1.46	0.00	18.30	MPW
SU7X-025-4	1545	9/25/2007	12:25	238.53	1461.15	23.72	0.72	5.19	5.42	0.00	50.10	MPW
SU7X-026-2	1755	9/25/2007	18:04	238.55	1461.21	30.87	0.64	0.00	4.43	0.00	55.60	MPW
SU7X-027-2	1871	9/26/2007	18:20	238.48	1460.82	28.94	0.67	3.03	3.47	0.00	51.70	MPW
SU7X-028-2	2053	9/26/2007	18:48	238.50	1460.94	23.31	0.41	0.00	3.57	0.00	45.00	MPW
SU7X-029-3	2087	9/26/2007	19:55	238.50	1461.09	5.28	0.35	0.00	1.88	0.00	23.30	MPW
SU7X-030-1	2036	9/26/2007	20:14	238.51	1461.08	44.65	0.52	6.15	6.73	0.00	60.90	MPW
SU7X-031-2	2061	9/26/2007	20:35	238.51	1461.09	19.58	0.49	0.00	3.35	0.00	41.80	MPW
SU7X-032-1	2062	9/27/2007	16:15	238.17	1461.34	15.18	0.44	0.00	2.94	0.00	37.60	MPW
SU7X-033-1	1916	9/27/2007	16:38	238.56	1461.37	10.28	0.42	1.24	1.68	0.00	31.50	MPW
SU7X-034-1	1794	9/27/2007	16:56	238.57	1461.29	2.41	0.32	0.00	1.58	0.00	19.30	MPW
SU7X-035-3	2134	9/27/2007	17:14	238.55	1461.32	22.46	0.37	3.67	3.71	0.00	42.70	MPW
SU7X-036-3	1975	9/27/2007	17:32	238.55	1461.08	69.99	1.00	5.52	5.53	0.00	76.80	MPW
SU7X-037-1	1970	9/27/2007	17:51	238.55	1461.29	25.25	0.58	2.45	2.78	0.00	48.30	MPW
SU7X-038-3	1684	10/1/2007	15:13	238.47	1460.94	0.84	0.19	1.17	1.86	0.00	15.60	MPW
SU7X-039-1	1750	10/1/2007	15:34	238.50	1460.92	26.32	0.77	0.00	4.15	0.00	52.30	MPW
SU7X-040-3	1824	10/1/2007	15:56	238.54	1461.05	2.60	0.30	0.00	1.62	0.00	18.70	MPW
SU7X-041-1	1829	10/1/2007	16:15	238.51	1461.01	23.56	0.67	0.00	3.83	0.00	47.80	MPW
SU7X-042-3	1760	10/1/2007	17:45	238.54	1460.98	0.85	0.23	0.72	1.20	0.00	16.10	MPW
SU7X-043-4	1411	10/1/2007	18:08	238.55	1461.23	1.38	0.28	1.48	1.91	0.00	21.40	MPW
SU7X-044-2	1943	10/1/2007	18:29	238.53	1461.11	7.02	0.32	0.00	2.19	0.00	27.50	MPW
SU7X-045-4	1905	10/2/2007	18:43	238.53	1461.08	42.34	0.74	4.10	4.31	0.00	56.80	MPW
SU7X-046-5	2026	10/2/2007	19:15	238.55	1461.21	31.00	0.58	0.00	4.10	0.00	52.00	MPW
SU7X-047-5	1381	10/3/2007	16:43	238.53	1461.12	1.34	0.25	0.00	1.73	0.00	20.10	MPW

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SU7X-048-5	1268	10/3/2007	17:10	238.54	1461.20	1.43	0.29	2.32	1.86	0.00	22.60	MPW
SU7X-049-5	1534	10/3/2007	17:33	238.50	1461.15	1.18	0.26	1.11	1.49	0.00	19.00	MPW
SU7X-050-1	1628	10/3/2007	17:59	238.52	1461.10	7.07	0.37	0.00	2.42	0.00	30.10	MPW
SU7X-051-1	1742	10/3/2007	18:15	238.52	1461.14	7.58	0.41	0.00	2.48	0.00	30.50	MPW
SU7X-052-4A	2195	10/4/2007	16:59	238.45	1458.99	2796.43	19.10	0.00	46.50	0.00	583.00	MPW
SU7X-052-4B	2715	10/4/2007	17:31	238.51	1459.41	623.01	4.97	0.00	18.70	0.00	240.00	MPW
SU7X-053-1	1347	10/5/2007	14:17	238.53	1461.20	1.74	0.30	2.91	2.25	0.00	22.10	MPW
SU7X-054-3	785	10/8/2007	9:34	238.54	1461.11	2.05	0.51	2.42	2.58	0.00	32.90	MPW
SU11X-055-3	1825	10/8/2007	14:00	238.55	1461.35	1.88	0.24	1.95	1.40	0.00	18.00	MPW
SU11X-056-3	1919	10/8/2007	14:20	238.56	1461.38	19.04	0.49	0.00	3.38	0.00	43.20	MPW
SU11X-057-3	1887	10/8/2007	14:37	238.60	1461.58	1.87	0.25	0.97	1.22	0.00	17.90	MPW
SU8X-058-3	1747	10/10/2007	12:53	238.50	1460.84	3.54	0.29	0.00	1.82	0.00	22.30	SK
SU8X-059-3	1492	10/11/2007	8:31	238.80	1460.40	85.66	1.38	22.96	11.10	0.00	96.70	JJW
SU11-219PR	1282	10/11/2007	9:15	238.52	1460.98	1.22	0.52	0.00	1.37	0.00	15.00	JJW
SU11-222PR	1323	10/11/2007	9:40	238.48	1461.09	0.77	0.22	0.00	1.31	0.00	15.10	JJW
SU11-230PR	1490	10/11/2007	10:21	238.50	1461.08	0.71	0.19	0.00	1.27	0.00	14.20	JJW
SU11-223PR	1550	10/11/2007	10:42	238.52	1461.04	0.00	0.48	1.06	1.21	0.00	14.30	JJW
SU11-231PR	1497	10/11/2007	11:10	238.53	1461.16	0.73	0.25	0.81	0.96	0.00	15.70	JJW
SU11-227PR	1392	10/11/2007	11:39	238.59	1461.08	0.70	0.16	0.00	1.24	0.00	14.70	JJW
SU11-235PR	1357	10/11/2007	12:14	238.51	1461.18	0.78	0.21	0.70	1.16	0.00	15.50	JJW
SU08X-060-3	1548	10/11/2007	13:09	238.52	1461.19	30.48	0.68	0.00	4.49	0.00	56.90	JJW
SU08X-061-4	1466	10/11/2007	13:29	238.52	1461.04	3.47	0.32	0.00	1.93	0.00	24.50	JJW
SU08X-062-4	1680	10/11/2007	14:44	238.50	1460.54	123.27	1.41	14.04	8.26	0.00	107.00	JJW
SU11-216PR	1532	10/11/2007	15:02	238.52	1461.27	0.88	0.25	0.68	1.20	0.00	15.10	JJW
SU11-226PR	1747	10/11/2007	8:32	238.54	1461.23	0.84	0.19	0.71	0.78	0.00	14.50	JJW
SU11-234PR	1355	10/11/2007	8:35	238.54	1461.22	1.01	0.24	0.00	1.37	0.00	16.80	JJW
SU11-217PR	1633	10/12/2007	8:07	238.51	1461.09	1.34	0.22	1.48	1.27	0.00	15.90	JJW
SU11-224PR	1347	10/12/2007	8:32	238.51	1461.09	0.88	0.24	0.85	1.53	0.00	17.80	JJW
SU11-232PR	1416	10/12/2007	8:48	238.52	1461.16	0.76	0.22	0.00	1.40	0.00	16.50	SK
SU08X-063	1576	10/12/2007	9:20	238.53	1461.07	5.75	0.38	1.47	1.99	0.00	28.40	SK
SU08X-064	1485	10/12/2007	9:51	238.53	1461.17	11.48	0.50	1.97	3.83	0.00	38.70	JJW
SU08X-065	1537	10/12/2007	10:12	238.55	1461.25	0.97	0.25	0.00	1.42	0.00	17.10	SK

Project Name: Great Lakes PPV
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU11-220PR	1506	10/12/2007	10:31	238.52	1461.09	0.74	0.22	0.00	1.29	0.00	15.80	SK
SU11-221PR	1645	10/12/2007	10:59	238.51	1461.16	0.75	0.16	1.07	1.32	0.00	14.90	SK
SU11-229PR	1619	10/12/2007	11:17	238.56	1461.17	0.79	0.20	0.00	1.21	0.00	14.30	SK
SU12-308PR	1657	10/12/2007	11:43	238.51	1461.23	0.87	0.21	0.54	0.93	0.00	13.70	SK
SU08X-066	1702	10/12/2007	12:27	238.53	1461.23	3.79	0.34	0.00	1.91	0.00	23.30	SK
SU11-228PR	1420	10/12/2007	14:16	238.52	1461.22	0.76	0.25	0.80	1.55	0.00	16.10	SK
SU11-218PR dup	1638	10/12/2007	14:35	238.60	1461.21	0.88	0.22	0.00	1.29	0.00	15.80	SK
SU11B-045PR	1551	10/12/2007	14:59	238.53	1461.16	0.72	0.24	0.84	1.22	0.00	16.20	MPW
SU11-218PR	1705	10/15/2007	8:06	238.53	1461.24	0.74	0.25	0.00	1.30	0.00	15.90	MPW
SU11-220PR	1576	10/15/2007	9:38	238.55	1461.25	0.84	0.23	0.00	1.33	0.00	15.50	MPW
SU11-225PR	1731	10/15/2007	10:15	238.55	1461.20	0.87	0.21	0.00	1.24	0.00	14.50	MPW
SU11-233PR	1525	10/15/2007	10:37	238.50	1461.23	0.82	0.24	0.00	1.35	0.00	16.00	MPW
SU08X-067-3	1744	10/15/2007	11:25	238.55	1461.26	7.10	0.42	0.00	2.39	0.00	29.30	MPW
SU08X-068-5	1728	10/15/2007	11:46	238.54	1461.24	10.24	0.45	0.00	2.86	0.00	35.00	MPW
SU08X-069-2	1786	10/15/2007	14:05	238.56	1461.30	1.49	0.25	0.00	1.40	0.00	16.80	MPW
SU08X-070-5	1677	10/15/2007	14:36	238.52	1461.30	8.37	0.39	0.00	2.56	0.00	32.00	MPW
SU08X-071-3	1745	10/16/2007	10:06	238.50	1461.03	3.16	0.30	0.00	1.78	0.00	21.80	MPW
SU08X-072-3	1725	10/16/2007	10:26	238.50	1461.04	3.65	0.32	0.00	1.83	0.00	22.30	MPW
SU08X-073-1	1698	10/17/2007	10:09	238.51	1460.90	1.10	0.27	0.00	1.38	0.00	16.40	MPW
SU08X-074-4	1219	10/17/2007	10:26	238.49	1460.91	3.11	0.37	0.00	2.13	0.00	25.50	MPW
SU08X-075-3	1826	10/17/2007	10:43	238.54	1460.98	1.03	0.17	0.00	1.28	0.00	15.20	MPW
SU08X-076-2	1610	10/17/2007	11:00	238.49	1460.96	2.94	0.30	0.95	1.93	0.00	22.10	MPW
SU08X-077-7	1757	10/17/2007	14:27	238.49	1460.90	3.40	0.31	0.00	1.74	0.00	21.40	MPW
SU08X-078-4	1605	10/19/2007	9:47	238.50	1460.82	4.44	0.35	0.00	2.03	0.00	24.70	MPW
SU08X-079-1	1760	10/19/2007	10:07	238.49	1460.98	34.69	0.84	5.11	6.63	0.00	60.10	MPW
SU08X-080-4	1627	10/19/2007	10:25	238.51	1461.02	1.62	0.27	1.13	1.15	0.00	18.40	MPW
SU08X-081-4	1691	10/19/2007	10:41	238.51	1460.95	2.72	0.28	0.00	1.70	0.00	20.90	MPW
SU08X-082-3	1489	10/19/2007	13:53	238.58	1461.04	2.43	0.34	2.27	1.83	0.00	22.30	MPW
SU08X-083-1	1614	10/23/2007	7:38	238.52	1461.02	1.37	0.25	0.00	1.41	0.00	16.80	MPW
SU08X-084-1	1509	10/23/2007	7:55	238.48	1461.01	3.81	0.32	0.00	1.98	0.00	24.30	MPW
SU08X-085-1	1470	10/23/2007	8:12	238.48	1461.02	4.14	0.36	0.00	2.06	0.00	24.70	MPW
SU08X-085-2	1197	10/23/2007	8:28	238.50	1461.05	4.74	0.38	0.00	2.39	0.00	29.00	MPW

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU08X-086-4	1546	10/23/2007	8:45	238.50	1460.98	4.15	0.35	1.45	1.72	0.00	25.30	MPW
SU08X-087-4	1281	10/23/2007	9:01	238.50	1461.07	5.65	0.38	1.85	2.49	0.00	29.50	MPW
SU08X-088-6	1706	11/1/2007	10:19	238.50	1460.70	1.41	0.25	0.00	1.47	0.00	17.70	MPW
SU08X-089-6	1751	11/1/2007	10:47	238.48	1460.78	2.42	0.27	0.00	1.61	0.00	19.50	MPW
SU08X-090-6	1545	11/1/2007	11:04	238.47	1460.86	1.88	0.31	1.20	1.32	0.00	19.20	MPW
SU08X-091-6	1539	11/1/2007	11:21	238.47	1460.87	2.94	0.34	0.00	1.82	0.00	22.50	MPW
SU06-108PR	1747	11/7/2007	13:58	238.52	1461.07	1.07	0.23	0.00	1.31	0.00	15.50	MPW
SU06-111PR	1950	11/7/2007	14:17	238.46	1461.04	0.84	0.17	0.00	1.13	0.00	13.10	MPW
SU06-113PR	1664	11/7/2007	14:34	238.52	1461.01	1.09	0.23	0.90	0.94	0.00	15.70	MPW
SU06-114PR	1715	11/7/2007	14:57	238.49	1460.99	0.85	0.21	0.00	1.24	0.00	14.80	MPW
SU06-117PR	1735	11/7/2007	15:14	238.51	1461.05	0.96	0.21	0.00	1.25	0.00	15.00	MPW
SU07-135PR	1627	11/7/2007	15:36	238.54	1460.98	0.81	0.24	0.00	1.31	0.00	15.40	MPW
SU07-143PR	1577	11/7/2007	15:53	238.49	1460.94	3.67	0.32	0.00	1.89	0.00	23.50	MPW
SU07-148PR	1662	11/7/2007	16:13	238.50	1460.99	0.99	0.21	0.88	1.23	0.00	15.30	MPW
SU08-157PR	1660	11/7/2007	16:29	238.47	1461.02	0.94	0.23	2.07	1.60	0.00	16.10	MPW
SU10-214PR	1750	11/7/2007	16:51	238.50	1461.15	1.53	0.23	0.00	1.35	0.00	16.80	MPW
SU6-7-8-Fill-A	1623	11/7/2007	17:09	238.50	1461.02	1.06	0.26	0.40	0.81	0.00	16.60	MPW
SU06B-034	1753	11/7/2007	17:51	238.50	1460.90	3.31	0.26	1.23	1.53	0.00	21.40	MPW
SU07-153PR	1871	11/8/2007	8:07	238.52	1460.94	0.79	0.17	0.00	1.13	0.00	13.70	MPW
SU08-156PR	1858	11/8/2007	8:24	238.53	1461.02	0.71	0.22	0.00	1.16	0.00	14.10	MPW
SU08-166PR	1619	11/8/2007	8:41	238.51	1460.96	0.70	0.21	1.08	1.16	0.00	15.60	MPW
SU10-Fill	1744	11/8/2007	8:57	238.53	1460.94	0.79	0.23	0.00	1.17	0.00	13.60	MPW
SU11-Fill	1658	11/8/2007	9:14	238.51	1461.01	0.80	0.22	0.00	1.26	0.00	15.20	MPW
SU6-7-8-Fill-B	1743	11/8/2007	9:36	238.51	1460.98	0.90	0.23	0.00	1.25	0.00	15.00	MPW
SU07B-035	1629	11/8/2007	10:31	238.49	1461.06	1.28	0.21	0.00	1.46	0.00	17.40	MPW
SU07B-036	1693	11/8/2007	10:57	238.52	1460.98	0.82	0.22	0.00	1.29	0.00	15.00	MPW
SU07B-037	1746	11/8/2007	11:14	238.52	1461.03	3.25	0.28	0.00	1.71	0.00	20.90	SK
SU10B-038	1786	11/8/2007	11:32	238.51	1461.01	3.20	0.27	0.00	1.70	0.00	21.10	SK
SU10B-039	1707	11/8/2007	11:52	238.49	1461.16	0.82	0.21	0.00	1.25	0.00	14.90	SK
SU10B-040	1976	11/8/2007	12:09	238.50	1461.05	1.43	0.25	0.69	1.13	0.00	15.80	MPW
SU10B-041PR	1764	11/12/2007	12:02	238.47	1460.91	1.77	0.30	0.00	1.42	0.00	17.70	SK
SU10B-042PR	1935	11/12/2007	12:37	238.50	1460.94	1.34	0.19	0.69	1.12	0.00	15.00	SK

Project Name: Great Lakes PPV
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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU8B-043PR	1136	11/12/2007	12:58	238.48	1460.91	1.57	0.35	0.00	1.85	0.00	21.60	SK
SU7B-044PR	1352	11/12/2007	13:17	238.49	1460.91	1.07	0.26	0.00	1.51	0.00	18.00	SK
SU7- 135PR FD	1668	11/12/2007	13:44	238.52	1461.06	0.87	0.25	0.00	1.24	0.00	14.70	SK
SU6-108PR FD	1448	11/12/2007	14:02	238.50	1461.04	1.22	0.25	0.00	1.42	0.00	17.20	SK
SU8-157PR FD	1352	11/12/2007	14:28	238.51	1461.03	1.13	0.25	1.24	1.24	0.00	18.10	SK
SU10-214PR FD	1570	11/12/2007	14:46	238.51	1460.99	1.64	0.28	0.00	1.54	0.00	18.90	SK
SU10-202 PR	1556	11/15/2007	15:33	238.42	1460.66	0.74	0.23	0.00	1.22	0.00	14.80	SK
SU3B-045 PR	1405	11/29/2007	11:04	238.47	1460.97	0.97	0.21	1.17	1.07	0.00	16.70	SK
SU3B-049 PR	1727	12/3/2007	12:57	238.47	1460.85	3.90	0.31	0.00	1.82	0.00	22.70	SK
SU3B-050 PR	1683	12/3/2007	13:23	238.45	1460.79	1.20	0.22	1.18	1.44	0.00	15.90	SK
SU3B-046 PR	1667	12/3/2007	13:44	238.45	1460.86	0.70	0.21	0.00	1.13	0.00	13.70	SK
SU4B-047 PR	1629	12/3/2007	14:02	238.45	1460.80	1.08	0.28	1.93	1.78	0.00	17.00	SK
SU3B-048 PR	1741	12/3/2007	14:22	238.44	1460.87	0.67	0.22	0.64	0.91	0.00	13.80	SK
SU5B-052 PR	1751	12/3/2007	14:41	238.46	1460.91	0.98	0.23	1.62	1.71	0.00	15.60	SK
SU4B-053 PR	1669	12/4/2007	7:56	238.49	1460.98	0.82	0.35	0.00	1.31	0.00	15.80	SK
SU5B-054 PR	1655	12/4/2007	8:36	238.50	1460.88	2.39	0.37	1.18	1.86	0.00	21.50	SK
SU1-IN 1	1773	12/4/2007	9:00	238.45	1460.95	0.45	0.45	0.00	2.96	0.00	36.60	SK
SU5B-051 PR	1545	12/4/2007	10:40	238.49	1460.88	1.01	0.21	0.00	1.43	0.00	16.70	SK
SU1-1-PR	1492	12/4/2007	11:00	238.51	1460.68	0.00	0.34	0.00	0.87	0.00	9.78	SK
SU1-2-PR	1639	12/4/2007	12:45	238.47	1460.66	0.42	0.16	0.00	0.97	0.00	11.20	SK
SU1-3-PR	1287	12/4/2007	13:13	238.36	1460.53	0.00	0.32	0.00	0.93	0.00	10.80	SK
SU1-4-PR	1445	12/4/2007	13:33	238.47	1460.90	0.00	0.30	0.00	0.75	0.00	9.25	SK
SU1-5-PR	1556	12/5/2007	7:45	238.38	1460.70	0.69	0.22	0.50	0.95	0.00	15.10	SK
SU1-8-PR	2185	12/5/2007	8:46	238.44	1460.74	0.00	0.20	0.00	0.53	0.00	6.47	SK
SU1-9-PR	1796	12/5/2007	9:10	238.42	1460.70	0.69	0.19	0.00	1.05	0.00	12.90	SK
SU1-7-PR	2074	12/5/2007	9:28	238.45	1460.71	0.69	0.19	0.00	1.01	0.00	12.00	SK
SU1-6-PR	1578	12/5/2007	9:49	238.39	1460.61	0.25	0.14	0.00	0.92	0.00	10.80	SK
SU1-10-PR	1662	12/5/2007	10:10	238.50	1460.63	0.38	0.16	0.00	0.90	0.00	11.50	SK
SU1-10-PR-FD	1594	12/5/2007	10:31	238.43	1460.74	0.35	0.14	0.00	0.90	0.00	11.30	SK
SU1-11-PR	1860	12/5/2007	11:08	238.48	1460.69	0.66	0.15	0.00	1.08	0.00	13.40	SK
SU1-14-PR	1370	12/5/2007	11:28	238.48	1460.65	0.99	0.27	1.36	1.61	0.00	17.30	SK
SU1-15-PR	1759	12/5/2007	11:46	238.44	1460.69	0.71	0.24	0.00	1.16	0.00	14.20	SK

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ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

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SU1-16-PR	1248	12/5/2007	12:10	238.53	1460.56	0.00	0.40	0.00	0.86	0.00	10.70	SK
SU1-13-PR	1665	12/5/2007	12:31	238.46	1460.76	0.00	0.34	0.00	0.91	0.00	10.80	SK
SU1-12-PR	1424	12/5/2007	12:49	238.35	1460.83	0.00	0.31	0.00	0.81	0.00	9.20	SK
SU1-17-PR	1940	12/5/2007	13:07	238.37	1460.69	0.41	0.15	0.00	0.95	0.00	11.30	SK
SU1-18-PR	1370	12/5/2007	13:24	238.43	1460.91	0.00	0.41	0.00	1.17	0.00	12.90	SK
SU1-19-PR	1570	12/5/2007	13:43	238.44	1460.80	0.82	0.21	0.00	1.26	0.00	14.90	SK
SU1-20-PR	1465	12/5/2007	14:01	238.50	1460.62	0.00	0.28	0.00	0.77	0.00	9.30	SK
SU1-20-PR-FD	1699	12/5/2007	14:20	238.44	1460.63	0.00	0.25	0.00	0.76	0.00	8.36	SK
SU1-21-PR	1193	12/5/2007	14:39	238.50	1460.67	0.00	0.47	0.00	1.11	0.00	13.60	SK
SU2-22-PR	1464	12/6/2007	10:27	238.56	1460.97	0.59	0.19	0.00	1.26	0.00	14.60	SK
SU2-23-PR	1626	12/6/2007	10:52	238.47	1460.85	0.34	0.18	0.00	0.90	0.00	10.20	SK
SU2-24-PR	1377	12/6/2007	11:09	238.45	1460.69	0.00	0.37	0.00	0.99	0.00	12.00	SK
SU2-26-PR	1543	12/6/2007	11:31	238.54	1460.86	0.74	0.24	0.82	1.04	0.00	14.00	SK
SU2-27-PR	1957	12/6/2007	11:50	238.48	1460.73	1.10	0.18	0.00	1.17	0.00	13.90	SK
SU2-29-PR	1548	12/6/2007	12:10	238.44	1460.76	0.00	0.34	0.00	0.88	0.00	9.77	SK
SU2-30-PR-FD	1781	12/6/2007	12:28	238.41	1460.69	0.66	0.23	0.58	0.92	0.00	13.10	SK
SU2-31-PR	1803	12/6/2007	12:49	238.45	1460.73	0.98	0.17	0.00	1.15	0.00	13.70	SK
SU2-32-PR	1432	12/6/2007	13:06	238.47	1460.57	1.16	0.29	0.64	0.90	0.00	16.90	SK
SU2-33-PR	2043	12/6/2007	13:26	238.55	1460.73	0.18	0.11	0.00	0.61	0.00	6.88	SK
SU2-34-PR	1514	12/6/2007	14:37	238.45	1460.68	0.63	0.18	0.00	1.10	0.00	13.00	SK
SU2-39-PR	1906	12/6/2007	14:54	238.43	1460.56	0.68	0.23	0.00	1.02	0.00	12.50	SK
SU2-41-PR	1905	12/7/2007	13:08	238.45	1460.82	1.23	0.19	0.00	1.12	0.00	14.20	SK
SU2-35-PR	1602	12/7/2007	7:20	238.45	1460.73	0.96	0.23	0.63	0.98	0.00	14.60	SK
SU2-36-PR	1719	12/7/2007	7:37	238.50	1460.82	0.95	0.20	0.00	1.21	0.00	14.40	SK
SU2-38-PR	1769	12/7/2007	7:56	238.51	1460.79	0.80	0.22	0.00	1.14	0.00	13.60	SK
SU2-28-PR	1724	12/7/2007	8:18	238.46	1460.75	0.56	0.17	0.00	0.99	0.00	11.40	SK
SU2-25-PR	1682	12/7/2007	8:36	238.51	1460.78	1.29	0.23	0.00	1.24	0.00	15.10	SK
SU2-30-PR	1876	12/7/2007	8:58	238.54	1460.83	0.79	0.21	0.00	1.06	0.00	13.10	SK
SU2-37-PR	1358	12/7/2007	9:16	238.47	1460.97	1.32	0.23	0.90	1.28	0.00	17.40	SK
SU2-40-PR	981	12/7/2007	9:34	238.51	1460.81	1.36	0.37	0.00	1.90	0.00	22.60	SK
SU2-40-PR-FD	1691	12/7/2007	9:51	238.42	146.88	1.07	0.23	0.00	1.24	0.00	15.10	SK
SU16-B55-W	1630	12/7/2007	10:09	238.49	1460.80	3.43	0.33	0.00	1.80	0.00	22.00	SK

Project Name: Great Lakes PPV
Project Number: 03-3040.30
Operator: Michael Withers

ONSITE GAMMA SPEC LAB SAMPLE ANALYSIS LOG

Sample ID	Sample Mass (g)	Date of Sample Count	Time of Sample Count	Low Peak Energy Trend (238.1- 239.1 or 351.4 - 352.4 keV)	High Peak Energy Trend (1460.3-1461.3 keV)	Ac-228 (Th-232) Result (pCi/g)	Ac-228 (Th-232) MDA (pCi/g)	Th-234 (U-238) Result (pCi/g)	Th-234 (U-238) MDA (pCi/g)	Th-230 Result (pCi/g)	Th-230 MDA (pCi/g)	Technician Initials
SU16-B56-S	1618	12/7/2007	10:27	238.47	1460.87	1.17	0.24	0.00	1.38	0.00	15.80	SK
SU16-B57-E	1721	12/7/2007	10:45	238.49	1460.88	3.62	0.30	0.00	1.77	0.00	21.70	SK
SU16-B58-N	1557	12/7/2007	11:03	238.51	1460.91	1.16	0.22	0.00	1.35	0.00	16.10	SK
SU1-B-59	1393	12/7/2007	11:22	238.49	1460.87	0.77	0.46	0.00	2.68	0.00	33.30	SK
SU16-X	1576	12/7/2007	11:54	238.48	1461.02	12.90	0.52	1.81	3.58	0.00	39.00	SK
SU16 Stockpile	1728	12/7/2007	12:31	238.53	1460.99	0.83	0.21	0.00	1.19	0.00	14.40	SK

APPENDIX D

CABRERA LABORATORY QUALITY CONTROL RESULTS

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

Full Parameter Results Report
2/29/08 10:45:43 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Peak energy (Cd-109 88 keV)
Parameter Units: keV
Parameter Type: Peak Search

Sample Start Date: 9/9/05 1:36:30 PM
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 8.8076E+001
Sample Std. Deviation: 1.3418E-002

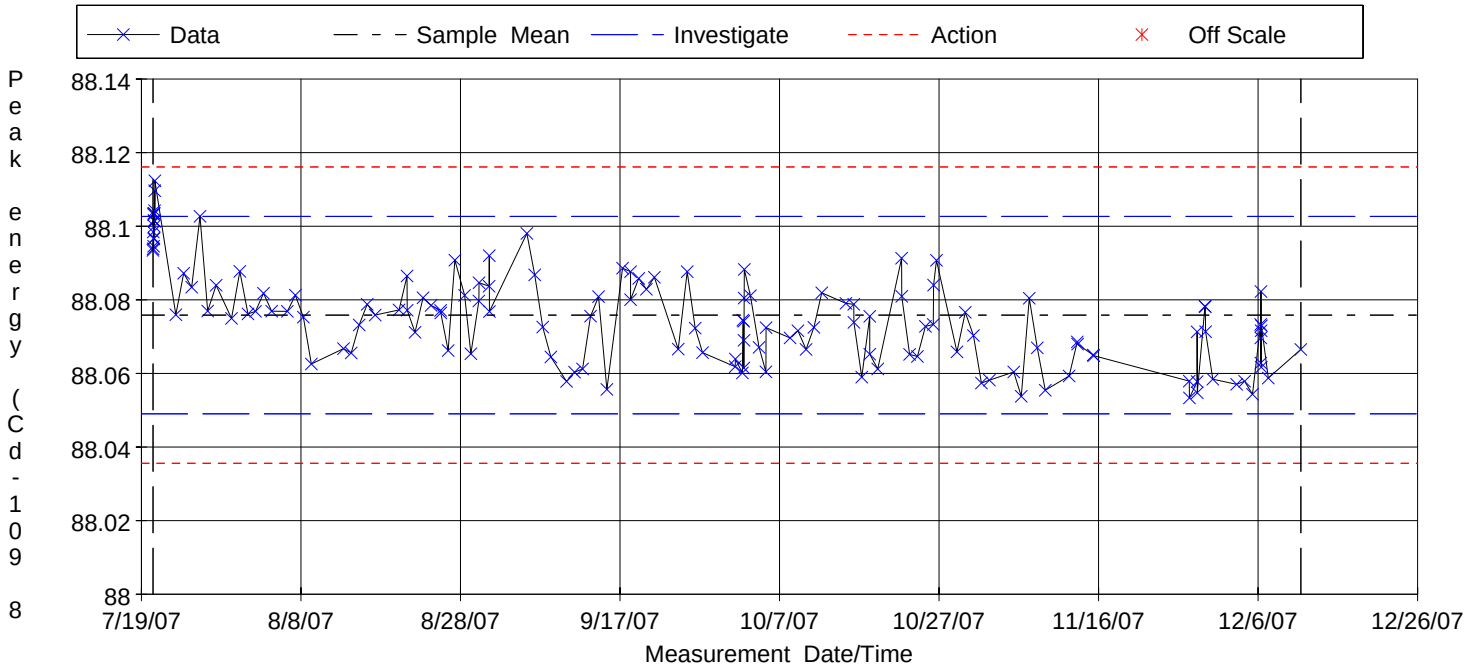
Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		8.8093E+001				
7/20/07 10:56:27 AM	QC		8.8094E+001				
7/20/07 11:34:14 AM	QC		8.8098E+001				
7/20/07 11:55:51 AM	QC		8.8103E+001		In		
7/20/07 12:17:12 PM	QC		8.8095E+001				
7/20/07 12:38:29 PM	QC		8.8103E+001		In		
7/20/07 12:59:33 PM	QC		8.8097E+001				
7/20/07 1:20:55 PM	QC		8.8097E+001				
7/20/07 1:43:10 PM	QC		8.8102E+001				
7/20/07 2:04:32 PM	QC		8.8100E+001				
7/20/07 2:25:38 PM	QC		8.8101E+001				
7/20/07 2:47:02 PM	QC		8.8103E+001		In		
7/20/07 3:08:38 PM	QC		8.8104E+001		In		
7/20/07 3:33:45 PM	QC		8.8110E+001		In		
7/20/07 3:54:55 PM	QC		8.8101E+001				
7/20/07 4:16:09 PM	QC		8.8112E+001		In		
7/23/07 7:26:34 AM	Daily QC		8.8076E+001				
7/24/07 6:48:52 AM	Daily QC		8.8087E+001				
7/25/07 6:56:23 AM	QC		8.8083E+001				
7/26/07 7:55:08 AM	QC		8.8103E+001		In		
7/27/07 6:54:22 AM	QC		8.8077E+001				
7/28/07 8:38:28 AM	QC		8.8084E+001				
7/30/07 6:58:07 AM	QC		8.8075E+001				
7/31/07 7:47:59 AM	QC		8.8088E+001				
8/1/07 8:15:19 AM	QC		8.8076E+001				
8/2/07 6:52:46 AM	QC		8.8077E+001				
8/3/07 7:08:25 AM	QC		8.8082E+001				
8/4/07 7:28:48 AM	QC		8.8077E+001				
8/6/07 6:43:50 AM	QC		8.8077E+001				
8/7/07 6:51:05 AM	QC		8.8081E+001				
8/8/07 6:58:13 AM	QC		8.8075E+001				
8/9/07 6:58:26 AM	QC		8.8063E+001				
8/13/07 7:47:07 AM	QC		8.8067E+001				
8/14/07 6:52:03 AM	QC		8.8066E+001				
8/15/07 7:02:37 AM	QC		8.8073E+001				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		8.8079E+001				
8/17/07 7:05:30 AM	QC		8.8076E+001				
8/20/07 6:59:44 AM	QC		8.8077E+001				
8/21/07 7:07:37 AM	QC		8.8086E+001				
8/21/07 7:36:40 AM	QC		8.8077E+001				
8/22/07 7:06:27 AM	QC		8.8071E+001				
8/23/07 7:03:15 AM	QC		8.8081E+001				
8/24/07 7:05:52 AM	QC		8.8078E+001				
8/25/07 12:12:56 PM	QC		8.8077E+001				
8/25/07 12:38:42 PM	QC		8.8076E+001				
8/26/07 10:32:00 AM	QC		8.8066E+001				
8/27/07 7:07:36 AM	QC		8.8091E+001				
8/28/07 12:12:13 PM	QC		8.8081E+001				
8/29/07 7:01:19 AM	QC		8.8065E+001				
8/30/07 7:12:35 AM	QC		8.8080E+001				
8/30/07 7:46:41 AM	QC		8.8085E+001				
8/31/07 1:46:55 PM	QC		8.8084E+001				
8/31/07 2:22:22 PM	QC		8.8092E+001				
8/31/07 2:53:34 PM	QC		8.8077E+001				
9/5/07 7:45:17 AM	QC		8.8098E+001				
9/6/07 7:02:54 AM	QC		8.8087E+001				
9/7/07 7:05:09 AM	QC		8.8073E+001				
9/8/07 7:52:16 AM	QC		8.8064E+001				
9/10/07 7:04:47 AM	QC		8.8058E+001				
9/11/07 6:58:49 AM	QC		8.8060E+001				
9/12/07 7:16:50 AM	QC		8.8061E+001				
9/13/07 7:03:29 AM	QC		8.8076E+001				
9/14/07 7:04:42 AM	QC		8.8081E+001				
9/15/07 8:12:46 AM	QC		8.8056E+001				
9/17/07 7:18:59 AM	QC		8.8089E+001				
9/18/07 7:17:50 AM	QC		8.8088E+001				
9/18/07 7:42:34 AM	QC		8.8080E+001				
9/19/07 7:53:32 AM	QC		8.8086E+001				
9/20/07 7:00:08 AM	QC		8.8083E+001				
9/21/07 7:01:56 AM	QC		8.8086E+001				
9/24/07 7:13:56 AM	QC		8.8067E+001				
9/25/07 10:09:04 AM	QC		8.8088E+001				
9/26/07 10:08:34 AM	QC		8.8072E+001				
9/27/07 8:25:30 AM	QC		8.8066E+001				
10/1/07 10:28:21 AM	QC		8.8062E+001				
10/1/07 11:02:27 AM	QC		8.8064E+001				
10/2/07 8:07:16 AM	QC		8.8060E+001				
10/2/07 9:16:58 AM	QC		8.8074E+001				
10/2/07 11:59:15 AM	QC		8.8074E+001				
10/2/07 12:32:52 PM	QC		8.8061E+001				
10/2/07 12:54:21 PM	QC		8.8069E+001				
10/2/07 1:17:15 PM	QC		8.8080E+001				
10/2/07 1:38:27 PM	QC		8.8088E+001				
10/3/07 8:00:16 AM	QC		8.8081E+001				
10/4/07 10:17:07 AM	QC		8.8067E+001				
10/5/07 6:56:23 AM	QC		8.8060E+001				
10/5/07 7:29:23 AM	QC		8.8072E+001				
10/8/07 7:24:18 AM	QC		8.8070E+001				
10/9/07 7:11:30 AM	QC		8.8072E+001				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		8.8067E+001				
10/11/07 7:28:01 AM	QC		8.8072E+001				
10/12/07 7:02:06 AM	QC		8.8082E+001				
10/15/07 7:19:15 AM	QC		8.8079E+001				
10/16/07 7:02:32 AM	QC		8.8079E+001				
10/16/07 7:44:23 AM	QC		8.8074E+001				
10/17/07 7:26:27 AM	QC		8.8059E+001				
10/18/07 7:04:39 AM	QC		8.8075E+001				
10/18/07 7:31:43 AM	QC		8.8065E+001				
10/19/07 7:25:27 AM	QC		8.8061E+001				
10/22/07 7:08:05 AM	QC		8.8091E+001				
10/22/07 7:35:40 AM	QC		8.8081E+001				
10/23/07 7:06:19 AM	QC		8.8065E+001				
10/24/07 6:38:19 AM	QC		8.8065E+001				
10/25/07 6:37:37 AM	QC		8.8073E+001				
10/26/07 6:38:38 AM	QC		8.8073E+001				
10/26/07 7:10:20 AM	QC		8.8084E+001				
10/26/07 4:15:30 PM	QC		8.8091E+001				
10/29/07 5:33:03 AM	QC		8.8066E+001				
10/30/07 6:32:53 AM	QC		8.8077E+001				
10/31/07 7:06:11 AM	QC		8.8070E+001				
11/1/07 7:09:36 AM	QC		8.8057E+001				
11/2/07 7:20:09 AM	QC		8.8058E+001				
11/5/07 8:36:15 AM	QC		8.8060E+001				
11/6/07 7:09:18 AM	QC		8.8054E+001				
11/7/07 7:15:45 AM	QC		8.8080E+001				
11/8/07 7:22:12 AM	QC		8.8067E+001				
11/9/07 7:21:05 AM	QC		8.8055E+001				
11/12/07 7:11:07 AM	QC		8.8059E+001				
11/13/07 7:57:24 AM	QC		8.8069E+001				
11/13/07 8:33:03 AM	QC		8.8068E+001				
11/15/07 7:31:29 AM	QC		8.8065E+001				
11/15/07 9:24:25 AM	QC		8.8065E+001				
11/27/07 8:36:51 AM	QC		8.8058E+001				
11/27/07 9:06:06 AM	QC		8.8053E+001				
11/28/07 8:05:52 AM	QC		8.8058E+001				
11/28/07 8:32:08 AM	QC		8.8071E+001				
11/28/07 8:54:15 AM	QC		8.8055E+001				
11/29/07 7:41:05 AM	QC		8.8078E+001				
11/29/07 8:44:19 AM	QC		8.8078E+001				
11/29/07 9:46:03 AM	QC		8.8071E+001				
11/30/07 7:24:19 AM	QC		8.8058E+001				
12/3/07 7:01:53 AM	QC		8.8057E+001				
12/4/07 7:22:26 AM	QC		8.8058E+001				
12/5/07 6:57:03 AM	QC		8.8054E+001				
12/6/07 7:17:58 AM	QC		8.8073E+001				
12/6/07 7:45:10 AM	QC		8.8063E+001				
12/6/07 8:10:19 AM	QC		8.8070E+001				
12/6/07 8:32:29 AM	QC		8.8082E+001				
12/6/07 8:55:35 AM	QC		8.8072E+001				
12/6/07 9:25:13 AM	QC		8.8062E+001				
12/6/07 9:57:51 AM	QC		8.8073E+001				
12/7/07 6:36:11 AM	QC		8.8059E+001				
12/11/07 8:06:46 AM	QC		8.8066E+001				

Flags Key:

LU	= Lower/Upper Bounds Test	(Ab = Above, Be = Below)
SD	= Sample Driven N-Sigma Test	(In = Investigate, Ac = Action)
UD	= User Driven N-Sigma Test	(In = Investigate, Ac = Action)
BS	= Measurement Bias Test	(In = Investigate, Ac = Action)



QA Filename : C:\GENIE2K\CAMFILES\Great Lakes Cd-Co.QAF
Parameter Description : Peak energy (Cd-109 88 keV) (keV)
Selection Dates : 7/20/07 10:29:49 AM - 12/11/07 8:06:46 AM
Sample Mean +/- Std Dev : 88.076 +/- 0.013

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

Full Parameter Results Report
2/29/08 10:40:57 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Peak FWHM (Cd-109 88.0 keV)
Parameter Units: keV
Parameter Type: Peak Search

Sample Start Date: 9/9/05 1:36:30 PM
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 9.0248E-001
Sample Std. Deviation: 2.1600E-002

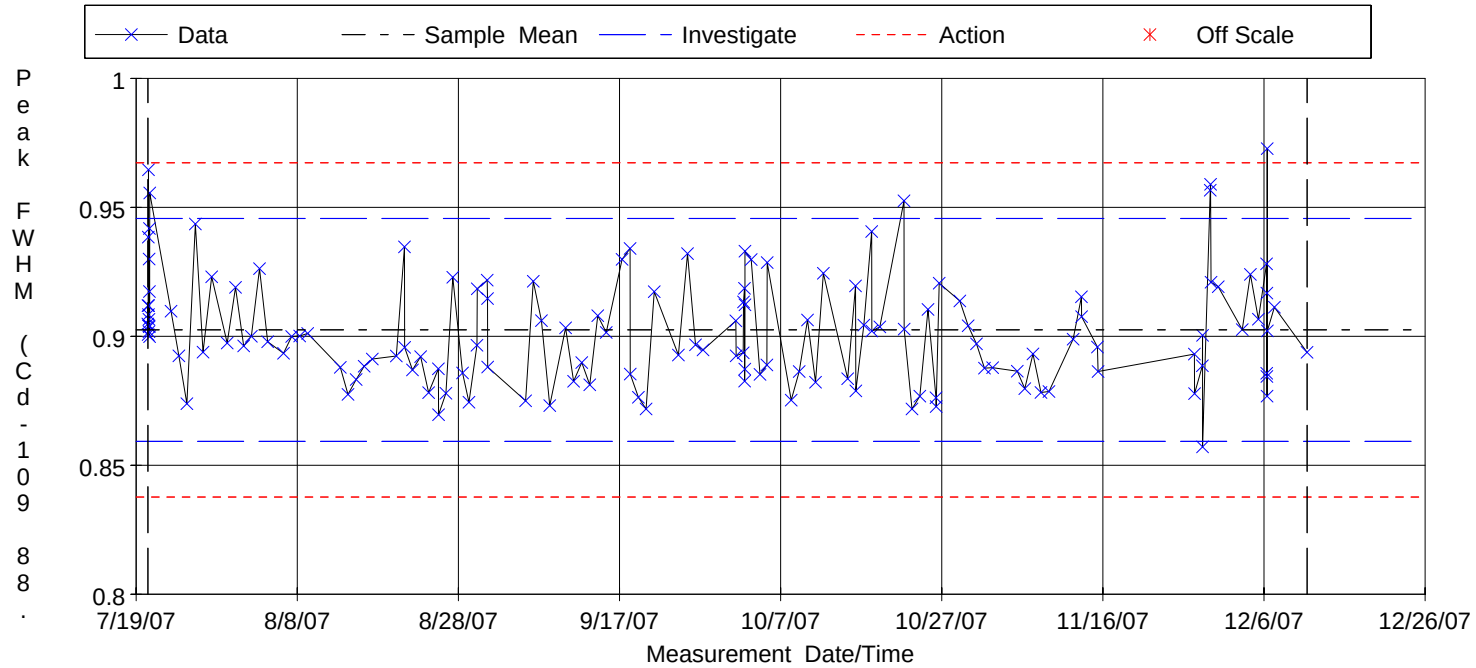
Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		9.0473E-001				
7/20/07 10:56:27 AM	QC		9.1188E-001				
7/20/07 11:34:14 AM	QC		9.0063E-001				
7/20/07 11:55:51 AM	QC		9.3843E-001				
7/20/07 12:17:12 PM	QC		9.0840E-001				
7/20/07 12:38:29 PM	QC		9.6455E-001		In		
7/20/07 12:59:33 PM	QC		9.1187E-001				
7/20/07 1:20:55 PM	QC		9.0409E-001				
7/20/07 1:43:10 PM	QC		9.0655E-001				
7/20/07 2:04:32 PM	QC		9.0178E-001				
7/20/07 2:25:38 PM	QC		9.2996E-001				
7/20/07 2:47:02 PM	QC		9.0369E-001				
7/20/07 3:08:38 PM	QC		9.1732E-001				
7/20/07 3:33:45 PM	QC		9.4176E-001				
7/20/07 3:54:55 PM	QC		8.9987E-001				
7/20/07 4:16:09 PM	QC		9.5557E-001		In		
7/23/07 7:26:34 AM	Daily QC		9.0972E-001				
7/24/07 6:48:52 AM	Daily QC		8.9239E-001				
7/25/07 6:56:23 AM	QC		8.7386E-001				
7/26/07 7:55:08 AM	QC		9.4349E-001				
7/27/07 6:54:22 AM	QC		8.9381E-001				
7/28/07 8:38:28 AM	QC		9.2307E-001				
7/30/07 6:58:07 AM	QC		8.9739E-001				
7/31/07 7:47:59 AM	QC		9.1897E-001				
8/1/07 8:15:19 AM	QC		8.9624E-001				
8/2/07 6:52:46 AM	QC		8.9999E-001				
8/3/07 7:08:25 AM	QC		9.2622E-001				
8/4/07 7:28:48 AM	QC		8.9786E-001				
8/6/07 6:43:50 AM	QC		8.9342E-001				
8/7/07 6:51:05 AM	QC		8.9988E-001				
8/8/07 6:58:13 AM	QC		9.0007E-001				
8/9/07 6:58:26 AM	QC		9.0110E-001				
8/13/07 7:47:07 AM	QC		8.8792E-001				
8/14/07 6:52:03 AM	QC		8.7743E-001				
8/15/07 7:02:37 AM	QC		8.8325E-001				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		8.8836E-001				
8/17/07 7:05:30 AM	QC		8.9118E-001				
8/20/07 6:59:44 AM	QC		8.9233E-001				
8/21/07 7:07:37 AM	QC		9.3467E-001				
8/21/07 7:36:40 AM	QC		8.9570E-001				
8/22/07 7:06:27 AM	QC		8.8693E-001				
8/23/07 7:03:15 AM	QC		8.9207E-001				
8/24/07 7:05:52 AM	QC		8.7812E-001				
8/25/07 12:12:56 PM	QC		8.8741E-001				
8/25/07 12:38:42 PM	QC		8.6955E-001				
8/26/07 10:32:00 AM	QC		8.7791E-001				
8/27/07 7:07:36 AM	QC		9.2284E-001				
8/28/07 12:12:13 PM	QC		8.8579E-001				
8/29/07 7:01:19 AM	QC		8.7442E-001				
8/30/07 7:12:35 AM	QC		8.9650E-001				
8/30/07 7:46:41 AM	QC		9.1842E-001				
8/31/07 1:46:55 PM	QC		9.2175E-001				
8/31/07 2:22:22 PM	QC		9.1458E-001				
8/31/07 2:53:34 PM	QC		8.8805E-001				
9/5/07 7:45:17 AM	QC		8.7499E-001				
9/6/07 7:02:54 AM	QC		9.2134E-001				
9/7/07 7:05:09 AM	QC		9.0604E-001				
9/8/07 7:52:16 AM	QC		8.7313E-001				
9/10/07 7:04:47 AM	QC		9.0329E-001				
9/11/07 6:58:49 AM	QC		8.8253E-001				
9/12/07 7:16:50 AM	QC		8.8977E-001				
9/13/07 7:03:29 AM	QC		8.8117E-001				
9/14/07 7:04:42 AM	QC		9.0795E-001				
9/15/07 8:12:46 AM	QC		9.0145E-001				
9/17/07 7:18:59 AM	QC		9.2981E-001				
9/18/07 7:17:50 AM	QC		9.3402E-001				
9/18/07 7:42:34 AM	QC		8.8532E-001				
9/19/07 7:53:32 AM	QC		8.7635E-001				
9/20/07 7:00:08 AM	QC		8.7183E-001				
9/21/07 7:01:56 AM	QC		9.1726E-001				
9/24/07 7:13:56 AM	QC		8.9268E-001				
9/25/07 10:09:04 AM	QC		9.3201E-001				
9/26/07 10:08:34 AM	QC		8.9667E-001				
9/27/07 8:25:30 AM	QC		8.9470E-001				
10/1/07 10:28:21 AM	QC		9.0596E-001				
10/1/07 11:02:27 AM	QC		8.9243E-001				
10/2/07 8:07:16 AM	QC		8.9357E-001				
10/2/07 9:16:58 AM	QC		9.1328E-001				
10/2/07 11:59:15 AM	QC		9.1859E-001				
10/2/07 12:32:52 PM	QC		8.8261E-001				
10/2/07 12:54:21 PM	QC		8.8727E-001				
10/2/07 1:17:15 PM	QC		9.1219E-001				
10/2/07 1:38:27 PM	QC		9.3295E-001				
10/3/07 8:00:16 AM	QC		9.2973E-001				
10/4/07 10:17:07 AM	QC		8.8523E-001				
10/5/07 6:56:23 AM	QC		8.8886E-001				
10/5/07 7:29:23 AM	QC		9.2859E-001				
10/8/07 7:24:18 AM	QC		8.7519E-001				
10/9/07 7:11:30 AM	QC		8.8634E-001				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		9.0628E-001				
10/11/07 7:28:01 AM	QC		8.8216E-001				
10/12/07 7:02:06 AM	QC		9.2443E-001				
10/15/07 7:19:15 AM	QC		8.8356E-001				
10/16/07 7:02:32 AM	QC		9.1952E-001				
10/16/07 7:44:23 AM	QC		8.7882E-001				
10/17/07 7:26:27 AM	QC		9.0431E-001				
10/18/07 7:04:39 AM	QC		9.4062E-001				
10/18/07 7:31:43 AM	QC		9.0203E-001				
10/19/07 7:25:27 AM	QC		9.0360E-001				
10/22/07 7:08:05 AM	QC		9.5251E-001	In			
10/22/07 7:35:40 AM	QC		9.0278E-001				
10/23/07 7:06:19 AM	QC		8.7183E-001				
10/24/07 6:38:19 AM	QC		8.7677E-001				
10/25/07 6:37:37 AM	QC		9.1036E-001				
10/26/07 6:38:38 AM	QC		8.7612E-001				
10/26/07 7:10:20 AM	QC		8.7274E-001				
10/26/07 4:15:30 PM	QC		9.2056E-001				
10/29/07 5:33:03 AM	QC		9.1369E-001				
10/30/07 6:32:53 AM	QC		9.0407E-001				
10/31/07 7:06:11 AM	QC		8.9706E-001				
11/1/07 7:09:36 AM	QC		8.8761E-001				
11/2/07 7:20:09 AM	QC		8.8781E-001				
11/5/07 8:36:15 AM	QC		8.8645E-001				
11/6/07 7:09:18 AM	QC		8.7971E-001				
11/7/07 7:15:45 AM	QC		8.9312E-001				
11/8/07 7:22:12 AM	QC		8.7822E-001				
11/9/07 7:21:05 AM	QC		8.7856E-001				
11/12/07 7:11:07 AM	QC		8.9882E-001				
11/13/07 7:57:24 AM	QC		9.1529E-001				
11/13/07 8:33:03 AM	QC		9.0763E-001				
11/15/07 7:31:29 AM	QC		8.9582E-001				
11/15/07 9:24:25 AM	QC		8.8632E-001				
11/27/07 8:36:51 AM	QC		8.9307E-001				
11/27/07 9:06:06 AM	QC		8.7775E-001				
11/28/07 8:05:52 AM	QC		8.8857E-001				
11/28/07 8:32:08 AM	QC		9.0031E-001				
11/28/07 8:54:15 AM	QC		8.5710E-001	In			
11/29/07 7:41:05 AM	QC		9.5658E-001	In			
11/29/07 8:44:19 AM	QC		9.5893E-001	In			
11/29/07 9:46:03 AM	QC		9.2091E-001				
11/30/07 7:24:19 AM	QC		9.1921E-001				
12/3/07 7:01:53 AM	QC		9.0260E-001				
12/4/07 7:22:26 AM	QC		9.2399E-001				
12/5/07 6:57:03 AM	QC		9.0661E-001				
12/6/07 7:17:58 AM	QC		9.2806E-001				
12/6/07 7:45:10 AM	QC		8.8566E-001				
12/6/07 8:10:19 AM	QC		8.8440E-001				
12/6/07 8:32:29 AM	QC		9.1670E-001				
12/6/07 8:55:35 AM	QC		8.7676E-001				
12/6/07 9:25:13 AM	QC		9.7275E-001		Ac		
12/6/07 9:57:51 AM	QC		9.0209E-001				
12/7/07 6:36:11 AM	QC		9.1125E-001				
12/11/07 8:06:46 AM	QC		8.9378E-001				

Flags Key:

LU	= Lower/Upper Bounds Test	(Ab = Above, Be = Below)
SD	= Sample Driven N-Sigma Test	(In = Investigate, Ac = Action)
UD	= User Driven N-Sigma Test	(In = Investigate, Ac = Action)
BS	= Measurement Bias Test	(In = Investigate, Ac = Action)



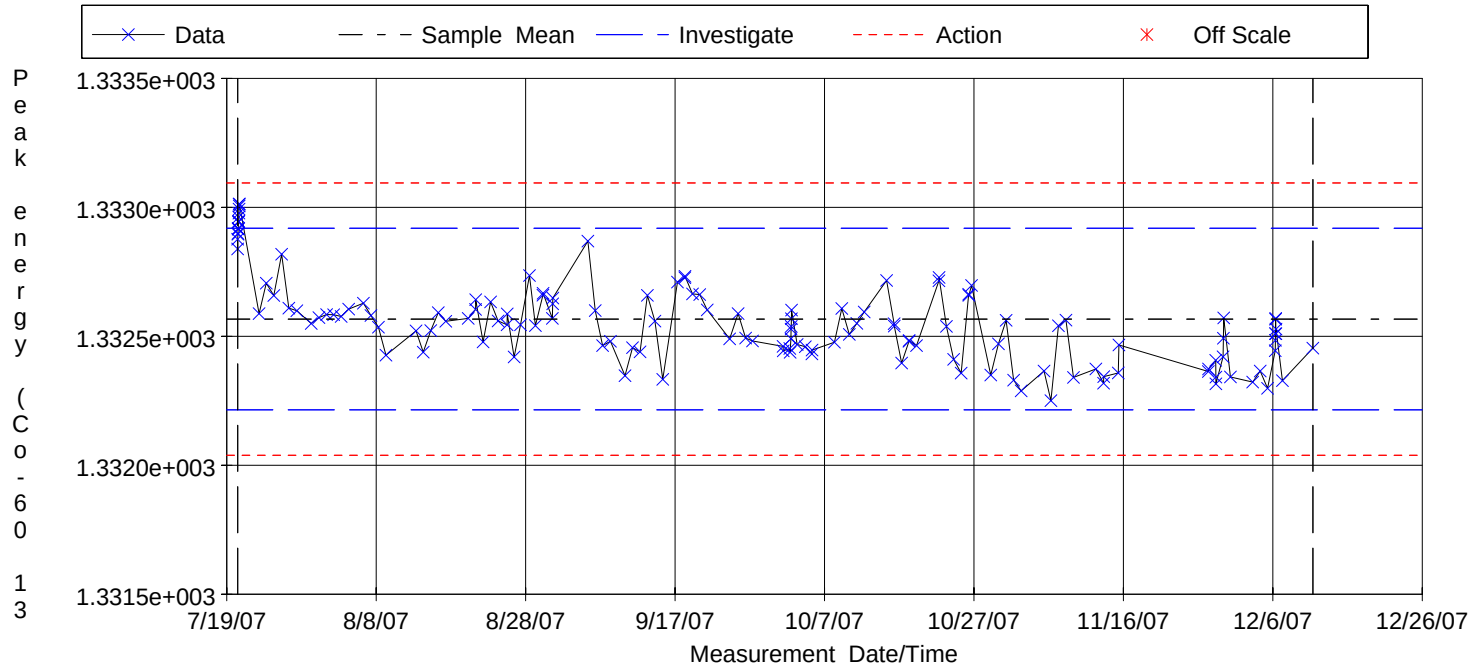
QA Filename : C:\GENIE2K\CAMFILES\Great Lakes Cd-Co.QAF
Parameter Description : Peak FWHM (Cd-109 88.0 keV) (keV)
Selection Dates : 7/20/07 10:29:49 AM - 12/11/07 8:06:46 AM
Sample Mean +/- Std Dev : 0.902 +/- 0.022

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		1.3326E+003				
8/17/07 7:05:30 AM	QC		1.3326E+003				
8/20/07 6:59:44 AM	QC		1.3326E+003				
8/21/07 7:07:37 AM	QC		1.3326E+003				
8/21/07 7:36:40 AM	QC		1.3326E+003				
8/22/07 7:06:27 AM	QC		1.3325E+003				
8/23/07 7:03:15 AM	QC		1.3326E+003				
8/24/07 7:05:52 AM	QC		1.3326E+003				
8/25/07 12:12:56 PM	QC		1.3325E+003				
8/25/07 12:38:42 PM	QC		1.3326E+003				
8/26/07 10:32:00 AM	QC		1.3324E+003				
8/27/07 7:07:36 AM	QC		1.3325E+003				
8/28/07 12:12:13 PM	QC		1.3327E+003				
8/29/07 7:01:19 AM	QC		1.3325E+003				
8/30/07 7:12:35 AM	QC		1.3327E+003				
8/30/07 7:46:41 AM	QC		1.3327E+003				
8/31/07 1:46:55 PM	QC		1.3326E+003				
8/31/07 2:22:22 PM	QC		1.3326E+003				
8/31/07 2:53:34 PM	QC		1.3326E+003				
9/5/07 7:45:17 AM	QC		1.3329E+003				
9/6/07 7:02:54 AM	QC		1.3326E+003				
9/7/07 7:05:09 AM	QC		1.3325E+003				
9/8/07 7:52:16 AM	QC		1.3325E+003				
9/10/07 7:04:47 AM	QC		1.3323E+003				
9/11/07 6:58:49 AM	QC		1.3325E+003				
9/12/07 7:16:50 AM	QC		1.3324E+003				
9/13/07 7:03:29 AM	QC		1.3327E+003				
9/14/07 7:04:42 AM	QC		1.3326E+003				
9/15/07 8:12:46 AM	QC		1.3323E+003				
9/17/07 7:18:59 AM	QC		1.3327E+003				
9/18/07 7:17:50 AM	QC		1.3327E+003				
9/18/07 7:42:34 AM	QC		1.3327E+003				
9/19/07 7:53:32 AM	QC		1.3327E+003				
9/20/07 7:00:08 AM	QC		1.3327E+003				
9/21/07 7:01:56 AM	QC		1.3326E+003				
9/24/07 7:13:56 AM	QC		1.3325E+003				
9/25/07 10:09:04 AM	QC		1.3326E+003				
9/26/07 10:08:34 AM	QC		1.3325E+003				
9/27/07 8:25:30 AM	QC		1.3325E+003				
10/1/07 10:28:21 AM	QC		1.3325E+003				
10/1/07 11:02:27 AM	QC		1.3324E+003				
10/2/07 8:07:16 AM	QC		1.3325E+003				
10/2/07 9:16:58 AM	QC		1.3324E+003				
10/2/07 11:59:15 AM	QC		1.3325E+003				
10/2/07 12:32:52 PM	QC		1.3325E+003				
10/2/07 12:54:21 PM	QC		1.3325E+003				
10/2/07 1:17:15 PM	QC		1.3326E+003				
10/2/07 1:38:27 PM	QC		1.3326E+003				
10/3/07 8:00:16 AM	QC		1.3325E+003				
10/4/07 10:17:07 AM	QC		1.3325E+003				
10/5/07 6:56:23 AM	QC		1.3324E+003				
10/5/07 7:29:23 AM	QC		1.3324E+003				
10/8/07 7:24:18 AM	QC		1.3325E+003				
10/9/07 7:11:30 AM	QC		1.3326E+003				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		1.3325E+003				
10/11/07 7:28:01 AM	QC		1.3325E+003				
10/12/07 7:02:06 AM	QC		1.3326E+003				
10/15/07 7:19:15 AM	QC		1.3327E+003				
10/16/07 7:02:32 AM	QC		1.3325E+003				
10/16/07 7:44:23 AM	QC		1.3325E+003				
10/17/07 7:26:27 AM	QC		1.3324E+003				
10/18/07 7:04:39 AM	QC		1.3325E+003				
10/18/07 7:31:43 AM	QC		1.3325E+003				
10/19/07 7:25:27 AM	QC		1.3325E+003				
10/22/07 7:08:05 AM	QC		1.3327E+003				
10/22/07 7:35:40 AM	QC		1.3327E+003				
10/23/07 7:06:19 AM	QC		1.3325E+003				
10/24/07 6:38:19 AM	QC		1.3324E+003				
10/25/07 6:37:37 AM	QC		1.3324E+003				
10/26/07 6:38:38 AM	QC		1.3327E+003				
10/26/07 7:10:20 AM	QC		1.3327E+003				
10/26/07 4:15:30 PM	QC		1.3327E+003				
10/29/07 5:33:03 AM	QC		1.3323E+003				
10/30/07 6:32:53 AM	QC		1.3325E+003				
10/31/07 7:06:11 AM	QC		1.3326E+003				
11/1/07 7:09:36 AM	QC		1.3323E+003				
11/2/07 7:20:09 AM	QC		1.3323E+003				
11/5/07 8:36:15 AM	QC		1.3324E+003				
11/6/07 7:09:18 AM	QC		1.3323E+003				
11/7/07 7:15:45 AM	QC		1.3325E+003				
11/8/07 7:22:12 AM	QC		1.3326E+003				
11/9/07 7:21:05 AM	QC		1.3323E+003				
11/12/07 7:11:07 AM	QC		1.3324E+003				
11/13/07 7:57:24 AM	QC		1.3323E+003				
11/13/07 8:33:03 AM	QC		1.3323E+003				
11/15/07 7:31:29 AM	QC		1.3324E+003				
11/15/07 9:24:25 AM	QC		1.3325E+003				
11/27/07 8:36:51 AM	QC		1.3324E+003				
11/27/07 9:06:06 AM	QC		1.3324E+003				
11/28/07 8:05:52 AM	QC		1.3324E+003				
11/28/07 8:32:08 AM	QC		1.3323E+003				
11/28/07 8:54:15 AM	QC		1.3323E+003				
11/29/07 7:41:05 AM	QC		1.3324E+003				
11/29/07 8:44:19 AM	QC		1.3325E+003				
11/29/07 9:46:03 AM	QC		1.3326E+003				
11/30/07 7:24:19 AM	QC		1.3323E+003				
12/3/07 7:01:53 AM	QC		1.3323E+003				
12/4/07 7:22:26 AM	QC		1.3324E+003				
12/5/07 6:57:03 AM	QC		1.3323E+003				
12/6/07 7:17:58 AM	QC		1.3324E+003				
12/6/07 7:45:10 AM	QC		1.3325E+003				
12/6/07 8:10:19 AM	QC		1.3325E+003				
12/6/07 8:32:29 AM	QC		1.3326E+003				
12/6/07 8:55:35 AM	QC		1.3326E+003				
12/6/07 9:25:13 AM	QC		1.3325E+003				
12/6/07 9:57:51 AM	QC		1.3325E+003				
12/7/07 6:36:11 AM	QC		1.3323E+003				
12/11/07 8:06:46 AM	QC		1.3325E+003				

Flags Key:

LU	= Lower/Upper Bounds Test	(Ab = Above, Be = Below)
SD	= Sample Driven N-Sigma Test	(In = Investigate, Ac = Action)
UD	= User Driven N-Sigma Test	(In = Investigate, Ac = Action)
BS	= Measurement Bias Test	(In = Investigate, Ac = Action)



QA Filename : C:\GENIE2K\CAMFILES\Great Lakes Cd-Co.QAF
Parameter Description : Peak energy (Co-60 1332 keV) (keV)
Selection Dates : 7/20/07 10:29:49 AM - 12/11/07 8:06:46 AM
Sample Mean +/- Std Dev : 1332.567 +/- 0.176

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

Full Parameter Results Report
2/29/08 10:46:04 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Peak energy (Co-60 1332 keV)
Parameter Units: keV
Parameter Type: Peak Search

Sample Start Date: 9/9/05 1:36:30 PM
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 1.3326E+003
Sample Std. Deviation: 1.7604E-001

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		1.3328E+003				
7/20/07 10:56:27 AM	QC		1.3329E+003				
7/20/07 11:34:14 AM	QC		1.3329E+003				
7/20/07 11:55:51 AM	QC		1.3329E+003				
7/20/07 12:17:12 PM	QC		1.3329E+003				
7/20/07 12:38:29 PM	QC		1.3329E+003				
7/20/07 12:59:33 PM	QC		1.3329E+003				
7/20/07 1:20:55 PM	QC		1.3329E+003	In			
7/20/07 1:43:10 PM	QC		1.3329E+003	In			
7/20/07 2:04:32 PM	QC		1.3329E+003	In			
7/20/07 2:25:38 PM	QC		1.3330E+003	In			
7/20/07 2:47:02 PM	QC		1.3330E+003	In			
7/20/07 3:08:38 PM	QC		1.3330E+003	In			
7/20/07 3:33:45 PM	QC		1.3330E+003	In			
7/20/07 3:54:55 PM	QC		1.3330E+003	In			
7/20/07 4:16:09 PM	QC		1.3330E+003	In			
7/23/07 7:26:34 AM	Daily QC		1.3326E+003				
7/24/07 6:48:52 AM	Daily QC		1.3327E+003				
7/25/07 6:56:23 AM	QC		1.3327E+003				
7/26/07 7:55:08 AM	QC		1.3328E+003				
7/27/07 6:54:22 AM	QC		1.3326E+003				
7/28/07 8:38:28 AM	QC		1.3326E+003				
7/30/07 6:58:07 AM	QC		1.3325E+003				
7/31/07 7:47:59 AM	QC		1.3326E+003				
8/1/07 8:15:19 AM	QC		1.3326E+003				
8/2/07 6:52:46 AM	QC		1.3326E+003				
8/3/07 7:08:25 AM	QC		1.3326E+003				
8/4/07 7:28:48 AM	QC		1.3326E+003				
8/6/07 6:43:50 AM	QC		1.3326E+003				
8/7/07 6:51:05 AM	QC		1.3326E+003				
8/8/07 6:58:13 AM	QC		1.3325E+003				
8/9/07 6:58:26 AM	QC		1.3324E+003				
8/13/07 7:47:07 AM	QC		1.3325E+003				
8/14/07 6:52:03 AM	QC		1.3324E+003				
8/15/07 7:02:37 AM	QC		1.3325E+003				

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

Full Parameter Results Report
2/29/08 10:45:17 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Peak FWHM (Co-60 1332 keV))
Parameter Units: keV
Parameter Type: Peak Search

Sample Start Date: 9/9/05 1:36:30 PM
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 2.2012E+000
Sample Std. Deviation: 7.6436E-002

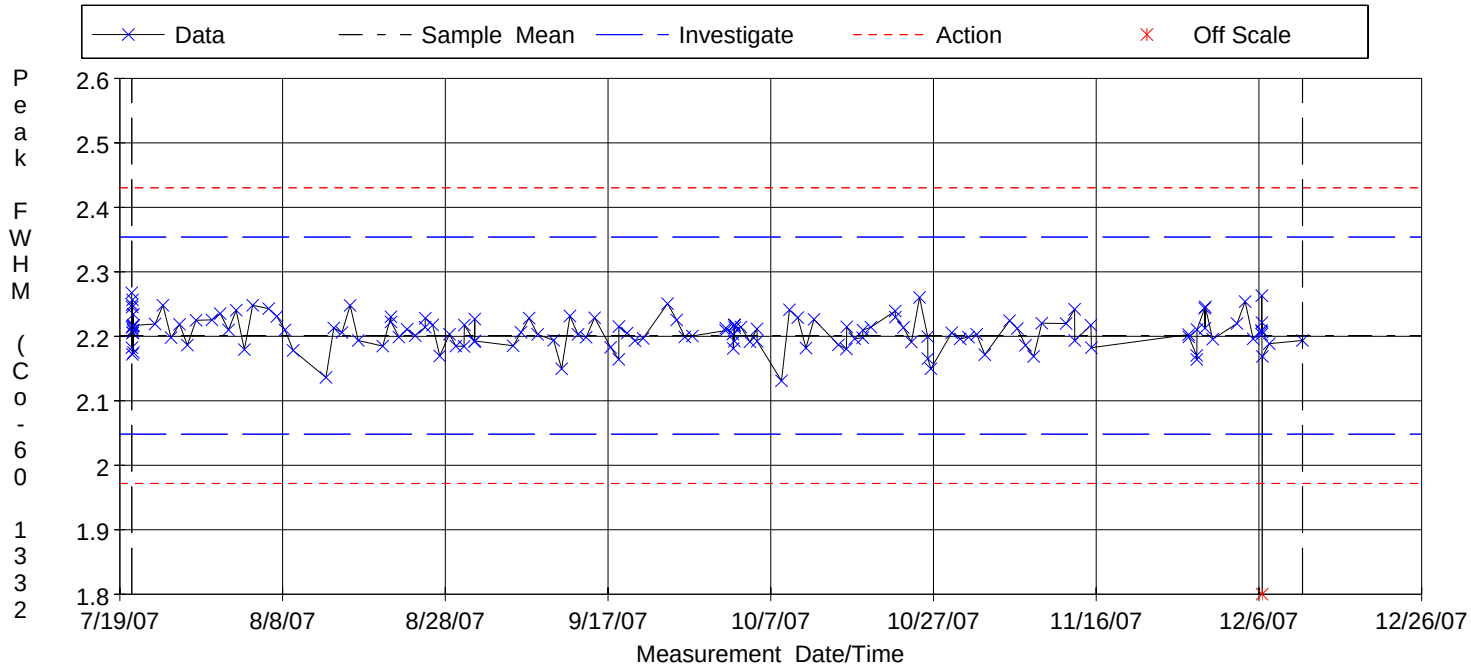
Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		2.2674E+000				
7/20/07 10:56:27 AM	QC		2.1823E+000				
7/20/07 11:34:14 AM	QC		2.2136E+000				
7/20/07 11:55:51 AM	QC		2.2487E+000				
7/20/07 12:17:12 PM	QC		2.2453E+000				
7/20/07 12:38:29 PM	QC		2.1718E+000				
7/20/07 12:59:33 PM	QC		2.2566E+000				
7/20/07 1:20:55 PM	QC		2.2153E+000				
7/20/07 1:43:10 PM	QC		2.2050E+000				
7/20/07 2:04:32 PM	QC		2.2056E+000				
7/20/07 2:25:38 PM	QC		2.2163E+000				
7/20/07 2:47:02 PM	QC		2.2092E+000				
7/20/07 3:08:38 PM	QC		2.2095E+000				
7/20/07 3:33:45 PM	QC		2.2342E+000				
7/20/07 3:54:55 PM	QC		2.1748E+000				
7/20/07 4:16:09 PM	QC		2.2167E+000				
7/23/07 7:26:34 AM	Daily QC		2.2190E+000				
7/24/07 6:48:52 AM	Daily QC		2.2480E+000				
7/25/07 6:56:23 AM	QC		2.1980E+000				
7/26/07 7:55:08 AM	QC		2.2184E+000				
7/27/07 6:54:22 AM	QC		2.1863E+000				
7/28/07 8:38:28 AM	QC		2.2246E+000				
7/30/07 6:58:07 AM	QC		2.2254E+000				
7/31/07 7:47:59 AM	QC		2.2352E+000				
8/1/07 8:15:19 AM	QC		2.2099E+000				
8/2/07 6:52:46 AM	QC		2.2404E+000				
8/3/07 7:08:25 AM	QC		2.1792E+000				
8/4/07 7:28:48 AM	QC		2.2480E+000				
8/6/07 6:43:50 AM	QC		2.2428E+000				
8/7/07 6:51:05 AM	QC		2.2306E+000				
8/8/07 6:58:13 AM	QC		2.2099E+000				
8/9/07 6:58:26 AM	QC		2.1780E+000				
8/13/07 7:47:07 AM	QC		2.1360E+000				
8/14/07 6:52:03 AM	QC		2.2128E+000				
8/15/07 7:02:37 AM	QC		2.2059E+000				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		2.2478E+000				
8/17/07 7:05:30 AM	QC		2.1933E+000				
8/20/07 6:59:44 AM	QC		2.1846E+000				
8/21/07 7:07:37 AM	QC		2.2303E+000				
8/21/07 7:36:40 AM	QC		2.2223E+000				
8/22/07 7:06:27 AM	QC		2.1986E+000				
8/23/07 7:03:15 AM	QC		2.2109E+000				
8/24/07 7:05:52 AM	QC		2.2007E+000				
8/25/07 12:12:56 PM	QC		2.2139E+000				
8/25/07 12:38:42 PM	QC		2.2280E+000				
8/26/07 10:32:00 AM	QC		2.2174E+000				
8/27/07 7:07:36 AM	QC		2.1695E+000				
8/28/07 12:12:13 PM	QC		2.2031E+000				
8/29/07 7:01:19 AM	QC		2.1847E+000				
8/30/07 7:12:35 AM	QC		2.1842E+000				
8/30/07 7:46:41 AM	QC		2.2174E+000				
8/31/07 1:46:55 PM	QC		2.1917E+000				
8/31/07 2:22:22 PM	QC		2.2268E+000				
8/31/07 2:53:34 PM	QC		2.1926E+000				
9/5/07 7:45:17 AM	QC		2.1853E+000				
9/6/07 7:02:54 AM	QC		2.2060E+000				
9/7/07 7:05:09 AM	QC		2.2281E+000				
9/8/07 7:52:16 AM	QC		2.2029E+000				
9/10/07 7:04:47 AM	QC		2.1938E+000				
9/11/07 6:58:49 AM	QC		2.1494E+000				
9/12/07 7:16:50 AM	QC		2.2314E+000				
9/13/07 7:03:29 AM	QC		2.2029E+000				
9/14/07 7:04:42 AM	QC		2.1983E+000				
9/15/07 8:12:46 AM	QC		2.2286E+000				
9/17/07 7:18:59 AM	QC		2.1828E+000				
9/18/07 7:17:50 AM	QC		2.1642E+000				
9/18/07 7:42:34 AM	QC		2.2150E+000				
9/19/07 7:53:32 AM	QC		2.2048E+000				
9/20/07 7:00:08 AM	QC		2.1931E+000				
9/21/07 7:01:56 AM	QC		2.1967E+000				
9/24/07 7:13:56 AM	QC		2.2505E+000				
9/25/07 10:09:04 AM	QC		2.2252E+000				
9/26/07 10:08:34 AM	QC		2.1989E+000				
9/27/07 8:25:30 AM	QC		2.2004E+000				
10/1/07 10:28:21 AM	QC		2.2089E+000				
10/1/07 11:02:27 AM	QC		2.2125E+000				
10/2/07 8:07:16 AM	QC		2.2033E+000				
10/2/07 9:16:58 AM	QC		2.1811E+000				
10/2/07 11:59:15 AM	QC		2.2168E+000				
10/2/07 12:32:52 PM	QC		2.1925E+000				
10/2/07 12:54:21 PM	QC		2.2173E+000				
10/2/07 1:17:15 PM	QC		2.2178E+000				
10/2/07 1:38:27 PM	QC		2.2133E+000				
10/3/07 8:00:16 AM	QC		2.2143E+000				
10/4/07 10:17:07 AM	QC		2.1913E+000				
10/5/07 6:56:23 AM	QC		2.2113E+000				
10/5/07 7:29:23 AM	QC		2.1922E+000				
10/8/07 7:24:18 AM	QC		2.1310E+000				
10/9/07 7:11:30 AM	QC		2.2410E+000				

Measurement Time	Sample ID	Analyst	Value (keV)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		2.2289E+000				
10/11/07 7:28:01 AM	QC		2.1817E+000				
10/12/07 7:02:06 AM	QC		2.2261E+000				
10/15/07 7:19:15 AM	QC		2.1867E+000				
10/16/07 7:02:32 AM	QC		2.1803E+000				
10/16/07 7:44:23 AM	QC		2.2144E+000				
10/17/07 7:26:27 AM	QC		2.1961E+000				
10/18/07 7:04:39 AM	QC		2.1977E+000				
10/18/07 7:31:43 AM	QC		2.2097E+000				
10/19/07 7:25:27 AM	QC		2.2140E+000				
10/22/07 7:08:05 AM	QC		2.2391E+000				
10/22/07 7:35:40 AM	QC		2.2296E+000				
10/23/07 7:06:19 AM	QC		2.2134E+000				
10/24/07 6:38:19 AM	QC		2.1910E+000				
10/25/07 6:37:37 AM	QC		2.2602E+000				
10/26/07 6:38:38 AM	QC		2.1994E+000				
10/26/07 7:10:20 AM	QC		2.1651E+000				
10/26/07 4:15:30 PM	QC		2.1494E+000				
10/29/07 5:33:03 AM	QC		2.2053E+000				
10/30/07 6:32:53 AM	QC		2.1959E+000				
10/31/07 7:06:11 AM	QC		2.1985E+000				
11/1/07 7:09:36 AM	QC		2.2028E+000				
11/2/07 7:20:09 AM	QC		2.1713E+000				
11/5/07 8:36:15 AM	QC		2.2242E+000				
11/6/07 7:09:18 AM	QC		2.2119E+000				
11/7/07 7:15:45 AM	QC		2.1861E+000				
11/8/07 7:22:12 AM	QC		2.1686E+000				
11/9/07 7:21:05 AM	QC		2.2203E+000				
11/12/07 7:11:07 AM	QC		2.2197E+000				
11/13/07 7:57:24 AM	QC		2.2418E+000				
11/13/07 8:33:03 AM	QC		2.1935E+000				
11/15/07 8:11:21 AM	QC		2.2173E+000				
11/15/07 9:24:25 AM	QC		2.1822E+000				
11/27/07 8:36:51 AM	QC		2.2026E+000				
11/27/07 9:06:06 AM	QC		2.1989E+000				
11/28/07 8:05:52 AM	QC		2.1701E+000				
11/28/07 8:32:08 AM	QC		2.1638E+000				
11/28/07 8:54:15 AM	QC		2.2103E+000				
11/29/07 7:41:05 AM	QC		2.2434E+000				
11/29/07 8:44:19 AM	QC		2.2126E+000				
11/29/07 9:46:03 AM	QC		2.2454E+000				
11/30/07 7:24:19 AM	QC		2.1954E+000				
12/3/07 7:01:53 AM	QC		2.2198E+000				
12/4/07 7:22:26 AM	QC		2.2536E+000				
12/5/07 6:57:03 AM	QC		2.1960E+000				
12/6/07 7:17:58 AM	QC		2.2090E+000				
12/6/07 7:45:10 AM	QC		2.2029E+000				
12/6/07 8:10:19 AM	QC		2.2628E+000				
12/6/07 8:32:29 AM	QC		2.2069E+000				
12/6/07 8:55:35 AM	QC		2.2211E+000				
12/6/07 9:25:13 AM	QC		1.3431E+000		Ac		
12/6/07 9:57:51 AM	QC		2.1685E+000				
12/7/07 6:36:11 AM	QC		2.1884E+000				
12/11/07 8:06:46 AM	QC		2.1935E+000				

Flags Key:

LU	= Lower/Upper Bounds Test	(Ab = Above, Be = Below)
SD	= Sample Driven N-Sigma Test	(In = Investigate, Ac = Action)
UD	= User Driven N-Sigma Test	(In = Investigate, Ac = Action)
BS	= Measurement Bias Test	(In = Investigate, Ac = Action)



QA Filename : C:\GENIE2K\CAMFILES\Great Lakes Cd-Co.QAF
Parameter Description : Peak FWHM (Co-60 1332 keV)) (keV)
Selection Dates : 7/20/07 10:29:49 AM - 12/11/07 8:06:46 AM
Sample Mean +/- Std Dev : 2.201 +/- 0.076

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

Full Parameter Results Report
2/29/08 10:47:01 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Decay Corrected Cd-109 Activity
Parameter Units: uCi
Parameter Type: Energy line

Sample Start Date:
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 3.2476E-001
Sample Std. Deviation: 1.9874E-002

Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		3.5990E-001				
7/20/07 10:56:27 AM	QC		3.5844E-001				
7/20/07 11:34:14 AM	QC		3.5547E-001				
7/20/07 11:55:51 AM	QC		3.5350E-001				
7/20/07 12:17:12 PM	QC		3.5398E-001				
7/20/07 12:38:29 PM	QC		3.5258E-001				
7/20/07 12:59:33 PM	QC		3.5341E-001				
7/20/07 1:20:55 PM	QC		3.5112E-001				
7/20/07 1:43:10 PM	QC		3.5838E-001				
7/20/07 2:04:32 PM	QC		3.5613E-001				
7/20/07 2:25:38 PM	QC		3.4763E-001				
7/20/07 2:47:02 PM	QC		3.5213E-001				
7/20/07 3:08:38 PM	QC		3.5439E-001				
7/20/07 3:33:45 PM	QC		3.4409E-001				
7/20/07 3:54:55 PM	QC		3.5976E-001				
7/20/07 4:16:09 PM	QC		3.5095E-001				
7/23/07 7:26:34 AM	Daily QC		3.5067E-001				
7/24/07 6:48:52 AM	Daily QC		3.5030E-001				
7/25/07 6:56:23 AM	QC		3.5159E-001				
7/26/07 7:55:08 AM	QC		3.4724E-001				
7/27/07 6:54:22 AM	QC		3.4652E-001				
7/28/07 8:38:28 AM	QC		3.4800E-001				
7/30/07 6:58:07 AM	QC		3.5395E-001				
7/31/07 7:47:59 AM	QC		3.3705E-001				
8/1/07 8:15:19 AM	QC		3.4266E-001				
8/2/07 6:52:46 AM	QC		3.5339E-001				
8/3/07 7:08:25 AM	QC		3.4512E-001				
8/4/07 7:28:48 AM	QC		3.4758E-001				
8/6/07 6:43:50 AM	QC		3.3683E-001				
8/7/07 6:51:05 AM	QC		3.4309E-001				
8/8/07 6:58:13 AM	QC		3.3534E-001				
8/9/07 6:58:26 AM	QC		3.4718E-001				
8/13/07 7:47:07 AM	QC		3.3009E-001				
8/14/07 6:52:03 AM	QC		3.5047E-001				
8/15/07 7:02:37 AM	QC		3.4922E-001				

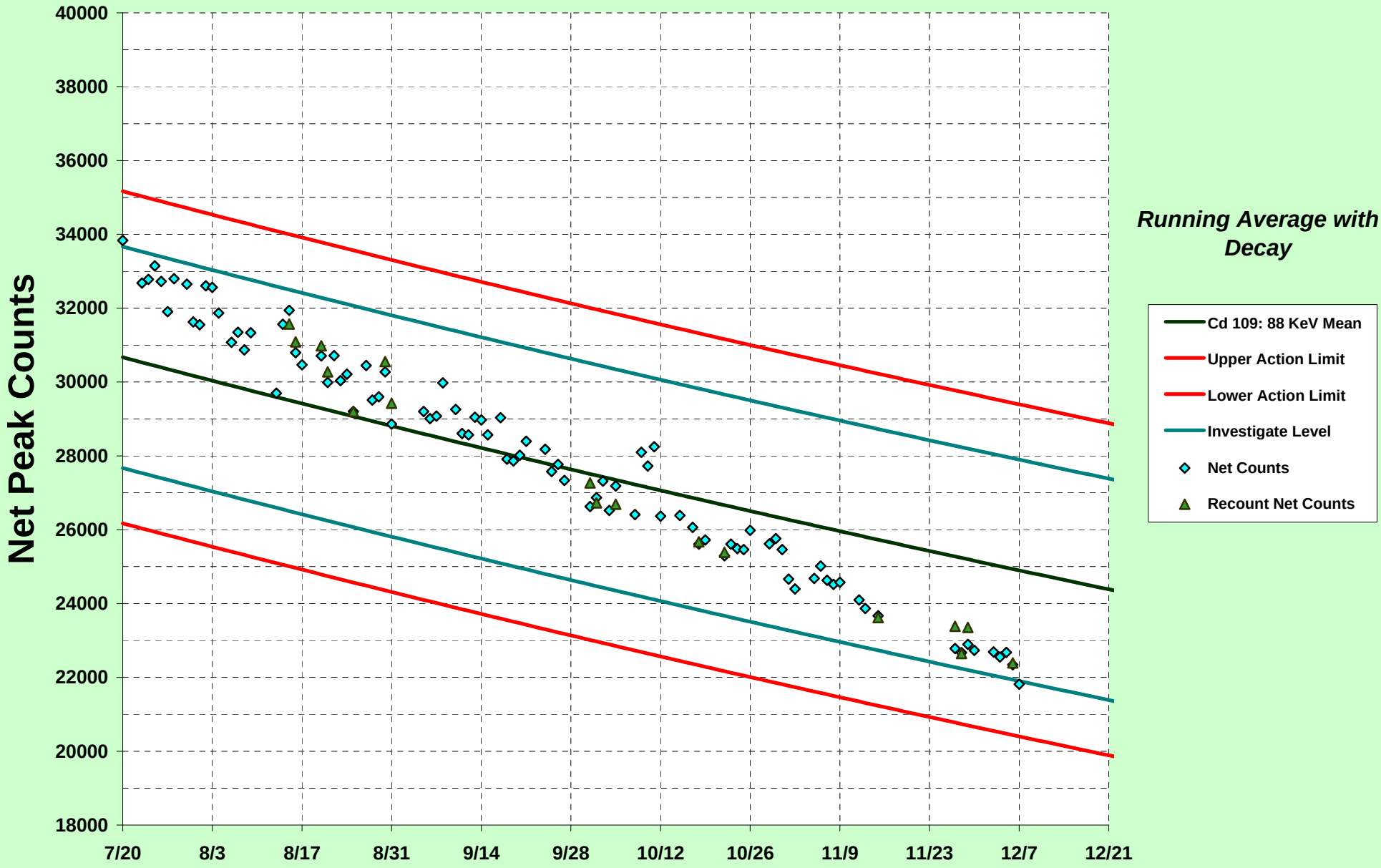
Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		3.4302E-001				
8/17/07 7:05:30 AM	QC		3.4071E-001				
8/20/07 6:59:44 AM	QC		3.4294E-001				
8/21/07 7:07:37 AM	QC		3.3407E-001				
8/21/07 7:36:40 AM	QC		3.4179E-001				
8/22/07 7:06:27 AM	QC		3.4000E-001				
8/23/07 7:03:15 AM	QC		3.3645E-001				
8/24/07 7:05:52 AM	QC		3.3906E-001				
8/25/07 12:12:56 PM	QC		3.3209E-001				
8/25/07 12:38:42 PM	QC		3.3071E-001				
8/26/07 10:32:00 AM	QC		3.3834E-001				
8/27/07 7:07:36 AM	QC		3.3724E-001				
8/28/07 12:12:13 PM	QC		3.3483E-001				
8/29/07 7:01:19 AM	QC		3.3321E-001				
8/30/07 7:12:35 AM	QC		3.4222E-001				
8/30/07 7:46:41 AM	QC		3.3564E-001				
8/31/07 1:46:55 PM	QC		3.2507E-001				
8/31/07 2:22:22 PM	QC		3.2729E-001				
8/31/07 2:53:34 PM	QC		3.4226E-001				
9/5/07 7:45:17 AM	QC		3.3352E-001				
9/6/07 7:02:54 AM	QC		3.2686E-001				
9/7/07 7:05:09 AM	QC		3.3056E-001				
9/8/07 7:52:16 AM	QC		3.3888E-001				
9/10/07 7:04:47 AM	QC		3.3617E-001				
9/11/07 6:58:49 AM	QC		3.3009E-001				
9/12/07 7:16:50 AM	QC		3.3169E-001				
9/13/07 7:03:29 AM	QC		3.3554E-001				
9/14/07 7:04:42 AM	QC		3.2559E-001				
9/15/07 8:12:46 AM	QC		3.2968E-001				
9/17/07 7:18:59 AM	QC		3.3218E-001				
9/18/07 7:17:50 AM	QC		3.2805E-001				
9/18/07 7:42:34 AM	QC		3.2499E-001				
9/19/07 7:53:32 AM	QC		3.2651E-001				
9/20/07 7:00:08 AM	QC		3.2675E-001				
9/21/07 7:01:56 AM	QC		3.2675E-001				
9/24/07 7:13:56 AM	QC		3.2863E-001				
9/25/07 10:09:04 AM	QC		3.2210E-001				
9/26/07 10:08:34 AM	QC		3.2784E-001				
9/27/07 8:25:30 AM	QC		3.2362E-001				
10/1/07 10:28:21 AM	QC		3.1937E-001				
10/1/07 11:02:27 AM	QC		3.2161E-001				
10/2/07 8:07:16 AM	QC		3.1954E-001				
10/2/07 9:16:58 AM	QC		3.0869E-001				
10/2/07 11:59:15 AM	QC		3.1441E-001				
10/2/07 12:32:52 PM	QC		3.1975E-001				
10/2/07 12:54:21 PM	QC		3.1370E-001				
10/2/07 1:17:15 PM	QC		3.1518E-001				
10/2/07 1:38:27 PM	QC		3.1516E-001				
10/3/07 8:00:16 AM	QC		3.2138E-001				
10/4/07 10:17:07 AM	QC		3.2112E-001				
10/5/07 6:56:23 AM	QC		3.2098E-001				
10/5/07 7:29:23 AM	QC		3.1140E-001				
10/8/07 7:24:18 AM	QC		3.1961E-001				
10/9/07 7:11:30 AM	QC		3.1877E-001				

Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		3.1799E-001				
10/11/07 7:28:01 AM	QC		3.2065E-001				
10/12/07 7:02:06 AM	QC		3.1493E-001				
10/15/07 7:19:15 AM	QC		3.1832E-001				
10/16/07 7:02:32 AM	QC		3.0707E-001				
10/16/07 7:44:23 AM	QC		3.1674E-001				
10/17/07 7:26:27 AM	QC		3.2057E-001				
10/18/07 7:04:39 AM	QC		3.0600E-001				
10/18/07 7:31:43 AM	QC		3.1225E-001				
10/19/07 7:25:27 AM	QC		3.1584E-001				
10/22/07 7:08:05 AM	QC		3.0557E-001				
10/22/07 7:35:40 AM	QC		3.1166E-001				
10/23/07 7:06:19 AM	QC		3.1441E-001				
10/24/07 6:38:19 AM	QC		3.1273E-001				
10/25/07 6:37:37 AM	QC		3.0743E-001				
10/26/07 6:38:38 AM	QC		3.2026E-001				
10/26/07 7:10:20 AM	QC		3.1422E-001				
10/26/07 4:15:30 PM	QC		3.0926E-001				
10/29/07 5:33:03 AM	QC		3.1086E-001				
10/30/07 6:32:53 AM	QC		3.1565E-001				
10/31/07 7:06:11 AM	QC		3.1721E-001				
11/1/07 7:09:36 AM	QC		3.0777E-001				
11/2/07 7:20:09 AM	QC		3.0685E-001				
11/5/07 8:36:15 AM	QC		3.1141E-001				
11/6/07 7:09:18 AM	QC		3.1301E-001				
11/7/07 7:15:45 AM	QC		3.0603E-001				
11/8/07 7:22:12 AM	QC		3.0725E-001				
11/9/07 7:21:05 AM	QC		2.9992E-001				
11/12/07 7:11:07 AM	QC		3.0713E-001				
11/13/07 7:57:24 AM	QC		2.9197E-001				
11/13/07 8:33:03 AM	QC		2.9729E-001				
11/15/07 8:11:21 AM	QC		3.0360E-001				
11/15/07 9:24:25 AM	QC		3.0257E-001				
11/27/07 8:36:51 AM	QC		2.9331E-001				
11/27/07 9:06:06 AM	QC		3.0489E-001				
11/28/07 8:05:52 AM	QC		2.9665E-001				
11/28/07 8:32:08 AM	QC		2.9351E-001				
11/28/07 8:54:15 AM	QC		2.9565E-001				
11/29/07 7:41:05 AM	QC		2.9290E-001				
11/29/07 8:44:19 AM	QC		2.9754E-001				
11/29/07 9:46:03 AM	QC		3.0045E-001				
11/30/07 7:24:19 AM	QC		2.9692E-001				
12/3/07 7:01:53 AM	QC		2.9736E-001				
12/4/07 7:22:26 AM	QC		2.9556E-001				
12/5/07 6:57:03 AM	QC		2.9487E-001				
12/6/07 7:17:58 AM	QC		2.8410E-001		In		
12/6/07 7:45:10 AM	QC		2.9031E-001				
12/6/07 8:32:29 AM	QC		2.8216E-001		In		
12/6/07 8:55:35 AM	QC		2.8643E-001				
12/6/07 9:57:51 AM	QC		2.9121E-001				
12/7/07 6:36:11 AM	QC		2.9086E-001				
12/11/07 8:06:46 AM	QC		2.9095E-001				

Flags Key:

LU	= Lower/Upper Bounds Test	(Ab = Above, Be = Below)
SD	= Sample Driven N-Sigma Test	(In = Investigate, Ac = Action)
UD	= User Driven N-Sigma Test	(In = Investigate, Ac = Action)
BS	= Measurement Bias Test	(In = Investigate, Ac = Action)

Det 6340 Daily QC
88 KeV



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

Full Parameter Results Report
2/29/08 10:46:30 AM

QA File: C:\GENIE2K\CAMFILES\Great Lakes
Description: Decay Corrected Co-60 Activity
Parameter Units: uCi
Parameter Type: Energy line

Sample Start Date:
Sample End Date: 12/11/07 8:06:46 AM
Sample Mean: 2.2396E-001
Sample Std. Deviation: 2.7511E-003

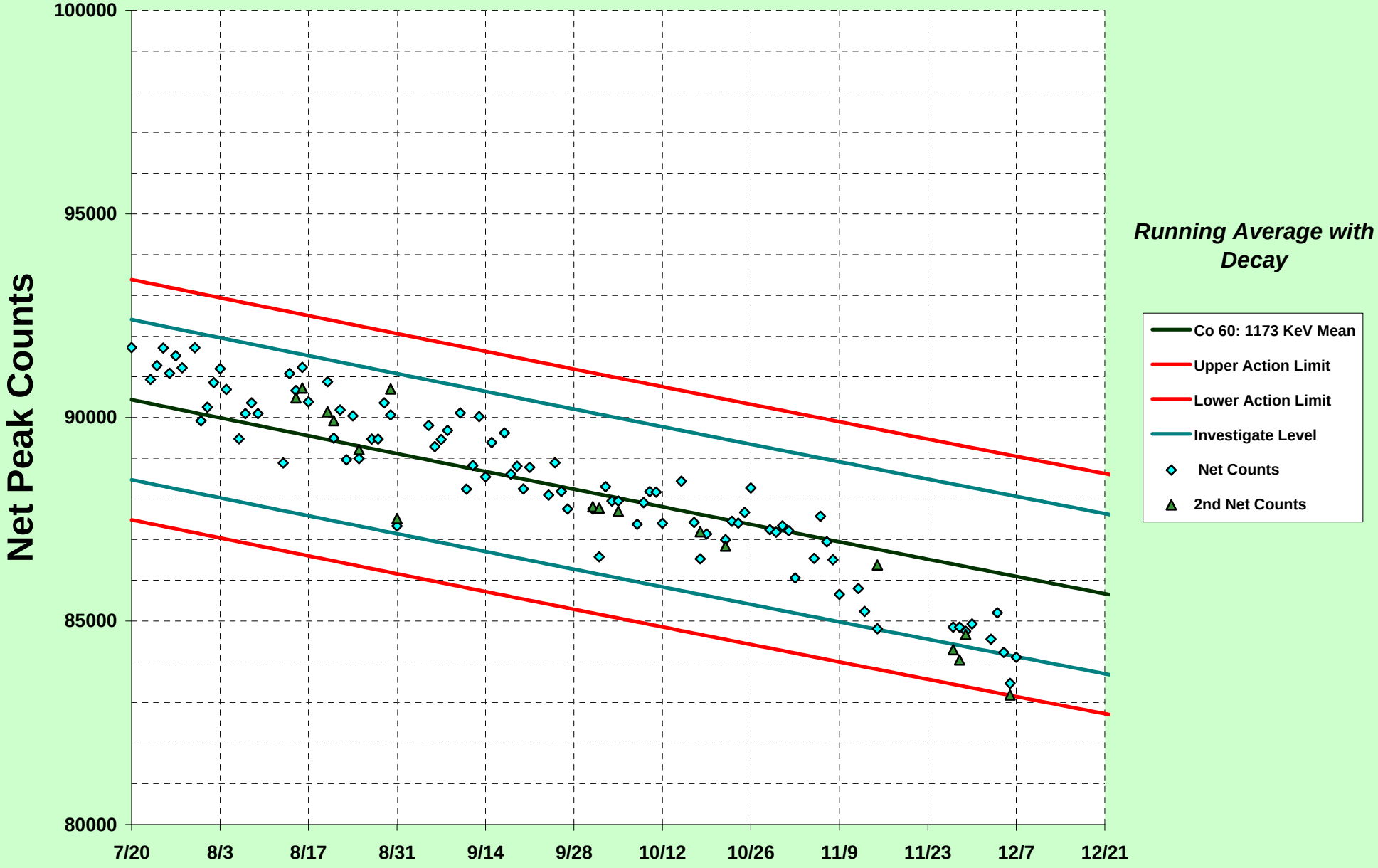
Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
7/20/07 10:29:49 AM	QC		2.2692E-001				
7/20/07 10:56:27 AM	QC		2.2611E-001				
7/20/07 11:34:14 AM	QC		2.2469E-001				
7/20/07 11:55:51 AM	QC		2.2916E-001				
7/20/07 12:17:12 PM	QC		2.2704E-001				
7/20/07 12:38:29 PM	QC		2.2784E-001				
7/20/07 12:59:33 PM	QC		2.2652E-001				
7/20/07 1:20:55 PM	QC		2.2488E-001				
7/20/07 1:43:10 PM	QC		2.2776E-001				
7/20/07 2:04:32 PM	QC		2.2517E-001				
7/20/07 2:25:38 PM	QC		2.2512E-001				
7/20/07 2:47:02 PM	QC		2.2681E-001				
7/20/07 3:08:38 PM	QC		2.2759E-001				
7/20/07 3:33:45 PM	QC		2.2522E-001				
7/20/07 3:54:55 PM	QC		2.2586E-001				
7/20/07 4:16:09 PM	QC		2.2492E-001				
7/23/07 7:26:34 AM	Daily QC		2.2635E-001				
7/24/07 6:48:52 AM	Daily QC		2.2633E-001				
7/25/07 6:56:23 AM	QC		2.2810E-001				
7/26/07 7:55:08 AM	QC		2.2528E-001				
7/27/07 6:54:22 AM	QC		2.2507E-001				
7/28/07 8:38:28 AM	QC		2.2779E-001				
7/30/07 6:58:07 AM	QC		2.2616E-001				
7/31/07 7:47:59 AM	QC		2.2280E-001				
8/1/07 8:15:19 AM	QC		2.2364E-001				
8/2/07 6:52:46 AM	QC		2.2722E-001				
8/3/07 7:08:25 AM	QC		2.2575E-001				
8/4/07 7:28:48 AM	QC		2.2664E-001				
8/6/07 6:43:50 AM	QC		2.2340E-001				
8/7/07 6:51:05 AM	QC		2.2570E-001				
8/8/07 6:58:13 AM	QC		2.2456E-001				
8/9/07 6:58:26 AM	QC		2.2489E-001				
8/13/07 7:47:07 AM	QC		2.2181E-001				
8/14/07 6:52:03 AM	QC		2.2709E-001				
8/15/07 7:02:37 AM	QC		2.2793E-001				

Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
8/16/07 7:07:34 AM	QC		2.2592E-001				
8/17/07 7:05:30 AM	QC		2.2548E-001				
8/20/07 6:59:44 AM	QC		2.2781E-001				
8/21/07 7:07:37 AM	QC		2.2512E-001				
8/21/07 7:36:40 AM	QC		2.2431E-001				
8/22/07 7:06:27 AM	QC		2.2686E-001				
8/23/07 7:03:15 AM	QC		2.2338E-001				
8/24/07 7:05:52 AM	QC		2.2579E-001				
8/25/07 12:12:56 PM	QC		2.2508E-001				
8/25/07 12:38:42 PM	QC		2.2479E-001				
8/26/07 10:32:00 AM	QC		2.2660E-001				
8/27/07 7:07:36 AM	QC		2.2665E-001				
8/28/07 12:12:13 PM	QC		2.2362E-001				
8/29/07 7:01:19 AM	QC		2.2476E-001				
8/30/07 7:12:35 AM	QC		2.2944E-001				
8/30/07 7:46:41 AM	QC		2.2700E-001				
8/31/07 1:46:55 PM	QC		2.1931E-001				
8/31/07 2:22:22 PM	QC		2.2197E-001				
8/31/07 2:53:34 PM	QC		2.2651E-001				
9/5/07 7:45:17 AM	QC		2.2565E-001				
9/6/07 7:02:54 AM	QC		2.2376E-001				
9/7/07 7:05:09 AM	QC		2.2523E-001				
9/8/07 7:52:16 AM	QC		2.2763E-001				
9/10/07 7:04:47 AM	QC		2.2556E-001				
9/11/07 6:58:49 AM	QC		2.2430E-001				
9/12/07 7:16:50 AM	QC		2.2496E-001				
9/13/07 7:03:29 AM	QC		2.2631E-001				
9/14/07 7:04:42 AM	QC		2.2609E-001				
9/15/07 8:12:46 AM	QC		2.2605E-001				
9/17/07 7:18:59 AM	QC		2.2621E-001				
9/18/07 7:17:50 AM	QC		2.2496E-001				
9/18/07 7:42:34 AM	QC		2.2373E-001				
9/19/07 7:53:32 AM	QC		2.2336E-001				
9/20/07 7:00:08 AM	QC		2.2375E-001				
9/21/07 7:01:56 AM	QC		2.2523E-001				
9/24/07 7:13:56 AM	QC		2.2610E-001				
9/25/07 10:09:04 AM	QC		2.2312E-001				
9/26/07 10:08:34 AM	QC		2.2542E-001				
9/27/07 8:25:30 AM	QC		2.2384E-001				
10/1/07 10:28:21 AM	QC		2.2302E-001				
10/1/07 11:02:27 AM	QC		2.2351E-001				
10/2/07 8:07:16 AM	QC		2.2138E-001				
10/2/07 9:16:58 AM	QC		2.2078E-001				
10/2/07 11:59:15 AM	QC		2.2153E-001				
10/2/07 12:32:52 PM	QC		2.2353E-001				
10/2/07 12:54:21 PM	QC		2.2237E-001				
10/2/07 1:17:15 PM	QC		2.2261E-001				
10/2/07 1:38:27 PM	QC		2.2227E-001				
10/3/07 8:00:16 AM	QC		2.2382E-001				
10/4/07 10:17:07 AM	QC		2.2355E-001				
10/5/07 6:56:23 AM	QC		2.2327E-001				
10/5/07 7:29:23 AM	QC		2.2257E-001				
10/8/07 7:24:18 AM	QC		2.2357E-001				
10/9/07 7:11:30 AM	QC		2.2330E-001				

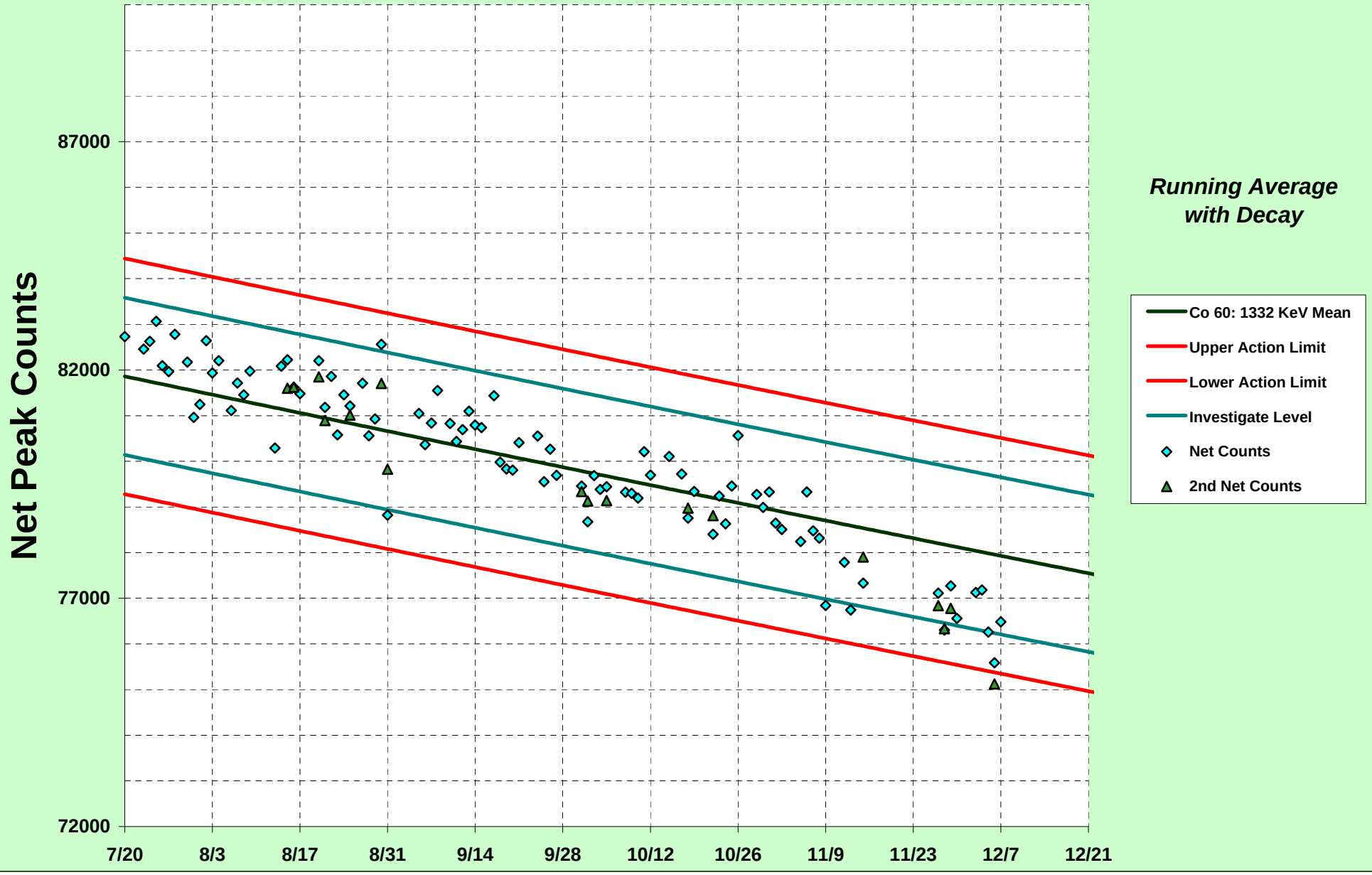
Measurement Time	Sample ID	Analyst	Value (uCi)	Flags LU	SD	UD	BS
10/10/07 7:36:56 AM	QC		2.2342E-001				
10/11/07 7:28:01 AM	QC		2.2640E-001				
10/12/07 7:02:06 AM	QC		2.2483E-001				
10/15/07 7:19:15 AM	QC		2.2619E-001				
10/16/07 7:02:32 AM	QC		2.2388E-001				
10/16/07 7:44:23 AM	QC		2.2191E-001				
10/17/07 7:26:27 AM	QC		2.2526E-001				
10/18/07 7:04:39 AM	QC		2.2245E-001				
10/18/07 7:31:43 AM	QC		2.2188E-001				
10/19/07 7:25:27 AM	QC		2.2442E-001				
10/22/07 7:08:05 AM	QC		2.2211E-001				
10/22/07 7:35:40 AM	QC		2.2312E-001				
10/23/07 7:06:19 AM	QC		2.2435E-001				
10/24/07 6:38:19 AM	QC		2.2339E-001				
10/25/07 6:37:37 AM	QC		2.2514E-001				
10/26/07 6:38:38 AM	QC		2.2842E-001				
10/26/07 7:10:20 AM	QC		2.2716E-001				
10/26/07 4:15:30 PM	QC		2.2495E-001				
10/29/07 5:33:03 AM	QC		2.2473E-001				
10/30/07 6:32:53 AM	QC		2.2278E-001				
10/31/07 7:06:11 AM	QC		2.2525E-001				
11/1/07 7:09:36 AM	QC		2.2350E-001				
11/2/07 7:20:09 AM	QC		2.2336E-001				
11/5/07 8:36:15 AM	QC		2.2303E-001				
11/6/07 7:09:18 AM	QC		2.2590E-001				
11/7/07 7:15:45 AM	QC		2.2354E-001				
11/8/07 7:22:12 AM	QC		2.2310E-001				
11/9/07 7:21:05 AM	QC		2.1822E-001		In		
11/12/07 7:11:07 AM	QC		2.2170E-001				
11/13/07 7:57:24 AM	QC		2.1763E-001		In		
11/15/07 7:31:29 AM	QC		2.2083E-001				
11/15/07 9:24:25 AM	QC		2.2257E-001				
11/27/07 8:36:51 AM	QC		2.2086E-001				
11/27/07 9:06:06 AM	QC		2.2043E-001				
11/28/07 8:05:52 AM	QC		2.1883E-001				
11/28/07 8:32:08 AM	QC		2.1819E-001		In		
11/28/07 8:54:15 AM	QC		2.1880E-001				
11/29/07 7:41:05 AM	QC		2.2177E-001				
11/29/07 8:44:19 AM	QC		2.2132E-001				
11/29/07 9:46:03 AM	QC		2.2059E-001				
11/30/07 7:24:19 AM	QC		2.2017E-001				
12/3/07 7:01:53 AM	QC		2.2204E-001				
12/4/07 7:22:26 AM	QC		2.2162E-001				
12/5/07 6:57:03 AM	QC		2.1979E-001				
12/6/07 7:17:58 AM	QC		2.1763E-001		In		
12/6/07 7:45:10 AM	QC		2.1738E-001		In		
12/6/07 8:32:29 AM	QC		2.1669E-001		In		
12/6/07 8:55:35 AM	QC		2.1728E-001		In		
12/6/07 9:57:51 AM	QC		2.1599E-001		In		
12/7/07 6:36:11 AM	QC		2.2043E-001				
12/11/07 8:06:46 AM	QC		2.1878E-001				

Flags Key:
LU = Lower/Upper Bounds Test (Ab = Above, Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Det 6340 Daily QC
1173 KeV



Det 6340 Daily QC
1332 KeV



APPENDIX E

TEST AMERICA LABORATORY QA SAMPLE RESULTS

Test America QA Sample Raw Results

STYPE	CLIENT SAMPLE DESCRIPTION	DATE SAMP	SDG NUMBER	COMPOUND NAME	UNITS	RESULT		TOTAL UNCERTAINTY	QUALIFIERS	RPT LIMIT/MDC
SO	SU06B-034	11/7/2007	F7L200251	Actinium 228	pCi/g	3.76	+/-	0.52		0.26
SO	SU07-143PR	11/7/2007	F7L200251	Actinium 228	pCi/g	3.17	+/-	0.43		0.27
SO	SU07B-037	11/7/2007	F7L200251	Actinium 228	pCi/g	3.46	+/-	0.46		0.36
SO	SU10-198-1	7/13/2007	F7L200260	Actinium 228	pCi/g	1.63	+/-	0.34		0.13
SO	SU10-212-1	7/13/2007	F7L200260	Actinium 228	pCi/g	1.53	+/-	0.41		0.42
SO	SU10-214PR	11/7/2007	F7L200260	Actinium 228	pCi/g	1.14	+/-	0.26		0.29
SO	SU10-214PR FD	11/7/2007	F7L200260	Actinium 228	pCi/g	1.71	+/-	0.29		0.33
SO	SU10B-038	11/7/2007	F7L200260	Actinium 228	pCi/g	3.89	+/-	0.54		0.23
SO	SU10B-041PR	11/12/2007	F7L200260	Actinium 228	pCi/g	2.05	+/-	0.36		0.1
SO	SU11-216-2	7/24/2007	F7L200260	Actinium 228	pCi/g	0.96	+/-	0.24		0.34
SO	SU11-220-1	8/2/2007	F7L200260	Actinium 228	pCi/g	2.38	+/-	0.35		0.4
SO	SU11-224-2	7/24/2007	F7L200260	Actinium 228	pCi/g	1.28	+/-	0.3		0.34
SO	SU11-228-1	8/2/2007	F7L200260	Actinium 228	pCi/g	1.01	+/-	0.31		0.46
SO	SU1-14-PR	12/3/2007	F7L200271	Actinium 228	pCi/g	0.8	+/-	0.3		0.35
SO	SU12-303-3	7/24/2007	F7L200260	Actinium 228	pCi/g	1.1	+/-	0.27		0.37
SO	SU12-307-1	7/24/2007	F7L200260	Actinium 228	pCi/g	4	+/-	0.42		0.29
SO	SU12-307-2	7/24/2007	F7L200260	Actinium 228	pCi/g	4.4	+/-	0.57		0.27
SO	SU13-329-1	7/24/2007	F7L200260	Actinium 228	pCi/g	0.76	+/-	0.25		0.38
SO	SU13-B18-1	8/22/2007	F7L200260	Actinium 228	pCi/g	2.41	+/-	0.39		0.51
SO	SU13-B19-1	8/22/2007	F7L200260	Actinium 228	pCi/g	1.51	+/-	0.45		0.36
SO	SU13-B28-1	8/23/2007	F7L200262	Actinium 228	pCi/g	2.71	+/-	0.5		0.6
SO	SU14-348-1	7/23/2007	F7L200262	Actinium 228	pCi/g	2.27	+/-	0.45		0.59
SO	SU15-357-1	8/1/2007	F7L200262	Actinium 228	pCi/g	1.11	+/-	0.28		0.45
SO	SU16-B55-W	12/4/2007	F7L200262	Actinium 228	pCi/g	4.6	+/-	0.59		0.24
SO	SU16-B56-S	12/4/2007	F7L200262	Actinium 228	pCi/g	2.14	+/-	0.59		0.59
SO	SU16-B57-E	12/4/2007	F7L200262	Actinium 228	pCi/g	5.27	+/-	0.61		0.16
SO	SU16-B58-N	12/4/2007	F7L200262	Actinium 228	pCi/g	1.08	+/-	0.33		0.58
SO	SU17-07-1	8/29/2007	F7L200262	Actinium 228	pCi/g	1.41	+/-	0.28		0.4
SO	SU17-10-1	8/29/2007	F7L200262	Actinium 228	pCi/g	1.47	+/-	0.34		0.4
SO	SU17-12-1	8/29/2007	F7L200262	Actinium 228	pCi/g	1.68	+/-	0.38		0.4
SO	SU17-B30-1	8/29/2007	F7L200262	Actinium 228	pCi/g	4.16	+/-	0.64		0.36
SO	SU18-04-1	9/4/2007	F7L200262	Actinium 228	pCi/g	1.08	+/-	0.3		0.55
SO	SU18-06-1	9/4/2007	F7L200262	Actinium 228	pCi/g	2.62	+/-	0.39		0.38
SO	SU18-B32-1	9/6/2007	F7L200262	Actinium 228	pCi/g	40.1	+/-	2.9		0.6
SO	SU18-B33-1	9/7/2007	F7L200262	Actinium 228	pCi/g	2.05	+/-	0.48		0.57
SO	SU2-25-PR	12/3/2007	F7L200271	Actinium 228	pCi/g	0.98	+/-	0.22		0.28
SO	SU2-31-PR	12/3/2007	F7L200271	Actinium 228	pCi/g	1	+/-	0.26		0.2
SO	SU3-43-1	7/30/2007	F7L200271	Actinium 228	pCi/g	1.48	+/-	0.3		0.41

SO	SU3-52-2	7/30/2007	F7L200271	Actinium 228	pCi/g	1.1	+/-	0.32		0.45
SO	SU3-55-1	7/30/2007	F7L200271	Actinium 228	pCi/g	1.2	+/-	0.24		0.34
SO	SU3B-049 PR	11/30/2007	F7L200271	Actinium 228	pCi/g	4.6	+/-	0.51		0.26
SO	SU4-64-2	7/31/2007	F7L200271	Actinium 228	pCi/g	1	+/-	0.21		0.29
SO	SU4-65-1	7/26/2007	F7L200271	Actinium 228	pCi/g	0.63	+/-	0.2		0.33
SO	SU4-67-2	7/31/2007	F7L200271	Actinium 228	pCi/g	1.11	+/-	0.28		0.28
SO	SU4-76-1	7/26/2007	F7L200271	Actinium 228	pCi/g	1.13	+/-	0.26		0.37
SO	SU4-79-3	7/26/2007	F7L200271	Actinium 228	pCi/g	1.07	+/-	0.23		0.42
SO	SU5-103-1	7/31/2007	F7L200271	Actinium 228	pCi/g	1.41	+/-	0.25		0.24
SO	SU5-88-1	7/31/2007	F7L200271	Actinium 228	pCi/g	0.74	+/-	0.24		0.39
SO	SU5-93-1	7/31/2007	F7L200271	Actinium 228	pCi/g	1.12	+/-	0.35		0.38
SO	SU5-93-2	7/31/2007	F7L200271	Actinium 228	pCi/g	1.11	+/-	0.31		0.41
SO	SU5B-054 PR	11/30/2007	F7L200271	Actinium 228	pCi/g	3.04	+/-	0.44		0.3
SO	SU6-111-1	7/16/2007	F7L200251	Actinium 228	pCi/g	1.79	+/-	0.3		0.12
SO	SU6-113-1	7/17/2007	F7L200251	Actinium 228	pCi/g	2.06	+/-	0.39		0.38
SO	SU6-113-2	7/17/2007	F7L200251	Actinium 228	pCi/g	2.1	+/-	0.39		0.36
SO	SU6-115-1	7/16/2007	F7L200251	Actinium 228	pCi/g	1.52	+/-	0.35		0.14
SO	SU6-115-2	7/16/2007	F7L200251	Actinium 228	pCi/g	4.8	+/-	0.53		0.28
SO	SU6-119-4	7/16/2007	F7L200251	Actinium 228	pCi/g	2.57	+/-	0.4		0.43
SO	SU6-128-4	7/23/2007	F7L200251	Actinium 228	pCi/g	1.27	+/-	0.24		0.33
SO	SU7-B25-1	8/23/2007	F7L200251	Actinium 228	pCi/g	4.73	+/-	0.7		0.39
SO	SU8B-043PR	11/12/2007	F7L200251	Actinium 228	pCi/g	1.17	+/-	0.29		0.48
SO	SU8-B27-1	8/23/2007	F7L200251	Actinium 228	pCi/g	2.46	+/-	0.4		0.23
SO	SU9-180-1	7/25/2007	F7L200251	Actinium 228	pCi/g	0.98	+/-	0.29		0.36
SO	SU9-181-1	7/25/2007	F7L200251	Actinium 228	pCi/g	1.46	+/-	0.3		0.15
SO	SU9-182-1	7/25/2007	F7L200251	Actinium 228	pCi/g	0.8	+/-	0.31		0.49
SO	SU9-183-1	7/25/2007	F7L200251	Actinium 228	pCi/g	1.21	+/-	0.31		0.48
SO	SU9-183-1	7/25/2007	F7L200251	Thallium 208	pCi/g	0.63	+/-	0.17		0.12
SO	SU9-183-1	7/25/2007	F7L200251	Thorium 234	pCi/g	4.4	+/-	1.3		2.2
SO	SU9-184-1	7/25/2007	F7L200260	Actinium 228	pCi/g	1.6	+/-	0.28		0.24

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

PROJECT NO. 03-3040.30/TA

Great Lakes NS Remediation

Lot #: F7L200251

John Eberline
Cabrera Services Inc
633 Stablestone Dr
Chesterfield, MO 63017

TESTAMERICA LABORATORIES, INC.

Ivan Vania
Project Manager

December 27, 2007

13715 Rider Trail North Earth City, MO 63045 tel 314.298.8566 fax 314.298.8757 www.testamericainc.com

Case Narrative
LOT NUMBER: F7L200251

This report contains the analytical results for the 17 samples received under chain of custody by TestAmerica St. Louis on December 20, 2007. These samples are associated with your Great Lakes NS Remediation project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Gamma Spectroscopy - Cesium-137 & Hits (EML GA-01-R MOD)
The reporting limit for Actinium-228 was not met. There is activity in the samples above the MDA.
Affected Samples:
F7L200251 (1): SU06B-034
F7L200251 (3): SU6-113-1
F7L200251 (4): SU6-113-2
F7L200251 (6): SU6-115-2
F7L200251 (7): SU6-119-4
F7L200251 (8): SU6-128-4
F7L200251 (9): SU07-143PR
F7L200251 (10): SU07B-037
F7L200251 (11): SU7-B25-1
F7L200251 (12): SU8B-043PR
F7L200251 (14): SU9-180-1
F7L200251 (16): SU9-182-1
F7L200251 (17): SU9-183-1

There were no other nonconformances or observations noted with any analysis on this lot.

F7L200251

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	SU06B-034			2007-11-07 / 1230	KEKAM	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	SU6-111-1			2007-07-16 / 1600	KEKAW	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	SU6-113-1			2007-07-17 / 1100	KEKA2	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	SU6-113-2			2007-07-17 / 1100	KEKA4	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	SU6-115-1			2007-07-16 / 1610	KEKA7	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	SU6-115-2			2007-07-16 / 1610	KEKA9	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	SU6-119-4			2007-07-16 / 1640	KEKCC	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

F7L200251 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Project Manager: IV | Quote #: 77996 | SDG:

Project: 03-3040.30/TA | Great Lakes NS Remediation

PO#: | Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

Date Received: 2007-12-20
Analytical Due Date: 2008-01-04
Report Due Date: 2008-01-07
Report Type: W
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	SU6-128-4			2007-07-23 / 845	KEKCD	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	SU07-143PR			2007-11-07 / 950	KEKCE	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	SU07B-037			2007-11-07 / 1245	KEKCF	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	SU7-B25-1			2007-08-23 / 1125	KEKCH	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	SU8B-043PR			2007-11-12 / 850	KEKCJ	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	SU8-B27-1			2007-08-23 / 1430	KEKCK	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	SU9-180-1			2007-07-25 / 1535	KEKCM	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F7L200251

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
15	SU9-181-1			2007-07-25 / 1542	KEKCP	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
16	SU9-182-1			2007-07-25 / 1600	KEKCQ	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
17	SU9-183-1			2007-07-25 / 1610	KEKCR	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

LOT# F7L200251

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

1412

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 2
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 1 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ____W_____			
(314) 703-6784 Phone	TAT if different from Below __15days_____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU06B-034	11/7/07	1230	Grab	Soil	1		X	
SU6-111-1	7/16/07	1600	Grab	Soil	1		X	
SU6-113-1	7/17/07	1100	Grab	Soil	1		X	
SU6-113-2	7/17/07	1100	Grab	Soil	1		X	
SU6-115-1	7/16/07	1610	Grab	Soil	1		X	
SU6-115-2	7/16/07	~~1640~~ 1610	Grab	Soil	1		X	
SU6-119-4	7/16/07	1640	Grab	Soil	1		X	
SU6-128-4	7/23/07	0845	Grab	Soil	1		X	
SU07-143PR	11/7/07	0950	Grab	Soil	1		X	
SU07B-037	11/7/07	1245	Grab	Soil	1		X	
SU7-B25-1	8/23/07	1125	Grab	Soil	1		X	
SU8B-043PR	11/12/07	0850	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABRERA	12/13/07 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 2
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 2 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ___W___			
(314) 703-6784 Phone	TAT if different from Below ___15days___			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU8-B27-1	8/23/07	1430	Grab	Soil	1		X	
SU9-180-1	7/25/07	1535	Grab	Soil	1		X	
SU9-181-1	7/25/07	1542	Grab	Soil	1		X	
SU9-182-1	7/25/07	1600	Grab	Soil	1		X	
SU9-183-1	7/25/07	1616	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABLERA	12/13/07 1830	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Lot #(s): F7L200251, 260, 262, 271

- 1412 -

Condition Upon Receipt Form

Client: Cabrera
Quote No: 77996
COC/RFA No: 2,3,4,1
Initiated By: [illegible]
Date: 12-20-07
Time: 0830

Shipping Information

Shipper Name: Client
Shipping # (s):*
1. N/A
2. ↓
3.
4.
5.
6.
7.
8.
9.
10.

Multiple Packages (Y) N
Sample Temperature (s):**
1. Ambient
2. ↓
3.
4.
5.
6.
7.
8.
9.
10.

*Numbered shipping lines correspond to Numbered Sample Temp lines

**Sample must be received at 4°C ± 2°C- If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid or Rad tests- Liquid or Solids

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y (N)	Are there custody seals present on the cooler?	8.	Y (N)	Are there custody seals present on bottles?
2.	Y N (N/A)	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	Do custody seals on bottles appear to be tampered with?
3.	(Y) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N (N/A)	Was sample received with proper pH[1]? (If not, make note below)
4.	(Y) N	Sample received with Chain of Custody?	11.	Y N	If N/A- Was pH taken by original TestAmerica lab?
5.	(Y) N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	(Y) N	Sample received in proper containers?
6.	Y (N)	Was sample received broken?	13.	Y N (N/A)	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	(Y) N	Is sample volume sufficient for analysis?	14.	Y N	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX and soils.

Notes:

Corrective Action:
- ☐ Client Contact Name: _____ Informed by: _____
- ☐ Sample(s) processed "as is"
- ☐ Sample(s) on hold until: _____ If released, notify: _____

Project Management Review: [signature] Date: 12-21-07

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

Revision 2

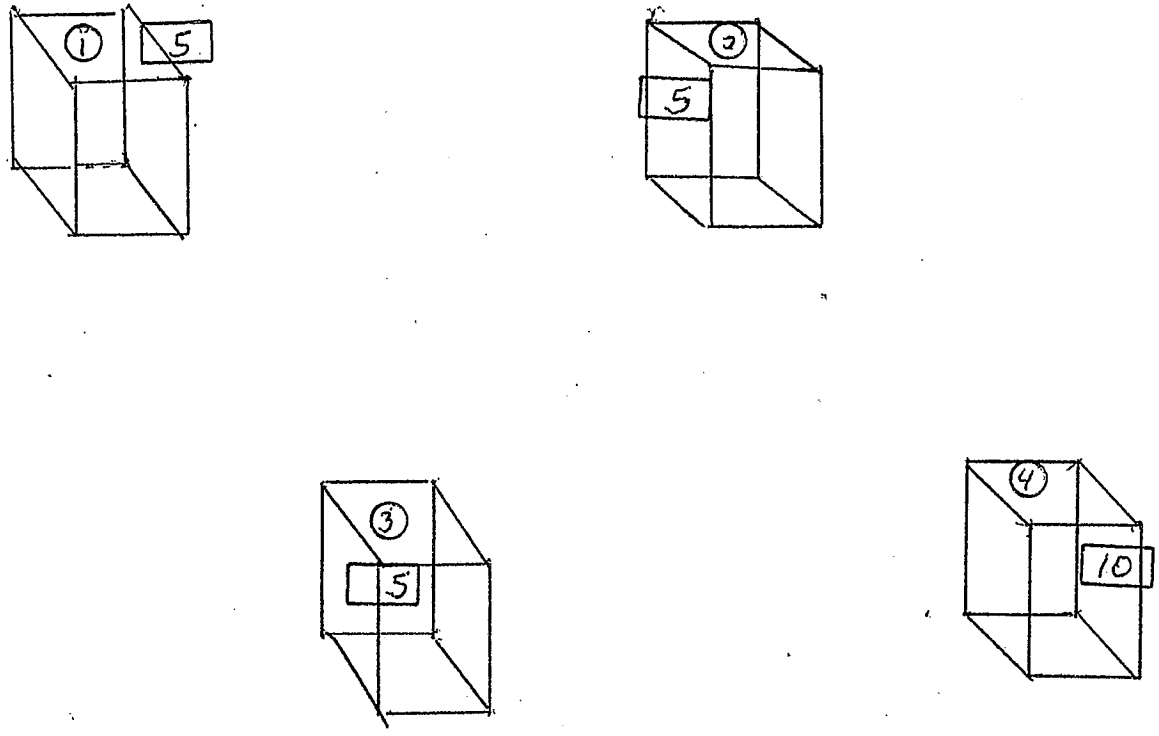
OP-001-02 Radiological Survey Sheet

Radiological Surveys

Location: Sample Containers Site: GLNTC PPV Areas	RWP# 003	Survey # 03-3040, 30-272	Survey Type:	pg. 1 of 1

Smear (CPM/100 cm²)					
Direct Count (CPM/Direct Frisk)					
No.	α	β	No.	α	β
1	0	62	26		
2	0	65	27		
3	1	49	28		
4	1	53	29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35	N	
11			36		
12	N		37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19		NA	44		
20			45		
21			46		
22			47		NA
23			48		
24			49		
25			50		

circle one



Comments	Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	γ Bkg	Cal. Due
	K. Condon	12/13/07	Bicron	L8545	N/A	N/A	N/A	N/A	5	6/17/08
			2929	163827	.3649	.2385	.15	44.2	N/A	9/7/08
	Reviewed By:	Date:								
	[signature]	12/13/07								

Key

■	A/S Location
-	Boundary
○	Smear
□	Dose Rate μR /hr
*	Direct Reading CPM/direct frisk
△	Grab Sample

METHODS SUMMARY

F7L200251

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Cesium-137 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F7L200251

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
KEKAM	001	SU06B-034	11/07/07	12:30
KEKAW	002	SU6-111-1	07/16/07	16:00
KEKA2	003	SU6-113-1	07/17/07	11:00
KEKA4	004	SU6-113-2	07/17/07	11:00
KEKA7	005	SU6-115-1	07/16/07	16:10
KEKA9	006	SU6-115-2	07/16/07	16:10
KEKCC	007	SU6-119-4	07/16/07	16:40
KEKCD	008	SU6-128-4	07/23/07	08:45
KEKCE	009	SU07-143PR	11/07/07	09:50
KEKCF	010	SU07B-037	11/07/07	12:45
KEKCH	011	SU7-B25-1	08/23/07	11:25
KEKCJ	012	SU8B-043PR	11/12/07	08:50
KEKCK	013	SU8-B27-1	08/23/07	14:30
KEKCM	014	SU9-180-1	07/25/07	15:35
KEKCP	015	SU9-181-1	07/25/07	15:42
KEKCQ	016	SU9-182-1	07/25/07	16:00
KEKCR	017	SU9-183-1	07/25/07	16:10

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Cabrera Services, Inc.

Client Sample ID: SU06B-034

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-001
Work Order: KEKAM
Matrix: SOLID

Date Collected: 11/07/07 1230
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**3.76**		**0.52**	0.25	**0.26**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU06B-034 DUP

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-001X
Work Order: KEKAM
Matrix: SOLID

Date Collected: 11/07/07 1230
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**4.18**		**0.50**	0.25	**0.22**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-111-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-002
Work Order: KEKAW
Matrix: SOLID

Date Collected: 07/16/07 1600
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.79**		**0.30**	0.25	**0.12**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-113-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-003
Work Order: KEKA2
Matrix: SOLID

Date Collected: 07/17/07 1100
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**2.06**		**0.39**	0.25	**0.38**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-113-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-004
Work Order: KEKA4
Matrix: SOLID

Date Collected: 07/17/07 1100
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**2.10**		**0.39**	0.25	**0.36**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-115-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-005
Work Order: KEKA7
Matrix: SOLID

Date Collected: 07/16/07 1610
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.52**		**0.35**	0.25	**0.14**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-115-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-006
Work Order: KEKA9
Matrix: SOLID

Date Collected: 07/16/07 1610
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**4.80**		**0.53**	0.25	**0.28**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-119-4

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-007
Work Order: KEKCC
Matrix: SOLID

Date Collected: 07/16/07 1640
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**2.57**		**0.40**	0.25	**0.43**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU6-128-4

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-008
Work Order: KEKCD
Matrix: SOLID

Date Collected: 07/23/07 0845
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.27**		**0.24**	0.25	**0.33**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU07-143PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-009
Work Order: KEKCE
Matrix: SOLID

Date Collected: 11/07/07 0950
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**3.17**		**0.43**	0.25	**0.27**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU07B-037

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-010
Work Order: KEKCF
Matrix: SOLID

Date Collected: 11/07/07 1245
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**3.46**		**0.46**	0.25	**0.36**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU7-B25-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-011
Work Order: KEKCH
Matrix: SOLID

Date Collected: 08/23/07 1125
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**4.73**		**0.70**	0.25	**0.39**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU8B-043PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-012
Work Order: KEKCJ
Matrix: SOLID

Date Collected: 11/12/07 0850
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.17**		**0.29**	0.25	**0.48**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU8-B27-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-013
Work Order: KEKCK
Matrix: SOLID

Date Collected: 08/23/07 1430
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**			**Batch # 7357010**	**Yld %**
Actinium 228	**2.46**		**0.40**	0.25	**0.23**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU9-180-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-014
Work Order: KEKCM
Matrix: SOLID

Date Collected: 07/25/07 1535
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**0.98**		**0.29**	0.25	**0.36**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU9-181-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-015
Work Order: KEKCP
Matrix: SOLID

Date Collected: 07/25/07 1542
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.46**		**0.30**	0.25	**0.15**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU9-182-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-016
Work Order: KEKCO
Matrix: SOLID

Date Collected: 07/25/07 1600
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**0.80**		**0.31**	0.25	**0.49**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU9-183-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200251-017
Work Order: KEKCR
Matrix: SOLID

Date Collected: 07/25/07 1610
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7357010**	**Yld %**
Actinium 228	**1.21**		**0.31**	0.25	**0.48**	**12/23/07**	**12/23/07**
--- Other Detected Radionuclides ---							
Thallium 208	**0.63**		**0.17**		**0.12**	**12/23/07**	**12/23/07**
Thorium 234	**4.4**		**1.3**		**2.2**	**12/23/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

METHOD BLANK REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200251
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC		Prep Date	Lab Sample ID Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**Batch #**	**7357010**	**Yld %**		**F7L230000-010B**
Actinium 228	-0.02	U	0.26	0.25	0.25		12/23/07	12/23/07

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC

U Result is less than the sample detection limit.

Laboratory Control Sample Report

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200251
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID / QC Control Limits
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**			**F7L230000-010C**
Americium 241	103	107	8.5	1.4		104	(85 - 118)
Cesium 137	40.0	43.6	2.7	0.4		109	(91 - 120)
Cobalt 60	62.7	65.9	3.9	0.3		105	(91 - 112)
	Batch #:	7357010		**Analysis Date:**	12/23/07		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200251
Matrix: SOLID

Date Sampled: 11/07/07
Date Received: 12/20/07

Parameter	SAMPLE Result	Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result	Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**			**F7L200251-001**	
Actinium 228	**3.76**	**0.52**		**4.18**	**0.50**		10	%RPD
	Batch #:	7357010	(Sample)	7357010	(Duplicate)			

NOTE(S)

Data are incomplete without the case narrative.
Calculations are performed before rounding to avoid round-off error in calculated results

GAMMA SPECTROSCOPY

Gamma Spectroscopy

Cesium-137

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Analysis Report for Gamma Spectroscopy

Batch: 7357010 **Operator:** 403293

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-001	KEKAM1AC	385.80g	2.00	GammaVision	GV04	12 / 23 / 07 12:21	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	3.765E+000 pCi/g	5.245E-001	4.776E-001	2.642E-001	1.078E-001	14.25

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-001X	KEKAM1AD	385.80g	2.00	GammaVision	GV01	12 / 23 / 07 13:03	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.176E+000 pCi/g	5.032E-001	4.421E-001	2.197E-001	9.456E-002	19.01

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-002	KEKAW1AC	401.40g	2.00	GammaVision	GV05	12 / 23 / 07 12:22	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.791E+000 pCi/g	3.020E-001	2.839E-001	1.214E-001	0.000E+000	14.76

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-003	KEKA21AC	370.40g	2.00	GammaVision	GV07	12 / 23 / 07 12:22	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.057E+000 pCi/g	3.938E-001	3.756E-001	3.831E-001	0.000E+000	5.37

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-004	KEKA41AC	351.70g	2.00	GammaVision	GV03	12 / 23 / 07 13:04	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.106E+000 pCi/g	3.935E-001	3.744E-001	3.596E-001	1.634E-001	5.86

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-005	KEKA71AC	358.10g	2.00	GammaVision	GV04	12 / 23 / 07 13:04	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.525E+000 pCi/g	3.543E-001	3.432E-001	1.423E-001	4.499E-002	10.72

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-006	KEKA91AC	387.10g	2.00	GammaVision	GV05	12 / 23 / 07 13:05	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.803E+000 pCi/g	5.327E-001	4.555E-001	2.760E-001	0.000E+000	17.40

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-007	KEKCC1AC	311.30g	2.00	GammaVision	GV07	12 / 23 / 07 13:05	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.571E+000 pCi/g	3.996E-001	3.712E-001	4.298E-001	0.000E+000	5.98

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-008	KEKCD1AC	355.00g	2.00	GammaVision	GV01	12 / 23 / 07 13:41	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.272E+000 pCi/g	2.391E-001	2.276E-001	3.303E-001	1.486E-001	3.85

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-009	KEKCE1AC	387.50g	2.00	GammaVision	GV03	12 / 23 / 07 13:42	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	3.170E+000 pCi/g	4.277E-001	3.868E-001	2.713E-001	1.207E-001	11.68

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-010	KEKCF1AC	341.40g	2.00	GammaVision	GV04	12 / 23 / 07 13:42	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	3.463E+000 pCi/g	4.582E-001	4.125E-001	3.631E-001	1.541E-001	9.54

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-011	KEKCH1AC	316.10g	2.00	GammaVision	GV05	12 / 23 / 07 13:43	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.729E+000 pCi/g	6.958E-001	6.404E-001	3.895E-001	0.000E+000	12.14

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-012	KEKCJ1AC	315.40g	2.00	GammaVision	GV07	12 / 23 / 07 13:43	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.174E+000 pCi/g	2.915E-001	2.835E-001	4.849E-001	0.000E+000	2.42

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-013	KEKCK1AC	361.50g	2.00	GammaVision	GV01	12 / 23 / 07 14:23	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.456E+000	pCi/g	3.988E-001	3.730E-001	2.251E-001	9.627E-002	10.91

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-014	KEKCM1AC	356.80g	2.00	GammaVision	GV03	12 / 23 / 07 14:23	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	9.763E-001	pCi/g	2.878E-001	2.823E-001	3.614E-001	1.645E-001	2.70

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-015	KEKCP1AC	347.70g	2.00	GammaVision	GV04	12 / 23 / 07 14:24	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.461E+000	pCi/g	3.003E-001	2.883E-001	1.466E-001	4.633E-002	9.97

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-016	KEKCQ1AC	321.00g	2.00	GammaVision	GV05	12 / 23 / 07 14:25	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	8.041E-001	pCi/g	3.129E-001	3.095E-001	4.917E-001	0.000E+000	1.64

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200251-017	KEKCR1AC	323.20g	2.00	GammaVision	GV07	12 / 23 / 07 14:25	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.208E+000	pCi/g	3.094E-001	3.015E-001	4.782E-001	0.000E+000	2.53

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L230000-010B	KEQKR1AA	372.80g	2.00	GammaVision	GV01	12 / 23 / 07 15:03	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	-2.055E-002	pCi/g	2.587E-001	2.587E-001	2.523E-001	1.103E-001	-0.08

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L230000-010C	KEQKR1AC	351.20g	2.00	GammaVision	GV03	12 / 23 / 07 15:04	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AM-241	1493	1.071E+002	pCi/g	8.484E+000	1.839E+000	1.385E+000	6.879E-001	77.32
CO-60	1515	6.591E+001	pCi/g	3.912E+000	1.118E+000	3.050E-001	1.421E-001	216.07
CS-137	1518	4.362E+001	pCi/g	2.675E+000	8.662E-001	3.559E-001	1.731E-001	122.57

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery
F7L230000-010C	KEQKR1AC	CS-137	4.362E+001	pCi/g	4.002E+001	109.00%
		CO-60	6.591E+001	pCi/g	6.272E+001	105.08%
		AM-241	1.071E+002	pCi/g	1.031E+002	103.84%

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity		Dup Activity	RPD	RER	DER	Flag
F7L200251-001	F7L200251-001X	AC-228	3.765E+000	pCi/g	4.176E+000	10.35%	4.000E-001	1.131E+000	

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Instrument Checks

TestAmerica **STL**

Gamma Spectroscopy Daily Check Summary

Detector: 1

Measurement Date/Time: 12/23/2007 12:45:25

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	3.250	3.500	3.638	4.250	4.500	ok
Total Activity (Bq)	1841.0	1880.0	1921.6	1996.0	2035.0	ok
Peak Shift (keV)	-0.3000	-0.2000	-0.1684	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	1.0027	1.0500	1.1000	ok
Avg FWTM Ratio	0.9000	0.9500	1.0093	1.1000	1.1500	ok

Detector: 3

Measurement Date/Time: 12/23/2007 12:48:08

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.500	2.750	3.206	3.250	3.500	ok
Total Activity (Bq)	1835.0	1874.0	1948.4	1990.0	2029.0	ok
Peak Shift (keV)	-0.3000	-0.2500	-0.2107	0.2500	0.3000	ok
Avg FWHM Ratio	0.8500	0.9000	1.0342	1.1500	1.2500	ok
Avg FWTM Ratio	0.9000	0.9500	1.1792	1.1500	1.2500	High

Detector: 4

Measurement Date/Time: 12/23/2007 12:10:00

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.150	1.200	1.344	1.450	1.500	ok
Total Activity (Bq)	1833.7	1872.3	1923.3	1988.2	2026.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1888	0.2500	0.5000	ok
Avg FWHM Ratio	0.7000	0.8000	0.9651	1.1000	1.2500	ok
Avg FWTM Ratio	0.7000	0.8000	0.9754	1.1000	1.2500	ok

Detector: 5

Measurement Date/Time: 12/23/2007 12:11:12

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.915	2.000	2.250	ok
Total Activity (Bq)	1837.9	1876.6	1912.4	1992.7	2031.4	ok
Peak Shift (keV)	-0.2500	-0.1750	0.0031	0.1750	0.2500	ok
Avg FWHM Ratio	0.8500	0.9000	0.9973	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0164	1.1500	1.2000	ok

Gamma Spectroscopy Daily Check Summary

Detector: 6

Measurement Date/Time: 12/23/2007 12:10:21

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.350	2.600	2.901	3.150	3.400	ok
Total Activity (Bq)	1829.3	1867.8	1899.2	1983.3	2021.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1349	0.2500	0.5000	ok
Avg FWHM Ratio	0.7500	0.9000	1.0167	1.1500	1.3000	ok
Avg FWTM Ratio	0.7500	0.9000	1.0641	1.1500	1.3000	ok

Detector: 7

Measurement Date/Time: 12/23/2007 12:10:31

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	0.750	1.000	1.348	1.750	2.000	ok
Total Activity (Bq)	1850.0	1875.0	1910.3	1975.0	2000.0	ok
Peak Shift (keV)	-0.5000	-0.2500	0.0885	0.2500	0.5000	ok
Avg FWHM Ratio	0.8000	0.8500	0.9807	1.1500	1.2000	ok
Avg FWTM Ratio	0.8000	0.8500	1.0029	1.2000	1.2500	ok

Detector: 8

Measurement Date/Time: 12/23/2007 12:45:08

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.527	2.000	2.250	ok
Total Activity (Bq)	1875.0	1900.0	1864.2	1995.0	2020.0	< MIN !!
Peak Shift (keV)	-0.2500	-0.2000	0.1958	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	1.0383	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0462	1.1000	1.1550	ok

Notes: Low and High are 2 sigma warning limits. Minimum (<MIN) and Maximum (>MAX) are 3 sigma control limits (Fail).

Analyst _____

Date _____

GammaVision V6.01 QA Background Report 12/23/2007 11:33:39 AM

Detector: 1 Ge 1 SN/242
Measurement Number: 1279
Data Acquired On: 12/23/2007 11:13:30 AM
Real Time: 1206.96 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	3.25	3.50	3.64	4.25	4.50

GammaVision V6.01 QA Background Report 12/23/2007 12:16:40 PM

Detector: 3 Ge 3 SN/155
Measurement Number: 1209
Data Acquired On: 12/23/2007 11:56:30 AM
Real Time: 1208.10 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.50	2.75	3.21	3.25	3.50

GammaVision V6.01 QA Background Report 12/23/2007 11:33:52 AM

Detector: 4 Ge 4 SN/181
Measurement Number: 101
Data Acquired On: 12/23/2007 11:13:47 AM
Real Time: 1202.22 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.15	1.20	1.34	1.45	1.50

GammaVision V6.01 QA Background Report 12/23/2007 11:33:58 AM

Detector: 5 Ge 5 SN/157
Measurement Number: 247
Data Acquired On: 12/23/2007 11:13:56 AM
Real Time: 1200.00 Sec.
Live Time: 1128.16 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.91	2.00	2.25

GammaVision V6.01 QA Background Report 12/23/2007 11:34:14 AM

Detector: 7 Ge 7 SN/154
Measurement Number: 341
Data Acquired On: 12/23/2007 11:14:03 AM
Real Time: 1210.08 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	0.75	1.00	1.35	1.75	2.00

GammaVision V6.01 QA Background Report 12/23/2007 11:35:00 AM

Detector: 8 Ge 8 SN/174
Measurement Number: 1227
Data Acquired On: 12/23/2007 11:14:14 AM
Real Time: 1244.44 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.53	2.00	2.25

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:45:23PM Page 1

DB Analysis ID: 32,957

Sample Description: 03-0366

Spectrum Filename: QA101259.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:14:38PM		
Live Time:	1800.00	Real Time:	1822.24
Dead Time:	1.22 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 air filter 74140-334 1_05_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\GE1 AF interp_165_quad 01_05_07.Clb		
Energy Created:	05-Jan-2007 1:55:09PM	Efficiency Created:	05-Jan-2007 1:58:17PM
Zero Offset:	0.112 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.11 keV
Stop Channel:	8,000 for an energy of 1999.43 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2789

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.307E+002	6.159E+002	1.74	5.96	1.151E+000
CS-137	3.464E+002	3.862E+002	2.02	6.39	2.418E+000
AM-241	9.125E+002	9.195E+002	1.03	9.34	4.805E+000

= All peaks for activity calculation had bad shape

Total Activity (25.11 to 1,999.43 keV) 1,589.70 Bq/SA

Analyzed by: _____

403605

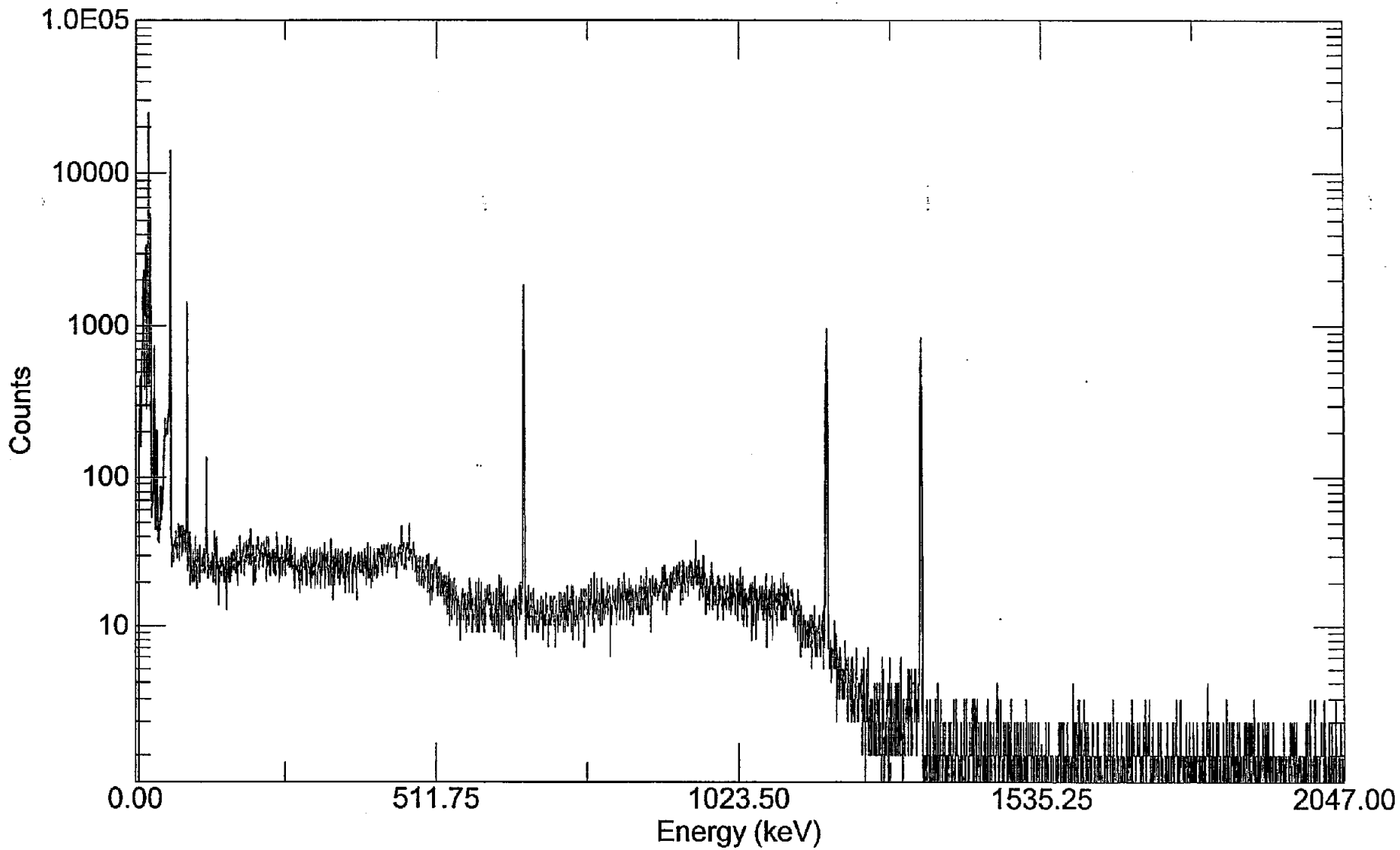
Reviewed by: _____

Supervisor

Laboratory: Test America

QA101259

03-0366



Acquired: 23-Dec-2007 12:14:38 PM
File: C:\User\spectra\QA101259.spc
Detector: #0 Ge 1 SN/242

Real Time: 1822.24 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:48:06PM Page 1

DB Analysis ID: 32,958

Sample Description: 03-0368

Spectrum Filename: QA301294.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:17:15PM		
Live Time:	1800.00	Real Time:	1825.74
Dead Time:	1.41 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 Air filter 74140_334 interp_122_quad 01_09_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Air filter interp_122_quad 01_09_07.Clb		
Energy Created:	09-Jan-2007 10:31:35AM	Efficiency Created:	09-Jan-2007 10:36:46AM
Zero Offset:	0.372 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.35 keV
Stop Channel:	8,000 for an energy of 2000.41 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Diff-------- 0.2754

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60		3.446E+002	6.417E+002	1.74	5.96	1.767E+000
CS-137		3.524E+002	3.929E+002	2.05	6.21	2.864E+000
AM-241	#	9.069E+002	9.138E+002	1.01	9.33	4.917E+000

= All peaks for activity calculation had bad shape

Total Activity (25.35 to 2,000.41 keV) 1,603.89 Bq/SA

Analyzed by: _____

403605

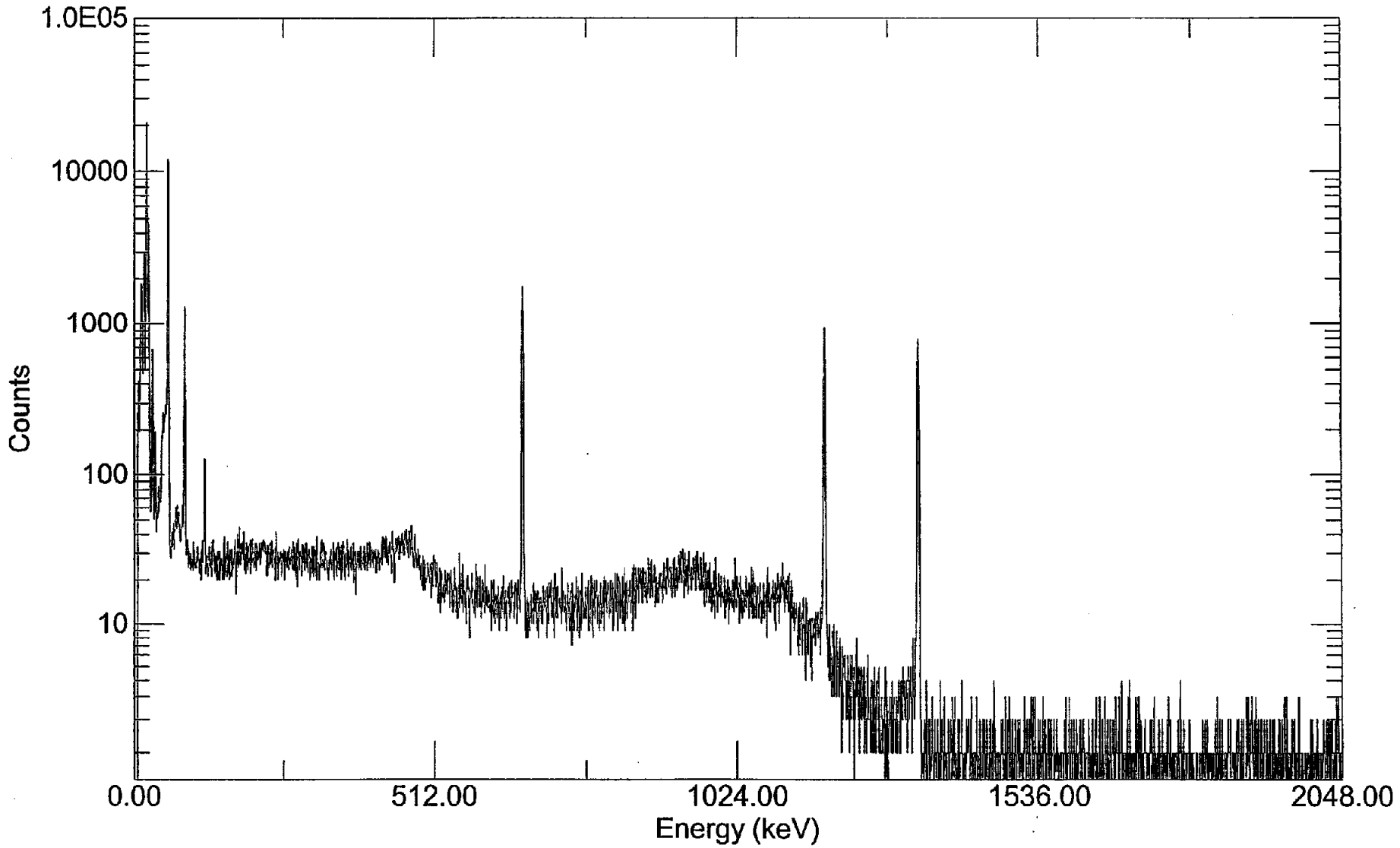
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA301294

03-0368



Acquired: 23-Dec-2007 12:17:15 PM
File: C:\User\spectra\QA301294.spc
Detector: #0 Ge 3 SN/155

Real Time: 1825.74 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:09:59PM Page: 1

DB Analysis ID: 32,951

Sample Description: 03-0371

Spectrum Filename: QA400104.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:38:52AM		
Live Time:	1800.00	Real Time:	1810.88
Dead Time:	0.60 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4 AirFilterCal_74140_334_05_08_07(EE)		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4 AirFilterCal_74140_334_05_08_07		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	08-May-2007 1:39:26PM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.03 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1888

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.230E+002	6.015E+002	2.23	6.11	1.381E+000
CS-137	3.587E+002	3.998E+002	2.62	6.50	4.056E+000
AM-241	9.150E+002	9.220E+002	1.12	9.28	4.985E+000

= All peaks for activity calculation had bad shape

Total Activity (25.03 to 1,998.47 keV) 1,596.71 Bq/SA

Analyzed by: _____

403605

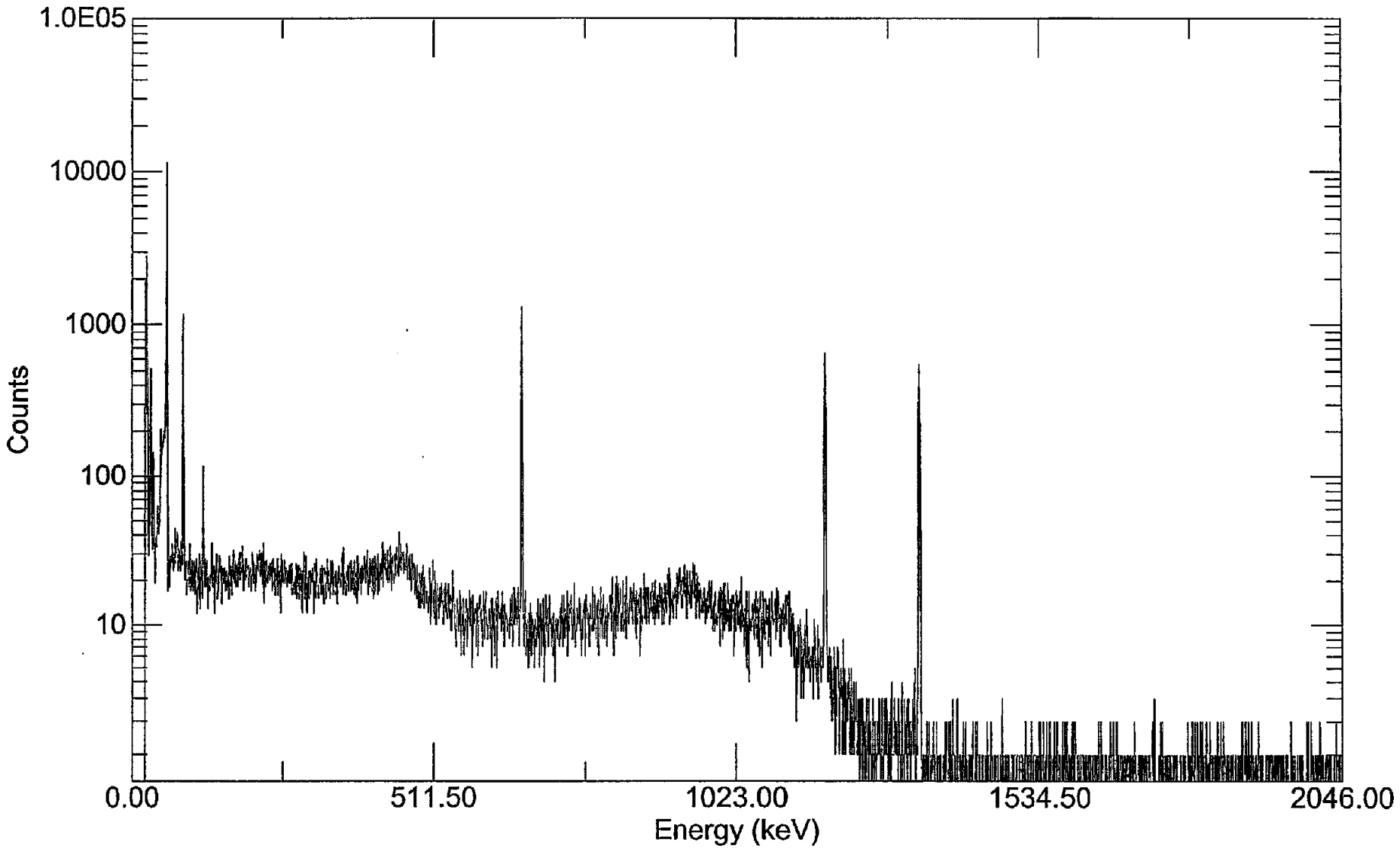
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA400104

03-0371



Acquired: 23-Dec-2007 11:38:52 AM
File: C:\User\spectra\QA400104.spc
Detector: #0 Ge 4 SN/181

Real Time: 1810.88 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:11:10PM Page 1

DB Analysis ID: 32,954

Sample Description: 03-0370

Spectrum Filename: QA500094.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:39:00AM		
Live Time:	1800.00	Real Time:	1897.84
Dead Time:	5.16 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 airfilter 74140-334_032707 interp_165_quad		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 airfilter_032707_interp165quad.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	28-Mar-2007 6:10:41PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.25 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0268

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.326E+002	6.194E+002	2.16	6.10	1.535E+000
CS-137	3.435E+002	3.829E+002	2.47	6.55	3.202E+000
AM-241	9.032E+002	9.101E+002	1.07	9.34	4.639E+000

= All peaks for activity calculation had bad shape

Total Activity (25.25 to 2,000.57 keV) 1,579.32 Bq/SA

Analyzed by: _____

403605

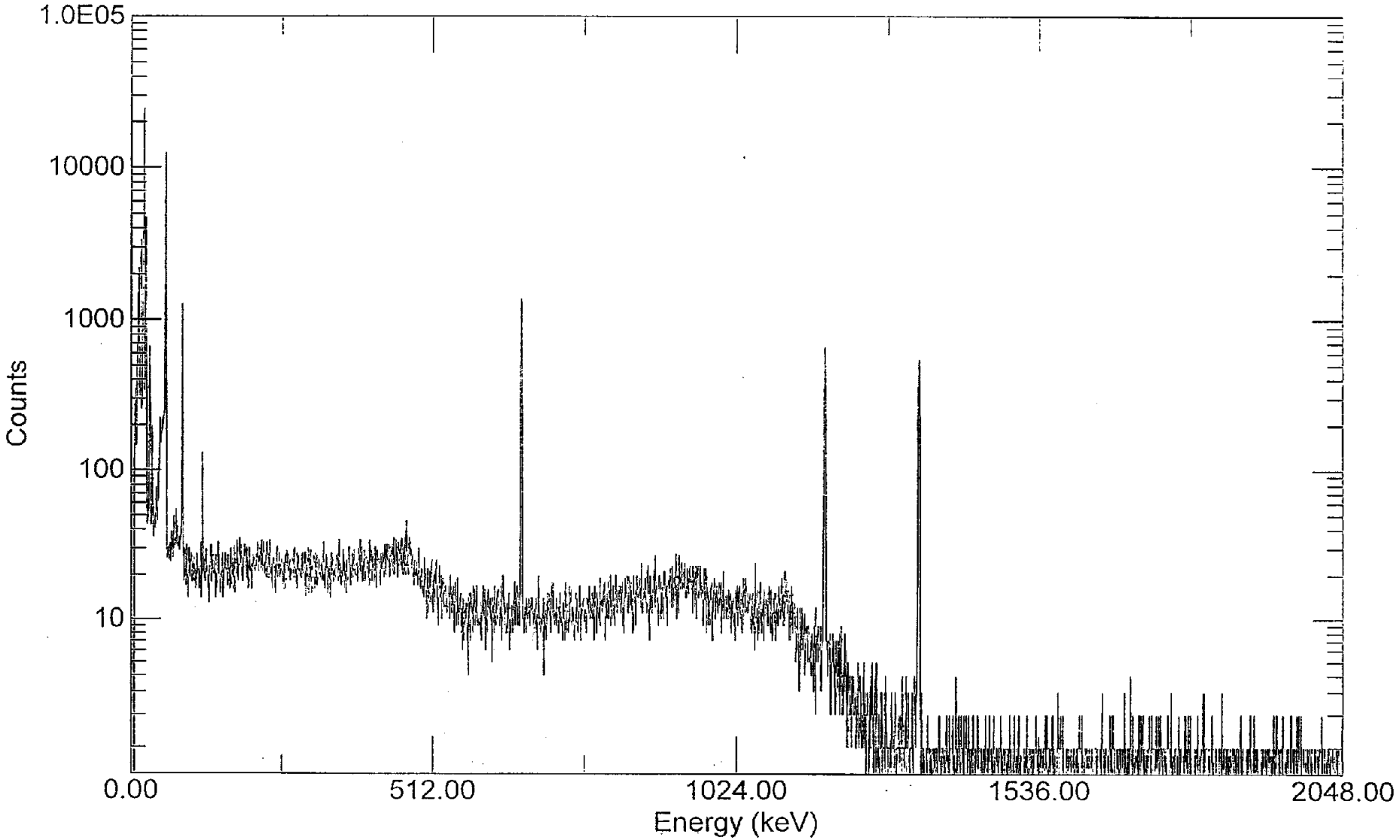
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA500094

03-0370



Acquired: 23-Dec-2007 11:39:00 AM
File: C:\User\spectra\QA500094.spc
Detector: #0 Ge 5 SN/157

Real Time: 1897.84 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:10:29PM Page 1

DB Analysis ID: 32,953

Sample Description: 03-0372

Spectrum Filename: QA700211.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:39:08AM		
Live Time:	1800.00	Real Time:	1828.52
Dead Time:	1.56 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 air filter 74140-334 01_04_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 air filter 01_04_07.Clb		
Energy Created:	04-Jan-2007 9:44:57AM	Efficiency Created:	04-Jan-2007 9:55:23AM
Zero Offset:	0.082 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.08 keV
Stop Channel:	8,000 for an energy of 2000.16 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1194

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.277E+002	6.102E+002	1.93	6.01	1.731E+000
CS-137	3.489E+002	3.890E+002	2.14	6.24	2.913E+000
AM-241	9.042E+002	9.111E+002	0.95	8.44	4.204E+000

= All peaks for activity calculation had bad shape

Total Activity (25.08 to 2,000.16 keV) 1,580.84 Bq/SA

Analyzed by: _____

403605

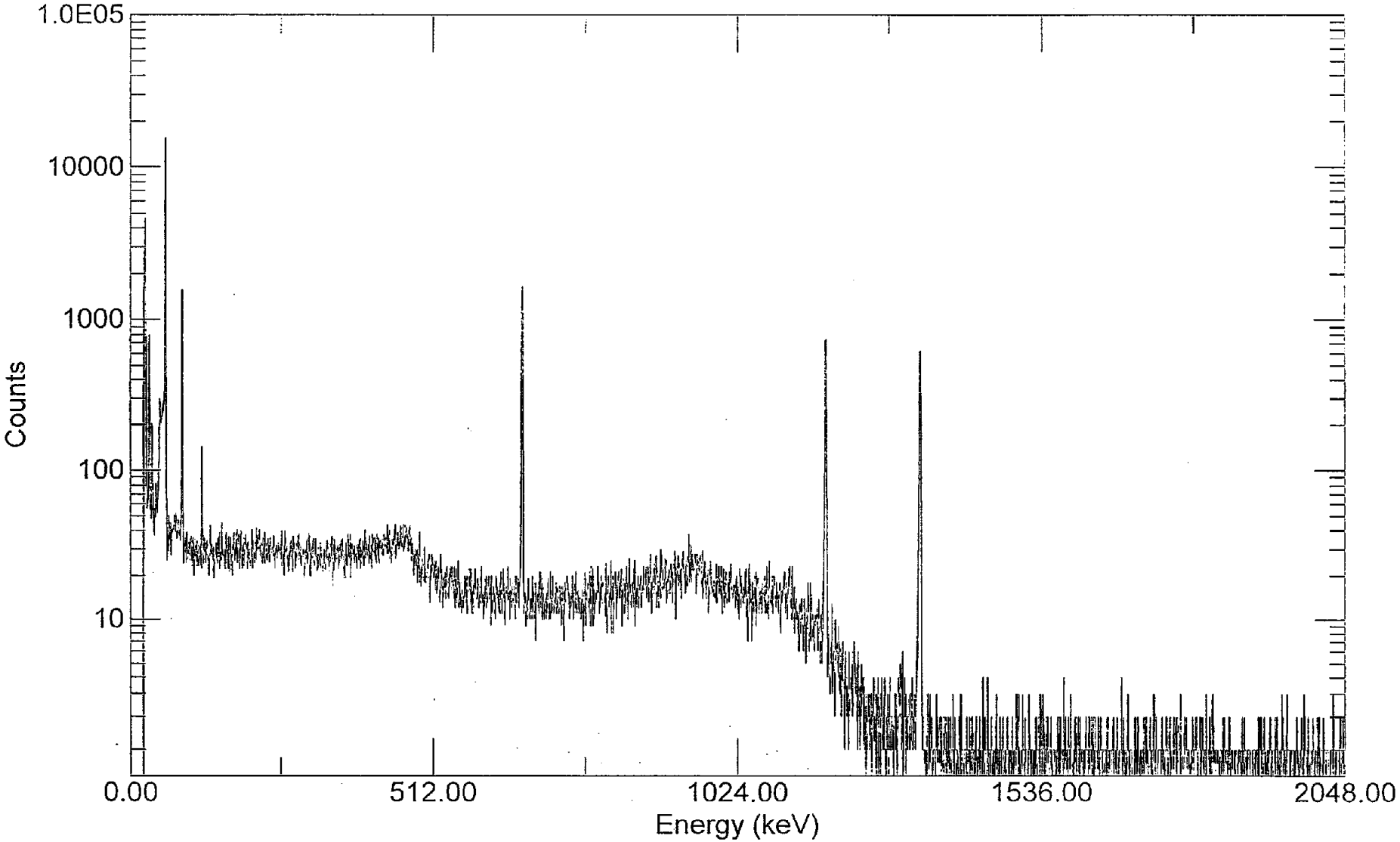
Reviewed by: _____

Supervisor

Laboratory: Test America

QA700211

03-0372



Acquired: 23-Dec-2007 11:39:08 AM
File: C:\User\spectra\QA700211.spc
Detector: #0 Ge 7 SN/154

Real Time: 1828.52 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:45:06PM Page 1

DB Analysis ID: 32,956

Sample Description: 03-0373

Spectrum Filename: QA801157.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:13:16PM		
Live Time:	1800.00	Real Time:	1879.12
Dead Time:	4.21 %		
Detector ID:	8		

Detector System: Ge 8 SN/174

Calibration

Description:	Ge8 air filter_interp>122<quad		
Filename:	C:\User\Calibrations\Ge8 post 11_03_06\Ge8 air filter interp_122_quad.Clb		
Energy Created:	06-Nov-2006 3:12:36PM	Efficiency Created:	06-Nov-2006 3:14:26PM
Zero Offset:	0.014 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.02 keV
Stop Channel:	8,000 for an energy of 2000.35 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2791

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.209E+002	5.976E+002	2.04	6.01	4.997E-001
CS-137	3.391E+002	3.780E+002	2.43	6.54	3.236E+000
AM-241	8.820E+002	8.887E+002	1.08	9.35	4.870E+000

= All peaks for activity calculation had bad shape

Total Activity (25.02 to 2,000.35 keV) 1,541.93 Bq/SA

Analyzed by: _____

403605

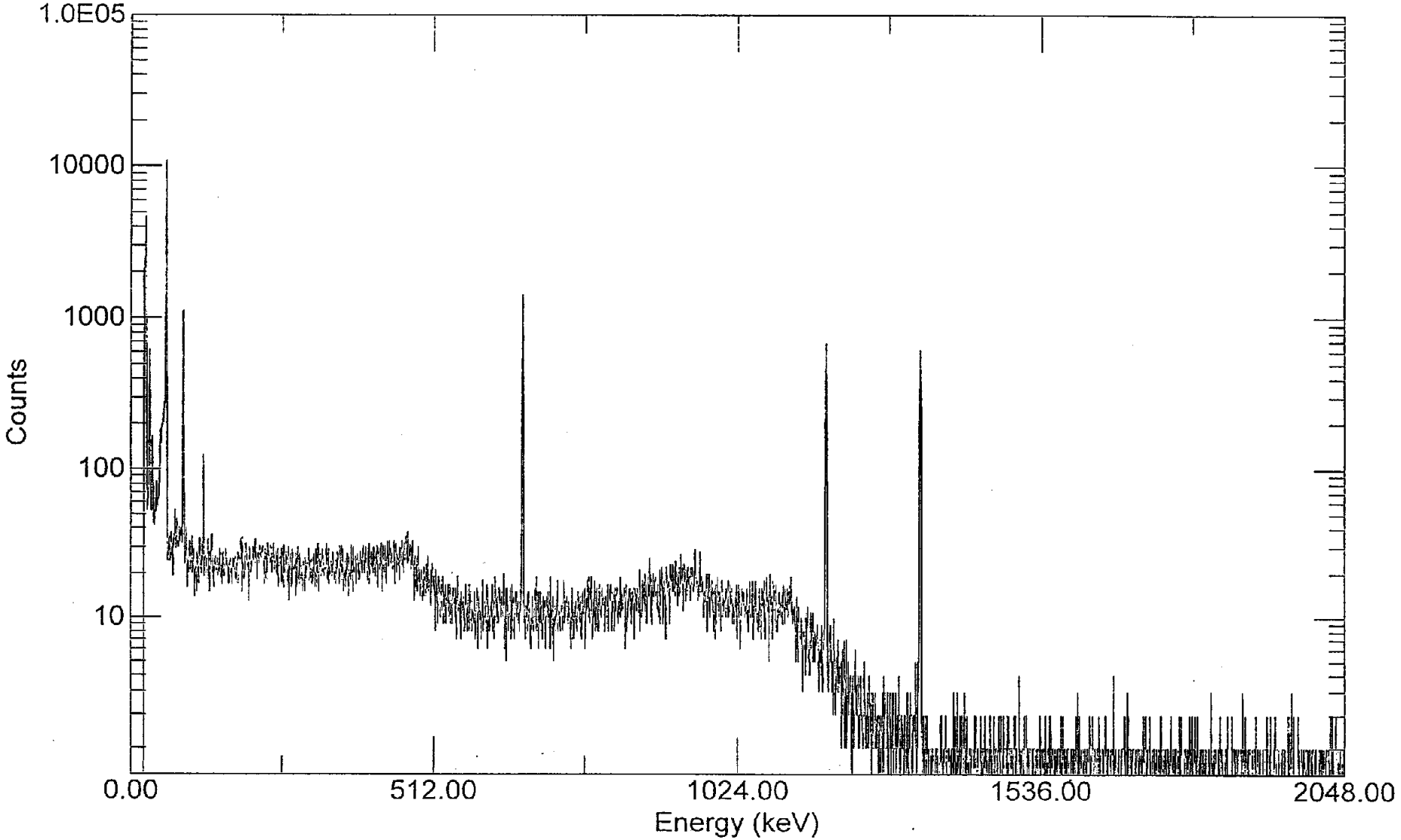
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA801157

03-0373



Acquired: 23-Dec-2007 12:13:16 PM
File: C:\User\spectra\QA801157.spc
Detector: #0 Ge 8 SN/174

Real Time: 1879.12 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica STL

Gamma Vision Long Backgrounds

November 2007

Ge1 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    1
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1

Sample description
     Ge1 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge1 bkgd\Ge1 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 20:12:47
       Live time:              43200
       Real time:              43454
       Dead time:                  0.59 %
       Detector ID:                    1

Detector system
     Ge 1 SN/242


Calibration
       Filename:                   GE1 AF interp_165_quad 01_05_07.Clb
     Ge1 air filter 74140-334 1_05_07


       Energy Calibration
            Created:               05-Jan-2007 13:55:09
            Zero offset:           0.112 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.471E-09 keV/channel^2

       Efficiency Calibration
            Created:               05-Jan-2007 13:58:17
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.63 %
            Log(Eff):             -5.325680E-02 + (-3.688631E-01*Log(E) ) +
                                   ( -3.389960E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:            90 (    22.61keV )
       Stop channel:           8000 (  1999.43keV )
       Peak rejection level:     40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    2
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1
                                       Page 1
```

Ge1 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 26 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1584

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.48	1145.	8.01	0.82	7.917E-02	29.46	20.350	1.645E+00	I129
					29.78	37.840	8.846E-01	I129
33.55	364.	19.14	1.08	7.930E-02	33.61	10.230	1.039E+00	I129
39.64	367.	17.70	0.72	7.948E-02	39.57	7.500	1.425E+00	I129
43.95	83.	36.93	0.77	7.961E-02				
46.49	615.	6.96	0.78	7.969E-02	46.54	4.250	4.202E+00	PB210
63.22	886.	6.96	0.78	7.996E-02	63.29	4.820	5.319E+00	TH234
74.91	250.	16.22	0.81	7.953E-02				
77.12	227.	16.57	0.81	7.945E-02				
84.26	190.	20.36	0.82	7.919E-02	83.79	25.180	2.206E-01	RA223
92.53	1212.	5.11	1.09	7.822E-02	92.59	5.570	6.442E+00	TH234
143.45	191.	27.71	1.47	6.596E-02	143.76	10.960	6.125E-01	U235
185.73	526.	9.46	0.72	5.472E-02	185.71	57.200	3.892E-01	U235
205.37	116.	29.90	0.76	5.087E-02	205.31	5.010	1.050E+00	U235
216.58	124.	37.90	0.67	4.893E-02				
238.22	550.	10.88	0.92	4.561E-02	238.63	43.300	6.455E-01	PB212
241.65	168.	26.87	0.76	4.508E-02	242.00	7.430	1.164E+00	PB214
294.87	221.	20.40	1.06	3.889E-02	295.22	19.300	6.822E-01	PB214
321.82	106.	28.71	0.51	3.640E-02				
338.11	118.	0.12	1.08	3.504E-02	338.28	2.790	1.406E+00	RA223
351.65	288.	15.45	1.27	3.402E-02	351.93	37.600	5.210E-01	PB214
510.67	1595.	4.49	2.58	2.544E-02				
558.30	154.	21.25	1.00	2.370E-02				
582.63	214.	22.14	1.61	2.290E-02	583.19	84.500	2.562E-01	TL208
609.26	279.	18.64	1.59	2.209E-02	609.31	46.090	6.342E-01	BI214
678.61	106.	27.09	0.86	2.025E-02				
910.54	225.	19.20	0.94	1.591E-02				
968.65	78.	33.31	1.64	1.511E-02	968.97	15.800	PBC<MDA	AC228
1119.75	138.	28.36	0.92	1.337E-02	1120.29	15.100	1.582E+00	BI214
1460.80	301.	11.17	1.75	1.066E-02	1460.83	10.670	6.124E+00	K40
1764.41	115.	18.86	0.40	9.048E-03	1764.49	15.400	1.916E+00	BI214

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 3
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1
Page 2

Ge1 background 11_21_07.Rpt

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
175.36	43.91	424.	83.	0.002	73.85	0.772	EU-155	lD
299.08	74.87	807.	207.	0.005	48.16	0.699	PB-214	
307.91	77.08	673.	174.	0.004	52.38	0.864	PB-214	
573.39	143.45	712.	191.	0.004	55.42	1.469	TC-99M	l
742.53	185.73	586.	526.	0.012	18.92	0.716	U-235	l
821.10	205.37	381.	116.	0.003	59.80	0.757	U-235	l
865.96	216.58	565.	124.	0.003	75.80	0.669	TB-160	s
2042.53	510.67	504.	1595.	0.037	8.97	2.583	TL-208	s
2233.07	558.30	218.	154.	0.004	42.50	0.999	Y-91M	s
2714.42	678.61	154.	106.	0.002	54.18	0.859	AG-110M	sM
3642.42	910.54	329.	109.	0.003	50.65	0.937	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.69	29.78	1412.	1845.	0.043	0.03	0.757D
I-129	133.99	33.61	705.	256.	0.006	31.86	0.761D
I-129	158.11	39.64	963.	367.	0.008	35.40	0.717s
PB-210	184.97	46.35	1060.	707.	0.016	20.60	0.662s
TH-234	252.44	63.22	832.	886.	0.020	13.92	0.776
RA-223	336.52	84.24	1308.	175.	0.004	60.22	0.815s
TH-234	369.70	92.53	789.	1212.	0.028	10.22	1.090s
RA-223	576.53	144.23	937.	32.	0.001	0.79	0.880D
Ra-226	744.47	186.21	938.	426.	0.010	22.51	0.924D
PB-212	952.51	238.22	700.	550.	0.013	21.77	0.919s
RA-224	959.36	239.93	1373.	-223.	-0.005	48.86	0.980
PB-214	966.24	241.65	538.	168.	0.004	53.74	0.758s
PB-214	1179.17	294.87	453.	221.	0.005	40.80	1.059
AC-228	1352.99	338.32	729.	118.	0.003	0.23	1.078D
PB-214	1406.31	351.65	405.	288.	0.007	30.91	1.275
TL-208	2330.44	582.63	348.	214.	0.005	44.27	1.612s
BI-214	2436.97	609.26	441.	279.	0.006	37.28	1.586s
AC-228	3644.09	910.96	250.	115.	0.003	43.01	1.596s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 4
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	3874.95	968.65	299.	78.	0.002	66.62	1.642s
BI-214	4479.56	1119.75	190.	138.	0.003	56.71	0.922s
K-40	5844.32	1460.80	94.	301.	0.007	22.35	1.747
BI-214	7059.40	1764.41	47.	115.	0.003	37.72	0.398s

s - Peak fails shape tests.

Ge1 background 11_21_07.Rpt

D - Peak area deconvoluted.
A Derived peak area.

```
*****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak -------------
Name   Code  Activity     Energy   Activity Code MDA Value
             Bq/sample     keV     Bq/sample     Bq/sample      COMMENTS
-----------------------------------------------------------------------------

Be-7     C  -2.5924E-02
                          477.61-2.592E-02 %(  8.962E-01 1.02E+03 G
                             1 of   1 peaks found

K-40     N   6.1244E+00
                         1460.83 6.124E+00  (  9.744E-01 1.12E+01 G
                             1 of   1 peaks found

CO-60    F   8.3359E-03
                         1332.50 8.336E-03 &(  1.027E-01 3.57E+02 G
                         1173.24 7.132E-02 %   1.179E-01 5.06E+01 G
                             2 of   2 peaks found

I-129    I   1.4251E+00
                           29.78 1.425E+00 }   1.374E-01 1.37E-02 X
                           33.61 7.311E-01 -   3.607E-01 1.59E+01 X
                           39.57 1.425E+00 *(  5.721E-01 1.77E+01 G
                           34.61-4.163E-01 %   1.957E+00 1.41E+02 X
                             4 of   5 peaks found

CS-137   I  -6.5179E-03
                          661.66-6.518E-03 &(  1.302E-01 5.91E+02 G
                             1 of   1 peaks found

TL-208   N   2.5616E-01
                          583.19 2.562E-01 @(  1.073E-01 2.21E+01 G
                          860.56 4.219E-01 %   9.305E-01 6.68E+01 G
                             2 of   2 peaks found

PB-210   N   4.8319E+00
                           46.54 4.832E+00 *(  1.055E+00 1.03E+01 G
                             1 of   1 peaks found

PB-212   N   6.4547E-01
                          238.63 6.455E-01 @(  1.479E-01 1.09E+01 G
                          300.10 1.825E-01 %   2.408E+00 3.93E+02 G
                             2 of   2 peaks found

PB-214   N   5.7564E-01
                          351.93 5.210E-01  (  1.748E-01 1.55E+01 G
                          295.22 6.822E-01  (  3.145E-01 2.04E+01 G
                          242.00 1.164E+00 +   7.653E-01 2.69E+01 G
                             3 of   3 peaks found
```



```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

BI-214   N   6.3420E-01
                          609.31 6.342E-01 *(  2.286E-01 1.86E+01 G
                         1764.49 1.916E+00 +   5.739E-01 1.89E+01 G
```

```
                                Ge1 background 11_21_07.Rpt
                              1120.29 1.582E+00 +   7.673E-01 2.84E+01 G
                               768.36 5.845E-01 %   2.258E+00 1.16E+02 G
                                  4 of   4 peaks found

RA-223    N    3.4520E-01
                               83.79 2.037E-01 *   1.987E-01 3.01E+01 X
                              269.46 1.066E-01 &(  5.409E-01 1.52E+02 G
                              154.21 4.946E-01 %   9.325E-01 5.73E+01 G
                              144.23 3.452E-01 }   1.590E+00 3.93E-01 G
                              323.87-5.721E-01 %   2.109E+00 1.11E+02 G
                                  5 of   6 peaks found

RA-224    N   -2.7848E+00
                              240.99-2.785E+00  (  2.190E+00 2.44E+01 G
                                  1 of   1 peaks found

AC-228    N    6.9099E-01
                              911.20 6.508E-01  (  4.310E-01 2.15E+01 G
                              968.97 7.567E-01 *(  8.074E-01 3.33E+01 G
                              338.32 6.910E-01 }   7.535E-01 1.16E-01 G
                                  3 of   3 peaks found

TH-234    N    5.3187E+00
                               63.29 5.319E+00  (  8.239E-01 6.96E+00 G
                               92.59 6.442E+00 +   7.098E-01 5.11E+00 G
                                  2 of   2 peaks found

U-235     N    1.3269E-01
                              185.71 3.695E-02 }(  1.143E-01 9.33E+01 G
                              143.76 2.880E-01 }(  4.162E-01 4.42E+01 G
                              163.36 5.461E-01 }(  1.152E+00 6.40E+01 G
                              205.31 4.668E-01 }(  1.258E+00 8.14E+01 G
                                  4 of   4 peaks found

Ra-226    N    5.0340E+00
                              186.21 5.034E+00 }(  1.717E+00 1.13E+01 G
                                  1 of   1 peaks found

AM-241    T    1.7879E-02
                               59.54 1.788E-02 %(  1.230E-01 2.06E+02 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
```

```
  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    6
 STL- St Louis                   Spectrum name: Ge1 background 11_21_07.An1

   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
```

to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	84.24	1308.	175.	0.004	60.22	2.037E-01
RA-223	144.23	937.	32.	0.001	0.79	3.452E-01
RA-224	239.93	1373.	-223.	-0.005	48.86	-2.785E+00
AC-228	910.96	250.	115.	0.003	43.01	6.508E-01
AC-228	968.65	299.	78.	0.002	66.62	7.567E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.5924E-02	2.0493E+03%	8.962E-01
K-40		6.1244E+00	2.2349E+01%	9.744E-01
CO-60	#A	8.3359E-03	7.1489E+02%	1.027E-01
I-129		1.4251E+00	3.5397E+01%	5.721E-01
CS-137	#A	-6.5179E-03	1.1826E+03%	1.302E-01
TL-208	#	2.5616E-01	4.4272E+01%	1.073E-01
PB-210	#	4.8319E+00	2.0595E+01%	1.055E+00
PB-212	#	6.4547E-01	2.1768E+01%	1.479E-01
PB-214		5.7564E-01	2.5595E+01%	1.748E-01
BI-214		6.3420E-01	3.7279E+01%	2.286E-01
RA-223	#A	3.4520E-01	7.1896E+01%	5.409E-01
RA-224	#A	-2.7848E+00	4.8862E+01%	2.190E+00
AC-228	#	6.9099E-01	3.9651E+01%	4.310E-01
TH-234		5.3187E+00	1.3922E+01%	8.239E-01

U-235	A	1.3269E-01	8.8419E+01%	1.258E+00
Ra-226		5.0340E+00	2.5148E+01%	1.717E+00
AM-241	#A	1.7879E-02	4.1232E+02%	1.230E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.

Ge1 background 11_21_07.Rpt

F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (39.4 to 1999.4 keV) 1.981E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge2 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    1
STL- St Louis                    Spectrum name: Ge2 background 11_21_07.An1

Sample description
     Ge2 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge2 bkgd\Ge2 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:39:03
       Live time:             43200
       Real time:             43328
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     Ge 2 SN/182


Calibration
       Filename:                   Ge2 AF w_spacer 72002 poly. 121206 no Hg
                                   .Clb
     Ge2 72002-334 Air Filter Poly no Hg 121206


       Energy Calibration
            Created:               13-Dec-2006 07:56:27
            Zero offset:           0.102 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.874E-09 keV/channel^2

       Efficiency Calibration
            Created:               13-Dec-2006 07:58:09
            Type:                  Polynomial
            Uncertainty:           1.400 %
            Coefficients:         -0.388770  -4.607021   0.563706
                                  -0.059383   0.002602  -0.000047

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.60keV )
       Stop channel:            8000 (  1999.97keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method

       Random error:              0.0000000E+00
       Systematic error:          0.0000000E+00
       Fraction Limit;            0.000%
       Background width:          average of three points.

       Half lives decay limit:   12.000
                                     Page 1
```

Ge2 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 2
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 3 cutoff 20.00000 %
Energy Calibration
Normalized diff: 1.0000

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
36.01	548.	9.94	2.31	1.554E-04	34.61	2.419	0.000E+00	I129
54.77	448.	20.63	0.48	2.979E-02				
70.79	795.	10.76	0.57	4.706E-02				
82.34	140.	38.03	1.07	5.505E-02				
104.48	141.	28.68	0.56	6.052E-02				
142.56	15.	0.90	1.13	5.781E-02	144.23	3.220	PBC<MDA	RA223
151.40	922.	7.90	0.80	5.654E-02				
172.73	246.	28.01	0.59	5.240E-02				
180.30	97.	34.82	0.46	5.091E-02				
270.17	94.	30.57	0.82	3.630E-02	269.46	13.700	4.365E-01	RA223
432.95	145.	13.12	1.10	2.330E-02				
774.09	107.	14.98	1.25	1.393E-02				

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
143.68	36.01	765.	548.	0.013	16.63	2.308	CS-137	sM
218.74	54.77	1948.	448.	0.010	41.27	0.482	LU-177	sM
282.83	70.79	1564.	795.	0.018	21.52	0.570	AU-198	sM
417.63	104.48	526.	141.	0.003	57.36	0.563	U-235	sM
605.36	151.40	549.	1148.	0.027	8.26	0.797	KR-85M	sM
690.68	172.73	768.	246.	0.006	56.02	0.592	-	sM
1080.54	270.17	183.	94.	0.002	61.15	0.819	AC-228	l
1731.80	432.95	50.	145.	0.003	26.23	1.105	J-134	sM
3096.58	774.09	25.	107.	0.002	23.42	1.245	W-187	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

Ge2 background 11_21_07.Rpt
This section based on library: long bkgd_pbc.lib

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 3
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
RA-223	329.04	82.34	1346.	140.	0.003	76.05	1.072s
RA-223	576.67	144.23	742.	15.	0.000	1.79	1.128D
RA-223	610.25	152.62	1317.	-226.	-0.005	47.36	1.137s
AC-228	1353.21	338.32	271.	-3.	0.000	-12.93	1.306D

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-4.6117E-02	477.61	-4.612E-02	%(	5.044E-01 3.17E+02	G
			1 of 1 peaks found				
K-40	N	-1.7222E-01	1460.83	-1.722E-01	%(	8.611E-01 1.44E+02	G
			1 of 1 peaks found				
CO-60	F	-8.3377E-03	1332.50	-8.338E-03	%(	7.747E-02 2.62E+02	G
			1173.24	6.175E-04	%	7.327E-02 3.29E+03	G
			2 of 2 peaks found				
I-129	I	-1.9497E-01	39.57	-1.950E-01	%(	1.419E+01 2.19E+03	G
			1 of 5 peaks found				
CS-137	I	-9.4394E-04	661.66	-9.439E-04	&(	6.847E-02 2.06E+03	G
			1 of 1 peaks found				
TL-208	N	-4.4122E-03	583.19	-4.412E-03	&(	6.480E-02 4.21E+02	G
			860.56	7.613E-04	&	4.117E-01 1.48E+04	G
			2 of 2 peaks found				
PB-210	N	-4.5169E-01	46.54	-4.517E-01	&(	8.363E+00 5.56E+02	G
			1 of 1 peaks found				
PB-212	N	-1.7207E-02	238.63	-1.721E-02	&(	1.488E-01 2.58E+02	G
			300.10	-4.113E-01	&	2.107E+00 1.53E+02	G
			2 of 2 peaks found				

```
                                Ge2 background 11_21_07.Rpt
PB-214    N   7.0784E-02
                              351.93 7.078E-02 %(  1.628E-01 6.95E+01 G
                              295.22-7.852E-02 &   3.395E-01 1.29E+02 G
0

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    4
STL- St Louis                   Spectrum name: Ge2 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                              242.00 1.721E-01 &   7.907E-01 1.37E+02 G
                                 3 of   3 peaks found

BI-214    N  -3.4801E-03
                              609.31-3.480E-03 &(  1.312E-01 1.08E+03 G
                             1764.49-1.363E-02 %   5.148E-01 1.02E+03 G
                             1120.29-1.887E-02 %   4.717E-01 6.99E+02 G
                              768.36 1.538E-01 &   1.164E+00 2.17E+02 G
                                 4 of   4 peaks found

RA-223    N   1.8540E-01
                               83.79 2.337E-01 *   2.900E-01 3.80E+01 X
                              269.46 1.854E-01 %(  4.423E-01 7.21E+01 G
                              154.21-1.660E+00 +   1.263E+00 2.37E+01 G
                              144.23 1.854E-01 }   1.612E+00 8.96E-01 G
                              323.87-2.960E-01 &   1.561E+00 1.57E+02 G
                              338.28 2.760E-01 }   2.283E+00 1.90E+02 G
                                 6 of   6 peaks found

RA-224    N   2.7670E-01
                              240.99 2.767E-01 &(  1.525E+00 1.65E+02 G
                                 1 of   1 peaks found

AC-228    N  -2.2436E-02
                              911.20-2.244E-02 %(  2.287E-01 2.88E+02 G
                              338.32-2.244E-02 }   5.553E-01 ******** G
                                 2 of   3 peaks found

TH-234    N   2.5408E-01
                               63.29 2.541E-01 %(  2.384E+00 2.82E+02 G
                               92.59-6.697E-02 %   1.236E+00 5.52E+02 G
                                 2 of   2 peaks found

U-235     N   6.1680E-02
                              185.71 2.368E-03 }(  1.010E-01 1.27E+03 G
                              143.76 1.920E-02 }(  5.448E-01 8.46E+02 G
                              163.36 5.295E-01 }(  1.179E+00 6.74E+01 G
                              205.31 3.574E-01 }(  1.228E+00 1.03E+02 G
                                 4 of   4 peaks found

Ra-226    N   0.0000E+00
                                 0 of   1 peaks found

AM-241    T   0.0000E+00
                                 0 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
                                     Page 4
```

Ge2 background 11_21_07.Rpt

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 5
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	82.34	1346.	140.	0.003	76.05	2.337E-01
RA-223	152.62	1317.	-226.	-0.005	47.36	-1.660E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-4.6117E-02	6.3413E+02%	5.044E-01
K-40	#A	-1.7222E-01	2.8889E+02%	8.611E-01
CO-60	#A	-8.3377E-03	5.2415E+02%	7.747E-02
I-129	#A	-1.9497E-01	4.3718E+03%	1.419E+01
CS-137	#A	-9.4394E-04	4.1142E+03%	6.847E-02
TL-208	#A	-4.4122E-03	8.4236E+02%	6.480E-02
PB-210	#A	-4.5169E-01	1.1128E+03%	8.363E+00
PB-212	#A	-1.7207E-02	5.1525E+02%	1.488E-01
PB-214	#A	7.0784E-02	1.3902E+02%	1.628E-01
BI-214	#A	-3.4801E-03	2.1577E+03%	1.312E-01
RA-223	#A	1.8540E-01	1.4419E+02%	4.423E-01
RA-224	#A	2.7670E-01	3.2921E+02%	1.525E+00
AC-228	#A	-2.2436E-02	5.7610E+02%	2.287E-01
TH-234	#A	2.5408E-01	5.6341E+02%	2.384E+00
U-235	#A	6.1680E-02	1.3487E+02%	1.228E+00
Ra-226	#A	0.0000E+00	7.4987E+03%	1.636E+00
AM-241	#A	0.0000E+00	1.4307E+04%	4.288E-01

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 6
Page 5

Ge2 background 11_21_07.Rpt
STL- St Louis
Spectrum name: Ge2 background 11_21_07.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.0 keV) 0.000E+00 Bq/sample

Analyzed by: _____
402630

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge3 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    1
STL- St Louis                    Spectrum name: Ge3 background 11_21_07.An1

Sample description
     Ge3 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge3 Bkd post 5_8_06\Ge3 background
                     11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 20:14:21
       Live time:              43200
       Real time:              44044
       Dead time:                  1.92 %
       Detector ID:                    3

Detector system
     Ge 3 SN/155


Calibration
       Filename:                   Ge3 Air filter interp_122_quad 01_09_07.
                                   clb
     Ge3 Air filter 74140_334 interp_122_quad 01_09_07


       Energy Calibration
            Created:               09-Jan-2007 10:31:35
            Zero offset:           0.372 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.457E-08 keV/channel^2

       Efficiency Calibration
            Created:               09-Jan-2007 10:36:46
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.114144E-01 + (-2.846233E-01*Log(E) ) +
                                   ( -4.247676E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.85keV )
       Stop channel:            8000 (  2000.41keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    2
                                   Page 1
```

Ge3 background 11_21_07.Rpt

STL- St Louis

Spectrum name: Ge3 background 11_21_07.An1

Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %

Energy Calibration
Normalized diff: 0.0700

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
46.63	517.	11.73	0.85	8.618E-02	46.54	4.250	3.266E+00	PB210
63.31	592.	12.93	0.85	8.723E-02	63.29	4.820	3.262E+00	TH234
72.12	210.	21.86	0.87	8.589E-02				
74.95	648.	7.63	0.87	8.546E-02				
84.56	371.	11.37	0.88	8.406E-02	83.79	25.180	4.057E-01	RA223
87.41	211.	18.65	0.88	8.364E-02				
92.67	628.	10.80	1.19	8.268E-02	92.59	5.570	3.156E+00	TH234
143.71	8.	1.77	0.94	6.882E-02	143.76	10.960	PBC<MDA	U235
185.84	362.	17.45	1.25	5.738E-02	185.71	57.200	2.556E-01	U235
					186.21	3.590	4.080E+00	Ra226
238.33	498.	13.20	1.16	4.774E-02	238.63	43.300	5.582E-01	PB212
294.85	179.	32.86	0.88	4.062E-02				
338.11	52.	0.25	1.13	3.652E-02	338.28	2.790	1.113E+00	RA223
351.95	221.	17.02	1.15	3.541E-02	351.93	37.600	3.840E-01	PB214
569.39	140.	24.12	0.46	2.406E-02				
583.08	191.	16.67	0.43	2.359E-02	583.19	84.500	2.218E-01	TL208
609.47	167.	20.68	1.40	2.275E-02	609.31	46.090	3.679E-01	BI214
675.97	198.	19.41	0.25	2.087E-02				
1460.77	269.	12.60	0.77	1.067E-02	1460.83	10.670	5.472E+00	K40
1763.99	57.	24.52	2.37	8.978E-03	1764.49	15.400	9.488E-01	BI214

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
287.30	72.26	948.	210.	0.005	43.72	0.865	W-187	]D
299.20	75.10	1479.	687.	0.016	24.09	0.945	PB-214	
347.97	87.28	676.	184.	0.004	51.12	0.891	PB-214	
1178.99	294.85	656.	179.	0.004	65.71	0.885	PB-214	]

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 3
Page 2

Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
2277.83	569.39	207.	140.	0.003	48.24	0.461	PA-234	s
2704.31	675.97	179.	198.	0.005	38.82	0.248	AU-198	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	116.48	29.46	1393.	-40.	-0.001	-33.03	0.821D
I-129	117.77	29.78	1360.	-75.	-0.002	-33.03	0.821D
PB-210	185.24	46.63	861.	517.	0.012	23.47	0.850
TH-234	252.02	63.31	1092.	592.	0.014	25.87	0.855s
RA-223	337.47	84.65	1341.	292.	0.007	37.32	0.877s
TH-234	369.57	92.67	882.	628.	0.015	21.59	1.192s
RA-223	576.02	144.23	823.	8.	0.000	3.54	0.939D
Ra-226	744.09	186.21	808.	362.	0.008	24.55	1.253D
PB-212	952.74	238.33	764.	498.	0.012	26.39	1.163s
RA-224	959.55	240.03	1211.	-150.	-0.003	67.51	1.037s
AC-228	1353.01	338.32	649.	52.	0.001	0.49	1.134D
PB-214	1407.56	351.95	596.	221.	0.005	34.04	1.148s
TL-208	2332.62	583.08	190.	191.	0.004	33.35	0.427s
BI-214	2438.23	609.47	511.	167.	0.004	41.37	1.396s
K-40	5843.24	1460.77	80.	269.	0.006	25.20	0.766s
BI-214	7055.28	1763.99	68.	57.	0.001	49.04	2.372s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Name	Nuclide Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-1.0312E-01					
			477.61	-1.031E-01	&(	7.955E-01 2.29E+02	G
			1 of 1 peaks found				
K-40	N	5.4719E+00					
			1460.83	5.472E+00	(	9.030E-01 1.26E+01	G
			1 of 1 peaks found				

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 4
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 1.3070E-02					

```
                                Ge3 background 11_21_07.Rpt
                              1332.50 1.307E-02 &(  1.156E-01 2.59E+02 G
                              1173.24 4.078E-02 %   1.050E-01 7.74E+01 G
                                 2 of   2 peaks found

I-129     I  -5.4321E-02
                               29.78-5.432E-02 }   1.270E-01 ******** X
                               29.46-5.432E-02 }   2.391E-01 ******** X
                               33.61-2.491E-03 %   3.687E-01 4.40E+03 X
                               39.57-5.432E-02 %(  5.521E-01 3.04E+02 G
                               34.61-2.405E-01 &   1.844E+00 2.30E+02 X
                                 5 of   5 peaks found

CS-137    I   2.9708E-02
                              661.66 2.971E-02 &(  9.574E-02 9.65E+01 G
                                 1 of   1 peaks found

TL-208    N   2.2178E-01
                              583.19 2.218E-01 *(  7.773E-02 1.67E+01 G
                              860.56 3.902E-01 %   8.439E-01 6.55E+01 G
                                 2 of   2 peaks found

PB-210    N   3.2658E+00
                               46.54 3.266E+00  (  8.816E-01 1.17E+01 G
                                 1 of   1 peaks found

PB-212    N   5.5819E-01
                              238.63 5.582E-01 *(  1.474E-01 1.32E+01 G
                              300.10-8.649E-02 %   2.144E+00 7.37E+02 G
                                 2 of   2 peaks found

PB-214    N   3.8402E-01
                              351.93 3.840E-01 *(  2.025E-01 1.70E+01 G
                              295.22 2.825E-01 %   3.796E-01 4.12E+01 G
                              242.00-1.394E-01 %   8.727E-01 1.87E+02 G
                                 3 of   3 peaks found

BI-214    N   3.6794E-01
                              609.31 3.679E-01 *(  2.385E-01 2.07E+01 G
                             1764.49 9.488E-01 +   6.898E-01 2.45E+01 G
                             1120.29 5.281E-01 %   7.381E-01 4.32E+01 G
                              768.36 5.301E-01 %   1.791E+00 1.01E+02 G
                                 4 of   4 peaks found

RA-223    N   8.8424E-02
                               83.79 3.193E-01 *   1.894E-01 1.87E+01 X
                              269.46 8.842E-02 %(  5.004E-01 1.69E+02 G
                              154.21 1.288E-01 %   8.834E-01 2.05E+02 G
                              144.23 8.842E-02 }   1.424E+00 1.77E+00 G
                              323.87-1.253E-01 %   1.965E+00 4.67E+02 G
                                 5 of   6 peaks found

RA-224    N  -1.7921E+00
                              240.99-1.792E+00 &(  1.966E+00 3.38E+01 G
                                 1 of   1 peaks found
```



```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.8991E-01
                              911.20 2.899E-01 %(  4.109E-01 4.37E+01 G
```

```
                                Ge3 background 11_21_07.Rpt
                              968.97 2.921E-01 %   6.997E-01 7.23E+01 G
                              338.32 2.899E-01 }   6.828E-01 2.46E-01 G
                                 3 of   3 peaks found

TH-234    N    3.2051E+00
                               63.29 3.262E+00 *(  8.629E-01 1.29E+01 G
                               92.59 3.156E+00 *(  7.091E-01 1.08E+01 G
                                 2 of   2 peaks found

U-235     N    0.0000E+00
                              143.76 1.575E-01 }   4.364E-01 8.36E+01 G
                              163.36 1.070E-02 }   1.003E+00 2.79E+03 G
                              205.31 3.099E-01 }   1.189E+00 1.15E+02 G
                                 3 of   4 peaks found

Ra-226    N    4.0797E+00
                              186.21 4.080E+00 }(  1.522E+00 1.23E+01 G
                                 1 of   1 peaks found

AM-241    T    3.0063E-02
                               59.54 3.006E-02 %(  1.121E-01 1.12E+02 G
                                 1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```



```
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  2 Sigma %
```

Ge3 background 11_21_07.Rpt

RA-223	84.65	1341.	292.	0.007	37.32	3.193E-01
RA-224	240.03	1211.	-150.	-0.003	67.51	-1.792E+00
PB-214	351.95	596.	221.	0.005	34.04	3.840E-01
BI-214	609.47	511.	167.	0.004	41.37	3.679E-01
BI-214	1763.99	68.	57.	0.001	49.04	9.488E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty Counting 2 Sigma	MDA Bq/sample
Be-7	#A	-1.0312E-01	4.5896E+02%	7.955E-01
K-40		5.4719E+00	2.5202E+01%	9.030E-01
CO-60	#A	1.3070E-02	5.1750E+02%	1.156E-01
I-129	#A	-5.4321E-02	6.0811E+02%	5.521E-01
CS-137	#A	2.9708E-02	1.9304E+02%	9.574E-02
TL-208	#	2.2178E-01	3.3349E+01%	7.773E-02
PB-210		3.2658E+00	2.3466E+01%	8.816E-01
PB-212	#	5.5819E-01	2.6390E+01%	1.474E-01
PB-214	#	3.8402E-01	3.4038E+01%	2.025E-01
BI-214	#	3.6794E-01	4.1367E+01%	2.385E-01
RA-223	#A	8.8424E-02	3.3888E+02%	5.004E-01
RA-224	#A	-1.7921E+00	6.7509E+01%	1.966E+00
AC-228	#A	2.8991E-01	8.7364E+01%	4.109E-01
TH-234	#	3.2051E+00	1.6848E+01%	8.629E-01
U-235	#A	0.0000E+00	2.3063E+02%	1.189E+00
Ra-226	#	4.0797E+00	2.4547E+01%	1.522E+00
AM-241	#A	3.0063E-02	2.2457E+02%	1.121E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.4 keV) 1.680E+01 Bq/sample

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 7
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge4 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    1
STL- St Louis                    Spectrum name: Ge4 background 11_21_07.An1

Sample description
     Ge4 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge4 Bkd post 09_07\Ge4 background
                   11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 21:20:23
       Live time:              43200
       Real time:              43294
       Dead time:                  0.22 %
       Detector ID:                    4

Detector system
     Ge 4 SN/181


Calibration
       Filename:                   Ge4 AirFilterCal_74140_334_05_08_07(EE).
                                   Clb
     Ge4 AirFilterCal_74140_334_05_08_07(EE)


       Energy Calibration
            Created:               08-May-2007 13:28:13
            Zero offset:           0.017 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.910E-08 keV/channel^2

       Efficiency Calibration
            Created:               08-May-2007 13:39:26
            Type:                  Polynomial
            Uncertainty:           0.775 %
            Coefficients:         -0.437839  -4.768164   0.564688
                                  -0.057886   0.002608  -0.000044

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.53keV )
       Stop channel:            8000 (  1998.47keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
       Fraction Limit:             0.000%
       Background width:           average of three points.
```

Ge4 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 2
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1398

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.44	117.	0.15	0.80	5.859E-02	29.46	20.350	PBC<MDA	I129
46.39	500.	10.13	0.83	6.160E-02	46.54	4.250	4.417E+00	PB210
63.30	385.	12.06	0.82	6.390E-02	63.29	4.820	2.891E+00	TH234
74.86	126.	20.28	0.84	6.352E-02				
77.23	163.	16.49	0.85	6.347E-02				
92.41	578.	13.01	1.06	6.276E-02	92.59	5.570	3.825E+00	TH234
144.26	17.	0.88	0.90	5.339E-02	143.76	10.960	PBC<MDA	U235
185.83	266.	18.20	1.03	4.428E-02	185.71	57.200	2.430E-01	U235
					186.21	3.590	3.880E+00	Ra226
238.37	223.	16.36	1.06	3.532E-02	238.63	43.300	3.379E-01	PB212
294.99	85.	32.83	1.03	2.863E-02	295.22	19.300	PBC<MDA	PB214
338.12	34.	0.42	1.07	2.500E-02	338.28	2.790	1.109E+00	RA223
351.60	126.	21.13	1.08	2.404E-02	351.93	37.600	3.223E-01	PB214
510.71	983.	5.17	2.12	1.675E-02				
582.75	103.	27.40	0.89	1.482E-02	583.19	84.500	1.899E-01	TL208
608.54	126.	15.99	1.63	1.422E-02	609.31	46.090	4.449E-01	BI214
1024.06	31.	31.88	0.48	8.934E-03				
1119.29	112.	21.18	1.36	8.239E-03	1120.29	15.100	2.075E+00	BI214
1460.75	68.	19.15	1.89	6.425E-03	1460.83	10.670	2.293E+00	K40

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
299.14	74.83	277.	115.	0.003	50.65	0.818	PB-214	
308.62	77.21	295.	148.	0.003	42.44	0.888	PB-214	
2042.44	510.71	228.	983.	0.023	10.33	2.116	TL-208	s
4096.82	1024.06	19.	31.	0.001	63.76	0.479	SR-91	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 3
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Ge4 background 11_21_07.Rpt

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.01	29.78	664.	117.	0.003	0.29	0.804D
PB-210	185.42	46.39	458.	500.	0.012	20.27	0.834s
TH-234	253.01	63.30	424.	385.	0.009	24.12	0.816
TH-234	369.42	92.41	822.	578.	0.013	26.02	1.057s
RA-223	576.64	144.23	522.	17.	0.000	1.75	0.905D
Ra-226	744.51	186.21	462.	266.	0.006	25.94	1.035D
PB-212	953.09	238.37	289.	223.	0.005	32.72	1.055
PB-214	1179.54	294.99	347.	85.	0.002	65.66	1.034s
AC-228	1352.85	338.32	320.	34.	0.001	0.85	1.071D
PB-214	1405.98	351.60	291.	126.	0.003	42.26	1.082s
TL-208	2331.16	582.87	184.	52.	0.001	78.17	1.269s
BI-214	2433.85	608.54	80.	126.	0.003	31.98	1.627s
BI-214	4478.11	1119.29	52.	112.	0.003	42.36	1.355s
K-40	5845.49	1460.75	51.	68.	0.002	38.29	1.887

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	2.5364E-01					
			477.61	2.536E-01	&(	7.571E-01 8.94E+01	G
			1 of 1 peaks found				
K-40	N	2.2933E+00					
			1460.83	2.293E+00	(	1.211E+00 1.91E+01	G
			1 of 1 peaks found				
CO-60	F	3.0919E-02					
			1332.50	3.092E-02	%(	1.270E-01 1.20E+02	G
			1173.24	-1.824E-03	%	1.272E-01 1.99E+03	G
			2 of 2 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 4
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
I-129	I 1.2169E-01					
		29.78	1.217E-01	}	1.282E-01 1.45E-01	X
		33.61	9.651E-03	%	3.713E-01 1.14E+03	X
		39.57	1.217E-01	%(	5.647E-01 1.39E+02	G

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```
                                Ge4 background 11_21_07.Rpt
                               34.61 5.812E-01 %   1.700E+00 8.81E+01 X
                                 4 of   5 peaks found

CS-137    I    6.1529E-02
                              661.66 6.153E-02 &(  1.199E-01 5.93E+01 G
                                 1 of   1 peaks found

TL-208    N    9.7012E-02
                              583.19 9.701E-02 ?(  1.219E-01 3.91E+01 G
                              860.56 5.068E-02 %   8.374E-01 4.76E+02 G
                                 2 of   2 peaks found

PB-210    N    4.4166E+00
                               46.54 4.417E+00 @(  9.062E-01 1.01E+01 G
                                 1 of   1 peaks found

PB-212    N    3.3787E-01
                              238.63 3.379E-01  (  1.241E-01 1.64E+01 G
                              300.10 4.578E-01 %   2.233E+00 1.45E+02 G
                                 2 of   2 peaks found

PB-214    N    3.3387E-01
                              351.93 3.223E-01  (  2.104E-01 2.11E+01 G
                              295.22 3.563E-01 *(  3.752E-01 3.28E+01 G
                              242.00-8.994E-02 %   9.155E-01 3.02E+02 G
                                 3 of   3 peaks found

BI-214    N    4.4492E-01
                              609.31 4.449E-01  (  1.567E-01 1.60E+01 G
                             1764.49 3.905E-01 %   9.161E-01 7.06E+01 G
                             1120.29 2.075E+00 +   6.787E-01 2.12E+01 G
                              768.36 3.163E-02 %   2.265E+00 2.07E+03 G
                                 4 of   4 peaks found

RA-223    N    2.3215E-01
                               83.79-2.020E-04 %   1.551E-01 2.27E+04 X
                              269.46 2.321E-01 &(  4.980E-01 6.50E+01 G
                              154.21-5.419E-02 %   8.607E-01 4.71E+02 G
                              144.23 2.321E-01 }   1.470E+00 8.75E-01 G
                              323.87 1.302E-01 &   2.085E+00 4.74E+02 G
                                 5 of   6 peaks found

RA-224    N   -3.8759E-01
                              240.99-3.876E-01 %(  1.566E+00 1.21E+02 G
                                 1 of   1 peaks found

AC-228    N    2.7907E-01
                              911.20 2.791E-01 &(  4.692E-01 5.16E+01 G
                              968.97 2.956E-01 %   7.776E-01 7.89E+01 G
                              338.32 2.791E-01 }   7.075E-01 4.24E-01 G
                                 3 of   3 peaks found
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234    N    3.3918E+00
                               63.29 2.891E+00  (  7.418E-01 1.21E+01 G
                               92.59 3.825E+00  (  9.027E-01 1.30E+01 G
                                 2 of   2 peaks found
```

Ge4 background 11_21_07.Rpt

```
U-235     N    0.0000E+00
                            143.76 1.399E-01 }   4.508E-01 9.69E+01 G
                            163.36 3.179E-01 }   9.891E-01 9.36E+01 G
                            205.31 9.367E-02 }   9.329E-01 2.94E+02 G
                               3 of   4 peaks found

Ra-226    N    3.8798E+00
                            186.21 3.880E+00 }(  1.500E+00 1.30E+01 G
                               1 of   1 peaks found

AM-241    T    1.6676E-02
                             59.54 1.668E-02 %(  1.068E-01 1.91E+02 G
                               1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 6
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
PB-214	294.99	347.	85.	0.002	65.66	3.563E-01
PB-214	351.60	291.	126.	0.003	42.26	3.223E-01
K-40	1460.75	51.	68.	0.002	38.29	2.293E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity	Uncertainty Counting	2 Sigma	MDA

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Ge4 background 11_21_07.Rpt

		Bq/sample		Bq/sample
Be-7	#A	2.5364E-01	1.7871E+02%	7.571E-01
K-40	#	2.2933E+00	3.8293E+01%	1.211E+00
CO-60	#A	3.0919E-02	2.4072E+02%	1.270E-01
I-129	#A	1.2169E-01	2.7780E+02%	5.647E-01
CS-137	#A	6.1529E-02	1.1860E+02%	1.199E-01
TL-208	#A	9.7012E-02	7.8165E+01%	1.219E-01
PB-210	#	4.4166E+00	2.0270E+01%	9.062E-01
PB-212		3.3787E-01	3.2718E+01%	1.241E-01
PB-214	#	3.3387E-01	3.9044E+01%	2.104E-01
BI-214	#	4.4492E-01	3.1983E+01%	1.567E-01
RA-223	#A	2.3215E-01	1.3001E+02%	4.980E-01
RA-224	#A	-3.8759E-01	2.4185E+02%	1.566E+00
AC-228	#A	2.7907E-01	1.0319E+02%	4.692E-01
TH-234		3.3918E+00	1.7740E+01%	7.418E-01
U-235	#A	0.0000E+00	5.8869E+02%	9.329E-01
Ra-226	#	3.8798E+00	2.5937E+01%	1.500E+00
AM-241	#A	1.6676E-02	3.8177E+02%	1.068E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 1998.5 keV) 1.257E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 7
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Laboratory: STL- St Louis

Ge5 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    1
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1

Sample description
     Ge5 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge5 bkgd\Ge5 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:23:41
       Live time:              43200
       Real time:              44675
       Dead time:                  3.30 %
       Detector ID:                    5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   Ge5 airfilter_032707_interp165quad.Clb
     Ge5 airfilter 74140-334_032707 interp_165_quad


       Energy Calibration
            Created:               28-Mar-2007 18:08:23
            Zero offset:           0.272 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.070E-08 keV/channel^2

       Efficiency Calibration
            Created:               28-Mar-2007 18:10:41
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.34 %
            Log(Eff):              1.077627E+00 + (-7.017228E-01*Log(E) ) +
                                   ( -1.776439E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.75keV )
       Stop channel:            8000 (  2000.57keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    2
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1
```

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Ge5 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1877

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.93	102.	0.14	0.75	7.146E-02	29.46	20.350	PBC<MDA	I129
46.66	414.	12.87	0.65	7.098E-02	46.54	4.250	3.179E+00	PB210
59.65	80.	33.94	0.71	7.060E-02	59.54	35.700	7.300E-02	AM241
63.18	340.	14.64	0.84	7.034E-02	63.29	4.820	2.322E+00	TH234
74.83	114.	25.18	0.78	6.946E-02				
77.10	91.	30.11	0.78	6.929E-02				
84.34	74.	32.20	0.44	6.875E-02				
92.62	549.	10.31	1.09	6.772E-02	92.59	5.570	3.367E+00	TH234
185.73	327.	15.49	0.92	4.627E-02	185.71	57.200	2.861E-01	U235
					186.21	3.590	4.570E+00	Ra226
238.72	164.	27.40	0.69	3.699E-02	238.63	43.300	2.362E-01	PB212
338.06	31.	0.43	1.04	2.700E-02	338.28	2.790	PBC<MDA	RA223
351.81	195.	22.22	0.90	2.606E-02				
511.11	1014.	5.24	2.08	1.851E-02				
583.25	90.	23.25	0.78	1.638E-02	583.19	84.500	1.505E-01	TL208
609.47	162.	20.78	1.01	1.572E-02	609.31	46.090	5.158E-01	BI214
662.05	150.	19.17	1.43	1.456E-02	661.66	85.210	2.798E-01	CS137
1173.48	41.	36.79	1.77	8.488E-03	1173.24	99.900	PBC<MDA	CO60
1332.05	125.	20.63	1.02	7.518E-03				
1461.10	43.	27.61	1.99	6.882E-03	1460.83	10.670	1.351E+00	K40
1764.57	44.	23.86	0.33	5.736E-03	1764.49	15.400	1.162E+00	BI214

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
298.47	74.83	392.	106.	0.002	67.56	0.809	PB-214	s
307.56	77.10	307.	79.	0.002	75.51	0.760	PB-214	
1407.10	351.81	306.	195.	0.005	44.45	0.904	PB-214	l
2044.52	511.11	240.	1014.	0.023	10.47	2.077	TL-208	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 3
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1
Page 2

Ge5 background 11_21_07.Rpt

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected
5328.04	1332.05	79.	100.	0.002	32.20	1.021	CO-60 s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.14	29.78	830.	102.	0.002	0.28	0.749D
PB-210	185.71	46.66	583.	414.	0.010	25.73	0.654s
AM-241	237.70	59.65	260.	80.	0.002	67.89	0.710
TH-234	251.85	63.18	534.	340.	0.008	29.27	0.841s
TH-234	369.69	92.62	568.	549.	0.013	20.62	1.088s
RA-223	576.28	144.23	424.	-4.	0.000	-30.17	0.847D
Ra-226	744.31	186.21	464.	327.	0.008	21.65	0.916D
PB-212	954.48	238.72	410.	164.	0.004	54.79	0.693s
RA-223	1352.94	338.28	354.	-2.	0.000	-30.17	1.040D
AC-228	1353.09	338.32	340.	31.	0.001	0.85	1.040D
PB-214	1407.50	351.92	329.	125.	0.003	44.77	1.053s
TL-208	2333.17	583.25	87.	90.	0.002	46.51	0.781s
BI-214	2438.11	609.47	176.	162.	0.004	41.57	1.012
CS-137	2648.46	662.05	116.	150.	0.003	38.34	1.432s
CO-60	4694.02	1173.48	96.	41.	0.001	73.58	1.772s
K-40	5843.97	1461.10	49.	43.	0.001	55.23	1.988
BI-214	7056.93	1764.57	11.	44.	0.001	47.72	0.329s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Name	Nuclide Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	2.9643E-03					
			477.61	2.964E-03	%(	9.373E-01 9.29E+03 G	
			1 of 1 peaks found				
K-40	N	1.3513E+00					
			1460.83	1.351E+00	?(	1.110E+00 2.76E+01 G	
			1 of 1 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 4
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 9.5390E-02					
		1332.50	7.761E-02	%(	1.333E-01 5.28E+01 G	
		1173.24	1.132E-01	(	1.318E-01 3.68E+01 G	

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```
                                Ge5 background 11_21_07.Rpt
                                  2 of   2 peaks found

I-129     I   8.6894E-02
                                29.78 8.689E-02 }   1.172E-01 1.40E-01 X
                                33.61-3.808E-02 &   3.942E-01 3.09E+02 X
                                39.57 8.689E-02 %(  4.761E-01 1.64E+02 G
                                34.61-1.386E-01 %   1.664E+00 3.58E+02 X
                                  4 of   5 peaks found

CS-137    I   2.7980E-01
                               661.66 2.798E-01 @(  9.868E-02 1.92E+01 G
                                  1 of   1 peaks found

TL-208    N   1.5053E-01
                               583.19 1.505E-01 *(  7.723E-02 2.33E+01 G
                               860.56 1.989E-01 %   9.708E-01 1.44E+02 G
                                  2 of   2 peaks found

PB-210    N   3.1792E+00
                                46.54 3.179E+00  (  8.839E-01 1.29E+01 G
                                  1 of   1 peaks found

PB-212    N   2.3621E-01
                               238.63 2.362E-01  (  1.402E-01 2.74E+01 G
                               300.10 3.484E-01 %   2.091E+00 1.79E+02 G
                                  2 of   2 peaks found

PB-214    N   2.9533E-01
                               351.93 2.953E-01  (  2.061E-01 2.24E+01 G
                               295.22 2.432E-01 %   3.647E-01 4.60E+01 G
                               242.00 1.720E-01 &   8.469E-01 1.47E+02 G
                                  3 of   3 peaks found

BI-214    N   5.1580E-01
                               609.31 5.158E-01  (  2.058E-01 2.08E+01 G
                              1764.49 1.162E+00 +   4.698E-01 2.39E+01 G
                              1120.29 2.913E-01 &   7.470E-01 7.69E+01 G
                               768.36 7.370E-01 %   2.029E+00 8.25E+01 G
                                  4 of   4 peaks found

RA-223    N  -5.2038E-02
                                83.79-4.616E-02 %   1.480E-01 9.64E+01 X
                               269.46-5.204E-02 &(  5.080E-01 2.90E+02 G
                               154.21-7.645E-02 %   7.471E-01 2.90E+02 G
                               144.23-5.204E-02 }   1.255E+00 ******** G
                               323.87-8.898E-02 %   1.870E+00 6.20E+02 G
                               338.28-5.204E-02 }   2.778E+00 ******** G
                                  6 of   6 peaks found

RA-224    N  -7.1857E-01
                               240.99-7.186E-01 %(  1.725E+00 7.26E+01 G
                                  1 of   1 peaks found
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.3763E-01
                               911.20 2.376E-01 %(  4.360E-01 5.60E+01 G
                               968.97 2.100E-01 %   7.716E-01 1.09E+02 G
                               338.32 2.376E-01 }   6.746E-01 4.26E-01 G
```

```
                                Ge5 background 11_21_07.Rpt
                                  3 of   3 peaks found

TH-234    N   2.3217E+00
                                63.29 2.322E+00 @(  7.538E-01 1.46E+01 G
                                92.59 3.367E+00 +   6.983E-01 1.03E+01 G
                                  2 of   2 peaks found

U-235     N   0.0000E+00
                               143.76 2.214E-01 }   3.882E-01 5.34E+01 G
                               163.36 4.277E-01 }   8.636E-01 6.13E+01 G
                               205.31 3.536E-01 }   1.095E+00 9.31E+01 G
                                  3 of   4 peaks found

Ra-226    N   4.5696E+00
                               186.21 4.570E+00 }(  1.440E+00 1.08E+01 G
                                  1 of   1 peaks found

AM-241    T   7.3002E-02
                                59.54 7.300E-02  (  7.142E-02 3.39E+01 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    6
 STL- St Louis                   Spectrum name: Ge5 background 11_21_07.An1

   R - Coincidence Corrected            C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  2 Sigma %
 ------------------------------------------------------------------------
 PB-214    351.92      329.       125.     0.003     44.77   2.953E-01
                                  Page 5
```

Ge5 background 11_21_07.Rpt

CO-60	1173.48	96.	41.	0.001	73.58	1.132E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	2.9643E-03	1.8576E+04%	9.373E-01
K-40	#	1.3513E+00	5.5227E+01%	1.110E+00
CO-60	#A	9.5390E-02	6.4328E+01%	1.333E-01
I-129	#A	8.6894E-02	3.2744E+02%	4.761E-01
CS-137	#	2.7980E-01	3.8336E+01%	9.868E-02
TL-208	#	1.5053E-01	4.6508E+01%	7.723E-02
PB-210	#	3.1792E+00	2.5734E+01%	8.839E-01
PB-212		2.3621E-01	5.4790E+01%	1.402E-01
PB-214	#	2.9533E-01	4.4766E+01%	2.061E-01
BI-214		5.1580E-01	4.1569E+01%	2.058E-01
RA-223	#A	-5.2038E-02	5.7978E+02%	5.080E-01
RA-224	#A	-7.1857E-01	1.4516E+02%	1.725E+00
AC-228	#A	2.3763E-01	1.1204E+02%	4.360E-01
TH-234	#	2.3217E+00	2.9270E+01%	7.538E-01
U-235	#A	0.0000E+00	1.8625E+02%	1.095E+00
Ra-226		4.5696E+00	2.1655E+01%	1.440E+00
AM-241		7.3002E-02	6.7890E+01%	7.142E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.6 keV) 1.268E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 7
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Laboratory: STL- St Louis

Ge7 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    1
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1

Sample description
     Ge7 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge7 bkgd\Ge7 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:50:18
       Live time:              43200
       Real time:              44220
       Dead time:                  2.31 %
       Detector ID:                    7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   Ge7 air filter 01_04_07.Clb
     Ge7 air filter 74140-334 01_04_07


       Energy Calibration
            Created:               04-Jan-2007 09:44:57
            Zero offset:           0.082 keV
            Gain:                  0.250 keV/channel
            Quadratic:             5.157E-09 keV/channel^2

       Efficiency Calibration
            Created:               04-Jan-2007 09:55:23
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.37 %
            Log(Eff):              6.564924E-01 + (-4.575726E-01*Log(E) ) +
                                   ( -3.880790E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.19 %
            Log(Eff):             -6.453588E+00 + ( 1.933612E+00*Log(E) ) +
                                   ( -2.285762E-01*Log(E)^2 )

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.58keV )
       Stop channel:            8000 (  2000.15keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

D

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    2
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1
                                       Page 1
```

Ge7 background 11_21_07.Rpt

Random error: 0.0000000E+00
Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 10 cutoff 20.00000 %

Energy Calibration
Normalized diff: 0.2579

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
23.39	188.	17.26	0.62	7.211E-02				
29.55	453.	11.10	0.94	7.991E-02	29.46	20.350	6.457E-01	I129
33.20	135.	27.90	0.47	8.331E-02				
40.27	166.	27.61	0.76	8.808E-02				
46.28	578.	11.03	0.77	9.072E-02	46.54	4.250	3.470E+00	PB210
63.10	498.	9.75	0.76	9.386E-02	63.29	4.820	2.548E+00	TH234
74.41	97.	24.75	0.88	9.388E-02				
77.06	125.	20.92	0.88	9.373E-02				
92.57	671.	8.34	0.99	9.212E-02	92.59	5.570	3.027E+00	TH234
143.96	102.	30.64	0.61	7.609E-02	143.76	10.960	2.842E-01	U235
145.13	1.	10.64	0.95	7.597E-02	144.23	3.220	PBC<MDA	RA223
185.59	330.	10.26	1.07	6.127E-02	185.71	57.200	2.178E-01	U235
197.70	154.	31.14	0.41	5.800E-02				
239.12	229.	23.87	1.02	4.911E-02	238.63	43.300	2.488E-01	PB212
337.98	32.	0.33	1.16	3.598E-02	338.28	2.790	PBC<MDA	RA223
346.03	83.	27.40	0.53	3.525E-02				
351.88	69.	36.45	1.18	3.471E-02	351.93	37.600	PBC<MDA	PB214
583.49	58.	39.50	1.42	2.168E-02	583.19	84.500	PBC<MDA	TL208

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
93.24	23.39	273.	188.	0.004	34.51	0.619	SN-113	s
117.91	29.55	519.	453.	0.010	22.20	0.936	TE-132	l
132.50	33.20	385.	135.	0.003	55.79	0.465	BA-139	l
160.78	40.27	527.	101.	0.002	67.63	0.756	EU-152	s
297.58	74.47	297.	91.	0.002	67.11	0.693	PB-214	
308.21	77.12	258.	104.	0.002	55.87	0.612	PB-214	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 3
Page 2

Ge7 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
575.58	143.96	252.	102.	0.002	61.28	0.606	U-235	l
742.11	185.59	232.	330.	0.008	20.52	1.073	U-235	l
790.56	197.70	412.	154.	0.004	62.28	0.414	KR-89	sM
1383.93	346.03	117.	83.	0.002	54.79	0.534	HF-181	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.81	29.78	642.	281.	0.007	24.80	0.827D
I-129	133.40	33.43	566.	89.	0.002	78.15	0.831s
PB-210	184.80	46.28	634.	578.	0.013	22.05	0.767
TH-234	252.09	63.10	413.	498.	0.012	19.50	0.762s
TH-234	370.01	92.57	492.	671.	0.016	16.68	0.985s
RA-223	576.67	144.23	412.	1.	0.000	21.28	0.954D
Ra-226	744.60	186.21	407.	266.	0.006	24.76	1.000D
PB-212	956.25	239.12	460.	229.	0.005	47.75	1.021s
AC-228	1353.09	338.32	350.	32.	0.001	0.67	1.164D
PB-214	1407.31	351.88	284.	69.	0.002	72.91	1.179s
TL-208	2333.81	583.49	232.	58.	0.001	79.01	1.417s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-2.6217E-01					
			477.61	-2.622E-01	%(	6.113E-01 7.04E+01 G	
			1 of 1 peaks found				
K-40	N	-7.6775E-02					
			1460.83	-7.677E-02	%(	1.012E+00 3.78E+02 G	
			1 of 1 peaks found				
CO-60	F	1.6295E-03					
			1332.50	1.630E-03	%(	9.943E-02 1.73E+03 G	
			1173.24	3.709E-02	%	9.526E-02 7.70E+01 G	
			2 of 2 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 4
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments

Page 3

Ge7 background 11_21_07.Rpt

```
I-129     I   2.2928E-01
                          29.78 2.147E-01 }   9.218E-02 1.24E+01 X
                          29.46 7.217E-02 }   1.816E-01 7.51E+01 X
                          33.61 2.419E-01     3.072E-01 3.91E+01 X
                          39.57 2.293E-01 %(  4.135E-01 5.49E+01 G
                          34.61-2.853E-01 &   1.439E+00 1.51E+02 X
                            5 of   5 peaks found

CS-137    I   2.5282E-02
                         661.66 2.528E-02 %(  9.732E-02 1.15E+02 G
                            1 of   1 peaks found

TL-208    N   7.3008E-02
                         583.19 7.301E-02 *(  9.303E-02 3.95E+01 G
                         860.56 4.559E-01 %   6.885E-01 4.66E+01 G
                            2 of   2 peaks found

PB-210    N   3.4696E+00
                          46.54 3.470E+00  (  7.203E-01 1.10E+01 G
                            1 of   1 peaks found

PB-212    N   2.4885E-01
                         238.63 2.488E-01 *(  1.116E-01 2.39E+01 G
                         300.10 4.881E-01 %   1.607E+00 9.88E+01 G
                            2 of   2 peaks found

PB-214    N   1.2280E-01
                         351.93 1.228E-01 @(  1.441E-01 3.65E+01 G
                         295.22 1.042E-01 &   2.667E-01 7.72E+01 G
                         242.00-7.215E-02 %   6.071E-01 2.50E+02 G
                            3 of   3 peaks found

BI-214    N   1.2372E-01
                         609.31 1.237E-01 %(  1.679E-01 4.20E+01 G
                        1764.49 3.233E-01 &   7.856E-01 7.30E+01 G
                        1120.29 1.921E-03 &   6.110E-01 9.08E+03 G
                         768.36-1.636E-02 &   1.410E+00 2.48E+03 G
                            4 of   4 peaks found

RA-223    N   5.2717E-03
                          83.79 6.497E-02 %   1.154E-01 5.41E+01 X
                         269.46 5.272E-03 &(  3.606E-01 2.02E+03 G
                         154.21 6.698E-02 &   5.727E-01 2.54E+02 G
                         144.23 5.272E-03 }   9.207E-01 1.06E+01 G
                         323.87 3.705E-01 &   1.454E+00 1.17E+02 G
                            5 of   6 peaks found

RA-224    N  -1.4485E-01
                         240.99-1.448E-01 %(  1.279E+00 2.63E+02 G
                            1 of   1 peaks found

AC-228    N   1.8327E-01
                         911.20 1.833E-01 %(  3.531E-01 5.87E+01 G
                         968.97 2.459E-01 %   5.187E-01 6.39E+01 G
                         338.32 1.833E-01 }   5.128E-01 3.35E-01 G
                            3 of   3 peaks found
```


Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments

Ge7 background 11_21_07.Rpt

```
TH-234    N   2.8048E+00
                          63.29 2.548E+00 @(  4.984E-01 9.75E+00 G
                          92.59 3.027E+00 @(  4.785E-01 8.34E+00 G
                            2 of   2 peaks found

U-235     N   3.7275E-02
                         185.71 2.114E-02 }(  7.270E-02 1.03E+02 G
                         163.36 2.303E-01 }(  6.865E-01 8.97E+01 G
                         205.31 2.573E-02 }(  8.217E-01 9.44E+02 G
                            3 of   4 peaks found

Ra-226    N   2.8025E+00
                         186.21 2.803E+00 }(  1.021E+00 1.24E+01 G
                            1 of   1 peaks found

AM-241    T   1.4071E-02
                          59.54 1.407E-02 %(  6.420E-02 1.36E+02 G
                            1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
D

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    6
STL- St Louis                   Spectrum name: Ge7 background 11_21_07.An1


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy    Counts     Counts     Cts/Sec  2 Sigma %
```

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	642.	281.	0.007	24.80	2.147E-01
I-129	33.43	566.	89.	0.002	78.15	2.419E-01

Page 5

Ge7 background 11_21_07.Rpt

PB-214	351.88	284.	69.	0.002	72.91	1.228E-01
TL-208	583.49	232.	58.	0.001	79.01	7.301E-02

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty Counting 2 Sigma	MDA Bq/sample
Be-7	#A	-2.6217E-01	1.4087E+02%	6.113E-01
K-40	#A	-7.6775E-02	7.5553E+02%	1.012E+00
CO-60	#A	1.6295E-03	3.4689E+03%	9.943E-02
I-129	#A	2.2928E-01	1.0977E+02%	4.135E-01
CS-137	#A	2.5282E-02	2.2936E+02%	9.732E-02
TL-208	#A	7.3008E-02	7.9007E+01%	9.303E-02
PB-210		3.4696E+00	2.2051E+01%	7.203E-01
PB-212	#	2.4885E-01	4.7748E+01%	1.116E-01
PB-214	#A	1.2280E-01	7.2905E+01%	1.441E-01
BI-214	#A	1.2372E-01	8.3934E+01%	1.679E-01
RA-223	#A	5.2717E-03	4.0366E+03%	3.606E-01
RA-224	#A	-1.4485E-01	5.2575E+02%	1.279E+00
AC-228	#A	1.8327E-01	1.1731E+02%	3.531E-01
TH-234	#	2.8048E+00	1.2828E+01%	4.984E-01
U-235	A	3.7275E-02	1.7944E+02%	8.217E-01
Ra-226		2.8025E+00	2.7743E+01%	1.021E+00
AM-241	#A	1.4071E-02	2.7247E+02%	6.420E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.2 keV) 9.363E+00 Bq/sample

Analyzed by: _____
403605

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 7
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge8 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    1
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1

Sample description
     Ge8 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge8 bkgd\Ge8 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:52:01
       Live time:              43200
       Real time:              44857
       Dead time:                  3.69 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   Ge8 air filter interp_122_quad.Clb
     Ge8  air filter_interp>122<quad


       Energy Calibration
            Created:               06-Nov-2006 15:12:36
            Zero offset:           0.014 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.050E-09 keV/channel^2

       Efficiency Calibration
            Created:               06-Nov-2006 15:14:26
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.61 %
            Log(Eff):              5.381757E-01 + (-5.615420E-01*Log(E) ) +
                                   ( -2.515438E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.52keV )
       Stop channel:            8000 (  2000.35keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    2
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1
                                       Page 1
```

Ge8 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1437

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
25.85	439.	17.91	0.98	7.362E-02				
29.52	518.	9.97	1.11	7.364E-02	29.46	20.350	7.999E-01	I129
63.12	715.	5.42	0.88	7.330E-02	63.29	4.820	4.686E+00	TH234
84.28	175.	21.65	0.90	7.044E-02	83.79	25.180	2.282E-01	RA223
92.47	1398.	5.34	1.10	6.915E-02	92.59	5.570	8.402E+00	TH234
143.63	200.	22.54	1.08	5.660E-02	143.76	10.960	7.488E-01	U235
185.64	683.	7.50	1.00	4.588E-02	185.71	57.200	6.026E-01	U235
238.54	182.	14.96	1.31	3.726E-02	238.63	43.300	2.605E-01	PB212
295.25	68.	38.42	1.04	3.113E-02	295.22	19.300	PBC<MDA	PB214
338.25	38.	0.33	1.07	2.772E-02	338.28	2.790	1.569E+00	RA223
511.02	945.	5.33	2.38	1.941E-02				
598.49	154.	25.28	0.27	1.689E-02				
609.45	64.	35.63	1.28	1.662E-02	609.31	46.090	PBC<MDA	BI214
898.43	68.	24.98	0.28	1.175E-02				
1461.18	53.	25.04	1.84	7.527E-03	1460.83	10.670	1.526E+00	K40

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
103.30	25.85	1327.	439.	0.010	25.33	0.977	CD-109	s
117.99	29.52	678.	518.	0.012	19.94	1.107	TE-132	l
742.34	185.64	388.	683.	0.016	15.00	0.995	U-235	l
2043.55	511.02	222.	945.	0.022	10.66	2.376	TL-208	s
2393.36	598.49	198.	154.	0.004	50.56	0.267	-	sM
3592.89	898.43	49.	68.	0.002	49.96	0.284	PA-234	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 3
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.

Ge8 background 11_21_07.Rpt

L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.04	29.78	1112.	348.	0.008	0.09	0.812D
TH-234	252.37	63.12	262.	715.	0.017	10.84	0.876
RA-223	337.73	84.47	568.	111.	0.003	63.59	0.858s
TH-234	369.72	92.47	715.	1398.	0.032	10.68	1.100s
U-235	574.85	143.76	431.	140.	0.003	45.31	1.085D
RA-223	576.73	144.23	414.	22.	0.001	0.55	0.910D
Ra-226	744.60	186.21	403.	563.	0.013	13.14	0.946D
PB-212	953.86	238.54	176.	182.	0.004	29.92	1.309s
PB-214	1180.65	295.25	305.	68.	0.002	76.83	1.036s
AC-228	1352.89	338.32	315.	38.	0.001	0.67	1.071D
BI-214	2437.17	609.45	229.	64.	0.001	71.27	1.282s
K-40	5843.55	1461.18	61.	53.	0.001	50.07	1.843s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-2.4489E-01					
			477.61	-2.449E-01	%(	7.495E-01 9.17E+01	G
			1 of 1 peaks found				
K-40	N	1.5256E+00					
			1460.83	1.526E+00	@(	1.130E+00 2.50E+01	G
			1 of 1 peaks found				
CO-60	F	-1.7283E-03					
			1332.50	-1.728E-03	&(	1.225E-01 2.02E+03	G
			1173.24	-2.257E-02	%	1.247E-01 1.62E+02	G
			2 of 2 peaks found				
I-129	I	2.8897E-01					
			29.78	2.890E-01	}	1.314E-01 4.30E-02	X
			33.61	1.305E-01	%	4.324E-01 9.98E+01	X

▯

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 4
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		39.57	2.890E-01	%(	4.905E-01 5.17E+01	G
		34.61	6.433E-01	&	1.630E+00 7.66E+01	X
		4 of 5 peaks found				
CS-137	I	3.6626E-02				

```
                                Ge8 background 11_21_07.Rpt
                               661.66 3.663E-02 &(  1.022E-01 8.37E+01 G
                                  1 of   1 peaks found

TL-208    N   4.6043E-02
                               583.19 4.604E-02 &(  1.122E-01 7.35E+01 G
                               860.56 1.757E-01 %   7.705E-01 1.29E+02 G
                                  2 of   2 peaks found

PB-210    N   4.2338E-01
                                46.54 4.234E-01 %(  8.404E-01 6.03E+01 G
                                  1 of   1 peaks found

PB-212    N   2.6051E-01
                               238.63 2.605E-01  (  9.250E-02 1.50E+01 G
                               300.10 5.416E-01 %   1.886E+00 1.04E+02 G
                                  2 of   2 peaks found

PB-214    N   1.5095E-01
                               351.93 9.453E-02 %(  1.895E-01 6.09E+01 G
                               295.22 2.609E-01 *(  3.237E-01 3.84E+01 G
                               242.00 2.345E-01 %   7.541E-01 9.65E+01 G
                                  3 of   3 peaks found

BI-214    N   1.9362E-01
                               609.31 1.936E-01 *(  2.211E-01 3.56E+01 G
                              1764.49 4.167E-01 %   7.719E-01 5.68E+01 G
                              1120.29 1.241E-01 %   7.957E-01 1.88E+02 G
                               768.36-3.096E-01 &   1.899E+00 1.80E+02 G
                                  4 of   4 peaks found

RA-223    N   2.7553E-01
                                83.79 1.448E-01 *   1.483E-01 3.18E+01 X
                               269.46-8.982E-02 &(  4.789E-01 1.59E+02 G
                               154.21 2.897E-02 &   7.497E-01 7.65E+02 G
                               144.23 2.755E-01 }   1.244E+00 2.77E-01 G
                               323.87 1.690E-02 %   1.742E+00 3.03E+03 G
                                  5 of   6 peaks found

RA-224    N  -7.0362E-02
                               240.99-7.036E-02 &(  1.628E+00 6.86E+02 G
                                  1 of   1 peaks found

AC-228    N   2.7845E-01
                               911.20 2.784E-01 %(  4.056E-01 4.51E+01 G
                               968.97 3.615E-01 %   6.834E-01 5.76E+01 G
                               338.32 2.784E-01 }   6.330E-01 3.34E-01 G
                                  3 of   3 peaks found

TH-234    N   4.6861E+00
                                63.29 4.686E+00  (  5.121E-01 5.42E+00 G
                                92.59 8.402E+00 +   7.655E-01 5.34E+00 G
                                  2 of   2 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    5
STL- St Louis                   Spectrum name: Ge8 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235     N   1.2819E-01
                               185.71 5.276E-02 }(  1.331E-01 7.63E+01 G
                               143.76 5.218E-01 }(  3.715E-01 2.27E+01 G
                                  2 of   4 peaks found
```

Page 4

Ge8 background 11_21_07.Rpt

```
Ra-226   N   7.9373E+00
                          186.21 7.937E+00 }(  1.356E+00 6.57E+00 G
                             1 of   1 peaks found

AM-241   T  -7.7932E-03
                          59.54-7.793E-03 &(  9.695E-02 3.70E+02 G
                             1 of   1 peaks found
```

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	1112.	348.	0.008	0.09	2.890E-01
RA-223	84.47	568.	111.	0.003	63.59	1.448E-01
RA-223	144.23	414.	22.	0.001	0.55	2.755E-01
PB-214	295.25	305.	68.	0.002	76.83	2.609E-01
BI-214	609.45	229.	64.	0.001	71.27	1.936E-01

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 6
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40		1461.18	61.	53.	0.001	50.07	1.526E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample

Ge8 background 11_21_07.Rpt

Be-7	#A	-2.4489E-01	1.8340E+02%	7.495E-01
K-40	#	1.5256E+00	5.0072E+01%	1.130E+00
CO-60	#A	-1.7283E-03	4.0408E+03%	1.225E-01
I-129	#A	2.8897E-01	1.0349E+02%	4.905E-01
CS-137	#A	3.6626E-02	1.6736E+02%	1.022E-01
TL-208	#A	4.6043E-02	1.4698E+02%	1.122E-01
PB-210	#A	4.2338E-01	1.2054E+02%	8.404E-01
PB-212		2.6051E-01	2.9920E+01%	9.250E-02
PB-214	#A	1.5095E-01	7.1988E+01%	1.895E-01
BI-214	#A	1.9362E-01	7.1268E+01%	2.211E-01
RA-223	#A	2.7553E-01	4.3437E+01%	4.789E-01
RA-224	#A	-7.0362E-02	1.3722E+03%	1.628E+00
AC-228	#A	2.7845E-01	9.0216E+01%	4.056E-01
TH-234		4.6861E+00	1.0837E+01%	5.121E-01
U-235	#A	1.2819E-01	4.5306E+01%	1.021E+00
Ra-226		7.9373E+00	1.4531E+01%	1.356E+00
AM-241	#A	-7.7932E-03	7.3956E+02%	9.695E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 2000.3 keV) 1.301E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Run Log

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/22/7	7353501	KEGTHIAA	8	2 hrs	1L Mar	e
		KEIFMWICA	7			
		KEIFMWICJ	8			
12/23/7	Daily	Blg + Source	1,3-8	20+3 min	QA	e
12/23/7	7357010	KEKAMIAC	4	30 min	tumacon	
		KEKAWIAC	5			
		KEKAZIAC	7			
12/23/07	7357010	KEKAMIAD	1	30min	Tumacon	LW
		KEKAYIAC	3			
		KEKATIAC	4			
		KEKA9IAC	5			
		KEKCCIAC	7			
		KEKCDIAC	1			
		KEKCEIAC	3			
		KEKCFIAC	4			
		KEKCHIAC	5			
		KEKCJIAC	7			
		KEKCKIAC	1			
		KEKCMIAC	3			
		KEKCPIAC	4			
		KEKCQIAC	5			
		KEKCRIAC	7			
		KEQKRIAA	1			e
		KEQKRIAC	3			
	7352122	KEKFEIAC	4			
		KEKFFIAC	5			
		KEKFGIAC	7			

Reviewed By: _____ Date: 12/23/7

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/23/7	7356122	KSKF51AD	1	30min	tumacan	[illegible]
		KSKFP1AC	3			
		KSKFT1AC	4			
		KSKV1AC	5			
		KSKF01AC	7			
		KSKF11AC	1			
		KSKF51AC	3			
		KSKF71AC	4			
		KSKF81AC	5			
		KSKF91AC	7			
		KSKG01AC	1			
		KSKGF1AC	3			
		KSKGG1AC	4			
		KSQKC1AA	5			
		KSQKC1AC	7			
12/20/7	Daily	Pbkg + Source	1,3-8	20+30min	CNA	SE
	7339395	KC6QE1AD	1	30min	tumacan	
		KC6QL1AD	3			
		KDCLL1AA	4			
		KDCLL1AC	5			
	M070859	1L0307-1	7			

Reviewed By:_____ Date:_____

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

CS137 1/4/08

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gamma Spectroscopy

Batch: 7357010 **Prep Analyst:** 403135

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200251-001	KEKAM1AC	3.8580E+002 g	1.00	3.8580E+002 g	Tuna Can
F7L200251-001X	KEKAM1AD	3.8580E+002 g	1.00	3.8580E+002 g	Tuna Can
F7L200251-002	KEKAW1AC	4.0140E+002 g	1.00	4.0140E+002 g	Tuna Can
F7L200251-003	KEKA21AC	3.7040E+002 g	1.00	3.7040E+002 g	Tuna Can
F7L200251-004	KEKA41AC	3.5170E+002 g	1.00	3.5170E+002 g	Tuna Can
F7L200251-005	KEKA71AC	3.5810E+002 g	1.00	3.5810E+002 g	Tuna Can
F7L200251-006	KEKA91AC	3.8710E+002 g	1.00	3.8710E+002 g	Tuna Can
F7L200251-007	KEKCC1AC	3.1130E+002 g	1.00	3.1130E+002 g	Tuna Can
F7L200251-008	KEKCD1AC	3.5500E+002 g	1.00	3.5500E+002 g	Tuna Can
F7L200251-009	KEKCE1AC	3.8750E+002 g	1.00	3.8750E+002 g	Tuna Can
F7L200251-010	KEKCF1AC	3.4140E+002 g	1.00	3.4140E+002 g	Tuna Can
F7L200251-011	KEKCH1AC	3.1610E+002 g	1.00	3.1610E+002 g	Tuna Can
F7L200251-012	KEKCJ1AC	3.1540E+002 g	1.00	3.1540E+002 g	Tuna Can
F7L200251-013	KEKCK1AC	3.6150E+002 g	1.00	3.6150E+002 g	Tuna Can
F7L200251-014	KEKCM1AC	3.5680E+002 g	1.00	3.5680E+002 g	Tuna Can
F7L200251-015	KEKCP1AC	3.4770E+002 g	1.00	3.4770E+002 g	Tuna Can
F7L200251-016	KEKCQ1AC	3.2100E+002 g	1.00	3.2100E+002 g	Tuna Can

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200251-017	KEKCR1AC	3.2320E+002 g	1.00	3.2320E+002 g	Tuna Can
F7L230000-010B	KEQKR1AA	3.7280E+002 g	1.00	3.7280E+002 g	Tuna Can
F7L230000-010C	KEQKR1AC	3.5120E+002 g	1.00	3.5120E+002 g	Tuna Can

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
F7L230000-010C	GV Tuna Can	AM-241	2.289E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	1.031E+002 pCi/g
F7L230000-010C	GV Tuna Can	CO-60	1.392E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	6.272E+001 pCi/g
F7L230000-010C	GV Tuna Can	CS-137	8.884E+001 dpm/g	351.20 g	4/1/2004 12:00:00AM	4.002E+001 pCi/g

Spiked By | Spike Verified By | Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐ STL-RC-0025	Preparation Of Samples For Gamma Spectroscopy	4.00
☐ STL-RD-0101	Daily Operations Of A Germanium Spectroscopy System	6.00
☐ STL-RD-0103	Maintenance Of The Germanium Spectroscopy System	0.00

Reviewed By: 12/27/07 (Review Date)

Analyst/Relenquished By: 12/23/07 (Release Date)

Received By: 12/23/7 (Receipt Date)

DB Analysis ID: 32,959

Sample Description: 7357010_KEKAM1AC_F7L200251-001

Spectrum Filename: KEKAM1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 12:21:31PM		
Live Time:	1800.00	Real Time:	1804.88
Dead Time:	0.27 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2241

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
187.76	46.98	153.13	23.87	0.013	76.12	0.463		s
298.93	74.78	374.00	307.00	0.171	13.59	0.583	PB-214	s
308.45	77.16	185.17	504.83	0.280	6.36	0.880	PB-214	
336.37	84.14	221.36	81.64	0.045	28.05	0.774	TA-182	s
348.54	87.19	375.35	30.65	0.017	91.21	1.238		s
359.73	89.99	154.01	143.99	0.080	14.76	0.660	PB-214	sM
516.36	129.16	256.77	126.23	0.070	20.04	0.523	AC-228	s
837.22	209.39	102.67	177.33	0.099	14.45	1.083	AC-228	s
2040.23	510.16	40.50	147.50	0.082	13.05	1.052	J-133	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.08	46.56	202.49	15.67	0.009	54.82	0.819	s
AM-241	1	237.99	59.54	326.67	-11.72	-0.007	220.03	0.830	s
TH-234	1	252.60	63.19	226.03	84.97	0.047	28.02	1.140	s
EU-155	1	348.67	87.22	326.83	180.36	0.100	16.01	0.854	s
TH-234	1	370.14	92.59	460.34	-22.84	-0.013	2424.09	0.859	D
AC-228	1	373.18	93.35	187.88	179.02	0.099	1.90	0.860	D
U-235	1	373.18	93.35	276.96	5.68	0.003	57.39	0.860	s D
EU-155	1	421.46	105.43	230.07	39.15	0.022	57.08	0.871	s
EU-152	1	487.69	121.99	253.18	-8.32	-0.005	272.61	0.885	s
EU-154	1	490.33	122.65	226.16	1.71	0.001	1248.73	0.886	s
Pa-234	1	523.19	130.87	267.63	-1.56	-0.001	1481.85	0.894	s
U-235	1	576.30	144.15	224.00	10.73	0.006	199.70	0.904	
U-235	1	653.76	163.52	213.18	1.92	0.001	1077.30	0.922	s
U-235	1	823.71	206.02	169.72	1.78	0.001	1036.86	0.958	s
PB-212	1	954.15	238.63	80.62	1039.88	0.578	3.29	0.986	D
RA-224	1	963.56	240.99	166.75	97.25	0.054	21.34	0.988	D
PB-214	1	967.61	242.00	152.00	63.00	0.035	30.41	0.989	D
TL-208	1	1106.88	276.82	72.00	104.00	0.058	21.50	0.988	s
I-131	1	1130.37	282.70	78.62	-16.33	-0.009	80.66	1.025	
PB-214	1	1179.60	295.00	51.04	133.96	0.074	12.68	1.191	
PB-212	1	1199.59	300.00	79.33	108.67	0.060	21.74	1.089	
AC-228	1	1351.64	338.02	56.33	223.67	0.124	10.24	0.942	
EU-152	1	1373.90	343.58	37.18	9.83	0.005	93.38	1.076	s
PB-214	1	1406.07	351.63	76.74	223.26	0.124	11.52	1.116	s
I-131	1	1457.50	364.48	89.24	0.00	0.000	1335.95	1.092	s
BE-7	1	1911.68	478.02	69.24	-4.91	-0.003	243.69	1.185	s
CS-134	1	2250.50	562.71	35.45	13.35	0.007	68.75	1.254	s
CS-134	1	2276.94	569.32	69.01	0.00	0.000	848.53	1.259	s D
Pa-234	1	2277.54	569.47	58.00	-0.23	0.000	-209.58	1.259	s D
TL-208	1	2330.84	582.79	28.18	337.82	0.188	6.80	1.137	
CS-134	1	2432.18	608.12	41.76	3.60	0.002	259.12	1.286	s
BI-214	1	2435.23	608.88	22.58	184.42	0.102	8.86	1.331	s
I-131	1	2548.56	637.21	38.88	-1.98	-0.001	450.38	1.312	s
CS-137	1	2645.97	661.55	40.38	3.46	0.002	265.32	1.331	s
EU-154	1	2892.09	723.06	79.98	-10.56	-0.006	123.64	1.378	s
BI-212	1	2907.37	726.87	33.78	58.82	0.033	19.11	1.381	s
PA-234M	1	3072.21	768.07	40.07	5.13	0.003	180.11	1.411	s
EU-152	1	3117.27	779.33	31.36	-0.51	0.000	1560.55	1.420	s
BI-212	1	3141.76	785.45	17.50	13.71	0.008	50.91	1.425	s
CS-134	1	3187.74	796.94	38.98	-4.89	-0.003	186.17	1.433	s
CS-134	1	3207.81	801.95	51.08	0.00	0.000	1010.70	1.437	s
TL-208	1	3440.83	860.17	2.67	34.33	0.019	19.34	0.485	s
EU-154	1	3489.71	872.38	31.01	-5.21	-0.003	157.27	1.490	s
Pa-234	1	3521.12	880.23	20.61	0.15	0.000	4321.70	1.495	s
Pa-234	1	3537.75	884.39	23.72	-3.97	-0.002	180.75	1.497	s

AC-228	1	3643.74	910.87	6.67	203.33	0.113	7.49	0.920	s
Pa-234	1	3779.41	944.76	19.13	1.07	0.001	586.10	1.543	s
EU-152	1	3860.72	965.07	103.19	1.99	0.001	726.07	1.556	s
AC-228	1	3874.67	968.56	6.00	154.00	0.086	9.09	0.969	s
EU-154	1	4003.14	1000.65	8.08	4.60	0.003	99.00	1.579	s
PA-234M	1	4004.36	1000.96	20.29	3.10	0.002	212.94	1.582	s
EU-154	1	4019.64	1004.77	37.00	0.00	0.000	860.23	1.585	s
EU-152	1	4444.85	1110.99	22.32	1.06	0.001	639.28	1.659	s
BI-214	1	4477.76	1119.21	4.65	55.35	0.031	12.91	0.520	s
CO-60	1	4689.65	1172.13	21.59	-4.98	-0.003	139.47	1.701	s
EU-154	1	5103.59	1275.51	21.70	1.23	0.001	542.36	1.768	s
CO-60	1	5320.53	1329.68	14.82	-0.66	0.000	828.19	1.806	s
EU-152	1	5633.55	1407.84	9.45	5.13	0.003	95.64	1.854	s
K-40	1	5843.61	1460.28	2.83	231.17	0.128	6.54	1.748	
BI-214	1	7062.19	1764.46	9.07	12.31	0.007	44.82	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
EU-155	T F I	1	7.197E+000	105.31	2.992E+000	* (	5.610E+000G		1.8E+003	21.20
			7.197E+000	86.54	1.010E+001	* (	4.870E+000G		1.8E+003	30.70
AM-241	T	1	-7.196E-001	59.54	-7.196E-001	& (	5.337E+000G		1.6E+005	35.90
CO-60	T F	1	-6.784E-002	1332.50	-6.784E-002	% (	2.108E+000G		1.9E+003	99.98
			-6.784E-002	1173.24	-4.562E-001	%	2.234E+000G		1.9E+003	99.90
PB-212	N	1	5.485E+001	238.63	5.485E+001	(P	2.350E+000G		7.0E+002	43.30
			5.485E+001	300.03	9.236E+001	+	3.758E+001G		7.0E+002	3.28
RA-224	N	1	5.461E+001	240.99	5.461E+001	(	3.532E+001G		7.0E+002	4.10
			5.375E+001	93.35	5.375E+001	- E	1.999E+001X	A	2.1E+003	5.56
AC-228	N	1	5.375E+001	911.07	5.202E+001	(	3.771E+000G		2.1E+003	29.00
			5.375E+001	968.97	6.887E+001	+	6.316E+000G		2.1E+003	17.46
			5.375E+001	338.32	5.792E+001	(	9.759E+000G		2.1E+003	12.01
TH-234	N	1	3.676E+001	63.29	3.676E+001	* (P	3.148E+001G		1.6E+012	4.82
			3.676E+001	92.59	-6.849E+000	% P	3.079E+001G		1.6E+012	5.58
BI-212	N	1	3.058E+001	727.33	3.058E+001	* (	1.549E+001G		7.0E+002	11.82
			3.058E+001	785.51	8.170E+001	%	1.323E+002G		7.0E+002	1.10
EU-154	T F I	1	-3.043E+000	873.23	-3.043E+000	% (	1.673E+001G		3.1E+003	12.27
			-3.043E+000	123.10	6.747E-002	&	2.878E+000G		3.1E+003	40.79
			-3.043E+000	1274.54	3.438E-001	%	6.816E+000G		3.1E+003	35.19
			-3.043E+000	723.36	-3.195E+000	%	1.343E+001G		3.1E+003	20.22
			-3.043E+000	1004.77	0.000E+000	%	1.388E+001G		3.1E+003	18.01
			-3.043E+000	996.33	3.470E+000	%	1.203E+001G		3.1E+003	10.60
PA-234	N	1	2.975E+001	1001.00	2.975E+001	% (	2.272E+002G		1.6E+012	.84
			2.975E+001	766.41	1.120E+002	&	7.036E+002G		1.6E+012	.29
K-40	N	1	2.395E+002	1460.83	2.395E+002	(P	1.093E+001G		4.7E+011	10.67
CS-137	T F I	1	2.302E-001	661.66	2.302E-001	% (	2.151E+000G		1.1E+004	85.21
BI-214	N	1	2.114E+001	609.31	2.114E+001	@ (P	2.849E+000G		5.8E+005	46.09
			2.114E+001	1120.29	3.230E+001	+ P	7.441E+000G		5.8E+005	15.10
			2.114E+001	1764.49	1.049E+001	%	1.427E+001G		5.8E+005	15.40
TL-208	F N	1	2.023E+001	583.02	2.032E+001	(P	1.652E+000G		7.0E+002	84.50
			2.023E+001	277.28	4.282E+001	+	1.740E+001G		7.0E+002	6.31
			2.023E+001	860.56	1.956E+001	(	5.879E+000G		7.0E+002	12.42
BE-7	N P C	1	-1.990E+000	477.60	-1.990E+000	% (	1.680E+001G		5.3E+001	10.52
CS-134	T F I	1	1.937E-001	604.71	1.937E-001	% (	1.765E+000G		7.5E+002	97.62
			1.937E-001	795.87	-3.789E-001	%	2.465E+000G		7.5E+002	85.53
			1.937E-001	569.32	0.000E+000	&)	1.069E+001G		7.5E+002	15.38
			1.937E-001	801.95	0.000E+000	&	2.765E+001G		7.5E+002	8.69
			1.937E-001	563.24	7.887E+000	%	1.799E+001G		7.5E+002	8.35
PB-214	N	1	1.917E+001	351.93	1.915E+001	(P	3.733E+000G		5.8E+005	37.60
			1.917E+001	295.09	1.906E+001	(P	5.123E+000G		5.8E+005	19.30
			1.917E+001	242.00	1.959E+001	(	1.871E+001G		5.8E+005	7.43
U-235	N	1	1.632E+000	143.79	1.632E+000	& (	1.103E+001G		2.6E+011	10.96
			1.632E+000	205.33	7.221E-001	%	2.571E+001G		2.6E+011	5.01
			1.632E+000	163.38	6.656E-001	&	2.451E+001G		2.6E+011	5.08

			1.632E+000	93.35	1.632E+000	%		E	2.306E+001X	2.6E+011	5.81
Pa-234	N	1	-1.414E-001	131.29	-1.414E-001	&	(		7.141E+000G	1.6E+012	18.00
			-1.414E-001	569.47	-1.414E-001	&			2.320E+001G	1.6E+012	8.20
			-1.414E-001	946.02	6.113E-001	%			1.319E+001G	1.6E+012	13.40
			-1.414E-001	883.24	-2.987E+000	%			1.913E+001G	1.6E+012	9.60
			-1.414E-001	880.53	1.789E-001	%			2.869E+001G	1.6E+012	6.00
PB-210	N	1	1.298E+001	46.54	1.298E+001	*	(	P	5.719E+001G	8.1E+003	4.25
			1.172E+000	1112.07	6.786E-001	%			1.587E+001G	4.9E+003	13.64
			1.172E+000	1408.00	2.612E+000	%			8.681E+000G	4.9E+003	21.00
EU-152	T F	1	1.172E+000	344.29	1.172E+000	&	(		3.712E+000G	4.9E+003	26.50
			1.172E+000	121.78	-4.692E-001	%			4.333E+000G	4.9E+003	28.58
			1.172E+000	778.92	-2.564E-001	%			1.449E+001G	4.9E+003	12.94
			1.172E+000	964.11	1.058E+000	%			2.664E+001G	4.9E+003	14.61
I-131	T F I	1	0.000E+000	364.48	0.000E+000	&	(		1.905E+000G	8.0E+000	81.70
			0.000E+000	284.30	-7.067E+000	&			1.905E+001G	8.0E+000	6.14
			0.000E+000	636.97	-1.518E+000	%			2.432E+001G	8.0E+000	7.17

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.990E+000	-1.990E+000	243.69	243.71	1.680E+001
K-40		2.395E+002	2.395E+002	6.62	7.24	1.093E+001
CO-60	<	-6.784E-002	-6.784E-002	828.19	828.20	2.108E+000
I-131	<			1,335.95	1,335.96	1.905E+000
CS-134	<	1.937E-001	1.937E-001	259.12	259.14	1.765E+000
EU-154	<	-3.043E+000	-3.043E+000	157.27	157.29	1.673E+001
PB-210	<	1.298E+001	1.298E+001	127.64	127.70	5.719E+001
PB-212		5.485E+001	5.485E+001	3.32	4.47	2.350E+000
PB-214		1.917E+001	1.917E+001	11.70	12.05	3.733E+000
BI-212	<	3.058E+001	3.058E+001	19.11	19.33	1.549E+001
Pa-234	<	-1.414E-001	-1.414E-001	1,481.85	1,481.86	7.141E+000
TH-234	#	3.676E+001	3.676E+001	33.31	33.51	3.148E+001
CS-137	<	2.302E-001	2.302E-001	265.32	265.34	2.151E+000
EU-152	<	1.172E+000	1.172E+000	93.38	93.42	3.712E+000
EU-155	<	7.197E+000	7.197E+000	16.01	16.36	5.610E+000
TL-208		2.023E+001	2.023E+001	6.85	7.43	1.652E+000
RA-224		5.461E+001	5.462E+001	21.34	21.55	3.532E+001
BI-214		2.114E+001	2.114E+001	9.11	9.56	2.849E+000
AC-228		5.375E+001	5.375E+001	6.34	6.97	3.771E+000
PA-234M	<	2.975E+001	2.975E+001	212.94	212.96	2.272E+002
U-235	<	1.632E+000	1.632E+000	199.70	199.72	1.103E+001
AM-241	<	-7.196E-001	-7.196E-001	220.03	220.07	5.337E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 500.00 Bq/sample

Analyzed by: _____

403605

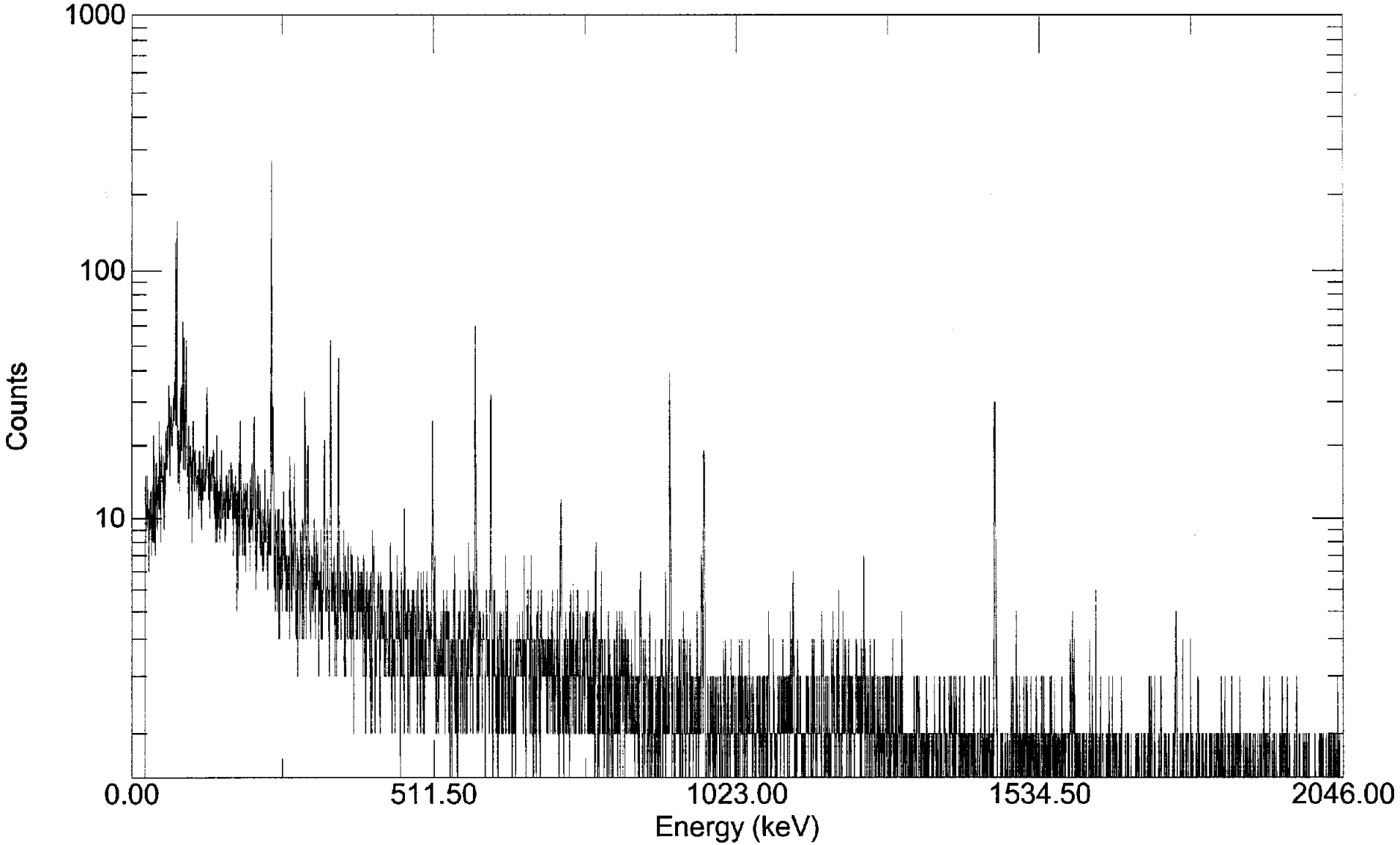
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKAM1AC

7357010_KEKAM1AC_F7L200251-001



Acquired: 23-Dec-2007 12:21:31 PM
File: C:\User\spectra\KEKAM1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.88 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,962

Sample Description: 7357010_KEKAM1AD_F7L200251-001X

Spectrum Filename: KEKAM1AD.An1

Acquisition Information

Start Time:	23-Dec-2007 1:03:38PM		
Live Time:	1800.00	Real Time:	1811.44
Dead Time:	0.63 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2340

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.19	74.76	339.17	367.83	0.204	9.91	0.831	PB-214	
307.74	77.15	359.67	609.33	0.339	6.86	0.889	PB-214	
347.87	87.18	272.81	204.19	0.113	13.41	0.815	PB-214	
359.09	89.99	191.67	180.33	0.100	14.58	0.953	PB-214	M
514.16	128.76	215.00	114.00	0.063	20.46	0.591	AC-228	s
836.65	209.38	141.00	162.00	0.090	16.63	0.886	AC-228	
1077.99	269.72	140.00	150.00	0.083	20.48	1.167	AC-228	s
1308.98	327.46	65.00	162.00	0.090	13.92	0.962	AC-228	s
2041.50	510.58	70.00	248.00	0.138	10.87	1.018	TL-208	s
2435.12	608.98	260.65	27.35	0.015	85.66	1.242		
2751.14	687.98	8.67	28.33	0.016	26.36	0.601	AG-110M	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.75	46.40	240.89	14.96	0.008	48.66	0.813	s
AM-241	1	240.66	60.38	410.89	-12.32	-0.007	234.34	0.824	s
TH-234	1	251.39	63.06	394.23	81.77	0.045	31.85	0.896	
EU-155	1	345.31	86.54	597.38	-2.41	-0.001	1435.65	0.849	
TH-234	1	369.50	92.59	356.38	48.62	0.027	26.90	0.855	D
U-235	1	372.54	93.35	335.45	-0.48	0.000	-513.12	0.855	s D
AC-228	1	372.54	93.35	282.48	247.98	0.138	1.27	0.855	D
EU-155	1	421.56	105.61	329.57	36.53	0.020	72.19	0.866	s
EU-152	1	486.51	121.84	377.20	-20.46	-0.011	136.05	0.881	s
EU-154	1	495.12	124.00	309.81	-1.81	-0.001	1377.99	0.882	s
Pa-234	1	529.29	132.54	331.15	-3.11	-0.002	829.36	0.890	s
U-235	1	573.76	143.66	325.84	-0.88	0.000	890.06	0.901	s
U-235	1	651.54	163.10	240.92	2.99	0.002	367.76	0.919	s
U-235	1	819.60	205.12	240.51	-2.54	-0.001	5533.71	0.957	s
PB-212	1	953.66	238.63	120.81	1302.19	0.723	2.94	0.987	D
RA-224	1	963.07	240.99	192.12	139.88	0.078	16.37	0.989	D
PB-214	1	967.12	242.00	213.12	76.88	0.043	26.55	0.990	D
TL-208	1	1108.96	277.46	115.50	72.50	0.040	33.57	1.072	
I-131	1	1140.65	285.38	113.29	-1.08	-0.001	1397.82	1.028	s
PB-214	1	1179.62	295.12	108.21	166.79	0.093	14.35	0.950	
PB-212	1	1199.08	299.99	73.67	109.33	0.061	18.10	1.121	
AC-228	1	1352.04	338.23	91.91	327.09	0.182	8.73	1.085	s
EU-152	1	1371.45	343.08	90.19	5.72	0.003	238.43	1.081	
PB-214	1	1406.61	351.87	115.49	294.51	0.164	9.66	1.083	s
I-131	1	1444.91	361.44	34.00	24.40	0.014	39.40	1.099	s
BE-7	1	1911.55	478.10	62.09	14.62	0.008	80.57	1.198	s
CS-134	1	2247.16	561.99	59.16	0.03	0.000	38740.28	1.273	s
CS-134	1	2276.47	569.32	39.61	8.20	0.005	3.97	1.278	s D
Pa-234	1	2277.07	569.47	42.21	8.31	0.005	15.61	1.278	s D
TL-208	1	2331.59	583.10	46.25	470.75	0.262	5.48	0.915	s
CS-134	1	2418.04	604.71	533.39	-1.86	-0.001	1759.54	1.309	s
BI-214	1	2435.36	609.04	65.90	205.79	0.114	8.30	1.313	
I-131	1	2547.11	636.97	80.36	0.00	0.000	1267.78	1.337	s
CS-137	1	2652.29	663.27	59.03	-7.69	-0.004	145.82	1.358	s
EU-154	1	2888.24	722.25	81.12	-6.11	-0.003	212.36	1.411	
BI-212	1	2905.97	726.68	51.33	133.67	0.074	17.73	1.196	
PA-234M	1	3062.86	765.90	49.05	-4.55	-0.003	222.64	1.447	s
EU-152	1	3113.44	778.54	42.31	-0.24	0.000	3809.37	1.458	s
BI-212	1	3140.61	785.33	6.50	35.50	0.020	21.10	1.060	s
CS-134	1	3177.84	794.64	33.81	62.78	0.035	18.19	1.472	s
CS-134	1	3210.21	802.73	41.05	0.05	0.000	19911.74	1.477	s
TL-208	1	3439.84	860.13	11.33	99.67	0.055	13.28	0.386	s
EU-154	1	3491.81	873.12	34.62	0.08	0.000	10285.53	1.537	s
Pa-234	1	3519.68	880.09	33.30	-1.98	-0.001	417.42	1.543	s
Pa-234	1	3527.69	882.09	28.03	3.11	0.002	247.46	1.546	s

AC-228	1	3643.33	910.99	12.97	363.03	0.202	5.72	1.220	
Pa-234	1	3789.23	947.46	35.48	-0.51	0.000	1653.16	1.598	s
EU-152	1	3844.88	961.37	52.11	4.04	0.002	257.57	1.613	
AC-228	1	3871.75	968.09	20.75	255.25	0.142	7.52	1.905	
EU-154	1	3994.54	998.78	31.89	-1.62	-0.001	500.40	1.640	s
PA-234M	1	4000.21	1000.20	36.42	9.98	0.006	91.20	1.643	s
EU-154	1	4018.34	1004.73	36.06	7.60	0.004	117.44	1.647	s
EU-152	1	4451.25	1112.94	26.69	1.07	0.001	692.48	1.735	s
BI-214	1	4479.94	1120.11	37.93	44.41	0.025	21.34	1.741	s
CO-60	1	4675.06	1168.88	19.14	0.25	0.000	2439.53	1.784	s
EU-154	1	5105.94	1276.57	33.25	-1.41	-0.001	584.76	1.866	s
CO-60	1	5329.70	1332.50	42.11	-5.69	-0.003	166.75	1.912	s
EU-152	1	5630.21	1407.60	19.24	7.96	0.004	85.65	1.972	s
K-40	1	5841.65	1460.45	12.54	355.46	0.197	5.21	1.867	
BI-214	1	7057.67	1764.35	8.13	28.37	0.016	19.02	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PB-210	N	1	9.451E+000	46.54	9.451E+000	% (P	4.739E+001G		8.1E+003	4.25
			7.247E-001	284.30	-3.556E-001	%	1.723E+001G		8.0E+000	6.14
			7.247E-001	636.97	0.000E+000	%	2.254E+001G		8.0E+000	7.17
I-131	T F I	1	7.247E-001	364.48	7.247E-001	(	8.877E-001G		8.0E+000	81.70
RA-224	N	1	6.142E+001	240.99	6.142E+001	(	2.955E+001G		7.0E+002	4.10
AC-228	N	1	5.961E+001	911.07	5.839E+001	(P	3.135E+000G		2.1E+003	29.00
			5.961E+001	968.97	7.120E+001	+ P	6.677E+000G		2.1E+003	17.46
			5.961E+001	338.32	6.256E+001	@ (P	9.064E+000G		2.1E+003	12.01
			5.961E+001	93.35	5.961E+001	- E	1.948E+001X	A	2.1E+003	5.56
AM-241	T	1	-5.958E-001	59.54	-5.958E-001	% (	4.697E+000G		1.6E+005	35.90
PA-234	N	1	5.941E+001	1001.00	5.941E+001	& (	1.836E+002G		1.6E+012	.84
			5.941E+001	766.41	-6.400E+001	%	4.971E+002G		1.6E+012	.29
			5.378E+001	300.03	7.011E+001	+	2.739E+001G		7.0E+002	3.28
PB-212	N	1	5.378E+001	238.63	5.378E+001	(P	2.227E+000G		7.0E+002	43.30
EU-152	T F	1	5.024E-001	344.29	5.024E-001	% (	4.124E+000G		4.9E+003	26.50
			5.024E-001	121.78	-9.418E-001	%	4.291E+000G		4.9E+003	28.58
			5.024E-001	778.92	-7.815E-002	%	1.067E+001G		4.9E+003	12.94
			5.024E-001	964.11	1.342E+000	%	1.208E+001G		4.9E+003	14.61
			5.024E-001	1112.07	4.195E-001	&	1.054E+001G		4.9E+003	13.64
			5.024E-001	1408.00	2.424E+000	%	7.053E+000G		4.9E+003	21.00
BI-212	N	1	4.509E+001	727.33	4.509E+001	(	1.218E+001G		7.0E+002	11.82
			4.509E+001	785.51	1.358E+002	+	5.579E+001G		7.0E+002	1.10
BE-7	N P C	1	4.113E+000	477.60	4.113E+000	% (	1.109E+001G		5.3E+001	10.52
CO-60	T F	1	-3.490E-001	1332.50	-3.490E-001	% (	2.022E+000G		1.9E+003	99.98
			-3.490E-001	1173.24	1.422E-002	&	1.291E+000G		1.9E+003	99.90
			3.401E+000	569.47	3.401E+000	!	1.350E+001G		1.6E+012	8.20
			3.401E+000	946.02	-1.828E-001	%	1.089E+001G		1.6E+012	13.40
			3.401E+000	883.24	1.478E+000	&	1.302E+001G		1.6E+012	9.60
			3.401E+000	880.53	-1.506E+000	%	2.247E+001G		1.6E+012	6.00
Pa-234	N	1	3.401E+000	131.29	-2.302E-001	% (	6.478E+000G		1.6E+012	18.00
CS-137	T F I	1	-3.368E-001	661.66	-3.368E-001	% (	1.687E+000G		1.1E+004	85.21
EU-154	T F I	1	2.987E-002	873.23	2.987E-002	% (	1.112E+001G		3.1E+003	12.27
			2.987E-002	123.10	-5.843E-002	%	2.737E+000G		3.1E+003	40.79
			2.987E-002	1274.54	-2.377E-001	&	4.989E+000G		3.1E+003	35.19
			2.987E-002	723.36	-1.200E+000	%	8.776E+000G		3.1E+003	20.22
			2.987E-002	1004.77	2.109E+000	%	8.516E+000G		3.1E+003	18.01
			2.987E-002	996.33	-7.573E-001	%	1.360E+001G		3.1E+003	10.60
TH-234	N	1	2.780E+001	63.29	2.780E+001	% (P	3.238E+001G		1.6E+012	4.82
			2.780E+001	92.59	1.166E+001	% P	2.175E+001G		1.6E+012	5.58
EU-155	T F I	1	2.259E+000	105.31	2.259E+000	* (	5.400E+000G		1.8E+003	21.20
			2.259E+000	86.54	-1.073E-001	&	5.194E+000G		1.8E+003	30.70
K-40	N	1	2.194E+002	1460.83	2.194E+002	(P	1.186E+001G		4.7E+011	10.67
TL-208	F N	1	1.902E+001	583.02	1.902E+001	(P	1.390E+000G		7.0E+002	84.50
			1.902E+001	277.28	2.283E+001	+	1.662E+001G		7.0E+002	6.31

			1.902E+001	860.56	3.597E+001	+				6.640E+000G	7.0E+002	12.42
PB-214	N	1	1.837E+001	351.93	1.853E+001	@	(	P		3.320E+000G	5.8E+005	37.60
			1.837E+001	295.09	1.796E+001		(	P		5.511E+000G	5.8E+005	19.30
			1.837E+001	242.00	1.868E+001		(	P		1.719E+001G	5.8E+005	7.43
CS-134 T F I		1	1.789E+000	604.71	-6.667E-002	%	(			3.959E+000G	7.5E+002	97.62
			1.789E+000	795.87	3.116E+000	?	(			1.479E+000G	7.5E+002	85.53
			1.789E+000	569.32	1.789E+000	!				6.991E+000G	7.5E+002	15.38
			1.789E+000	801.95	2.235E-002	%				1.599E+001G	7.5E+002	8.69
			1.789E+000	563.24	1.120E-002	&				1.538E+001G	7.5E+002	8.35
BI-214	N	1	1.544E+001	609.31	1.572E+001		(	P		3.097E+000G	5.8E+005	46.09
			1.544E+001	1120.29	1.588E+001		(	P		1.123E+001G	5.8E+005	15.10
			1.544E+001	1764.49	1.415E+001	?	(	P		7.976E+000G	5.8E+005	15.40
U-235	N	1	-1.102E-001	143.79	-1.102E-001	%	(	P		1.082E+001G	2.6E+011	10.96
			-1.102E-001	205.33	-8.214E-001	%		P		2.428E+001G	2.6E+011	5.01
			-1.102E-001	163.38	8.441E-001	%		P		2.119E+001G	2.6E+011	5.08
			-1.102E-001	93.35	-1.102E-001	!			E	2.026E+001X	2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	1.789E+000	1.789E+000	18.19	18.42	3.959E+000
EU-154	<	2.987E-002	2.987E-002	10,285.53	10,285.53	1.112E+001
EU-155	<	2.259E+000	2.259E+000	72.19	72.27	5.400E+000
PB-214		1.837E+001	1.837E+001	10.05	10.45	3.320E+000
BI-212		4.509E+001	4.509E+001	17.73	17.96	1.218E+001
BI-214	<	1.544E+001	1.544E+001	8.77	9.24	3.097E+000
TH-234		2.780E+001	2.780E+001	46.23	46.37	3.238E+001
PA-234M	<	5.941E+001	5.941E+001	91.20	91.24	1.836E+002
BE-7	<	4.113E+000	4.115E+000	80.57	80.62	1.109E+001
K-40		2.194E+002	2.194E+002	5.40	6.14	1.186E+001
CO-60	<	-3.490E-001	-3.490E-001	166.75	166.77	2.022E+000
I-131	<	7.247E-001	7.275E-001	39.40	39.51	8.877E-001
CS-137	<	-3.368E-001	-3.368E-001	145.82	145.85	1.687E+000
EU-152	<	5.024E-001	5.024E-001	238.43	238.45	4.124E+000
TL-208		1.902E+001	1.902E+001	5.58	6.29	1.390E+000
RA-224		6.142E+001	6.143E+001	16.37	16.64	2.955E+001
PB-210	<	9.451E+000	9.451E+000	144.47	144.52	4.739E+001
PB-212		5.378E+001	5.379E+001	2.99	4.23	2.227E+000
AC-228		5.961E+001	5.961E+001	5.29	6.02	3.135E+000
Pa-234	<	3.401E+000	3.401E+000	38.13	38.25	6.478E+000
U-235	<	-1.102E-001	-1.102E-001	4,655.27	4,655.27	1.082E+001
AM-241	<	-5.958E-001	-5.958E-001	234.34	234.37	4.697E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 476.66 Bq/sample

Analyzed by: _____

403293

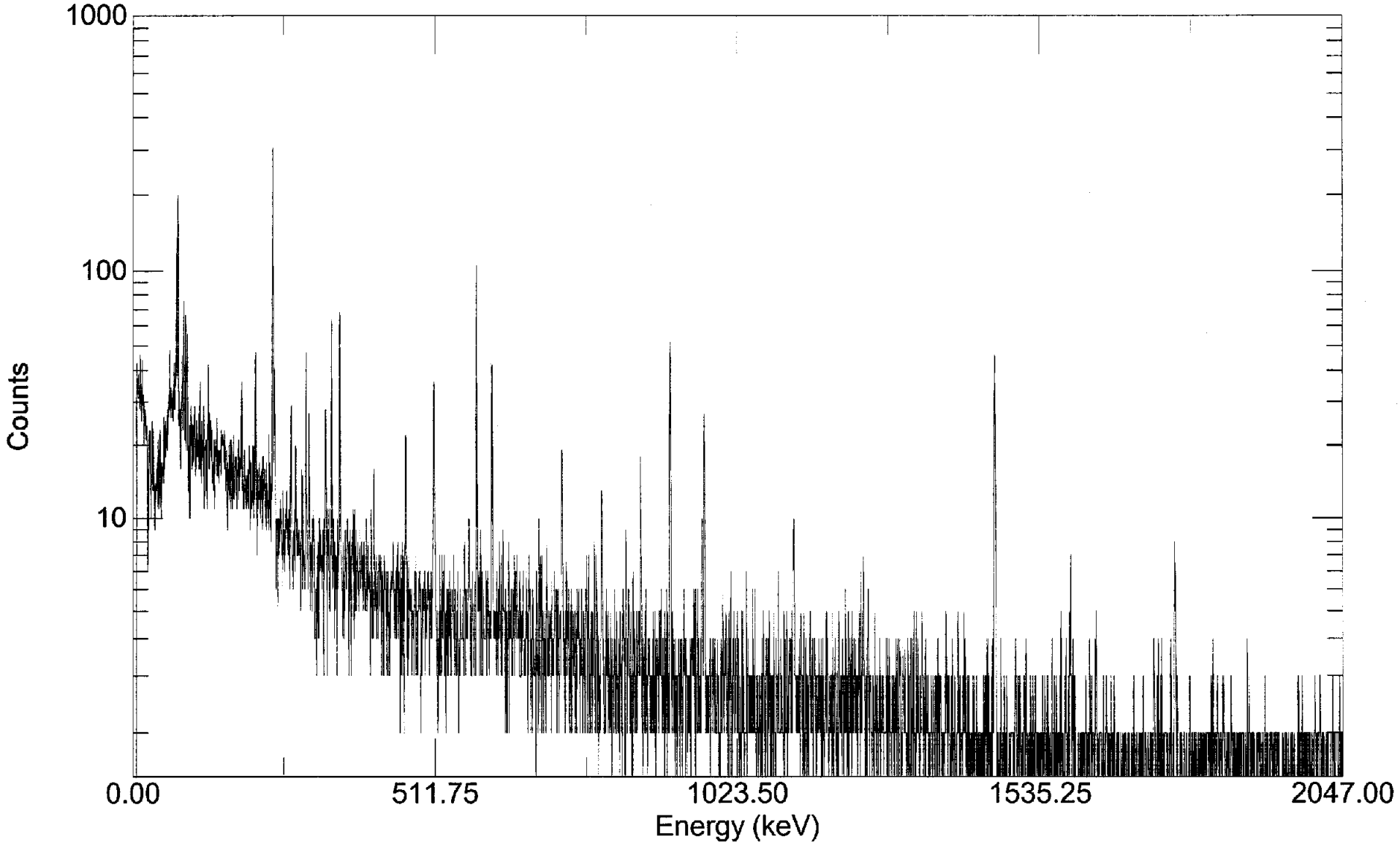
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKAM1AD

7357010_KEKAM1AD_F7L200251-001X



Acquired: 23-Dec-2007 1:03:38 PM
File: C:\User\spectra\KEKAM1AD.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.44 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,961

Sample Description: 7357010_KEKAW1AC_F7L200251-002

Spectrum Filename: KEKAW1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 12:22:21PM		
Live Time:	1800.00	Real Time:	1850.56
Dead Time:	2.73 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0878

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.48	74.58	219.00	170.00	0.094	19.02	1.020	BI-207	s
307.05	76.97	209.00	229.00	0.127	14.48	0.912	PB-214	
334.81	83.91	88.00	69.00	0.038	22.68	0.794	TA-182	s
347.39	87.05	205.46	24.54	0.014	85.04	1.079		s
358.19	89.75	63.00	63.00	0.035	21.82	0.884	PB-214	
369.40	92.73	114.75	76.25	0.042	22.93	0.795	TH-234	D
839.27	209.94	63.33	57.67	0.032	31.10	0.740	NP-239	s
1180.77	295.26	134.73	14.27	0.008	118.07	1.099		
1310.58	327.70	48.33	66.67	0.037	28.01	0.800	AC-228	s
1407.69	351.96	146.72	7.28	0.004	238.22	1.100		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.58	46.63	110.67	5.44	0.003	63.77	0.749	s
AM-241	1	235.81	59.18	169.89	-14.94	-0.008	159.75	0.761	s
TH-234	1	251.80	63.17	192.65	20.17	0.011	57.62	0.764	
EU-155	1	347.51	87.08	185.61	84.13	0.047	25.36	0.788	s
TH-234	1	369.59	92.60	181.02	60.42	0.034	24.00	0.795	s
AC-228	1	372.61	93.35	-52.49	91.49	0.051	2.30	0.795	D
U-235	1	372.61	93.35	164.74	4.71	0.003	42.33	0.795	s D
EU-155	1	416.83	104.40	137.85	14.19	0.008	119.99	0.808	s
EU-152	1	488.10	122.20	143.71	-9.14	-0.005	188.42	0.824	s
EU-154	1	491.69	123.10	152.34	-1.17	-0.001	1491.24	0.826	s
Pa-234	1	529.22	132.48	90.60	3.08	0.002	441.34	0.834	s
U-235	1	572.27	143.23	88.76	8.91	0.005	119.07	0.847	s
U-235	1	653.64	163.56	93.96	0.35	0.000	582.42	0.867	s
U-235	1	812.29	203.20	44.60	1.15	0.001	824.26	0.909	s
PB-212	1	954.12	238.63	120.48	398.52	0.221	7.55	0.804	
RA-224	1	958.88	239.82	412.08	-118.58	-0.066	25.89	0.944	
PB-214	1	971.46	242.96	109.19	-0.02	0.000	68462.47	0.945	
TL-208	1	1109.10	277.35	57.80	17.56	0.010	65.71	0.980	s
I-131	1	1135.41	283.93	55.97	-10.18	-0.006	108.60	0.987	s
PB-214	1	1180.53	295.20	42.84	108.15	0.060	12.49	0.998	
PB-212	1	1199.18	299.86	26.67	54.33	0.030	23.99	0.555	s
AC-228	1	1353.03	338.30	50.17	85.57	0.048	15.93	1.040	
EU-152	1	1378.87	344.76	49.41	-4.16	-0.002	244.17	1.045	s
PB-214	1	1407.63	351.95	40.76	125.22	0.070	10.88	1.053	
I-131	1	1454.76	363.72	27.46	9.23	0.005	86.78	1.065	s
BE-7	1	1916.51	479.11	33.20	-4.99	-0.003	169.49	1.173	s
CS-134	1	2251.18	562.76	15.90	8.28	0.005	76.48	1.252	
CS-134	1	2277.45	569.32	26.02	-0.59	0.000	-38.43	1.258	s D
Pa-234	1	2278.05	569.47	25.86	0.46	0.000	118.89	1.258	s D
TL-208	1	2333.75	583.39	8.25	175.75	0.098	7.96	1.048	
CS-134	1	2417.27	604.27	25.92	-3.58	-0.002	208.00	1.290	s
BI-214	1	2437.76	609.39	14.40	102.60	0.057	11.07	1.477	
I-131	1	2546.66	636.61	32.13	-4.62	-0.003	179.62	1.319	s
CS-137	1	2646.89	661.66	67.57	-6.25	-0.003	1107.43	1.342	s
EU-154	1	2896.71	724.10	42.64	-6.13	-0.003	155.90	1.397	s
BI-212	1	2909.22	727.23	0.00	57.00	0.032	13.25	0.700	s
PA-234M	1	3065.58	766.32	28.36	0.09	0.000	8654.67	1.434	s
EU-152	1	3116.85	779.14	23.02	1.84	0.001	375.74	1.445	s
BI-212	1	3141.48	785.29	17.16	4.97	0.003	126.08	1.451	s
CS-134	1	3180.17	794.96	14.99	12.77	0.007	51.21	1.460	s
CS-134	1	3208.14	801.96	18.24	-0.67	0.000	908.68	1.465	s
TL-208	1	3441.84	860.38	12.90	5.20	0.003	107.08	1.516	s
EU-154	1	3492.37	873.01	18.99	-3.16	-0.002	202.76	1.527	s
Pa-234	1	3528.18	881.97	12.36	2.76	0.002	189.89	1.533	s
Pa-234	1	3544.95	886.16	15.51	-0.76	0.000	743.09	1.535	s
AC-228	1	3644.51	911.05	0.00	108.00	0.060	9.62	0.675	s

Pa-234	1	3773.78	943.37	18.81	0.40	0.000	1529.32	1.588	s
EU-152	1	3843.30	960.75	10.89	0.35	0.000	1352.08	1.603	s
AC-228	1	3875.83	968.88	0.00	63.00	0.035	12.60	0.719	s
EU-154	1	3984.85	996.15	24.26	-1.92	-0.001	370.64	1.630	s
PA-234M	1	4008.47	1002.05	14.09	8.37	0.005	72.24	1.633	s
EU-154	1	4020.75	1005.12	30.29	-4.48	-0.002	179.93	1.637	s
EU-152	1	4450.27	1112.52	27.83	-2.10	-0.001	361.52	1.723	s
BI-214	1	4479.94	1119.94	25.89	5.33	0.003	141.72	1.730	s
CO-60	1	4690.82	1172.68	23.44	2.01	0.001	348.21	1.772	s
EU-154	1	5096.96	1274.25	13.20	2.31	0.001	231.54	1.850	s
CO-60	1	5332.95	1333.28	13.49	0.34	0.000	1553.99	1.894	s
EU-152	1	5629.57	1407.47	15.62	-2.38	-0.001	243.52	1.950	s
K-40	1	5843.48	1460.98	0.00	253.00	0.141	6.29	2.076	
BI-214	1	7058.71	1765.01	5.23	19.82	0.011	24.61	2.196	

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
AM-241	T	1	-8.498E-001	59.54	-8.498E-001	%	(	P	3.610E+000G			1.6E+005	35.90
PA-234M	N	1	7.653E+001	1001.00	7.653E+001	%	(		1.847E+002G			1.6E+012	.84
			7.653E+001	766.41	1.823E+000	&			5.763E+002G			1.6E+012	.29
RA-224	N	1	-6.403E+001	240.99	-6.403E+001	&	(		5.254E+001G			7.0E+002	4.10
			-4.762E-001	964.11	1.769E-001	%			9.195E+000G			4.9E+003	14.61
			-4.762E-001	1112.07	-1.284E+000	%			1.667E+001G			4.9E+003	13.64
			-4.762E-001	1408.00	-1.147E+000	%			1.017E+001G			4.9E+003	21.00
EU-152	T F	1	-4.762E-001	344.29	-4.762E-001	%	(		4.064E+000G			4.9E+003	26.50
			-4.762E-001	121.78	-4.994E-001	%			3.200E+000G			4.9E+003	28.58
			-4.762E-001	778.92	8.878E-001	&			1.208E+001G			4.9E+003	12.94
CS-137	T F I	1	-3.992E-001	661.66	-3.992E-001	&	(	P	2.619E+000G			1.1E+004	85.21
PB-210	N	1	3.991E+000	46.54	3.991E+000	*	(	P	3.799E+001G			8.1E+003	4.25
I-131	T F I	1	3.615E-001	364.48	3.615E-001	%	(		1.062E+000G			8.0E+000	81.70
			3.615E-001	284.30	-4.230E+000	%			1.562E+001G			8.0E+000	6.14
			3.615E-001	636.97	-3.395E+000	%			2.140E+001G			8.0E+000	7.17
CO-60	T F	1	3.249E-002	1332.50	3.249E-002	&	(		1.915E+000G			1.9E+003	99.98
			3.249E-002	1173.24	1.749E-001	%			2.202E+000G			1.9E+003	99.90
BI-212	N	1	2.842E+001	727.33	2.842E+001		(		3.674E+000G			7.0E+002	11.82
			2.842E+001	785.51	2.839E+001	%			1.257E+002G			7.0E+002	1.10
Pa-234	N	1	2.694E-001	131.29	2.694E-001	%	(		4.122E+000G			1.6E+012	18.00
			2.694E-001	569.47	2.694E-001	%			1.540E+001G			1.6E+012	8.20
			2.694E-001	946.02	2.200E-001	&			1.251E+001G			1.6E+012	13.40
			2.694E-001	883.24	-5.464E-001	%			1.517E+001G			1.6E+012	9.60
			2.694E-001	880.53	3.174E+000	&			2.195E+001G			1.6E+012	6.00
AC-228	N	1	2.660E+001	911.16	2.641E+001		(		1.802E+000G			2.1E+003	29.00
			2.660E+001	968.97	2.690E+001		(		3.147E+000G			2.1E+003	17.46
			2.660E+001	338.32	2.129E+001	-			8.887E+000G			2.1E+003	12.01
			2.660E+001	93.35	2.660E+001			E	2.142E+000G		A	2.1E+003	5.56
K-40	N	1	2.473E+002	1460.83	2.473E+002		(		7.204E+000G			4.7E+011	10.67
PB-212	N	1	2.021E+001	238.63	2.021E+001		(	P	2.731E+000G			7.0E+002	43.30
			2.021E+001	300.03	4.437E+001	+			2.187E+001G			7.0E+002	3.28
BE-7	N P C	1	-1.940E+000	477.60	-1.940E+000	%	(		1.150E+001G			5.3E+001	10.52

CS-134	T F I		1	-1.848E-001	604.71	-1.848E-001	%	(		1.365E+000G		7.5E+002	97.62
				-1.848E-001	795.87	9.479E-001	%			1.541E+000G		7.5E+002	85.53
				-1.848E-001	569.32	-1.848E-001	%			8.234E+000G		7.5E+002	15.38
				-1.848E-001	801.95	-4.932E-001	%			1.663E+001G		7.5E+002	8.69
				-1.848E-001	563.24	4.697E+000	%			1.208E+001G		7.5E+002	8.35
EU-154	T F I		1	-1.766E+000	873.23	-1.766E+000	%	(		1.285E+001G		3.1E+003	12.27
				-1.766E+000	123.10	-4.494E-002	%			2.308E+000G		3.1E+003	40.79
				-1.766E+000	1274.54	6.125E-001	%			5.198E+000G		3.1E+003	35.19
				-1.766E+000	723.36	-1.779E+000	&			9.614E+000G		3.1E+003	20.22
				-1.766E+000	1004.77	-1.911E+000	%			1.209E+001G		3.1E+003	18.01
				-1.766E+000	996.33	-1.378E+000	%			1.846E+001G		3.1E+003	10.60
TH-234		N	1	1.320E+001	63.29	8.169E+000	%	(	P	2.730E+001G		1.6E+012	4.82
				1.320E+001	92.59	1.754E+001	*	(	P	1.898E+001G		1.6E+012	5.58
U-235		N	1	1.312E+000	143.79	1.312E+000	%	(	P	6.859E+000G		2.6E+011	10.96
				1.312E+000	205.33	4.499E-001	&			1.320E+001G		2.6E+011	5.01
				1.312E+000	163.38	1.157E-001	%		P	1.601E+001G		2.6E+011	5.08
				1.312E+000	93.35	1.312E+000	&			E 1.740E+001X		2.6E+011	5.81
BI-214		N	1	1.129E+001	609.31	1.129E+001		(	P	2.244E+000G		5.8E+005	46.09
				1.129E+001	1120.29	2.961E+000	%			1.467E+001G		5.8E+005	15.10
				1.129E+001	1764.49	1.580E+001	+		P	1.066E+001G		5.8E+005	15.40
EU-155	T F I		1	1.052E+000	105.31	1.052E+000	*	(		4.257E+000G		1.8E+003	21.20
				1.052E+000	86.54	4.550E+000	*			3.580E+000G	A	1.8E+003	30.70
PB-214		N	1	1.032E+001	351.93	1.032E+001		(	P	2.675E+000G		5.8E+005	37.60
				1.032E+001	295.09	1.479E+001	+		P	4.541E+000G		5.8E+005	19.30
				1.032E+001	242.00	-6.454E-003	%			1.537E+001G		5.8E+005	7.43
TL-208	F	N	1	1.015E+001	583.02	1.015E+001		(	P	9.299E-001G		7.0E+002	84.50
				1.015E+001	277.28	6.949E+000	%			1.509E+001G		7.0E+002	6.31
				1.015E+001	860.56	2.834E+000	%			1.060E+001G		7.0E+002	12.42

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-1.940E+000	-1.940E+000	169.49	169.52	1.150E+001
K-40		2.473E+002	2.473E+002	6.29	6.94	7.204E+000
CO-60	#	3.249E-002	3.249E-002	1,553.99	1,554.00	1.915E+000
I-131	#	3.615E-001	3.619E-001	86.78	86.83	1.062E+000
CS-134	#	-1.848E-001	-1.848E-001	208.00	208.02	1.365E+000
EU-154	#	-1.766E+000	-1.766E+000	202.76	202.78	1.285E+001
PB-210	#	3.991E+000	3.991E+000	266.30	266.32	3.799E+001
PB-212		2.021E+001	2.021E+001	7.68	8.24	2.731E+000
PB-214	#	1.032E+001	1.032E+001	11.34	11.70	2.675E+000
BI-212		2.842E+001	2.842E+001	13.25	13.56	3.674E+000
CS-137	#	-3.992E-001	-3.992E-001	2,214.86	2,214.87	2.619E+000
EU-152	#	-4.762E-001	-4.762E-001	244.17	244.18	4.064E+000
EU-155	#	1.052E+000	1.052E+000	119.99	120.04	4.257E+000
TL-208		1.015E+001	1.015E+001	8.13	8.63	9.299E-001
BI-214		1.129E+001	1.129E+001	11.79	12.14	2.244E+000
RA-224	#	-6.403E+001	-6.403E+001	25.89	26.06	5.254E+001
AC-228		2.660E+001	2.660E+001	7.93	8.43	1.802E+000
TH-234	#	1.320E+001	1.320E+001	33.08	33.29	2.730E+001
PA-234M	#	7.653E+001	7.653E+001	72.24	72.29	1.847E+002
U-235	#	1.312E+000	1.312E+000	152.14	152.17	6.859E+000
Pa-234	#	2.694E-001	2.694E-001	441.34	441.35	4.122E+000
AM-241	#	-8.498E-001	-8.498E-001	195.18	195.22	3.610E+000

= All peaks for activity calculation had bad shape

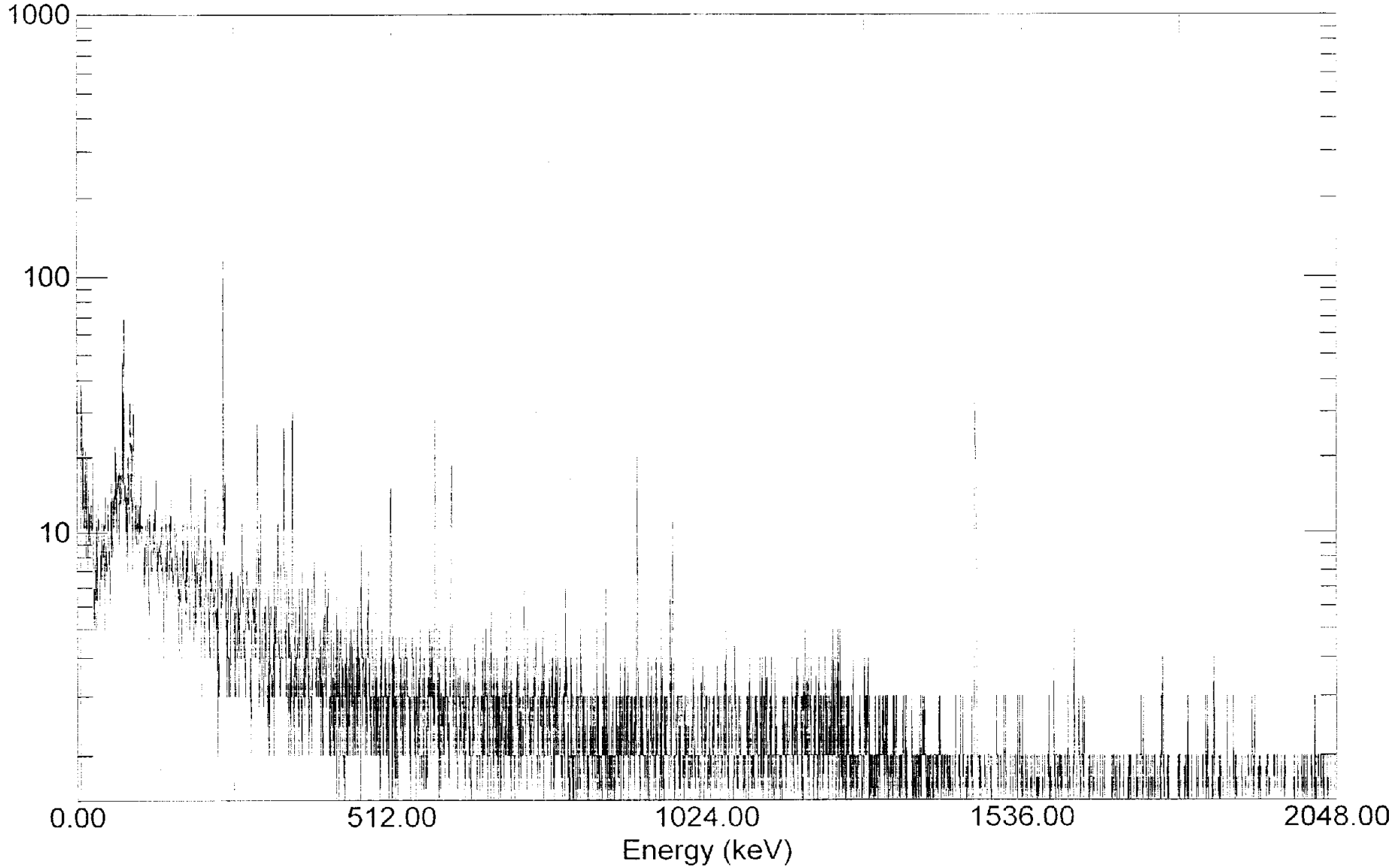
Total Activity (37.74 to 2,000.57 keV) 343.97 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKAW1AC

7357010_KEKAW1AC_F7L200251-002



Acquired: 23-Dec-2007 12:22:21 PM
File: C:\User\spectra\KEKAW1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1850.56 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,960

Sample Description: 7357010_KEKA21AC_F7L200251-003

Spectrum Filename: KEKA21AC.An1

Acquisition Information

Start Time:	23-Dec-2007 12:22:50PM		
Live Time:	1800.00	Real Time:	1818.24
Dead Time:	1.00 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2876

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.96	74.70	480.00	297.00	0.165	15.85	0.687	PB-214	
307.81	77.17	336.00	569.00	0.316	7.46	0.883	PB-214	
348.04	87.19	219.27	174.73	0.097	14.17	0.875	PB-214	D
358.92	89.94	186.00	154.00	0.086	14.89	0.854	PB-214	M
371.59	93.11	443.00	0.00	0.000	2976.58	1.219		s
1353.12	338.45	285.76	20.24	0.011	120.20	1.315		
2042.22	510.69	53.33	174.67	0.097	13.83	0.657	TL-208	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	187.06	46.99	144.44	103.56	0.058	19.65	0.606	s
AM-241	1	237.32	59.55	358.00	-6.73	-0.004	399.64	0.846	s
TH-234	1	253.14	63.50	426.03	18.12	0.010	74.98	0.850	s
EU-155	1	345.32	86.54	457.95	-13.65	-0.008	223.29	0.874	D
TH-234	1	371.37	93.05	416.90	110.25	0.061	21.90	0.881	s
U-235	1	372.56	93.35	346.53	-9.36	-0.005	-260.15	0.882	s D
AC-228	1	372.56	93.35	567.02	0.00	0.000	2679.55	0.882	s D
EU-155	1	420.90	105.43	210.00	79.00	0.044	38.37	0.634	s
EU-152	1	486.56	121.84	238.42	11.35	0.006	194.70	0.912	s
EU-154	1	493.27	123.52	239.49	13.54	0.008	163.87	0.913	s
Pa-234	1	521.59	130.60	290.39	-31.42	-0.017	78.75	0.922	s
U-235	1	574.56	143.84	288.61	-17.61	-0.010	138.50	0.935	s
U-235	1	652.89	163.42	205.89	1.12	0.001	1808.39	0.955	s
U-235	1	817.12	204.47	172.11	31.37	0.017	61.78	0.999	s
PB-212	1	953.80	238.63	129.69	942.31	0.524	3.63	1.034	D
RA-224	1	963.22	240.99	216.23	99.77	0.055	23.12	1.036	D
PB-214	1	967.26	242.00	152.55	71.45	0.040	27.16	1.037	D
TL-208	1	1108.56	277.31	44.00	57.00	0.032	24.12	0.343	s
I-131	1	1130.99	282.92	77.54	-13.75	-0.008	94.52	1.081	
PB-214	1	1180.55	295.31	83.33	222.67	0.124	11.48	0.964	s
PB-212	1	1200.06	300.19	88.67	101.33	0.056	24.25	1.513	s
AC-228	1	1352.90	338.39	59.63	242.43	0.135	7.84	1.136	
EU-152	1	1375.07	343.93	82.80	10.96	0.006	121.18	1.142	s
PB-214	1	1407.63	352.07	77.88	274.12	0.152	9.73	1.047	s
I-131	1	1457.00	364.41	59.32	15.12	0.008	76.51	1.163	s
BE-7	1	1903.20	475.94	42.19	-0.12	0.000	7592.94	1.277	s
CS-134	1	2248.88	562.35	42.06	12.87	0.007	76.50	1.363	s
CS-134	1	2276.76	569.32	76.03	0.00	0.000	948.68	1.369	s D
Pa-234	1	2277.35	569.47	53.21	-4.63	-0.003	-156.73	1.369	s D
TL-208	1	2332.45	583.24	27.74	335.26	0.186	6.78	1.446	s
CS-134	1	2421.96	605.62	75.67	-5.50	-0.003	227.66	1.403	s
BI-214	1	2437.03	609.38	39.63	223.37	0.124	10.35	1.230	s
I-131	1	2546.26	636.69	47.49	-3.55	-0.002	279.55	1.435	s
CS-137	1	2648.46	662.24	50.83	12.80	0.007	78.74	1.459	s
EU-154	1	2899.90	725.09	104.69	-26.25	-0.015	58.47	1.519	s
BI-212	1	2909.73	727.55	42.24	45.69	0.025	24.97	1.523	s
PA-234M	1	3071.57	768.00	27.25	23.41	0.013	37.71	1.561	s
EU-152	1	3124.46	781.23	28.65	1.67	0.001	459.63	1.573	s
BI-212	1	3144.56	786.25	34.24	2.17	0.001	387.03	1.579	s
CS-134	1	3179.86	795.08	17.90	40.28	0.022	21.66	1.589	
CS-134	1	3205.53	801.49	29.43	5.08	0.003	157.54	1.595	s
TL-208	1	3441.20	860.41	7.17	72.83	0.040	15.74	0.488	s
EU-154	1	3492.90	873.33	30.84	-3.01	-0.002	266.77	1.662	s
Pa-234	1	3513.38	878.45	26.26	-4.08	-0.002	184.19	1.669	s
Pa-234	1	3531.80	883.05	26.09	0.13	0.000	5511.71	1.672	s
AC-228	1	3645.67	911.52	31.24	146.59	0.081	9.86	1.698	s

Pa-234	1	3783.46	945.97	25.39	7.42	0.004	102.84	1.731	s
EU-152	1	3859.62	965.00	76.86	15.93	0.009	81.79	1.748	s
AC-228	1	3876.42	969.20	60.00	95.52	0.053	15.37	1.752	s
EU-154	1	3984.04	996.11	22.94	1.18	0.001	582.88	1.778	s
PA-234M	1	4014.88	1003.82	19.95	-0.60	0.000	1055.09	1.782	s
EU-154	1	4018.71	1004.77	28.65	0.00	0.000	756.94	1.785	s
EU-152	1	4446.19	1111.64	35.23	-3.56	-0.002	241.98	1.884	s
BI-214	1	4483.92	1121.07	4.50	43.50	0.024	18.99	0.466	s
CO-60	1	4698.90	1174.82	25.87	1.88	0.001	390.09	1.939	s
EU-154	1	5096.24	1274.15	18.22	2.72	0.002	229.73	2.030	s
CO-60	1	5327.32	1331.92	16.51	-2.72	-0.002	219.87	2.081	s
EU-152	1	5630.60	1407.75	21.99	1.20	0.001	561.80	2.147	s
K-40	1	5844.42	1461.20	6.50	330.50	0.184	5.89	1.840	
BI-214	1	7058.11	1764.65	8.15	13.24	0.007	41.04	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code	Peak MDA Value Becquerels		Peak Code	Peak Comments	
CS-134	T F I	1	9.257E-001	604.71	-2.095E-001	%	(	1.647E+000G			7.5E+002	97.62
			9.257E-001	795.87	2.221E+000		(	1.237E+000G			7.5E+002	85.53
			9.257E-001	569.32	0.000E+000	&	}	8.192E+000G			7.5E+002	15.38
			9.257E-001	801.95	2.773E+000	%		1.529E+001G			7.5E+002	8.69
			9.257E-001	563.24	5.382E+000	%		1.377E+001G			7.5E+002	8.35
EU-152	T F	1	9.213E-001	344.29	9.213E-001	%	(	3.790E+000G			4.9E+003	26.50
			9.213E-001	121.78	4.477E-001	%		2.946E+000G			4.9E+003	28.58
			9.213E-001	778.92	5.979E-001	%		9.897E+000G			4.9E+003	12.94
			9.213E-001	964.11	6.060E+000	%		1.658E+001G			4.9E+003	14.61
			9.213E-001	1112.07	-1.638E+000	%		1.399E+001G			4.9E+003	13.64
			9.213E-001	1408.00	4.413E-001	%		9.059E+000G			4.9E+003	21.00
PA-234M	N	1	9.145E+001	1001.00	-4.136E+000	%	(	1.613E+002G			1.6E+012	.84
			9.145E+001	766.41	3.636E+002	&	(	4.199E+002G			1.6E+012	.29
PB-210	N	1	6.183E+001	46.54	6.183E+001	*	(	P 3.506E+001G			8.1E+003	4.25
CS-137	T F I	1	6.041E-001	661.66	6.041E-001	%	(	P 1.696E+000G			1.1E+004	85.21
			4.342E-001	636.97	-1.927E+000	&		1.890E+001G			8.0E+000	7.17
I-131	T F I	1	4.342E-001	364.48	4.342E-001	%	(	1.109E+000G			8.0E+000	81.70
			4.342E-001	284.30	-4.186E+000	%		1.332E+001G			8.0E+000	6.14
EU-155	T F I	1	4.220E+000	105.31	4.220E+000	*	(	3.752E+000G			1.8E+003	21.20
			4.220E+000	86.54	-5.338E-001	%		4.005E+000G		A	1.8E+003	30.70
RA-224	N	1	3.940E+001	240.99	3.940E+001		(	2.813E+001G			7.0E+002	4.10
PB-212	N	1	3.495E+001	238.63	3.495E+001		(	P 2.069E+000G			7.0E+002	43.30
			3.495E+001	300.03	6.063E+001	+		2.788E+001G			7.0E+002	3.28
BE-7	N P C	1	-3.463E-002	477.60	-3.463E-002	&	(	9.434E+000G			5.3E+001	10.52
AM-241	T	1	-2.906E-001	59.54	-2.906E-001	&	(	3.926E+000G			1.6E+005	35.90
AC-228	N	1	2.818E+001	911.16	2.677E+001		(	5.251E+000G			2.1E+003	29.00
			2.818E+001	968.97	3.054E+001		(	1.241E+001G			2.1E+003	17.46
			2.818E+001	338.32	4.423E+001	+		7.059E+000G			2.1E+003	12.01
			2.818E+001	93.35	0.000E+000	%	}	E 1.875E+001G		A	2.1E+003	5.56
K-40	N	1	2.482E+002	1460.83	2.482E+002		(	1.096E+001G			4.7E+011	10.67
CO-60	T F	1	-2.004E-001	1332.50	-2.004E-001	%	(	1.596E+000G			1.9E+003	99.98
			-2.004E-001	1173.24	1.237E-001	%		1.741E+000G			1.9E+003	99.90

				-1.990E+000	946.02	3.027E+000	&			1.069E+001G	1.6E+012	13.40
				-1.990E+000	883.24	7.049E-002	&			1.424E+001G	1.6E+012	9.60
				-1.990E+000	880.53	-3.501E+000	%			2.279E+001G	1.6E+012	6.00
Pa-234		N	1	-1.990E+000	131.29	-1.990E+000	&	(		5.202E+000G	1.6E+012	18.00
				-1.990E+000	569.47	-1.990E+000	&			1.578E+001G	1.6E+012	8.20
U-235		N	1	-1.878E+000	143.79	-1.878E+000	%	(		8.734E+000G	2.6E+011	10.96
				-1.878E+000	205.33	8.934E+000	&			1.818E+001G	2.6E+011	5.01
				-1.878E+000	163.38	2.731E-001	%			1.691E+001G	2.6E+011	5.08
				-1.878E+000	93.35	-1.878E+000	!		E	1.795E+001X	2.6E+011	5.81
BI-214		N	1	1.816E+001	609.31	1.813E+001	@	(	P	2.602E+000G	5.8E+005	46.09
				1.816E+001	1120.29	1.822E+001		(		5.276E+000G	5.8E+005	15.10
				1.816E+001	1764.49	8.258E+000	%			9.985E+000G	5.8E+005	15.40
BI-212		N	1	1.687E+001	727.33	1.687E+001		(		1.219E+001G	7.0E+002	11.82
				1.687E+001	785.51	9.209E+000	%			1.271E+002G	7.0E+002	1.10
				1.641E+001	295.09	2.230E+001	*			4.533E+000G	5.8E+005	19.30
				1.641E+001	242.00	1.563E+001		(		1.318E+001G	5.8E+005	7.43
PB-214		N	1	1.641E+001	351.93	1.657E+001	@	(	P	2.649E+000G	5.8E+005	37.60
TH-234		N	1	1.493E+001	63.29	5.499E+000	%	(	P	3.002E+001G	1.6E+012	4.82
				1.493E+001	92.59	2.308E+001	*	(	P	2.049E+001G	1.6E+012	5.58
TL-208	F	N	1	1.443E+001	583.02	1.428E+001	@	(	P	1.161E+000G	7.0E+002	84.50
				1.443E+001	277.28	1.652E+001		(		9.741E+000G	7.0E+002	6.31
				1.443E+001	860.56	2.958E+001	*			6.166E+000G	7.0E+002	12.42
				-1.255E+000	123.10	3.748E-001	%			2.071E+000G	3.1E+003	40.79
				-1.255E+000	1274.54	5.482E-001	%			4.549E+000G	3.1E+003	35.19
				-1.255E+000	723.36	-5.642E+000	&			1.083E+001G	3.1E+003	20.22
				-1.255E+000	1004.77	0.000E+000	&			8.841E+000G	3.1E+003	18.01
				-1.255E+000	996.33	6.348E-001	%			1.350E+001G	3.1E+003	10.60
EU-154	T F I		1	-1.255E+000	873.23	-1.255E+000	%	(		1.190E+001G	3.1E+003	12.27

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	#	9.257E-001	9.257E-001	21.66	21.85	1.647E+000
CS-137	#	6.041E-001	6.041E-001	83.32	83.37	1.696E+000
EU-155	#	4.220E+000	4.220E+000	38.37	38.52	3.752E+000
BI-212	#	1.687E+001	1.687E+001	24.97	25.14	1.219E+001
BI-214		1.816E+001	1.816E+001	10.44	10.84	2.602E+000
TH-234	#	1.493E+001	1.493E+001	27.45	27.70	3.002E+001
PA-234M	#	9.145E+001	9.145E+001	37.71	37.82	1.613E+002
BE-7	#	-3.463E-002	-3.464E-002	7,592.94	7,592.94	9.434E+000
K-40		2.482E+002	2.482E+002	5.89	6.58	1.096E+001
CO-60	#	-2.004E-001	-2.004E-001	219.87	219.89	1.596E+000
I-131	#	4.342E-001	4.348E-001	76.51	76.57	1.109E+000
EU-152	#	9.213E-001	9.213E-001	121.18	121.22	3.790E+000
EU-154	#	-1.255E+000	-1.255E+000	266.77	266.78	1.190E+001
TL-208		1.443E+001	1.443E+001	6.82	7.41	1.161E+000
PB-210	#	6.183E+001	6.183E+001	24.22	24.53	3.506E+001
PB-212		3.495E+001	3.495E+001	3.66	4.73	2.069E+000
PB-214		1.641E+001	1.641E+001	9.84	10.25	2.649E+000
RA-224		3.940E+001	3.940E+001	23.12	23.32	2.813E+001
AC-228	#	2.818E+001	2.818E+001	9.13	9.57	5.251E+000
Pa-234	#	-1.990E+000	-1.990E+000	78.75	78.81	5.202E+000
U-235	#	-1.878E+000	-1.878E+000	138.50	138.53	8.734E+000
AM-241	#	-2.906E-001	-2.906E-001	399.64	399.66	3.926E+000

= All peaks for activity calculation had bad shape

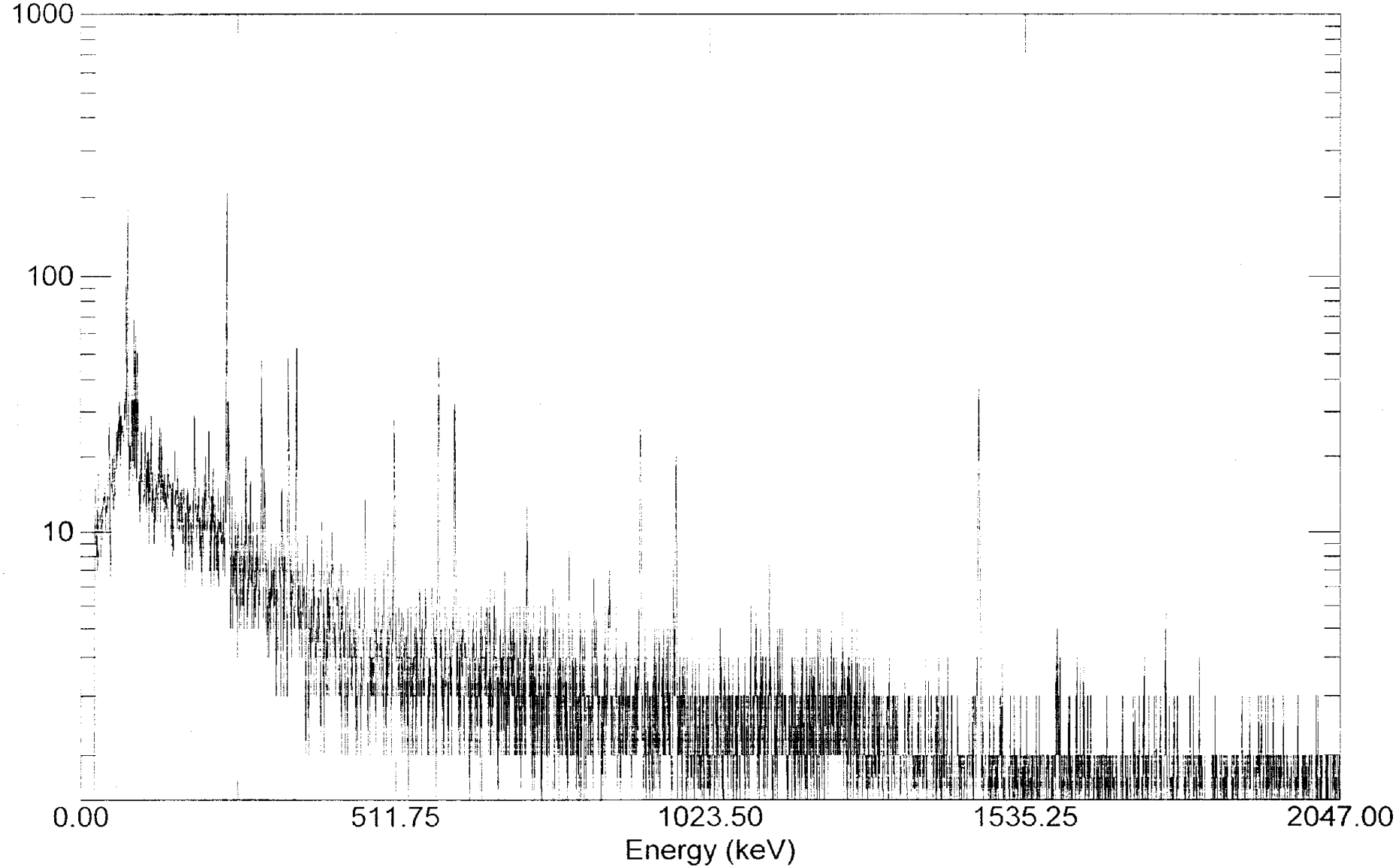
Total Activity (37.72 to 2,000.15 keV) 437.65 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKA21AC

7357010_KEKA21AC_F7L200251-003



Acquired: 23-Dec-2007 12:22:50 PM
File: C:\User\spectra\KEKA21AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1818.24 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,963

Sample Description: 7357010_KEKA41AC_F7L200251-004

Spectrum Filename: KEKA41AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:04:21PM		
Live Time:	1800.00	Real Time:	1814.50
Dead Time:	0.80 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1463

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.72	74.76	575.17	268.83	0.149	18.50	0.847	PB-214	
306.79	77.03	678.33	395.67	0.220	15.08	0.928	PB-214	
347.55	87.21	323.06	117.94	0.066	23.44	0.784	PB-214	
357.98	89.81	190.00	101.00	0.056	21.71	0.726	PB-214	
837.50	209.58	195.50	116.50	0.065	19.34	0.766	NP-239	s
1352.03	338.11	297.67	50.33	0.028	50.49	1.127		s
1849.40	462.36	43.50	93.50	0.052	19.93	0.680	CS-138	s
3644.21	910.92	185.56	34.44	0.019	58.47	1.557		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.36	46.70	234.89	31.41	0.017	41.37	0.864	
AM-241	1	241.27	60.67	351.15	1.11	0.001	2387.22	0.878	s
TH-234	1	252.04	63.36	493.88	12.98	0.007	82.94	0.882	s
EU-155	1	344.88	86.54	647.04	9.01	0.005	400.78	0.906	
TH-234	1	369.10	92.59	594.16	-30.05	-0.017	868.66	0.912	s
AC-228	1	372.14	93.35	330.10	123.40	0.069	1.97	0.913	s D
U-235	1	372.14	93.35	330.10	6.65	0.004	41.68	0.913	s D
EU-155	1	421.10	105.58	261.88	32.57	0.018	72.41	0.925	s
EU-152	1	482.54	120.92	216.05	5.26	0.003	397.58	0.942	s
EU-154	1	491.26	123.10	295.64	-1.34	-0.001	1816.71	0.943	s
Pa-234	1	520.61	130.43	314.40	-42.69	-0.024	60.69	0.952	
U-235	1	576.37	144.36	280.87	12.19	0.007	166.76	0.964	s
U-235	1	652.13	163.28	216.89	22.14	0.012	96.44	0.984	s
U-235	1	823.01	205.96	209.32	13.74	0.008	151.39	1.027	s
PB-212	1	953.82	238.63	182.76	1005.24	0.558	3.58	1.060	D
RA-224	1	963.24	240.99	342.91	136.09	0.076	21.07	1.062	D
PB-214	1	967.29	242.00	215.58	96.42	0.054	23.82	1.063	D
TL-208	1	1107.36	276.99	108.00	97.00	0.054	27.10	0.331	s
I-131	1	1135.96	284.13	116.47	-12.33	-0.007	126.98	1.105	s
PB-214	1	1178.28	294.70	98.98	235.02	0.131	11.90	1.326	s
PB-212	1	1199.27	299.94	51.33	87.67	0.049	18.35	1.162	s
AC-228	1	1352.48	338.22	129.58	195.86	0.109	10.75	1.158	s
EU-152	1	1374.67	343.76	73.22	19.28	0.011	66.76	1.164	s
PB-214	1	1405.76	351.53	91.54	360.46	0.200	8.44	1.354	s
I-131	1	1460.00	365.08	84.51	10.15	0.006	131.91	1.184	s
BE-7	1	1906.64	476.67	44.76	11.39	0.006	88.17	1.292	s
CS-134	1	2252.14	563.00	48.88	-0.16	0.000	6106.06	1.372	s
CS-134	1	2277.45	569.32	42.16	2.68	0.001	267.54	1.378	s D
Pa-234	1	2278.04	569.47	47.38	-7.43	-0.004	-178.14	1.378	s D
TL-208	1	2332.24	583.01	26.63	373.38	0.207	5.79	1.545	
CS-134	1	2422.11	605.47	90.98	-8.36	-0.005	164.96	1.410	s
BI-214	1	2436.88	609.16	47.95	264.05	0.147	8.98	1.062	s
I-131	1	2552.37	638.02	46.12	-0.78	0.000	1231.56	1.440	s
CS-137	1	2644.60	661.07	55.10	11.27	0.006	97.77	1.462	s
EU-154	1	2876.67	719.07	14.32	-2.89	-0.002	194.14	1.518	s
BI-212	1	2909.97	727.39	15.50	110.50	0.061	12.99	0.832	s
PA-234M	1	3062.56	765.53	45.34	-0.56	0.000	1713.83	1.556	s
EU-152	1	3115.12	778.67	33.57	-4.48	-0.002	188.75	1.567	s
BI-212	1	3141.68	785.31	31.61	10.40	0.006	82.46	1.572	s
CS-134	1	3180.52	795.01	38.62	31.76	0.018	32.87	1.582	s
CS-134	1	3208.27	801.95	68.39	0.00	0.000	1169.57	1.587	s
TL-208	1	3442.42	860.48	34.34	30.60	0.017	32.56	1.638	s
EU-154	1	3489.46	872.24	37.85	-2.41	-0.001	366.08	1.649	s
Pa-234	1	3522.64	880.53	88.75	0.00	0.000	1332.26	1.655	s
Pa-234	1	3535.52	883.75	30.12	8.02	0.004	103.04	1.657	s

AC-228	1	3644.46	910.98	33.45	173.71	0.097	8.78	1.681	
Pa-234	1	3794.77	948.56	28.46	4.33	0.002	180.86	1.710	s
EU-152	1	3858.75	964.55	153.93	1.73	0.001	1015.64	1.726	s
AC-228	1	3875.40	968.72	60.64	128.00	0.071	12.34	1.730	
EU-154	1	3986.49	996.49	28.29	2.19	0.001	350.70	1.753	s
PA-234M	1	4005.06	1001.13	35.35	1.58	0.001	536.82	1.756	s
EU-154	1	4017.30	1004.19	29.66	1.64	0.001	475.53	1.760	s
EU-152	1	4448.78	1112.07	27.84	0.00	0.000	746.24	1.847	s
BI-214	1	4479.99	1119.88	1.94	84.06	0.047	10.78	0.688	s
CO-60	1	4699.27	1174.71	40.34	-4.76	-0.003	194.04	1.896	s
EU-154	1	5100.03	1274.93	42.03	-5.02	-0.003	187.87	1.975	s
CO-60	1	5332.13	1332.98	24.73	-1.42	-0.001	503.49	2.019	s
EU-152	1	5632.07	1408.00	30.48	0.00	0.000	780.73	2.076	s
K-40	1	5840.58	1460.16	11.21	357.79	0.199	5.21	2.364	
BI-214	1	7055.83	1764.21	15.10	39.02	0.022	19.76	2.326	

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PA-234	N	1	9.282E+000	1001.00	9.282E+000	% (	1.783E+002G		1.6E+012	.84
			9.282E+000	766.41	-7.640E+000	&	4.673E+002G		1.6E+012	.29
EU-154	T F I	1	-8.726E-001	873.23	-8.726E-001	% (	1.134E+001G		3.1E+003	12.27
			-8.726E-001	123.10	-4.015E-002	%	2.482E+000G		3.1E+003	40.79
			-8.726E-001	1274.54	-8.426E-001	%	5.522E+000G		3.1E+003	35.19
			-8.726E-001	723.36	-5.526E-001	&	3.887E+000G		3.1E+003	20.22
			-8.726E-001	1004.77	4.485E-001	%	7.673E+000G		3.1E+003	18.01
			-8.726E-001	996.33	1.008E+000	%	1.268E+001G		3.1E+003	10.60
CO-60	T F	1	-8.665E-002	1332.50	-8.665E-002	% (	1.583E+000G		1.9E+003	99.98
			-8.665E-002	1173.24	-2.638E-001	%	1.789E+000G		1.9E+003	99.90
CS-134	T F I	1	5.639E-001	604.71	-2.901E-001	% (	1.636E+000G		7.5E+002	97.62
			5.639E-001	795.87	1.539E+000	(	1.534E+000G		7.5E+002	85.53
			5.639E-001	569.32	5.639E-001	%	6.942E+000G		7.5E+002	15.38
			5.639E-001	801.95	0.000E+000	%	1.977E+001G		7.5E+002	8.69
			5.639E-001	563.24	-6.236E-002	%	1.358E+001G		7.5E+002	8.35
RA-224	N	1	5.622E+001	240.99	5.622E+001	(	3.677E+001G		7.0E+002	4.10
AM-241	T	1	4.911E-002	59.54	4.911E-002	% (	3.980E+000G		1.6E+005	35.90
CS-137	T F I	1	4.788E-001	661.66	4.788E-001	% (	1.584E+000G		1.1E+004	85.21
TH-234	N	1	4.042E+000	63.29	4.042E+000	% (P	3.309E+001G		1.6E+012	4.82
			4.042E+000	92.59	-6.659E+000	% P	2.577E+001G		1.6E+012	5.58
PB-212	N	1	3.905E+001	238.63	3.905E+001	(P	2.552E+000G		7.0E+002	43.30
			3.905E+001	300.03	5.320E+001	+	2.191E+001G		7.0E+002	3.28
BI-212	N	1	3.626E+001	727.33	3.626E+001	(	6.910E+000G		7.0E+002	11.82
			3.626E+001	785.51	3.881E+001	%	1.078E+002G		7.0E+002	1.10
BE-7	N P C	1	3.075E+000	477.60	3.075E+000	& (	9.146E+000G		5.3E+001	10.52
			-2.935E+000	880.53	0.000E+000	%	3.466E+001G		1.6E+012	6.00
Pa-234	N	1	-2.935E+000	131.29	-2.935E+000	& (	5.867E+000G		1.6E+012	18.00
			-2.935E+000	569.47	-2.935E+000	%	1.374E+001G		1.6E+012	8.20
			-2.935E+000	946.02	1.519E+000	%	9.678E+000G		1.6E+012	13.40
			-2.935E+000	883.24	3.735E+000	%	1.317E+001G		1.6E+012	9.60
I-131	T F I	1	2.869E-001	364.48	2.869E-001	& (	1.288E+000G		8.0E+000	81.70
			2.869E-001	284.30	-3.839E+000	%	1.650E+001G		8.0E+000	6.14
			2.869E-001	636.97	-3.844E-001	&	1.686E+001G		8.0E+000	7.17
AC-228	N	1	2.740E+001	911.07	2.740E+001	(P	4.679E+000G		2.1E+003	29.00
			2.740E+001	968.97	3.510E+001	+	1.070E+001G		2.1E+003	17.46
			2.740E+001	338.32	3.558E+001	* P	1.013E+001G		2.1E+003	12.01
			2.740E+001	93.35	2.740E+001	! E	1.940E+001X	A	2.1E+003	5.56
			2.233E+001	242.00	2.205E+001	(	1.626E+001G		5.8E+005	7.43
PB-214	N	1	2.233E+001	351.93	2.156E+001	@ (P	2.828E+000G		5.8E+005	37.60
			2.233E+001	295.09	2.394E+001	* (P	4.998E+000G		5.8E+005	19.30
K-40	N	1	2.210E+002	1460.83	2.210E+002	(P	1.131E+001G		4.7E+011	10.67
BI-214	N	1	1.955E+001	609.31	1.951E+001	(P	2.585E+000G		5.8E+005	46.09
			1.955E+001	1120.29	2.973E+001	+ P	3.254E+000G		5.8E+005	15.10
			1.955E+001	1764.49	1.968E+001	? (P	1.050E+001G		5.8E+005	15.40

EU-155	T F I		1	1.864E+000	105.31	1.864E+000	*	(		4.472E+000G	1.8E+003	21.20
				1.864E+000	86.54	3.701E-001	%			4.982E+000G	1.8E+003	30.70
PB-210		N	1	1.820E+001	46.54	1.820E+001	%	(	P	4.295E+001G	8.1E+003	4.25
EU-152	T F		1	1.609E+000	344.29	1.609E+000	%	(		3.553E+000G	4.9E+003	26.50
				1.609E+000	121.78	2.246E-001	&			3.040E+000G	4.9E+003	28.58
				1.609E+000	778.92	-1.413E+000	%			9.364E+000G	4.9E+003	12.94
				1.609E+000	964.11	5.659E-001	%			1.977E+001G	4.9E+003	14.61
				1.609E+000	1112.07	0.000E+000	&			1.063E+001G	4.9E+003	13.64
				1.609E+000	1408.00	0.000E+000	%			8.656E+000G	4.9E+003	21.00
TL-208	F	N	1	1.457E+001	583.02	1.457E+001		(	P	1.044E+000G	7.0E+002	84.50
				1.457E+001	277.28	2.884E+001	*			1.520E+001G	7.0E+002	6.31
				1.457E+001	860.56	1.081E+001	-			1.060E+001G	7.0E+002	12.42
U-235		N	1	1.413E+000	143.79	1.413E+000	&	(	P	9.364E+000G	2.6E+011	10.96
				1.413E+000	205.33	4.168E+000	%			2.128E+001G	2.6E+011	5.01
				1.413E+000	163.38	5.830E+000	%			1.879E+001G	2.6E+011	5.08
				1.413E+000	93.35	1.413E+000	%		E	1.857E+001X	2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	3.075E+000	3.077E+000	88.17	88.21	9.146E+000
K-40		2.210E+002	2.210E+002	5.37	6.12	1.131E+001
CO-60	<	-8.665E-002	-8.666E-002	503.49	503.50	1.583E+000
I-131	<	2.869E-001	2.880E-001	131.91	131.95	1.288E+000
CS-134	<	5.639E-001	5.639E-001	32.87	33.00	1.636E+000
CS-137	<	4.788E-001	4.788E-001	97.77	97.81	1.584E+000
EU-152	<	1.609E+000	1.609E+000	66.76	66.82	3.553E+000
EU-154	<	-8.726E-001	-8.726E-001	366.08	366.09	1.134E+001
EU-155	<	1.864E+000	1.864E+000	72.41	72.49	4.472E+000
TL-208		1.457E+001	1.457E+001	5.91	6.58	1.044E+000
BI-212		3.626E+001	3.626E+001	12.99	13.31	6.910E+000
BI-214		1.955E+001	1.955E+001	9.22	9.66	2.585E+000
AC-228	<	2.740E+001	2.741E+001	8.89	9.34	4.679E+000
TH-234	<	4.042E+000	4.042E+000	240.66	240.69	3.309E+001
PA-234M	<	9.282E+000	9.282E+000	536.82	536.83	1.783E+002
U-235	<	1.413E+000	1.413E+000	196.08	196.10	9.364E+000
RA-224		5.622E+001	5.622E+001	21.07	21.28	3.677E+001
PB-210	<	1.820E+001	1.820E+001	69.72	69.83	4.295E+001
PB-212		3.905E+001	3.905E+001	3.66	4.72	2.552E+000
PB-214		2.233E+001	2.233E+001	8.66	9.12	2.828E+000
Pa-234	<	-2.935E+000	-2.935E+000	60.69	60.77	5.867E+000
AM-241	<	4.911E-002	4.911E-002	2,387.22	2,387.22	3.980E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 409.01 Bq/sample

Analyzed by: _____

403293

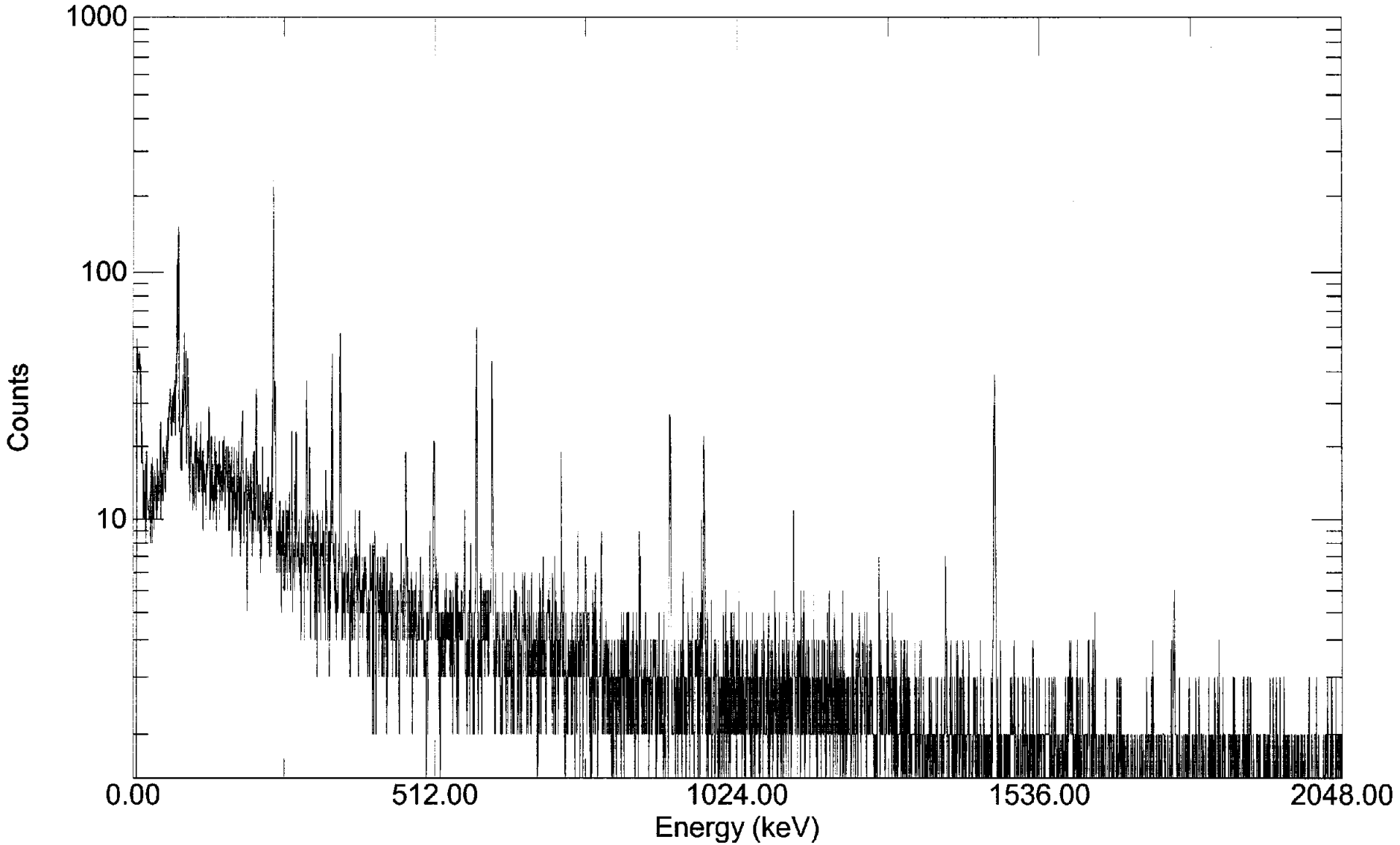
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKA41AC

7357010_KEKA41AC_F7L200251-004



Acquired: 23-Dec-2007 1:04:21 PM
File: C:\User\spectra\KEKA41AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1814.50 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,964

Sample Description: 7357010_KEKA71AC_F7L200251-005

Spectrum Filename: KEKA71AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:04:53PM		
Live Time:	1800.00	Real Time:	1804.52
Dead Time:	0.25 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1887

Test America St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.77	74.74	186.33	144.67	0.080	18.74	0.528	PB-214	s
308.29	77.12	246.00	282.00	0.157	12.62	0.846	PB-214	
348.95	87.29	103.48	102.52	0.057	17.16	0.740	PB-214	
359.73	89.99	96.67	69.33	0.039	23.38	1.071	PB-214	sM

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.72	46.72	61.31	27.69	0.015	25.23	1.213	s
AM-241	1	235.28	58.86	161.68	-3.84	-0.002	471.27	0.830	s
TH-234	1	252.16	63.09	181.03	81.97	0.046	28.09	1.139	s
EU-155	1	345.96	86.54	254.86	3.64	0.002	623.22	0.854	s
TH-234	1	370.14	92.59	259.83	37.50	0.021	37.51	0.859	D
AC-228	1	373.18	93.35	128.09	67.32	0.037	3.38	0.860	D
U-235	1	373.18	93.35	195.66	11.19	0.006	21.84	0.860	s D
EU-155	1	422.42	105.67	105.90	28.35	0.016	54.66	0.871	s
EU-152	1	494.30	123.64	61.72	22.41	0.012	53.90	0.885	s
EU-154	1	499.95	125.05	80.29	8.54	0.005	152.33	0.886	s
Pa-234	1	524.66	131.23	161.16	6.07	0.003	298.76	0.894	s
U-235	1	576.20	144.12	118.44	21.14	0.012	76.00	0.904	s
U-235	1	655.19	163.88	94.26	-11.25	-0.006	125.67	0.922	s
U-235	1	819.05	204.85	67.79	4.10	0.002	288.24	0.958	s
PB-212	1	953.26	238.41	75.96	437.04	0.243	6.08	0.905	
RA-224	1	958.66	239.76	446.68	-129.16	-0.072	24.76	0.988	
PB-214	1	965.80	241.55	51.00	101.00	0.056	17.29	1.181	s
TL-208	1	1108.99	277.35	53.16	29.88	0.017	39.05	1.019	s
I-131	1	1136.06	284.12	60.78	7.39	0.004	153.66	1.025	s
PB-214	1	1180.31	295.18	41.88	121.12	0.067	14.12	1.094	
PB-212	1	1202.61	300.76	31.50	47.50	0.026	28.96	0.473	s
AC-228	1	1350.64	337.77	34.00	150.00	0.083	12.94	1.070	s
EU-152	1	1378.29	344.68	30.46	0.58	0.000	1343.12	1.076	s
PB-214	1	1406.08	351.63	36.24	206.76	0.115	9.47	1.068	
I-131	1	1462.83	365.81	45.54	-3.06	-0.002	316.69	1.092	s
BE-7	1	1909.97	477.60	55.81	0.00	0.000	1056.54	1.185	s
CS-134	1	2264.17	566.13	20.04	1.24	0.001	517.37	1.254	s
CS-134	1	2276.94	569.32	34.42	0.00	0.000	600.00	1.259	s D
Pa-234	1	2277.54	569.47	30.23	0.90	0.001	163.92	1.259	s D
TL-208	1	2331.26	582.90	13.18	176.82	0.098	8.84	1.282	
CS-134	1	2412.32	603.16	-0.98	1.13	0.001	88.62	1.286	s
BI-214	1	2435.59	608.97	8.42	136.58	0.076	8.78	1.083	
I-131	1	2546.92	636.80	23.75	-0.49	0.000	1419.33	1.312	s
CS-137	1	2644.08	661.08	27.43	13.63	0.008	60.72	1.331	s
EU-154	1	2899.44	724.90	50.94	-12.36	-0.007	86.45	1.378	s
BI-212	1	2907.55	726.92	21.49	20.04	0.011	39.61	1.381	s
PA-234M	1	3068.19	767.06	36.21	-0.68	0.000	1249.60	1.411	s
EU-152	1	3111.74	777.95	21.35	-2.29	-0.001	293.12	1.420	s
BI-212	1	3144.38	786.10	20.44	2.73	0.002	241.98	1.425	
CS-134	1	3180.35	795.09	15.88	10.44	0.006	62.24	1.433	s
CS-134	1	3206.24	801.56	18.81	-3.32	-0.002	192.88	1.437	s
TL-208	1	3441.79	860.41	25.07	7.45	0.004	101.83	1.481	s
EU-154	1	3493.09	873.23	15.03	0.00	0.000	548.31	1.490	s
Pa-234	1	3523.54	880.84	28.49	-2.68	-0.001	288.61	1.495	s
Pa-234	1	3533.59	883.35	19.44	0.09	0.000	6849.45	1.497	s

AC-228	1	3644.13	910.96	0.00	79.00	0.044	11.25	0.909	s
Pa-234	1	3776.31	943.99	20.52	1.58	0.001	412.35	1.543	s
EU-152	1	3853.34	963.23	35.52	1.95	0.001	437.45	1.556	s
AC-228	1	3874.52	968.52	25.01	26.41	0.015	33.11	1.559	s
EU-154	1	3978.83	994.58	17.79	-3.68	-0.002	170.46	1.579	s
PA-234M	1	4005.31	1001.20	11.92	2.13	0.001	239.04	1.582	s
EU-154	1	4022.28	1005.44	12.98	-0.93	-0.001	559.14	1.585	s
EU-152	1	4454.34	1113.36	21.60	-1.27	-0.001	523.73	1.659	s
BI-214	1	4481.91	1120.24	21.06	17.41	0.010	33.59	1.665	s
CO-60	1	4692.27	1172.78	8.63	7.29	0.004	68.01	1.701	s
EU-154	1	5104.21	1275.66	13.25	-0.04	0.000	11590.08	1.768	s
CO-60	1	5331.84	1332.50	0.00	0.00	0.000	100.00	1.806	s
EU-152	1	5636.95	1408.69	19.07	0.14	0.000	4354.11	1.854	s
K-40	1	5843.76	1460.32	2.83	196.17	0.109	7.09	1.159	s
BI-214	1	7060.91	1764.14	2.40	15.12	0.008	29.51	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak MDA Code	Peak Comments	
CS-137	T F I	1	9.070E-001	661.66	9.070E-001	% (	1.805E+000G		1.1E+004	85.21
RA-224	N	1	-7.254E+001	240.99	-7.254E+001	(	5.683E+001G		7.0E+002	4.10
			6.963E-002	1408.00	7.241E-002	&	1.175E+001G		4.9E+003	21.00
EU-152	T F	1	6.963E-002	344.29	6.963E-002	% (	3.390E+000G		4.9E+003	26.50
			6.963E-002	121.78	1.263E+000	&	2.217E+000G		4.9E+003	28.58
			6.963E-002	778.92	-1.151E+000	%	1.220E+001G		4.9E+003	12.94
			6.963E-002	964.11	1.040E+000	%	1.623E+001G		4.9E+003	14.61
			6.963E-002	1112.07	-8.172E-001	%	1.564E+001G		4.9E+003	13.64
CS-134	T F I	1	6.066E-002	604.71	6.066E-002	% (	3.962E-001G		7.5E+002	97.62
			6.066E-002	795.87	8.090E-001	%	1.649E+000G		7.5E+002	85.53
			6.066E-002	569.32	0.000E+000	% }	9.403E+000G		7.5E+002	15.38
			6.066E-002	801.95	-2.547E+000	%	1.760E+001G		7.5E+002	8.69
			6.066E-002	563.24	7.340E-001	%	1.392E+001G		7.5E+002	8.35
Pa-234	N	1	5.487E-001	131.29	5.487E-001	% (	5.596E+000G		1.6E+012	18.00
			5.487E-001	569.47	5.487E-001	%	1.721E+001G		1.6E+012	8.20
			5.487E-001	946.02	9.043E-001	&	1.361E+001G		1.6E+012	13.40
			5.487E-001	883.24	6.865E-002	&	1.752E+001G		1.6E+012	9.60
			5.487E-001	880.53	-3.217E+000	%	3.315E+001G		1.6E+012	6.00
TH-234	N	1	3.546E+001	63.29	3.546E+001	@ (P	2.830E+001G		1.6E+012	4.82
			3.546E+001	92.59	1.124E+001	% P	2.333E+001G		1.6E+012	5.58
U-235	N	1	3.217E+000	143.79	3.217E+000	% (	8.131E+000G		2.6E+011	10.96
			3.217E+000	205.33	1.662E+000	&	1.665E+001G		2.6E+011	5.01
			3.217E+000	163.38	-3.897E+000	%	1.661E+001G		2.6E+011	5.08
			3.217E+000	93.35	3.217E+000	! E	1.951E+001X		2.6E+011	5.81
AM-241	T	1	-2.357E-001	59.54	-2.357E-001	% (	3.804E+000G		1.6E+005	35.90
PB-212	N	1	2.305E+001	238.63	2.305E+001	(P	2.285E+000G		7.0E+002	43.30
			2.305E+001	300.03	4.037E+001	*	2.453E+001G		7.0E+002	3.28
PB-210	N	1	2.294E+001	46.54	2.294E+001	% (P	3.248E+001G		8.1E+003	4.25
EU-155	T F I	1	2.167E+000	105.31	2.167E+000	% (	3.873E+000G		1.8E+003	21.20
			2.167E+000	86.54	2.036E-001	%	4.318E+000G		1.8E+003	30.70
PA-234	N	1	2.043E+001	1001.00	2.043E+001	% (	1.801E+002G		1.6E+012	.84
			2.043E+001	766.41	-1.495E+001	&	6.718E+002G		1.6E+012	.29
K-40	N	1	2.032E+002	1460.83	2.032E+002	(P	1.093E+001G		4.7E+011	10.67
AC-228	N	1	2.021E+001	911.07	2.021E+001	(	1.885E+000G		2.1E+003	29.00
			2.021E+001	968.97	1.181E+001	-	1.163E+001G		2.1E+003	17.46
			2.021E+001	338.32	3.884E+001	*	7.738E+000G		2.1E+003	12.01
			2.021E+001	93.35	2.021E+001	E	1.665E+001X	A	2.1E+003	5.56
PB-214	N	1	1.756E+001	351.93	1.773E+001	(P	2.638E+000G		5.8E+005	37.60
			1.756E+001	295.09	1.724E+001	(P	4.677E+000G		5.8E+005	19.30
			1.756E+001	242.00	3.141E+001	*	1.119E+001G		5.8E+005	7.43
BI-214	N	1	1.565E+001	609.31	1.565E+001	(P	1.860E+000G		5.8E+005	46.09
			1.565E+001	1120.29	1.016E+001	% P	1.406E+001G		5.8E+005	15.10
			1.565E+001	1764.49	1.289E+001	-	8.458E+000G		5.8E+005	15.40
I-131	T F I	1	-1.249E-001	364.48	-1.249E-001	* (	1.392E+000G		8.0E+000	81.70

				-1.249E-001	284.30	3.197E+000	%		1.689E+001G	8.0E+000	6.14
				-1.249E-001	636.97	-3.736E-001	%		1.946E+001G	8.0E+000	7.17
TL-208	F	N	1	1.075E+001	583.02	1.064E+001		(P	1.181E+000G	7.0E+002	84.50
				1.075E+001	277.28	1.230E+001	?	(	1.511E+001G	7.0E+002	6.31
				1.075E+001	860.56	4.245E+000	%		1.484E+001G	7.0E+002	12.42
BI-212		N	1	1.042E+001	727.33	1.042E+001	?	(	1.264E+001G	7.0E+002	11.82
				1.042E+001	785.51	1.627E+001	%		1.417E+002G	7.0E+002	1.10
EU-154	T F I		1	0.000E+000	873.23	0.000E+000	%	(	1.213E+001G	3.1E+003	12.27
				0.000E+000	123.10	3.376E-001	&		1.758E+000G	3.1E+003	40.79
				0.000E+000	1274.54	-1.241E-002	%		5.491E+000G	3.1E+003	35.19
				0.000E+000	723.36	-3.740E+000	&		1.088E+001G	3.1E+003	20.22
				0.000E+000	1004.77	-4.143E-001	&		8.711E+000G	3.1E+003	18.01
				0.000E+000	996.33	-2.771E+000	%		1.686E+001G	3.1E+003	10.60
BE-7		N P C	1	0.000E+000	477.60	0.000E+000	%	(	1.520E+001G	5.3E+001	10.52
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	&	(	7.522E-001G	1.9E+003	99.98
				0.000E+000	1173.24	6.680E-001	%		1.504E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	<	-1.249E-001	-1.254E-001	316.69	316.70	1.392E+000
CS-134	<	6.066E-002	6.067E-002	88.62	88.67	3.962E-001
EU-154	<			548.31	548.31	1.213E+001
PB-212		2.305E+001	2.305E+001	6.20	6.89	2.285E+000
PB-214		1.756E+001	1.756E+001	8.74	9.20	2.638E+000
BI-212	#	1.042E+001	1.042E+001	39.61	39.72	1.264E+001
Pa-234	<	5.487E-001	5.487E-001	298.76	298.78	5.596E+000
TH-234	#	3.546E+001	3.546E+001	33.59	33.79	2.830E+001
BE-7	<			1.056.54	1.056.55	1.520E+001
K-40		2.032E+002	2.032E+002	7.19	7.76	1.093E+001
CO-60	<			100.00	100.04	7.522E-001
CS-137	#	9.070E-001	9.070E-001	60.72	60.79	1.805E+000
EU-152	<	6.963E-002	6.963E-002	1.343.12	1.343.12	3.390E+000
EU-155	<	2.167E+000	2.167E+000	54.66	54.76	3.873E+000
TL-208		1.075E+001	1.075E+001	8.95	9.40	1.181E+000
RA-224	<	-7.254E+001	-7.254E+001	24.76	24.94	5.683E+001
PB-210		2.294E+001	2.294E+001	44.20	44.37	3.248E+001
BI-214		1.565E+001	1.565E+001	9.12	9.56	1.860E+000
AC-228		2.021E+001	2.021E+001	11.25	11.61	1.885E+000
PA-234M	<	2.043E+001	2.043E+001	239.04	239.06	1.801E+002
U-235	<	3.217E+000	3.217E+000	76.00	76.06	8.131E+000
AM-241	<	-2.357E-001	-2.357E-001	471.27	471.28	3.804E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 336.35 Bq/sample

Analyzed by: _____

403293

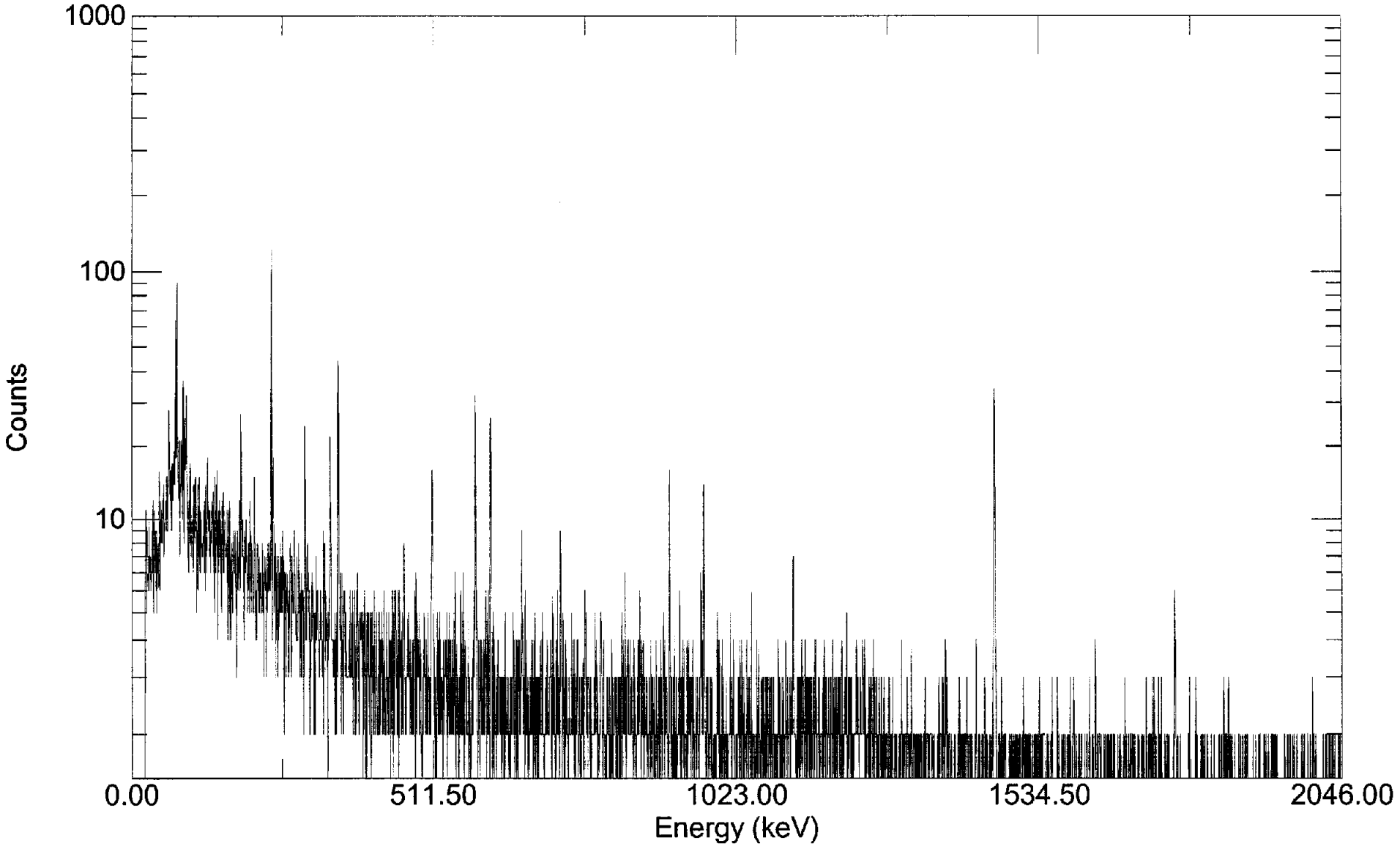
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKA71AC

7357010_KEKA71AC_F7L200251-005



Acquired: 23-Dec-2007 1:04:53 PM
File: C:\User\spectra\KEKA71AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.52 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,966

Sample Description: 7357010_KEKA91AC_F7L200251-006

Spectrum Filename: KEKA91AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:05:25PM		
Live Time:	1800.00	Real Time:	1858.64
Dead Time:	3.15 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0706

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.43	74.57	534.00	351.00	0.195	14.21	0.853	PB-214	s
307.17	77.00	290.00	552.00	0.307	6.83	0.750	PB-214	
347.47	87.07	448.79	53.21	0.030	57.95	0.829		s
358.81	89.90	188.84	167.16	0.093	13.96	0.855	PB-214	
395.09	98.97	223.33	131.67	0.073	25.18	0.756	AC-228	s
515.39	129.02	179.23	172.77	0.096	13.34	0.933	AC-228	
837.06	209.38	168.71	216.29	0.120	10.88	0.718	AC-228	s
1311.77	328.00	60.67	73.33	0.041	22.64	0.908	AC-228	
1852.27	463.06	46.67	117.33	0.065	17.80	0.795	AC-228	s
2042.13	510.51	51.00	193.00	0.107	11.96	1.039	J-133	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	183.91	46.21	164.76	57.24	0.032	32.62	0.717	s
AM-241	1	237.27	59.54	374.62	-17.56	-0.010	193.06	0.761	s
TH-234	1	252.95	63.46	437.79	21.66	0.012	82.95	0.764	s
EU-155	1	347.81	87.16	359.49	210.46	0.117	14.49	0.788	s
TH-234	1	370.96	92.94	405.65	120.41	0.067	21.04	0.795	s
U-235	1	372.61	93.35	295.87	8.19	0.005	42.25	0.795	s D
AC-228	1	372.61	93.35	264.00	236.64	0.131	1.38	1.234	s D
EU-155	1	421.51	105.57	288.61	36.35	0.020	68.14	0.808	s
EU-152	1	489.32	122.51	234.84	-0.42	0.000	5157.34	0.824	s
EU-154	1	491.89	123.15	248.43	6.32	0.004	354.96	0.826	s
Pa-234	1	520.02	130.18	308.43	-38.94	-0.022	65.77	0.834	s
U-235	1	574.82	143.87	269.90	15.48	0.009	130.92	0.847	s
U-235	1	653.86	163.61	202.79	8.72	0.005	189.52	0.867	s
U-235	1	820.84	205.33	188.06	5.16	0.003	378.27	0.909	s
PB-212	1	954.18	238.65	222.81	1277.19	0.710	3.79	0.881	
RA-224	1	963.54	240.99	100.02	85.98	0.048	19.67	0.944	D
PB-214	1	967.59	242.00	84.08	-0.51	0.000	2544.28	0.945	D
TL-208	1	1109.53	277.46	70.00	100.00	0.056	20.08	1.821	s
I-131	1	1138.90	284.80	133.00	-12.91	-0.007	129.36	0.987	
PB-214	1	1180.09	295.09	114.58	188.42	0.105	15.04	1.083	s
PB-212	1	1200.58	300.21	80.50	88.50	0.049	24.69	1.267	s
AC-228	1	1353.09	338.32	61.33	273.67	0.152	8.72	0.963	
EU-152	1	1376.17	344.09	67.93	17.88	0.010	69.34	1.045	s
PB-214	1	1407.57	351.93	77.21	228.79	0.127	10.73	0.675	s
I-131	1	1457.76	364.47	87.05	-9.08	-0.005	148.98	1.065	s
BE-7	1	1905.50	476.36	49.85	3.00	0.002	337.30	1.173	s
CS-134	1	2251.16	562.75	33.90	15.45	0.009	59.05	1.252	s
CS-134	1	2277.45	569.32	37.85	4.68	0.003	8.10	1.258	s D
Pa-234	1	2278.05	569.47	41.61	-5.85	-0.003	-224.28	1.258	s D
TL-208	1	2333.45	583.32	44.25	408.75	0.227	6.11	1.171	
CS-134	1	2419.84	604.91	49.62	5.73	0.003	178.90	1.290	
BI-214	1	2437.66	609.36	33.40	175.60	0.098	10.28	1.258	
I-131	1	2545.35	636.28	41.33	-2.06	-0.001	446.14	1.319	s
CS-137	1	2647.67	661.85	50.38	10.54	0.006	61.05	1.342	s
EU-154	1	2889.23	722.23	56.08	-3.12	-0.002	344.37	1.397	s
BI-212	1	2909.49	727.30	15.83	90.17	0.050	13.86	0.868	s
PA-234M	1	3061.03	765.18	44.15	-4.43	-0.002	217.35	1.434	s
EU-152	1	3125.40	781.27	28.82	0.51	0.000	1500.67	1.445	s
BI-212	1	3142.35	785.51	28.64	2.06	0.001	374.01	1.451	s
CS-134	1	3179.57	794.82	28.74	37.40	0.021	26.04	1.460	s
CS-134	1	3205.99	801.42	24.66	-4.33	-0.002	169.32	1.465	s
TL-208	1	3442.10	860.45	0.00	84.00	0.047	10.91	1.042	s
EU-154	1	3491.71	872.85	26.83	-1.49	-0.001	499.81	1.527	s
Pa-234	1	3522.44	880.53	25.44	0.00	0.000	713.36	1.533	s
Pa-234	1	3530.75	882.61	20.73	-1.22	-0.001	535.73	1.535	s
AC-228	1	3645.12	911.20	8.33	263.67	0.146	6.64	1.282	

Pa-234	1	3786.82	946.63	23.61	1.16	0.001	600.60	1.588	s
EU-152	1	3856.73	964.11	510.06	0.00	0.000	3193.92	1.603	s
AC-228	1	3873.77	968.37	12.00	179.00	0.099	9.06	1.321	s
EU-154	1	3984.46	996.05	27.24	-3.62	-0.002	210.43	1.630	s
PA-234M	1	4006.16	1001.47	19.23	9.43	0.005	73.37	1.633	s
EU-154	1	4015.17	1003.72	29.72	-3.23	-0.002	245.38	1.637	s
EU-152	1	4450.53	1112.59	26.26	1.30	0.001	565.87	1.723	s
BI-214	1	4483.83	1120.91	0.00	61.00	0.034	12.80	1.081	s
CO-60	1	4695.88	1173.94	27.00	-3.74	-0.002	203.20	1.772	s
EU-154	1	5098.13	1274.54	44.00	0.00	0.000	938.08	1.850	s
CO-60	1	5323.84	1331.00	24.15	-5.90	-0.003	124.74	1.894	s
EU-152	1	5636.13	1409.11	14.81	2.96	0.002	193.05	1.950	s
K-40	1	5843.19	1460.90	0.00	231.00	0.128	6.58	1.418	s
BI-214	1	7057.45	1764.70	13.24	13.68	0.008	39.87	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code			Peak MDA Value Becquerels		Peak Code	Peak Comments	
AM-241	T	1	-9.992E-001	59.54	-9.992E-001	&	(	P	5.286E+000G			1.6E+005	35.90
PA-234M	N	1	8.625E+001	1001.00	8.625E+001	%	(		2.116E+002G			1.6E+012	.84
			8.625E+001	766.41	-9.275E+001	&			7.049E+002G			1.6E+012	.29
EU-154	T F I	1	-8.296E-001	873.23	-8.296E-001	%	(		1.499E+001G			3.1E+003	12.27
			-8.296E-001	123.10	2.421E-001	%			2.918E+000G			3.1E+003	40.79
			-8.296E-001	1274.54	0.000E+000	%			8.898E+000G			3.1E+003	35.19
			-8.296E-001	723.36	-9.045E-001	%			1.091E+001G			3.1E+003	20.22
			-8.296E-001	1004.77	-1.375E+000	%			1.199E+001G			3.1E+003	18.01
			-8.296E-001	996.33	-2.606E+000	%			1.945E+001G			3.1E+003	10.60
			6.879E+001	93.35	6.879E+001			E	2.280E+001G		A	2.1E+003	5.56
AC-228	N	1	6.879E+001	911.16	6.448E+001		(		3.953E+000G			2.1E+003	29.00
			6.879E+001	968.97	7.643E+001		(		8.050E+000G			2.1E+003	17.46
			6.879E+001	338.32	6.809E+001		(		9.755E+000G			2.1E+003	12.01
CS-137	T F I	1	6.730E-001	661.66	6.730E-001	&	(	P	2.285E+000G			1.1E+004	85.21
PB-212	N	1	6.530E+001	238.63	6.477E+001		(	P	3.665E+000G			7.0E+002	43.30
			6.530E+001	300.03	7.227E+001		(		3.636E+001G			7.0E+002	3.28
			-5.703E-001	1173.24	-3.258E-001	%			2.346E+000G			1.9E+003	99.90
CO-60	T F	1	-5.703E-001	1332.50	-5.703E-001	%	(		2.475E+000G			1.9E+003	99.98
RA-224	N	1	4.642E+001	240.99	4.642E+001		(		2.663E+001G			7.0E+002	4.10
BI-212	N	1	4.495E+001	727.33	4.495E+001		(		1.060E+001G			7.0E+002	11.82
			4.495E+001	785.51	1.176E+001	&			1.579E+002G			7.0E+002	1.10
PB-210	N	1	4.203E+001	46.54	4.203E+001	*	(	P	4.591E+001G			8.1E+003	4.25
I-131	T F I	1	-3.558E-001	364.48	-3.558E-001	%	(		1.809E+000G			8.0E+000	81.70
			-3.558E-001	284.30	-5.367E+000	&			2.347E+001G			8.0E+000	6.14
			-3.558E-001	636.97	-1.516E+000	%			2.401E+001G			8.0E+000	7.17
Pa-234	N	1	-3.410E+000	131.29	-3.410E+000	%	(		7.405E+000G			1.6E+012	18.00
			-3.410E+000	569.47	-3.410E+000	&			1.912E+001G			1.6E+012	8.20
			-3.410E+000	946.02	6.319E-001	%			1.383E+001G			1.6E+012	13.40
			-3.410E+000	883.24	-8.784E-001	%			1.723E+001G			1.6E+012	9.60
			-3.410E+000	880.53	0.000E+000	%			3.014E+001G			1.6E+012	6.00
EU-155	T F I	1	2.695E+000	105.31	2.695E+000	%	(		6.069E+000G			1.8E+003	21.20
			2.695E+000	86.54	1.138E+001	*			4.925E+000G		A	1.8E+003	30.70

TL-208	F	N	1	2.362E+001	583.02	2.362E+001		(	P	1.948E+000G	7.0E+002	84.50
				2.362E+001	277.28	3.957E+001	*			1.650E+001G	7.0E+002	6.31
				2.362E+001	860.56	4.579E+001	+			4.017E+000G	7.0E+002	12.42
TH-234		N	1	2.282E+001	63.29	8.773E+000	*	(	P	4.060E+001G	1.6E+012	4.82
				2.282E+001	92.59	3.495E+001	*	(	P	2.803E+001G	1.6E+012	5.58
U-235		N	1	2.279E+000	143.79	2.279E+000	%	(	P	1.166E+001G	2.6E+011	10.96
				2.279E+000	205.33	2.014E+000	%			2.599E+001G	2.6E+011	5.01
				2.279E+000	163.38	2.915E+000	&		P	2.310E+001G	2.6E+011	5.08
				2.279E+000	93.35	2.279E+000	%		E	2.306E+001X	2.6E+011	5.81
K-40		N	1	2.258E+002	1460.83	2.258E+002		(		7.204E+000G	4.7E+011	10.67
				2.049E+000	1112.07	7.920E-001	%			1.624E+001G	4.9E+003	13.64
				2.049E+000	1408.00	1.423E+000	%			9.939E+000G	4.9E+003	21.00
EU-152	T F		1	2.049E+000	344.29	2.049E+000	%	(		4.711E+000G	4.9E+003	26.50
				2.049E+000	121.78	-2.297E-002	&			4.050E+000G	4.9E+003	28.58
				2.049E+000	778.92	2.450E-001	%			1.337E+001G	4.9E+003	12.94
				2.049E+000	964.11	0.000E+000	%			5.488E+001G	4.9E+003	14.61
BI-214		N	1	1.932E+001	609.31	1.932E+001		(	P	3.262E+000G	5.8E+005	46.09
				1.932E+001	1120.29	3.387E+001	+			4.092E+000G	5.8E+005	15.10
				1.932E+001	1764.49	1.090E+001	%		P	1.568E+001G	5.8E+005	15.40
PB-214		N	1	1.885E+001	351.93	1.885E+001	@	(	P	3.597E+000G	5.8E+005	37.60
				1.885E+001	295.09	2.576E+001	+		P	7.191E+000G	5.8E+005	19.30
				1.885E+001	242.00	-1.526E-001	%			1.359E+001G	5.8E+005	7.43
CS-134	T F I		1	1.454E+000	604.71	2.956E-001	%	(		1.834E+000G	7.5E+002	97.62
				1.454E+000	795.87	2.777E+000	?	(		2.056E+000G	7.5E+002	85.53
				1.454E+000	569.32	1.454E+000	&			9.758E+000G	7.5E+002	15.38
				1.454E+000	801.95	-3.180E+000	%			1.901E+001G	7.5E+002	8.69
				1.454E+000	563.24	8.768E+000	&			1.693E+001G	7.5E+002	8.35
BE-7		N P C	1	1.169E+000	477.60	1.169E+000	&	(		1.386E+001G	5.3E+001	10.52

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	#	-3.558E-001	-3.572E-001	148.98	149.01	1.809E+000
CS-134	#	1.454E+000	1.454E+000	26.04	26.20	1.834E+000
EU-154	#	-8.296E-001	-8.296E-001	499.81	499.82	1.499E+001
PB-212		6.530E+001	6.530E+001	3.81	4.84	3.665E+000
PB-214	#	1.885E+001	1.885E+001	10.97	11.34	3.597E+000
BI-212		4.495E+001	4.495E+001	13.86	14.16	1.060E+001
Pa-234	#	-3.410E+000	-3.410E+000	65.77	65.84	7.405E+000
TH-234	#	2.282E+001	2.282E+001	25.04	25.31	4.060E+001
BE-7	#	1.169E+000	1.170E+000	337.30	337.32	1.386E+001
K-40		2.258E+002	2.258E+002	6.58	7.20	7.204E+000
CO-60	#	-5.703E-001	-5.703E-001	124.74	124.77	2.475E+000
CS-137	#	6.730E-001	6.730E-001	97.26	97.30	2.285E+000
EU-152	#	2.049E+000	2.049E+000	69.34	69.40	4.711E+000
EU-155	#	2.695E+000	2.695E+000	68.14	68.22	6.069E+000
TL-208		2.362E+001	2.362E+001	6.17	6.81	1.948E+000
PB-210	#	4.203E+001	4.203E+001	42.47	42.64	4.591E+001
BI-214		1.932E+001	1.932E+001	10.67	11.06	3.262E+000
RA-224		4.642E+001	4.642E+001	19.67	19.90	2.663E+001
AC-228		6.879E+001	6.879E+001	4.74	5.55	3.953E+000
PA-234M	#	8.625E+001	8.625E+001	73.37	73.43	2.116E+002
U-235	#	2.279E+000	2.279E+000	151.85	151.88	1.166E+001
AM-241	#	-9.992E-001	-9.992E-001	229.47	229.51	5.286E+000

= All peaks for activity calculation had bad shape

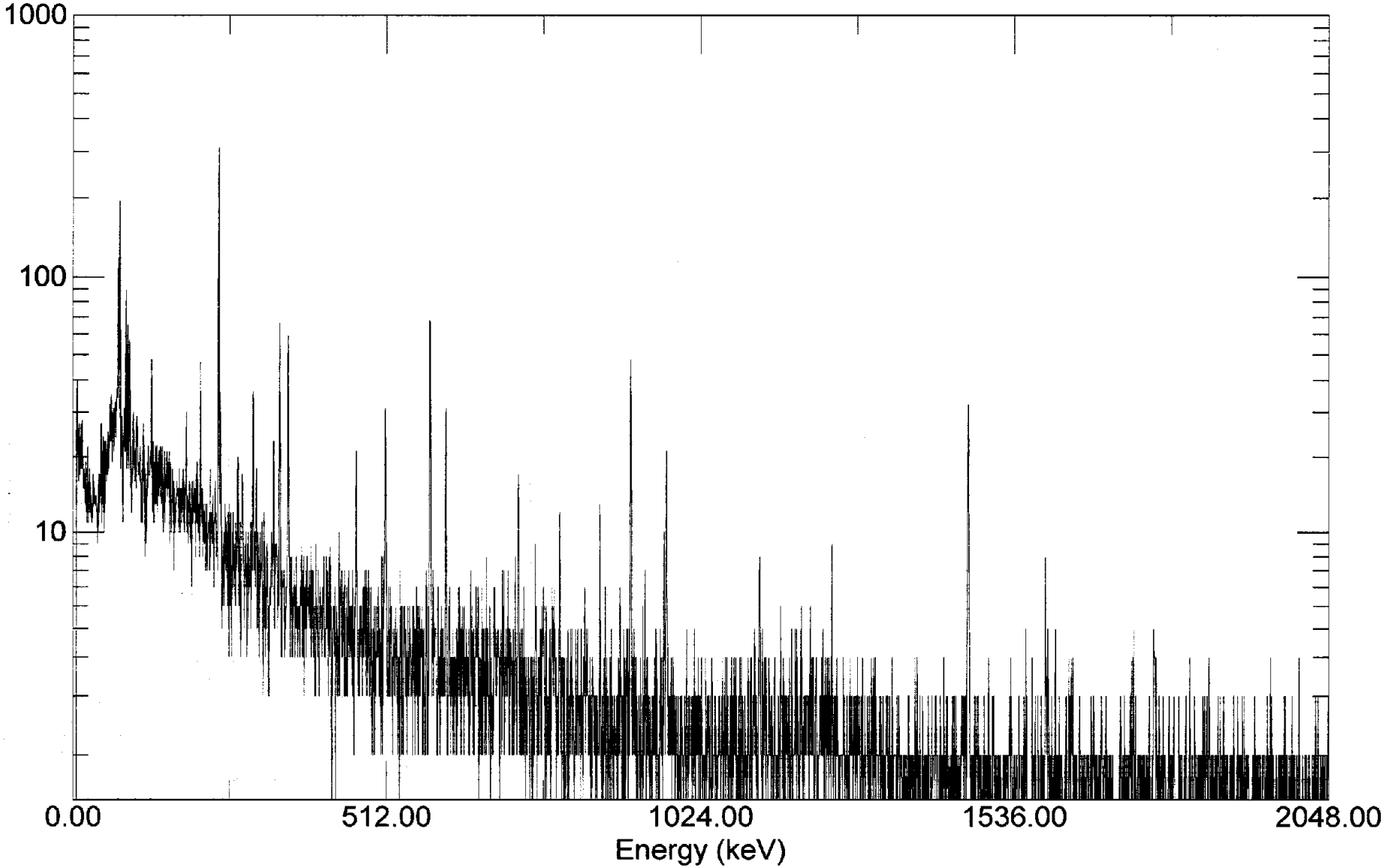
Total Activity (37.74 to 2,000.57 keV) 513.06 Bq/sample

Analyzed by: 403293

Laboratory: STL- St Louis

KEKA91AC

7357010_KEKA91AC_F7L200251-006



Acquired: 23-Dec-2007 1:05:25 PM
File: C:\User\spectra\KEKA91AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1858.64 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,965

Sample Description: 7357010_KEKCC1AC_F7L200251-007

Spectrum Filename: KEKCC1AC.An1

Acquisition Information

Start Time: 23-Dec-2007 1:05:56PM
Live Time: 1800.00 Real Time: 1818.26
Dead Time: 1.00 %
Detector ID: 7

Detector System: Ge 7 SN/154

Calibration

Description: Ge7 Tunacan 74139_334 01_16_07
Filename: C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb
Energy Created: 16-Jan-2007 4:24:37PM Efficiency Created: 16-Jan-2007 4:27:00PM
Zero Offset: 0.231 keV Gain: 0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel: 150 for an energy of 37.72 keV
Stop Channel: 8,000 for an energy of 2000.15 keV
Peak rejection level: 40.000 %
Activity Scaling Factor: 1.0000 / 1.0000 = 1.0000
Detection Limit Method: Nureg method 4.16
Sample Size: 1.00E+000
Additional random error: 0.0000
Additional systematic error: 0.0000
Fraction Limit: 0.0000%
Background Width: Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1287

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.30	74.79	577.50	296.50	0.165	18.15	0.753	PB-214	
307.60	77.11	459.17	445.83	0.248	10.89	0.926	PB-214	
348.04	87.22	221.22	226.78	0.126	11.41	0.522	PB-214	s
358.55	89.85	186.00	143.00	0.079	15.87	0.808	PB-214	s
371.69	93.13	524.00	0.00	0.000	3237.28	0.744		s
1353.09	338.44	259.22	29.78	0.017	78.62	0.954		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.74	46.40	248.39	3.42	0.002	79.29	0.832	s
AM-241	1	236.50	59.34	322.28	19.13	0.011	134.65	0.846	s
TH-234	1	252.24	63.28	398.19	49.56	0.028	40.86	0.850	s
EU-155	1	345.32	86.54	492.55	-7.45	-0.004	423.01	0.874	s
TH-234	1	370.87	92.93	456.10	118.46	0.066	21.63	0.881	s
AC-228	1	372.56	93.35	565.99	0.00	0.000	2817.80	0.882	s D
U-235	1	372.56	93.35	329.07	-10.80	-0.006	-236.57	0.882	s D
EU-155	1	421.31	105.54	235.85	37.36	0.021	60.39	0.894	s
EU-152	1	484.78	121.40	191.26	5.11	0.003	385.17	0.912	s
EU-154	1	490.10	122.73	201.07	2.99	0.002	674.27	0.913	s
Pa-234	1	519.35	130.04	283.56	-34.39	-0.019	71.32	0.922	s
U-235	1	574.40	143.80	235.78	-20.32	-0.011	109.15	0.935	s
U-235	1	652.73	163.38	262.35	-2.71	-0.002	846.74	0.955	s
U-235	1	825.64	206.60	204.92	-1.12	-0.001	1802.40	0.999	s
PB-212	1	953.80	238.63	142.49	895.51	0.498	3.78	1.034	D
RA-224	1	963.22	240.99	258.56	103.44	0.057	24.08	1.036	D
PB-214	1	967.26	242.00	176.85	91.15	0.051	23.14	1.037	D
TL-208	1	1107.80	277.13	79.17	88.83	0.049	25.12	0.374	s
I-131	1	1131.51	283.05	101.93	3.30	0.002	435.95	1.081	s
PB-214	1	1180.70	295.35	47.50	215.50	0.120	9.07	1.153	s
PB-212	1	1202.09	300.69	85.50	95.50	0.053	24.91	1.045	s
AC-228	1	1353.28	338.49	121.96	151.89	0.084	13.10	1.136	
EU-152	1	1377.08	344.43	112.19	-8.20	-0.005	185.89	1.142	s
PB-214	1	1407.80	352.11	76.55	352.45	0.196	8.19	1.097	
I-131	1	1453.89	363.63	55.32	8.03	0.004	135.69	1.163	s
BE-7	1	1910.76	477.83	54.42	-2.49	-0.001	424.31	1.277	s
CS-134	1	2237.17	559.43	23.05	6.47	0.004	112.02	1.363	s
CS-134	1	2276.76	569.32	36.65	6.56	0.004	132.42	1.369	s D
Pa-234	1	2277.35	569.47	44.04	-5.07	-0.003	-155.35	1.369	s D
TL-208	1	2332.79	583.33	47.41	325.59	0.181	8.13	1.400	s
CS-134	1	2427.07	606.89	74.04	-13.25	-0.007	95.90	1.403	s
BI-214	1	2436.76	609.32	23.47	260.53	0.145	7.59	1.536	
I-131	1	2543.67	636.04	39.17	1.07	0.001	836.08	1.435	s
CS-137	1	2629.98	657.62	26.63	-0.64	0.000	6716.82	1.459	s
EU-154	1	2890.35	722.70	63.14	0.28	0.000	3994.76	1.519	s
BI-212	1	2908.52	727.25	22.67	99.33	0.055	15.93	0.679	s
PA-234M	1	3067.08	766.88	54.91	-5.38	-0.003	199.68	1.561	s
EU-152	1	3115.24	778.92	19.85	0.00	0.000	630.06	1.573	s
BI-212	1	3144.65	786.27	6.67	60.33	0.034	17.50	1.160	s
CS-134	1	3180.01	795.11	28.41	23.71	0.013	37.85	1.589	s
CS-134	1	3211.78	803.05	32.98	-2.41	-0.001	343.01	1.595	s
TL-208	1	3442.17	860.65	28.47	26.94	0.015	34.00	1.650	
EU-154	1	3490.35	872.69	26.02	-0.35	0.000	2064.51	1.662	s
Pa-234	1	3526.62	881.76	18.63	12.30	0.007	57.23	1.669	s
Pa-234	1	3536.74	884.29	32.33	-3.15	-0.002	261.33	1.672	s
AC-228	1	3645.27	911.42	27.41	170.00	0.094	8.82	1.698	s

Pa-234	1	3775.54	943.99	20.95	-0.30	0.000	2141.58	1.731	s
EU-152	1	3850.67	962.77	58.09	-7.79	-0.004	143.01	1.748	s
AC-228	1	3876.32	969.18	42.92	89.27	0.050	14.82	1.752	s
EU-154	1	3984.93	996.33	53.26	0.00	0.000	1032.08	1.778	s
PA-234M	1	4004.44	1001.21	34.17	2.04	0.001	410.27	1.782	s
EU-154	1	4024.94	1006.33	31.96	1.56	0.001	520.28	1.785	s
EU-152	1	4450.03	1112.60	39.94	-6.46	-0.004	143.76	1.884	s
BI-214	1	4481.86	1120.56	0.00	91.00	0.051	10.48	0.380	s
CO-60	1	4695.11	1173.87	40.87	-3.74	-0.002	247.12	1.939	s
EU-154	1	5096.69	1274.27	22.12	4.27	0.002	163.08	2.030	s
CO-60	1	5329.63	1332.50	17.83	0.00	0.000	597.22	2.081	s
EU-152	1	5631.41	1407.95	15.08	8.27	0.005	74.97	2.147	s
K-40	1	5843.98	1461.09	0.00	319.00	0.177	5.60	1.679	s
BI-214	1	7059.95	1765.11	15.87	15.68	0.009	43.91	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
AM-241	T	1	8.266E-001	59.54	8.266E-001	& (	3.731E+000G		1.6E+005	35.90
BE-7	N P C	1	-7.113E-001	477.60	-7.113E-001	& (	1.061E+001G		5.3E+001	10.52
EU-152	T F	1	-6.893E-001	344.29	-6.893E-001	% (	4.375E+000G		4.9E+003	26.50
			-6.893E-001	121.78	2.017E-001	%	2.650E+000G		4.9E+003	28.58
			-6.893E-001	778.92	0.000E+000	%	8.400E+000G		4.9E+003	12.94
			-6.893E-001	964.11	-2.963E+000	%	1.455E+001G		4.9E+003	14.61
			-6.893E-001	1112.07	-2.977E+000	%	1.481E+001G		4.9E+003	13.64
			-6.893E-001	1408.00	3.050E+000	%	7.675E+000G		4.9E+003	21.00
RA-224	N	1	4.085E+001	240.99	4.085E+001	(	3.066E+001G		7.0E+002	4.10
BI-212	N	1	3.669E+001	727.33	3.669E+001	* (	9.195E+000G		7.0E+002	11.82
			3.669E+001	785.51	2.558E+002	*	6.251E+001G		7.0E+002	1.10
CS-134	T F I	1	3.418E-001	604.71	-5.043E-001	% (	1.630E+000G		7.5E+002	97.62
			3.418E-001	795.87	1.307E+000	(	1.519E+000G		7.5E+002	85.53
			3.418E-001	569.32	1.503E+000	% }	7.517E+000G		7.5E+002	15.38
			3.418E-001	801.95	-1.317E+000	%	1.610E+001G		7.5E+002	8.69
			3.418E-001	563.24	2.705E+000	%	1.048E+001G		7.5E+002	8.35
PB-212	N	1	3.322E+001	238.63	3.322E+001	(P	2.164E+000G		7.0E+002	43.30
			3.322E+001	300.03	5.714E+001	+	2.740E+001G		7.0E+002	3.28
CS-137	T F I	1	-3.010E-002	661.66	-3.010E-002	% (P	1.263E+000G		1.1E+004	85.21
AC-228	N	1	2.961E+001	911.16	3.104E+001	(	4.950E+000G		2.1E+003	29.00
			2.961E+001	968.97	2.854E+001	(	1.063E+001G		2.1E+003	17.46
			2.961E+001	338.32	2.771E+001	(	9.882E+000G		2.1E+003	12.01
			2.961E+001	93.35	0.000E+000	% } E	1.829E+001G	A	2.1E+003	5.56
K-40	N	1	2.396E+002	1460.83	2.396E+002	(	5.536E+000G		4.7E+011	10.67
I-131	T F I	1	2.306E-001	364.48	2.306E-001	% (	1.074E+000G		8.0E+000	81.70
			2.306E-001	284.30	1.005E+000	&	1.515E+001G		8.0E+000	6.14
			2.306E-001	636.97	5.784E-001	%	1.730E+001G		8.0E+000	7.17
			-2.178E+000	883.24	-1.693E+000	%	1.569E+001G		1.6E+012	9.60
			-2.178E+000	880.53	1.055E+001	%	1.957E+001G		1.6E+012	6.00
Pa-234	N	1	-2.178E+000	131.29	-2.178E+000	% (	5.142E+000G		1.6E+012	18.00
			-2.178E+000	569.47	-2.178E+000	%	1.446E+001G		1.6E+012	8.20
			-2.178E+000	946.02	-1.238E-001	%	9.810E+000G		1.6E+012	13.40

U-235		N	1	-2.167E+000	143.79	-2.167E+000	&	(		7.922E+000G	2.6E+011	10.96
				-2.167E+000	205.33	-3.203E-001	%			1.977E+001G	2.6E+011	5.01
				-2.167E+000	163.38	-6.593E-001	%			1.901E+001G	2.6E+011	5.08
				-2.167E+000	93.35	-2.167E+000	!		E	1.751E+001X	2.6E+011	5.81
				2.123E+001	242.00	1.993E+001		(		1.415E+001G	5.8E+005	7.43
PB-214		N	1	2.123E+001	351.93	2.130E+001		(	P	2.628E+000G	5.8E+005	37.60
				2.123E+001	295.09	2.159E+001	@	(		3.489E+000G	5.8E+005	19.30
BI-214		N	1	2.115E+001	609.31	2.115E+001		(	P	2.053E+000G	5.8E+005	46.09
				2.115E+001	1120.29	3.812E+001	+			3.087E+000G	5.8E+005	15.10
				2.115E+001	1764.49	9.778E+000	%			1.326E+001G	5.8E+005	15.40
PB-210		N	1	2.039E+000	46.54	2.039E+000	*	(	P	4.547E+001G	8.1E+003	4.25
TH-234		N	1	2.028E+001	63.29	1.504E+001	%	(	P	2.905E+001G	1.6E+012	4.82
				2.028E+001	92.59	2.480E+001	*	(	P	2.140E+001G	1.6E+012	5.58
EU-155	T F I		1	1.996E+000	105.31	1.996E+000	%	(		3.968E+000G	1.8E+003	21.20
				1.996E+000	86.54	-2.912E-001	%			4.149E+000G	A 1.8E+003	30.70
				-1.459E-001	1274.54	8.597E-001	&			4.957E+000G	3.1E+003	35.19
				-1.459E-001	723.36	6.052E-002	%			8.540E+000G	3.1E+003	20.22
				-1.459E-001	1004.77	4.972E-001	%			9.289E+000G	3.1E+003	18.01
				-1.459E-001	996.33	0.000E+000	%			1.980E+001G	3.1E+003	10.60
EU-154	T F I		1	-1.459E-001	873.23	-1.459E-001	%	(		1.102E+001G	3.1E+003	12.27
				-1.459E-001	123.10	8.261E-002	%			1.904E+000G	3.1E+003	40.79
PA-234M		N	1	1.402E+001	1001.00	1.402E+001	&	(		2.054E+002G	1.6E+012	.84
				1.402E+001	766.41	-8.349E+001	%			5.785E+002G	1.6E+012	.29
TL-208	F	N	1	1.387E+001	583.02	1.387E+001	@	(	P	1.482E+000G	7.0E+002	84.50
				1.387E+001	277.28	2.574E+001	*			1.280E+001G	7.0E+002	6.31
				1.387E+001	860.56	1.094E+001	-			1.120E+001G	7.0E+002	12.42
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(		1.650E+000G	1.9E+003	99.98
				0.000E+000	1173.24	-2.466E-001	%			2.142E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-7.113E-001	-7.118E-001	424.31	424.32	1.061E+001
K-40		2.396E+002	2.396E+002	5.60	6.32	5.536E+000
CO-60	#			597.22	597.23	1.650E+000
I-131	#	2.306E-001	2.316E-001	135.69	135.72	1.074E+000
CS-134	#	3.418E-001	3.418E-001	37.85	37.96	1.630E+000
CS-137	#	-3.010E-002	-3.010E-002	14.563.06	14.563.06	1.263E+000
EU-152	#	-6.893E-001	-6.893E-001	185.89	185.92	4.375E+000
EU-155	#	1.996E+000	1.996E+000	60.39	60.48	3.968E+000
TL-208	#	1.387E+001	1.387E+001	8.19	8.68	1.482E+000
BI-212	#	3.669E+001	3.669E+001	15.93	16.19	9.195E+000
BI-214		2.115E+001	2.115E+001	7.66	8.18	2.053E+000
RA-224		4.085E+001	4.085E+001	24.08	24.27	3.066E+001
TH-234	#	2.028E+001	2.028E+001	26.73	26.98	2.905E+001
PA-234M	#	1.402E+001	1.402E+001	410.27	410.28	2.054E+002
U-235	#	-2.167E+000	-2.167E+000	109.15	109.19	7.922E+000
EU-154	#	-1.459E-001	-1.459E-001	2.064.51	2.064.51	1.102E+001
PB-210	#	2.039E+000	2.039E+000	638.83	638.84	4.547E+001
PB-212		3.322E+001	3.322E+001	3.82	4.85	2.164E+000
PB-214		2.123E+001	2.123E+001	8.25	8.74	2.628E+000
AC-228	#	2.961E+001	2.961E+001	7.22	7.77	4.950E+000
Pa-234	#	-2.178E+000	-2.178E+000	71.32	71.38	5.142E+000
AM-241	#	8.266E-001	8.266E-001	134.65	134.71	3.731E+000

= All peaks for activity calculation had bad shape

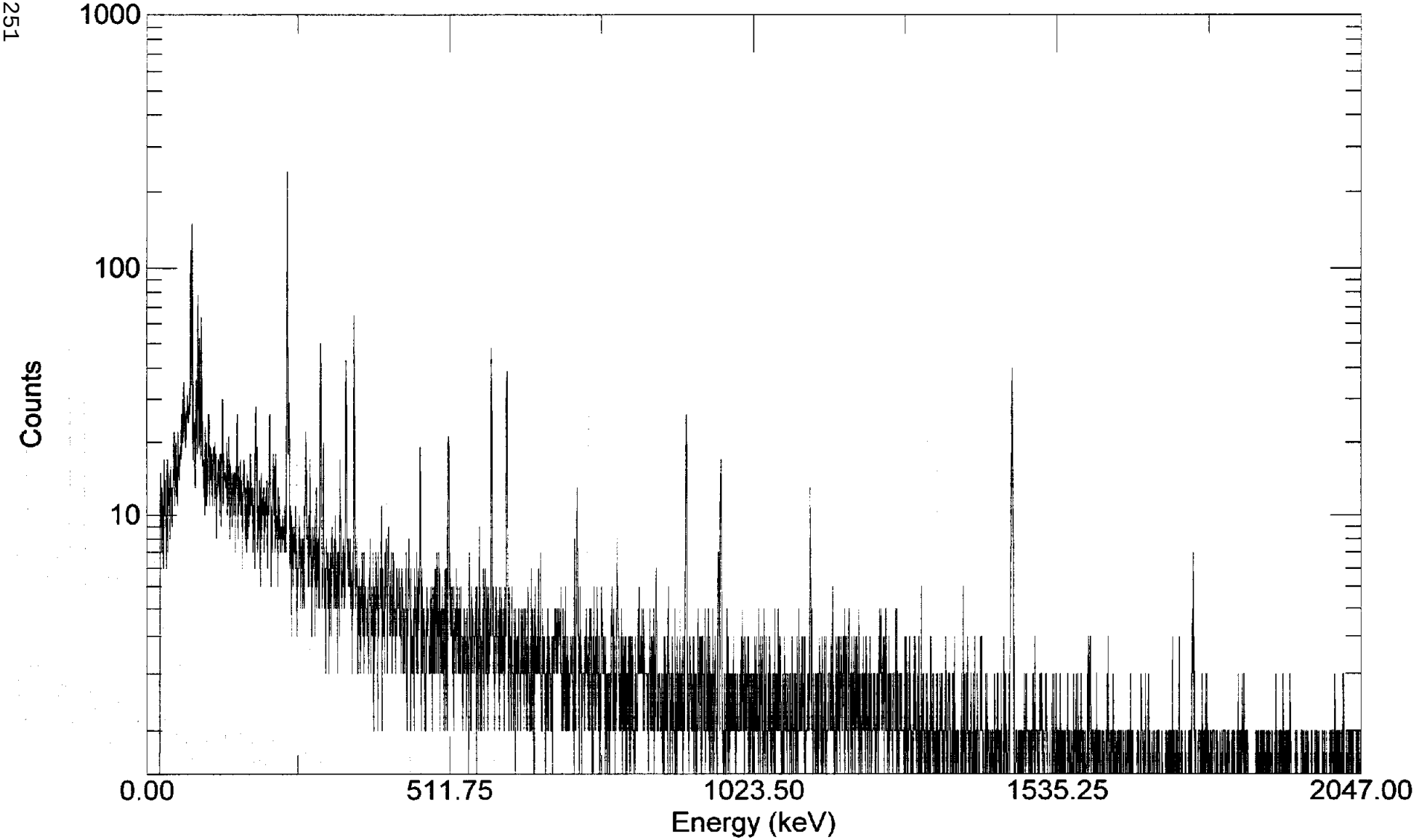
Total Activity (37.72 to 2,000.15 keV) 406.60 Bq/sample

Analyzed by: 403293

Laboratory: Test America

KEKCC1AC

7357010_KEKCC1AC_F7L200251-007



Acquired: 23-Dec-2007 1:05:57 PM
File: C:\User\spectra\KEKCC1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1818.26 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,967

Sample Description: 7357010_KEKCD1AC_F7L200251-008

Spectrum Filename: KEKCD1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:41:38PM		
Live Time:	1800.00	Real Time:	1810.70
Dead Time:	0.59 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1908

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
223.47	56.08	45.33	32.67	0.018	36.02	0.688	HF-181	
298.49	74.84	282.67	170.33	0.095	20.39	0.696	PB-214	
307.47	77.08	313.33	307.67	0.171	13.26	0.764	PB-214	
335.60	84.11	111.81	56.19	0.031	29.77	0.744	TA-182	
347.76	87.16	143.10	135.90	0.075	15.12	0.586	PB-214	s
743.25	186.03	110.00	137.00	0.076	18.08	1.229	PA-234	s
1351.49	338.09	147.22	29.78	0.017	60.47	0.709		s
2041.36	510.55	46.67	135.33	0.075	15.75	1.323	J-133	s
2435.65	609.11	206.68	33.32	0.019	63.43	1.370		
3643.88	911.13	103.74	39.26	0.022	40.01	0.892		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	183.69	46.14	151.96	82.04	0.046	23.09	1.120	s
AM-241	1	240.18	60.26	241.96	-11.54	-0.006	192.86	0.824	s
TH-234	1	252.18	63.26	215.40	79.60	0.044	24.29	0.604	s
EU-155	1	344.87	86.43	349.37	-25.90	-0.014	103.94	0.849	
TH-234	1	370.39	92.81	250.01	117.99	0.066	18.76	1.398	s
AC-228	1	372.54	93.35	481.39	0.00	0.000	2349.47	0.855	s D
U-235	1	372.54	93.35	245.41	-9.86	-0.005	-368.97	0.855	s D
EU-155	1	421.21	105.52	206.95	12.17	0.007	169.67	0.866	s
EU-152	1	485.58	121.61	181.30	8.81	0.005	218.63	0.881	s
EU-154	1	491.59	123.11	188.38	8.91	0.005	220.47	0.882	s
Pa-234	1	522.67	130.88	208.68	-26.61	-0.015	79.18	0.890	s
U-235	1	573.60	143.62	187.03	-18.22	-0.010	134.87	0.901	s
U-235	1	662.89	165.94	133.53	1.21	0.001	389.12	0.919	s
U-235	1	820.39	205.32	117.40	0.52	0.000	573.36	0.957	s
PB-212	1	953.66	238.63	96.87	478.00	0.266	5.09	0.987	D
RA-224	1	963.07	240.99	124.10	54.90	0.030	31.71	0.989	D
PB-214	1	967.12	242.00	128.51	41.49	0.023	35.19	0.990	D
TL-208	1	1107.42	277.07	72.38	15.41	0.009	82.12	1.021	s
I-131	1	1142.21	285.77	55.50	-3.31	-0.002	322.79	1.028	s
PB-214	1	1179.52	295.10	69.21	133.79	0.074	13.69	0.985	
PB-212	1	1199.41	300.07	64.00	72.00	0.040	27.50	0.840	
AC-228	1	1351.88	338.19	62.57	98.98	0.055	14.25	1.076	s
EU-152	1	1377.37	344.56	67.61	5.79	0.003	205.14	1.081	s
PB-214	1	1406.26	351.78	34.65	283.35	0.157	6.62	1.174	s
I-131	1	1455.90	364.19	59.88	0.82	0.000	1341.88	1.099	s
BE-7	1	1900.31	475.29	21.37	-0.08	0.000	8145.15	1.198	s
CS-134	1	2251.12	562.98	37.63	3.37	0.002	262.95	1.273	s
CS-134	1	2276.47	569.32	54.48	0.00	0.000	812.40	1.278	s D
Pa-234	1	2277.07	569.47	45.50	-4.81	-0.003	-155.97	1.278	s D
TL-208	1	2330.54	582.84	21.92	183.08	0.102	8.42	1.245	s
CS-134	1	2418.04	604.71	429.80	-1.86	-0.001	1579.80	1.309	s
BI-214	1	2435.63	609.11	40.59	185.10	0.103	8.11	1.313	
I-131	1	2547.97	637.19	35.27	12.32	0.007	73.87	1.337	s
CS-137	1	2646.63	661.85	37.39	2.25	0.001	390.72	1.358	s
EU-154	1	2899.28	725.01	68.60	-12.89	-0.007	95.07	1.411	s
BI-212	1	2906.91	726.91	34.93	26.69	0.015	36.82	1.414	s
PA-234M	1	3064.92	766.41	50.46	0.00	0.000	1004.58	1.447	s
EU-152	1	3113.26	778.50	32.94	-0.43	0.000	1911.75	1.458	s
BI-212	1	3141.34	785.52	30.41	8.43	0.005	98.71	1.463	s
CS-134	1	3179.39	795.03	21.48	21.43	0.012	37.44	1.472	s
CS-134	1	3206.03	801.69	37.11	-3.23	-0.002	272.19	1.477	s
TL-208	1	3440.93	860.40	5.67	59.33	0.033	16.61	0.457	s
EU-154	1	3492.95	873.40	24.78	2.83	0.002	255.83	1.537	s
Pa-234	1	3519.37	880.01	10.90	2.75	0.002	180.44	1.546	s
Pa-234	1	3521.10	880.44	19.28	2.33	0.001	274.11	1.543	s

AC-228	1	3643.76	911.10	27.12	93.44	0.052	12.17	1.569	s
Pa-234	1	3785.50	946.53	41.17	-6.38	-0.004	147.74	1.598	s
EU-152	1	3848.71	962.33	40.30	-3.28	-0.002	279.12	1.613	s
AC-228	1	3874.39	968.75	38.48	64.47	0.036	17.36	1.617	
EU-154	1	3986.08	996.67	32.78	0.47	0.000	1737.01	1.640	s
PA-234M	1	4003.71	1001.07	30.27	4.00	0.002	201.05	1.643	s
EU-154	1	4019.19	1004.94	32.53	-2.70	-0.002	304.46	1.647	s
EU-152	1	4447.80	1112.07	13.81	0.00	0.000	525.62	1.735	s
BI-214	1	4479.52	1120.00	32.10	38.70	0.021	22.17	1.741	
CO-60	1	4692.51	1173.24	26.64	0.00	0.000	729.95	1.784	s
EU-154	1	5100.09	1275.11	15.98	7.88	0.004	80.12	1.866	s
CO-60	1	5332.37	1333.16	27.67	-3.53	-0.002	217.31	1.912	s
EU-152	1	5630.81	1407.75	14.34	4.38	0.002	131.33	1.972	s
K-40	1	5841.93	1460.52	12.54	468.46	0.260	4.56	1.826	
BI-214	1	7056.56	1764.08	7.58	20.22	0.011	22.09	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak MDA Code	Peak Comments	
CS-137	T F I	1	9.838E-002	661.66	9.838E-002	% (	1.367E+000G		1.1E+004	85.21
BI-212	N	1	9.003E+000	727.33	9.003E+000	(	1.020E+001G		7.0E+002	11.82
			9.003E+000	785.51	3.224E+001	%	1.086E+002G		7.0E+002	1.10
EU-155	T F I	1	7.524E-001	105.31	7.524E-001	* (	4.314E+000G		1.8E+003	21.20
			7.524E-001	86.54	-1.154E+000	&	4.000E+000G		1.8E+003	30.70
TL-208	F N	1	7.396E+000	583.02	7.396E+000	@ (P	9.908E-001G		7.0E+002	84.50
			7.396E+000	277.28	4.852E+000	&	1.333E+001G		7.0E+002	6.31
			7.396E+000	860.56	2.141E+001	+	4.981E+000G		7.0E+002	12.42
AM-241	T	1	-5.579E-001	59.54	-5.579E-001	* (	3.635E+000G		1.6E+005	35.90
PB-210	N	1	5.182E+001	46.54	5.182E+001	* (P	3.800E+001G		8.1E+003	4.25
EU-152	T F	1	5.083E-001	344.29	5.083E-001	% (	3.603E+000G		4.9E+003	26.50
			5.083E-001	121.78	4.058E-001	%	3.013E+000G		4.9E+003	28.58
			5.083E-001	778.92	-1.376E-001	%	9.519E+000G		4.9E+003	12.94
			5.083E-001	964.11	-1.090E+000	%	1.073E+001G		4.9E+003	14.61
			5.083E-001	1112.07	0.000E+000	%	7.885E+000G		4.9E+003	13.64
			5.083E-001	1408.00	1.334E+000	%	6.201E+000G		4.9E+003	21.00
CS-134	T F I	1	4.612E-001	604.71	-6.667E-002	% (	3.564E+000G		7.5E+002	97.62
			4.612E-001	795.87	1.064E+000	(	1.206E+000G		7.5E+002	85.53
			4.612E-001	569.32	0.000E+000	% }	7.618E+000G		7.5E+002	15.38
			4.612E-001	801.95	-1.588E+000	%	1.527E+001G		7.5E+002	8.69
			4.612E-001	563.24	1.345E+000	&	1.248E+001G		7.5E+002	8.35
K-40	N	1	2.891E+002	1460.83	2.891E+002	(P	1.186E+001G		4.7E+011	10.67
TH-234	N	1	2.773E+001	63.29	2.707E+001	(P	2.418E+001G		1.6E+012	4.82
			2.773E+001	92.59	2.830E+001	* (P	1.833E+001G		1.6E+012	5.58
I-131	T F I	1	2.431E-002	364.48	2.431E-002	% (	1.152E+000G		8.0E+000	81.70
			2.431E-002	284.30	-1.091E+000	&	1.233E+001G		8.0E+000	6.14
			2.431E-002	636.97	6.245E+000	%	1.540E+001G		8.0E+000	7.17
RA-224	N	1	2.411E+001	240.99	2.411E+001	(	2.399E+001G		7.0E+002	4.10
PA-234	N	1	2.379E+001	1001.00	2.379E+001	& (	1.688E+002G		1.6E+012	[illegible].84
			2.379E+001	766.41	0.000E+000	&	5.037E+002G		1.6E+012	[illegible].29
U-235	N	1	-2.270E+000	143.79	-2.270E+000	% (P	8.277E+000G		2.6E+011	10.96
			-2.270E+000	205.33	1.689E-001	% P	1.723E+001G		2.6E+011	5.01
			-2.270E+000	163.38	3.406E-001	& P	1.597E+001G		2.6E+011	5.08
			-2.270E+000	93.35	-2.270E+000	!	1.742E+001X	E	2.6E+011	5.81
BE-7	N P C	1	-2.260E-002	477.60	-2.260E-002	% (	6.821E+000G		5.3E+001	10.52
CO-60	T F	1	-2.167E-001	1332.50	-2.167E-001	% (	1.671E+000G		1.9E+003	99.98
			-2.167E-001	1173.24	0.000E+000	%	1.496E+000G		1.9E+003	99.90
PB-212	N	1	1.974E+001	238.63	1.974E+001	(P	2.006E+000G		7.0E+002	43.30
			1.974E+001	300.03	4.617E+001	+	2.564E+001G		7.0E+002	3.28
			-1.970E+000	946.02	-2.278E+000	&	1.165E+001G		1.6E+012	13.40
			-1.970E+000	883.24	1.305E+000	%	8.603E+000G		1.6E+012	9.60
			-1.970E+000	880.53	1.771E+000	%	1.759E+001G		1.6E+012	6.00
Pa-234	N	1	-1.970E+000	131.29	-1.970E+000	% (	5.183E+000G		1.6E+012	18.00
			-1.970E+000	569.47	-1.970E+000	%	1.398E+001G		1.6E+012	8.20

PB-214	N	1	1.782E+001	351.93	1.782E+001	@	(	P	1.896E+000G		5.8E+005	37.60
			1.782E+001	295.09	1.441E+001	-		P	4.466E+000G		5.8E+005	19.30
			1.782E+001	242.00	1.008E+001	%		P	1.350E+001G		5.8E+005	7.43
AC-228	N	1	1.671E+001	911.07	1.503E+001		(	P	4.339E+000G		2.1E+003	29.00
			1.671E+001	968.97	1.798E+001		(	P	8.820E+000G		2.1E+003	17.46
			1.671E+001	338.32	1.893E+001	@	(	P	7.569E+000G		2.1E+003	12.01
			1.671E+001	93.35	0.000E+000	%		} E	1.820E+001X	A	2.1E+003	5.56
BI-214	N	1	1.407E+001	609.31	1.414E+001		(	P	2.475E+000G		5.8E+005	46.09
			1.407E+001	1120.29	1.384E+001		(	P	1.041E+001G		5.8E+005	15.10
			1.407E+001	1764.49	1.009E+001	-		P	7.749E+000G		5.8E+005	15.40
			1.044E+000	123.10	2.877E-001	&			2.153E+000G		3.1E+003	40.79
			1.044E+000	1274.54	1.329E+000	%			3.599E+000G		3.1E+003	35.19
			1.044E+000	723.36	-2.531E+000	%			8.114E+000G		3.1E+003	20.22
			1.044E+000	1004.77	-7.501E-001	%			8.126E+000G		3.1E+003	18.01
			1.044E+000	996.33	2.192E-001	%			1.377E+001G		3.1E+003	10.60
EU-154	T F I	1	1.044E+000	873.23	1.044E+000	%	(		9.561E+000G		3.1E+003	12.27

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-2.260E-002	-2.262E-002	8,145.15	8,145.15	6.821E+000
K-40		2.891E+002	2.891E+002	4.68	5.52	1.186E+001
CO-60	<	-2.167E-001	-2.167E-001	217.31	217.33	1.671E+000
I-131	<	2.431E-002	2.446E-002	1,341.88	1,341.89	1.152E+000
CS-134	<	4.612E-001	4.613E-001	37.44	37.55	3.564E+000
CS-137	<	9.838E-002	9.838E-002	390.72	390.73	1.367E+000
EU-155	<	7.524E-001	7.524E-001	169.67	169.70	4.314E+000
PB-214		1.782E+001	1.782E+001	6.90	7.47	1.896E+000
BI-212	<	9.003E+000	9.003E+000	36.82	36.93	1.020E+001
BI-214	<	1.407E+001	1.407E+001	8.62	9.09	2.475E+000
TH-234		2.773E+001	2.773E+001	22.26	22.56	2.418E+001
PA-234M	<	2.379E+001	2.379E+001	201.05	201.07	1.688E+002
EU-152	<	5.083E-001	5.083E-001	205.14	205.16	3.603E+000
EU-154	<	1.044E+000	1.044E+000	255.83	255.85	9.561E+000
TL-208	#	7.396E+000	7.396E+000	8.83	9.29	9.908E-001
RA-224		2.411E+001	2.411E+001	31.71	31.85	2.399E+001
PB-210	#	5.182E+001	5.182E+001	31.38	31.62	3.800E+001
PB-212		1.974E+001	1.974E+001	5.33	6.11	2.006E+000
AC-228	<	1.671E+001	1.671E+001	8.94	9.39	4.339E+000
Pa-234	<	-1.970E+000	-1.970E+000	79.18	79.24	5.183E+000
U-235	<	-2.270E+000	-2.270E+000	162.58	162.60	8.277E+000
AM-241	<	-5.579E-001	-5.579E-001	192.86	192.89	3.635E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 437.72 Bq/sample

Analyzed by: _____

403293

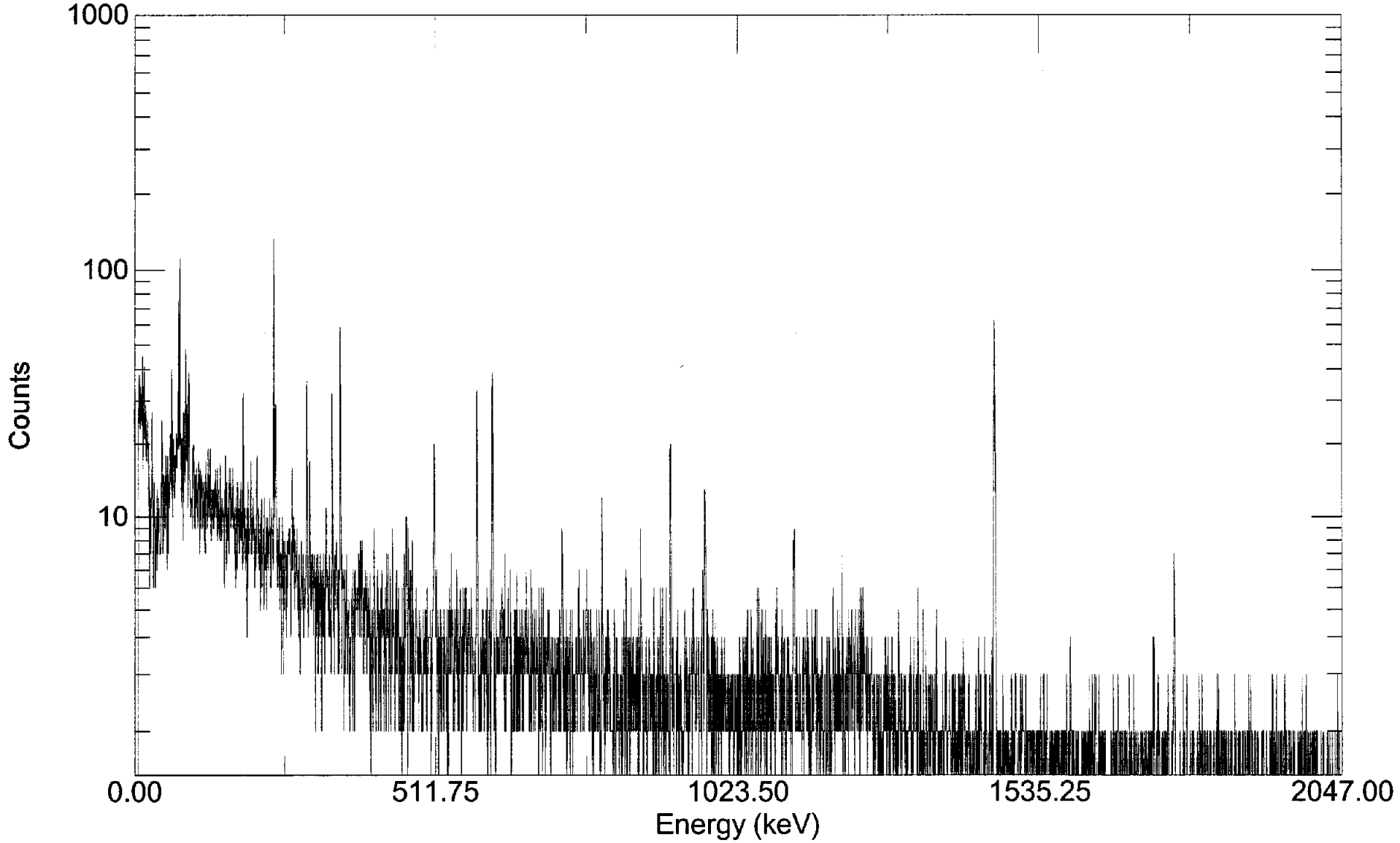
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKCD1AC

7357010_KEKCD1AC_F7L200251-008



Acquired: 23-Dec-2007 1:41:37 PM
File: C:\User\spectra\KEKCD1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.70 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,968

Sample Description: 7357010_KEKCE1AC_F7L200251-009

Spectrum Filename: KEKCE1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:42:03PM		
Live Time:	1800.00	Real Time:	1815.34
Dead Time:	0.85 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2060

Testamerica St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.69	74.76	671.50	256.50	0.143	20.74	0.597	PB-214	s
306.66	77.00	687.17	402.83	0.224	14.19	0.809	PB-214	
346.99	87.07	412.43	36.57	0.020	80.26	0.908		
358.59	89.97	198.87	224.13	0.125	11.13	1.037	PB-214	sM
743.00	185.97	258.33	217.67	0.121	19.55	1.263	RA-226	s
1179.21	294.93	284.72	46.28	0.026	53.62	1.387		s
1311.57	328.00	54.00	95.00	0.053	18.56	0.929	AC-228	
1407.02	351.84	329.61	74.39	0.041	36.41	1.313	PB-214	s
1852.12	463.04	56.00	82.00	0.046	23.20	0.378	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.48	46.49	246.89	14.68	0.008	60.95	0.864	
AM-241	1	244.56	61.49	366.76	6.31	0.004	430.88	0.878	s
TH-234	1	252.75	63.53	535.60	15.01	0.008	82.08	0.882	
EU-155	1	347.11	87.10	566.15	126.43	0.070	28.06	0.906	
TH-234	1	364.60	91.47	605.99	-119.71	-0.067	37.85	0.912	s
AC-228	1	372.14	93.35	218.83	204.65	0.114	1.36	1.116	s D
U-235	1	372.14	93.35	404.70	-1.40	-0.001	-3225.36	0.913	s D
EU-155	1	420.46	105.42	326.37	37.09	0.021	70.81	0.925	s
EU-152	1	489.59	122.68	276.01	-0.10	0.000	23939.23	0.942	s
EU-154	1	490.49	122.91	294.07	-1.12	-0.001	2175.41	0.943	s
Pa-234	1	525.96	131.77	353.10	-15.90	-0.009	169.04	0.952	s
U-235	1	574.05	143.78	305.34	-2.56	-0.001	5916.89	0.964	s
U-235	1	652.60	163.40	252.73	-12.32	-0.007	184.75	0.984	s
U-235	1	817.95	204.69	189.06	23.76	0.013	84.37	1.027	s
PB-212	1	954.47	238.80	281.75	1272.25	0.707	4.10	0.977	s
RA-224	1	960.09	240.20	1202.35	-202.07	-0.112	25.27	1.062	s
PB-214	1	962.21	240.73	570.39	-6.32	-0.004	536.30	1.063	s
TL-208	1	1108.73	277.33	98.67	52.33	0.029	38.88	0.993	s
I-131	1	1136.64	284.30	161.80	-8.78	-0.005	207.73	1.105	s
PB-214	1	1179.95	295.12	157.37	164.74	0.092	12.92	1.116	s
PB-212	1	1200.01	300.13	130.50	120.50	0.067	24.64	0.693	s
AC-228	1	1353.27	338.42	72.98	257.02	0.143	9.65	1.510	s
EU-152	1	1365.64	341.51	65.37	-0.08	0.000	15221.36	1.164	s
PB-214	1	1407.33	351.92	136.58	224.08	0.124	9.47	1.171	s
I-131	1	1463.07	365.85	91.08	-10.45	-0.006	132.75	1.184	s
BE-7	1	1907.04	476.77	48.95	1.77	0.001	563.91	1.292	s
CS-134	1	2252.00	562.96	56.24	18.34	0.010	62.35	1.372	s
CS-134	1	2277.45	569.32	46.69	3.17	0.002	290.52	1.378	s D
Pa-234	1	2278.04	569.47	39.25	-2.77	-0.002	-184.73	1.378	s D
TL-208	1	2332.00	582.95	42.96	429.04	0.238	5.95	1.528	s
CS-134	1	2427.09	606.71	80.61	-3.03	-0.002	423.66	1.410	s
BI-214	1	2436.31	609.02	54.95	247.05	0.137	9.30	1.380	
I-131	1	2546.34	636.51	49.33	7.06	0.004	145.58	1.440	s
CS-137	1	2646.72	661.60	56.57	3.67	0.002	294.24	1.462	s
EU-154	1	2893.03	723.16	91.33	-14.62	-0.008	96.09	1.518	s
BI-212	1	2907.87	726.87	36.67	145.33	0.081	14.61	1.070	s
PA-234M	1	3062.56	765.53	63.12	-3.44	-0.002	330.95	1.556	s
EU-152	1	3131.69	782.81	20.05	1.25	0.001	515.84	1.567	s
BI-212	1	3141.69	785.31	26.43	11.51	0.006	69.68	1.572	s
CS-134	1	3177.94	794.37	35.31	31.99	0.018	31.67	1.582	s
CS-134	1	3207.54	801.77	43.52	2.86	0.002	331.33	1.587	s
TL-208	1	3441.97	860.37	8.67	74.33	0.041	14.77	0.922	s
EU-154	1	3493.90	873.35	42.69	-0.26	0.000	3599.39	1.649	s
Pa-234	1	3520.91	880.10	29.26	-0.17	0.000	4624.34	1.655	s
Pa-234	1	3532.41	882.97	32.16	-3.56	-0.002	231.41	1.657	s

AC-228	1	3644.34	910.95	22.18	284.82	0.158	7.31	1.678	
Pa-234	1	3779.19	944.67	26.02	-1.35	-0.001	541.80	1.710	s
EU-152	1	3855.86	963.83	168.20	-0.91	-0.001	2015.22	1.726	
AC-228	1	3874.67	968.53	7.67	227.33	0.126	7.54	1.382	
EU-154	1	3986.55	996.51	33.25	1.89	0.001	438.01	1.753	s
PA-234M	1	4002.87	1000.59	30.00	4.71	0.003	170.63	1.756	s
EU-154	1	4015.78	1003.81	27.03	-0.68	0.000	1089.82	1.760	s
EU-152	1	4444.80	1111.08	19.21	7.82	0.004	86.97	1.847	s
BI-214	1	4480.10	1119.91	6.61	57.39	0.032	15.61	0.601	s
CO-60	1	4693.37	1173.24	61.52	0.00	0.000	1109.21	1.896	s
EU-154	1	5099.09	1274.70	35.15	2.71	0.002	315.68	1.975	s
CO-60	1	5329.22	1332.25	24.85	3.88	0.002	188.57	2.019	s
EU-152	1	5629.49	1407.36	17.84	6.28	0.003	103.20	2.076	s
K-40	1	5840.86	1460.23	11.21	395.79	0.220	4.96	1.705	
BI-214	1	7055.58	1764.14	15.18	20.28	0.011	30.69	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
EU-154	T F I	1	-9.291E-002	873.23	-9.291E-002	% (	1.198E+001G		3.1E+003	12.27
			-9.291E-002	123.10	-3.343E-002	&	2.476E+000G		3.1E+003	40.79
			-9.291E-002	1274.54	4.540E-001	%	5.089E+000G		3.1E+003	35.19
			-9.291E-002	723.36	-2.793E+000	%	9.026E+000G		3.1E+003	20.22
			-9.291E-002	1004.77	-1.854E-001	%	7.358E+000G		3.1E+003	18.01
			-9.291E-002	996.33	8.708E-001	%	1.364E+001G		3.1E+003	10.60
PB-210	N	1	8.503E+000	46.54	8.503E+000	% (P	4.399E+001G		8.1E+003	4.25
RA-224	N	1	-8.347E+001	240.99	-8.347E+001	* (	6.787E+001G		7.0E+002	4.10
CS-134	T F I	1	6.676E-001	604.71	-1.049E-001	% (	1.546E+000G		7.5E+002	97.62
			6.676E-001	795.87	1.549E+000	? (	1.472E+000G		7.5E+002	85.53
			6.676E-001	569.32	6.676E-001	%	7.276E+000G		7.5E+002	15.38
			6.676E-001	801.95	1.372E+000	%	1.604E+001G		7.5E+002	8.69
			6.676E-001	563.24	7.058E+000	%	1.449E+001G		7.5E+002	8.35
			-6.269E-003	964.11	-2.977E-001	%	2.063E+001G		4.9E+003	14.61
			-6.269E-003	1112.07	3.043E+000	&	9.005E+000G		4.9E+003	13.64
			-6.269E-003	1408.00	1.910E+000	%	6.816E+000G		4.9E+003	21.00
EU-152	T F	1	-6.269E-003	344.29	-6.269E-003	% (	3.370E+000G		4.9E+003	26.50
			-6.269E-003	121.78	-4.191E-003	%	3.421E+000G		4.9E+003	28.58
			-6.269E-003	778.92	3.929E-001	&	7.431E+000G		4.9E+003	12.94
PB-212	N	1	4.942E+001	238.63	4.942E+001	@ (P	3.144E+000G		7.0E+002	43.30
			4.942E+001	300.03	7.313E+001	+	3.395E+001G		7.0E+002	3.28
BE-7	N P C	1	4.778E-001	477.60	4.778E-001	% (	9.530E+000G		5.3E+001	10.52
BI-212	N	1	4.769E+001	727.33	4.769E+001	(	1.015E+001G		7.0E+002	11.82
			4.769E+001	785.51	4.295E+001	&	9.948E+001G		7.0E+002	1.10
TH-234	N	1	4.673E+000	63.29	4.673E+000	% (P	3.443E+001G		1.6E+012	4.82
			4.673E+000	92.59	-2.652E+001	% P	2.602E+001G		1.6E+012	5.58
AC-228	N	1	4.545E+001	911.07	4.493E+001	(P	3.890E+000G		2.1E+003	29.00
			4.545E+001	968.97	6.235E+001	+	4.282E+000G		2.1E+003	17.46
			4.545E+001	338.32	4.669E+001	* (P	7.723E+000G		2.1E+003	12.01
			4.545E+001	93.35	4.545E+001	E	1.591E+001X	A	2.1E+003	5.56
EU-155	T F I	1	3.940E+000	105.31	2.123E+000	* (	4.974E+000G		1.8E+003	21.20
			3.940E+000	86.54	5.195E+000	(	4.668E+000G		1.8E+003	30.70
U-235	N	1	-2.967E-001	143.79	-2.967E-001	& (P	9.750E+000G		2.6E+011	10.96
			-2.967E-001	205.33	7.210E+000	%	2.026E+001G		2.6E+011	5.01
			-2.967E-001	163.38	-3.243E+000	%	2.022E+001G		2.6E+011	5.08
			-2.967E-001	93.35	-2.967E-001	! E	2.050E+001X		2.6E+011	5.81
I-131	T F I	1	-2.956E-001	364.48	-2.956E-001	% (	1.334E+000G		8.0E+000	81.70
			-2.956E-001	284.30	-2.732E+000	%	1.930E+001G		8.0E+000	6.14
			-2.956E-001	636.97	3.466E+000	&	1.739E+001G		8.0E+000	7.17
AM-241	T	1	2.790E-001	59.54	2.790E-001	& (	4.064E+000G		1.6E+005	35.90
PA-234	N	1	2.763E+001	1001.00	2.763E+001	& (	1.655E+002G		1.6E+012	.84
			2.763E+001	766.41	-4.717E+001	%	5.447E+002G		1.6E+012	.29
K-40	N	1	2.445E+002	1460.83	2.445E+002	(P	1.131E+001G		4.7E+011	10.67
CO-60	T F	1	2.374E-001	1332.50	2.374E-001	% (	1.587E+000G		1.9E+003	99.98

				2.374E-001	1173.24	0.000E+000	%			2.174E+000G	1.9E+003	99.90
BI-214		N	1	1.876E+001	609.31	1.826E+001		(	P	2.753E+000G	5.8E+005	46.09
				1.876E+001	1120.29	2.030E+001		(	P	5.195E+000G	5.8E+005	15.10
				1.876E+001	1764.49	1.023E+001	-		P	1.052E+001G	5.8E+005	15.40
TL-208	F	N	1	1.666E+001	583.02	1.674E+001		(	P	1.297E+000G	7.0E+002	84.50
				1.666E+001	277.28	1.556E+001		(		1.457E+001G	7.0E+002	6.31
				1.666E+001	860.56	2.626E+001	+			5.803E+000G	7.0E+002	12.42
CS-137	T F I		1	1.560E-001	661.66	1.560E-001	%	(		1.604E+000G	1.1E+004	85.21
PB-214		N	1	1.455E+001	351.93	1.340E+001	*	(	P	3.419E+000G	5.8E+005	37.60
				1.455E+001	295.09	1.678E+001	@	(	P	6.230E+000G	5.8E+005	19.30
				1.455E+001	242.00	-1.444E+000	%			2.607E+001G	5.8E+005	7.43
Pa-234		N	1	-1.093E+000	131.29	-1.093E+000	%	(		6.206E+000G	1.6E+012	18.00
				-1.093E+000	569.47	-1.093E+000	%			1.260E+001G	1.6E+012	8.20
				-1.093E+000	946.02	-4.734E-001	%			9.295E+000G	1.6E+012	13.40
				-1.093E+000	883.24	-1.658E+000	%			1.357E+001G	1.6E+012	9.60
				-1.093E+000	880.53	-1.232E-001	%			2.076E+001G	1.6E+012	6.00

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CO-60	<	2.374E-001	2.374E-001	188.57	188.59	1.587E+000
I-131	<	-2.956E-001	-2.974E-001	132.75	132.78	1.334E+000
CS-134	<	6.676E-001	6.676E-001	31.67	31.80	1.546E+000
EU-154	<	-9.291E-002	-9.291E-002	3,599.39	3,599.39	1.198E+001
RA-224	<	-8.347E+001	-8.348E+001	25.27	25.44	6.787E+001
PB-210	<	8.503E+000	8.503E+000	150.35	150.40	4.399E+001
PB-212	#	4.942E+001	4.943E+001	4.17	5.13	3.144E+000
PB-214	<	1.455E+001	1.455E+001	8.25	8.74	3.419E+000
BE-7	<	4.778E-001	4.782E-001	563.91	563.92	9.530E+000
K-40		2.445E+002	2.445E+002	5.10	5.88	1.131E+001
CS-137	<	1.560E-001	1.560E-001	294.24	294.25	1.604E+000
EU-152	<	-6.269E-003	-6.269E-003	15,221.36	15,221.36	3.370E+000
EU-155	<	3.940E+000	3.940E+000	28.06	28.26	4.974E+000
TL-208		1.666E+001	1.666E+001	6.06	6.71	1.297E+000
BI-212		4.769E+001	4.769E+001	14.61	14.90	1.015E+001
BI-214		1.876E+001	1.876E+001	9.38	9.81	2.753E+000
AC-228		4.545E+001	4.545E+001	6.10	6.75	3.890E+000
TH-234	<	4.673E+000	4.673E+000	217.09	217.12	3.443E+001
PA-234M	<	2.763E+001	2.763E+001	170.63	170.65	1.655E+002
U-235	<	-2.967E-001	-2.967E-001	10,871.62	10,871.62	9.750E+000
Pa-234	<	-1.093E+000	-1.093E+000	169.04	169.07	6.206E+000
AM-241	<	2.790E-001	2.790E-001	430.88	430.90	4.064E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 422.48 Bq/sample

Analyzed by: _____

403293

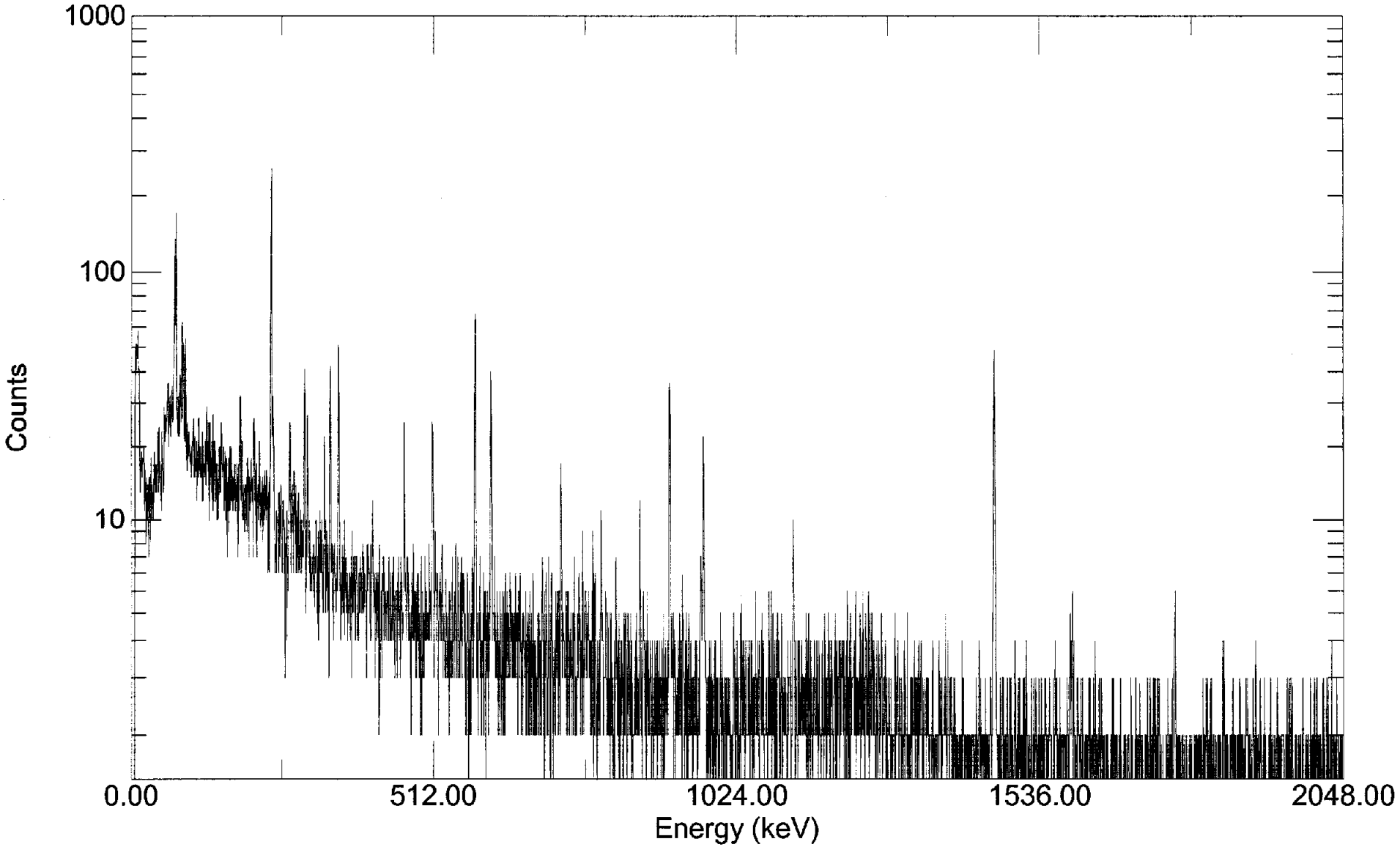
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKCE1AC

7357010_KEKCE1AC_F7L200251-009



Acquired: 23-Dec-2007 1:42:03 PM
File: C:\User\spectra\KEKCE1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1815.34 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,969

Sample Description: 7357010_KEKCF1AC_F7L200251-010

Spectrum Filename: KEKCF1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:42:39PM		
Live Time:	1800.00	Real Time:	1804.86
Dead Time:	0.27 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2308

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.38	74.89	362.67	244.33	0.136	16.55	0.798	PB-214	
308.38	77.15	317.33	422.67	0.235	9.58	0.831	PB-214	
349.23	87.36	186.12	132.88	0.074	16.91	1.172	PB-214	s
359.52	89.93	150.33	85.67	0.048	22.94	0.709	PB-214	M
1080.59	270.25	67.50	134.50	0.075	16.72	0.898	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.37	46.63	191.52	9.96	0.006	62.69	0.819	s
AM-241	1	238.75	59.73	304.70	-13.58	-0.008	183.74	0.830	s
TH-234	1	253.78	63.49	243.53	59.47	0.033	39.11	1.005	s
EU-155	1	345.96	86.54	334.91	8.48	0.005	307.02	0.854	s
TH-234	1	370.14	92.59	300.37	105.93	0.059	20.10	0.859	D
AC-228	1	373.18	93.35	171.24	145.71	0.081	1.79	0.860	D
U-235	1	373.18	93.35	262.80	4.12	0.002	76.44	0.860	s D
EU-155	1	421.06	105.32	200.39	31.91	0.018	65.19	0.871	s
EU-152	1	486.84	121.78	200.41	1.26	0.001	1596.60	0.885	s
EU-154	1	490.32	122.64	169.78	0.70	0.000	2650.88	0.886	s
Pa-234	1	521.20	130.37	201.56	-15.17	-0.008	134.81	0.894	s
U-235	1	574.48	143.69	209.81	7.77	0.004	265.99	0.904	s
U-235	1	652.92	163.31	161.85	13.99	0.008	131.33	0.922	s
U-235	1	824.26	206.15	135.84	-0.32	0.000	5207.72	0.958	
PB-212	1	954.15	238.63	62.70	770.30	0.428	3.82	0.986	D
RA-224	1	963.56	240.99	125.10	96.90	0.054	19.23	0.988	D
PB-214	1	967.61	242.00	139.29	73.71	0.041	25.46	0.989	D
TL-208	1	1109.06	277.37	52.00	92.00	0.051	20.39	0.627	s
I-131	1	1134.57	283.75	55.26	-5.91	-0.003	182.45	1.025	s
PB-214	1	1179.47	294.97	78.54	175.46	0.097	13.30	0.854	
PB-212	1	1199.74	300.04	40.00	64.00	0.036	24.07	0.480	s
AC-228	1	1351.83	338.06	51.33	193.67	0.108	11.37	0.960	
EU-152	1	1374.69	343.78	45.93	6.03	0.003	163.95	1.076	s
PB-214	1	1406.16	351.65	69.41	262.59	0.146	9.92	1.123	s
I-131	1	1459.49	364.98	51.67	-1.04	-0.001	985.52	1.092	s
BE-7	1	1911.53	477.98	38.65	0.63	0.000	1403.92	1.185	s
CS-134	1	2251.82	563.04	34.25	-3.06	-0.002	276.36	1.254	s
CS-134	1	2276.94	569.32	50.41	-0.69	0.000	-50.24	1.259	s D
Pa-234	1	2277.54	569.47	49.74	-2.26	-0.001	-185.00	1.259	s D
TL-208	1	2330.59	582.73	13.52	277.48	0.154	6.74	1.342	
CS-134	1	2425.63	606.48	41.59	-4.15	-0.002	225.07	1.286	s
BI-214	1	2436.10	609.10	21.92	158.08	0.088	9.67	1.360	
I-131	1	2558.91	639.79	25.03	-1.20	-0.001	595.45	1.312	s
CS-137	1	2657.01	664.31	18.22	4.68	0.003	136.98	1.331	s
EU-154	1	2899.16	724.82	56.65	-7.26	-0.004	151.26	1.378	s
BI-212	1	2906.96	726.77	12.33	86.67	0.048	15.27	1.104	
PA-234M	1	3059.02	764.77	35.13	-0.23	0.000	3631.33	1.411	s
EU-152	1	3115.64	778.92	41.84	0.00	0.000	914.74	1.420	s
BI-212	1	3143.44	785.87	33.56	5.09	0.003	166.81	1.425	
CS-134	1	3171.33	792.83	25.51	-6.18	-0.003	122.36	1.433	s
CS-134	1	3217.44	804.36	27.54	-3.86	-0.002	198.88	1.437	s
TL-208	1	3439.15	859.75	5.67	48.33	0.027	19.20	1.172	
EU-154	1	3491.00	872.71	19.26	-0.88	0.000	712.99	1.490	s
Pa-234	1	3520.26	880.02	26.19	-3.71	-0.002	201.91	1.495	s
Pa-234	1	3533.38	883.30	20.91	-0.54	0.000	1212.01	1.497	s

AC-228	1	3643.67	910.85	10.67	158.33	0.088	9.49	1.212	
Pa-234	1	3782.24	945.47	16.30	5.49	0.003	112.46	1.543	s
EU-152	1	3848.91	962.13	34.87	-2.82	-0.002	301.83	1.556	s
AC-228	1	3875.39	968.74	0.00	100.00	0.056	10.00	0.945	s
EU-154	1	3986.55	996.51	22.25	-4.85	-0.003	144.90	1.579	s
PA-234M	1	4003.24	1000.68	10.96	3.57	0.002	141.43	1.582	s
EU-154	1	4020.56	1005.00	21.79	-0.68	0.000	985.07	1.585	s
EU-152	1	4444.21	1110.83	21.22	-1.37	-0.001	484.30	1.659	s
BI-214	1	4481.54	1120.15	4.65	46.35	0.026	14.00	0.562	s
CO-60	1	4690.12	1172.25	24.11	-2.27	-0.001	312.92	1.701	s
EU-154	1	5096.73	1273.79	19.06	-2.88	-0.002	222.14	1.768	s
CO-60	1	5332.08	1332.56	16.61	-0.64	0.000	904.10	1.806	s
EU-152	1	5633.98	1407.94	5.99	6.70	0.004	64.54	1.854	s
K-40	1	5844.28	1460.45	2.83	277.17	0.154	5.98	1.746	
BI-214	1	7059.43	1763.77	4.06	20.36	0.011	26.21	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak MDA Code	Peak Comments	
AM-241	T	1	-8.340E-001	59.54	-8.340E-001	& (	5.161E+000G		1.6E+005	35.90
PB-210	N	1	8.253E+000	46.54	8.253E+000	% (P	5.569E+001G		8.1E+003	4.25
EU-152	T F	1	7.197E-001	344.29	7.197E-001	% (	4.089E+000G		4.9E+003	26.50
			7.197E-001	121.78	7.081E-002	&	3.872E+000G		4.9E+003	28.58
			7.197E-001	778.92	0.000E+000	&	1.653E+001G		4.9E+003	12.94
			7.197E-001	964.11	-1.503E+000	%	1.609E+001G		4.9E+003	14.61
			7.197E-001	1112.07	-8.771E-001	%	1.552E+001G		4.9E+003	13.64
			7.197E-001	1408.00	3.412E+000	%	7.192E+000G		4.9E+003	21.00
CO-60	T F	1	-6.570E-002	1332.50	-6.570E-002	% (	2.215E+000G		1.9E+003	99.98
			-6.570E-002	1173.24	-2.082E-001	&	2.346E+000G		1.9E+003	99.90
RA-224	N	1	5.442E+001	240.99	5.442E+001	(	3.079E+001G		7.0E+002	4.10
EU-154	T F I	1	-5.138E-001	873.23	-5.138E-001	% (	1.352E+001G		3.1E+003	12.27
			-5.138E-001	123.10	2.751E-002	&	2.508E+000G		3.1E+003	40.79
			-5.138E-001	1274.54	-8.047E-001	%	6.436E+000G		3.1E+003	35.19
			-5.138E-001	723.36	-2.196E+000	%	1.143E+001G		3.1E+003	20.22
			-5.138E-001	1004.77	-3.018E-001	%	1.093E+001G		3.1E+003	18.01
			-5.138E-001	996.33	-3.654E+000	%	1.861E+001G		3.1E+003	10.60
BI-212	N	1	4.506E+001	727.33	4.506E+001	(	9.918E+000G		7.0E+002	11.82
			4.506E+001	785.51	3.037E+001	%	1.771E+002G		7.0E+002	1.10
AC-228	N	1	4.374E+001	911.07	4.051E+001	(	4.587E+000G		2.1E+003	29.00
			4.374E+001	968.97	4.472E+001	(	3.296E+000G		2.1E+003	17.46
			4.374E+001	338.32	5.015E+001	(	9.348E+000G		2.1E+003	12.01
			4.374E+001	93.35	4.374E+001	E	1.912E+001X	A	2.1E+003	5.56
I-131	T F I	1	-4.226E-002	364.48	-4.226E-002	% (	1.476E+000G		8.0E+000	81.70
			-4.226E-002	284.30	-2.559E+000	%	1.616E+001G		8.0E+000	6.14
			-4.226E-002	636.97	-9.206E-001	%	1.992E+001G		8.0E+000	7.17
			4.063E+001	300.03	5.440E+001	+	2.735E+001G		7.0E+002	3.28
PB-212	N	1	4.063E+001	238.63	4.063E+001	(P	2.089E+000G		7.0E+002	43.30
PA-234	N	1	3.421E+001	1001.00	3.421E+001	% (	1.738E+002G		1.6E+012	[illegible].84
			3.421E+001	766.41	-5.051E+000	%	6.626E+002G		1.6E+012	[illegible].29
CS-137	T F I	1	3.115E-001	661.66	3.115E-001	% (	1.504E+000G		1.1E+004	85.21
TH-234	N	1	2.896E+001	63.29	2.573E+001	% (P	3.263E+001G		1.6E+012	4.82
			2.896E+001	92.59	3.176E+001	(P	2.503E+001G		1.6E+012	5.58
K-40	N	1	2.871E+002	1460.83	2.871E+002	(P	1.093E+001G		4.7E+011	10.67
BE-7	N P C	1	2.547E-001	477.60	2.547E-001	% (	1.283E+001G		5.3E+001	10.52
EU-155	T F I	1	2.439E+000	105.31	2.439E+000	% (	5.250E+000G		1.8E+003	21.20
			2.439E+000	86.54	4.750E-001	&	4.927E+000G		1.8E+003	30.70
PB-214	N	1	2.330E+001	351.93	2.252E+001	@ (P	3.562E+000G		5.8E+005	37.60
			2.330E+001	295.09	2.497E+001	(P	6.263E+000G		5.8E+005	19.30
			2.330E+001	242.00	2.292E+001	(	1.795E+001G		5.8E+005	7.43
CS-134	T F I	1	-2.232E-001	604.71	-2.232E-001	% (	1.761E+000G		7.5E+002	97.62
			-2.232E-001	795.87	-4.790E-001	%	2.034E+000G		7.5E+002	85.53
			-2.232E-001	569.32	-2.232E-001	%	1.159E+001G		7.5E+002	15.38
			-2.232E-001	801.95	-2.964E+000	%	2.086E+001G		7.5E+002	8.69

				-2.232E-001	563.24	-1.808E+000	%			1.771E+001G	7.5E+002	8.35
BI-214		N	1	1.793E+001	609.31	1.812E+001		(	P	2.811E+000G	5.8E+005	46.09
				1.793E+001	1120.29	2.705E+001	+		P	7.441E+000G	5.8E+005	15.10
				1.793E+001	1764.49	1.736E+001	?	(		1.031E+001G	5.8E+005	15.40
TL-208	F	N	1	1.669E+001	583.02	1.669E+001		(	P	1.194E+000G	7.0E+002	84.50
				1.669E+001	277.28	3.788E+001	+			1.495E+001G	7.0E+002	6.31
				1.669E+001	860.56	2.753E+001	+			7.863E+000G	7.0E+002	12.42
				-1.372E+000	569.47	-1.372E+000	%			2.161E+001G	1.6E+012	8.20
				-1.372E+000	946.02	3.135E+000	%			1.230E+001G	1.6E+012	13.40
				-1.372E+000	883.24	-4.044E-001	%			1.809E+001G	1.6E+012	9.60
				-1.372E+000	880.53	-4.458E+000	%			3.192E+001G	1.6E+012	6.00
Pa-234		N	1	-1.372E+000	131.29	-1.372E+000	%	(		6.230E+000G	1.6E+012	18.00
U-235		N	1	1.183E+000	143.79	1.183E+000	&	(		1.069E+001G	2.6E+011	10.96
				1.183E+000	205.33	-1.284E-001	%			2.311E+001G	2.6E+011	5.01
				1.183E+000	163.38	4.848E+000	%			2.148E+001G	2.6E+011	5.08
				1.183E+000	93.35	1.183E+000	%		E	2.249E+001X	2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	2.547E-001	2.549E-001	1,403.92	1,403.92	1.283E+001
K-40		2.871E+002	2.871E+002	6.04	6.71	1.093E+001
CO-60	<	-6.570E-002	-6.570E-002	904.10	904.10	2.215E+000
I-131	<	-4.226E-002	-4.252E-002	985.52	985.52	1.476E+000
CS-134	<	-2.232E-001	-2.232E-001	225.07	225.09	1.761E+000
EU-154	<	-5.138E-001	-5.138E-001	712.99	712.99	1.352E+001
EU-155	<	2.439E+000	2.439E+000	65.19	65.28	5.250E+000
PB-214		2.330E+001	2.330E+001	10.12	10.52	3.562E+000
BI-212		4.506E+001	4.507E+001	15.27	15.54	9.918E+000
BI-214		1.793E+001	1.793E+001	9.99	10.40	2.811E+000
TH-234		2.896E+001	2.896E+001	24.66	24.94	3.263E+001
PA-234M	<	3.421E+001	3.421E+001	141.43	141.46	1.738E+002
CS-137	<	3.115E-001	3.115E-001	136.98	137.02	1.504E+000
EU-152	<	7.197E-001	7.197E-001	163.95	163.97	4.089E+000
TL-208		1.669E+001	1.670E+001	6.79	7.38	1.194E+000
RA-224		5.442E+001	5.442E+001	19.23	19.46	3.079E+001
PB-210	<	8.253E+000	8.253E+000	193.71	193.75	5.569E+001
PB-212		4.063E+001	4.063E+001	3.87	4.88	2.089E+000
AC-228		4.374E+001	4.375E+001	5.96	6.61	4.587E+000
Pa-234	<	-1.372E+000	-1.372E+000	134.81	134.84	6.230E+000
U-235	<	1.183E+000	1.183E+000	265.99	266.01	1.069E+001
AM-241	<	-8.340E-001	-8.340E-001	183.74	183.78	5.161E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 557.89 Bq/sample

Analyzed by: _____

403293

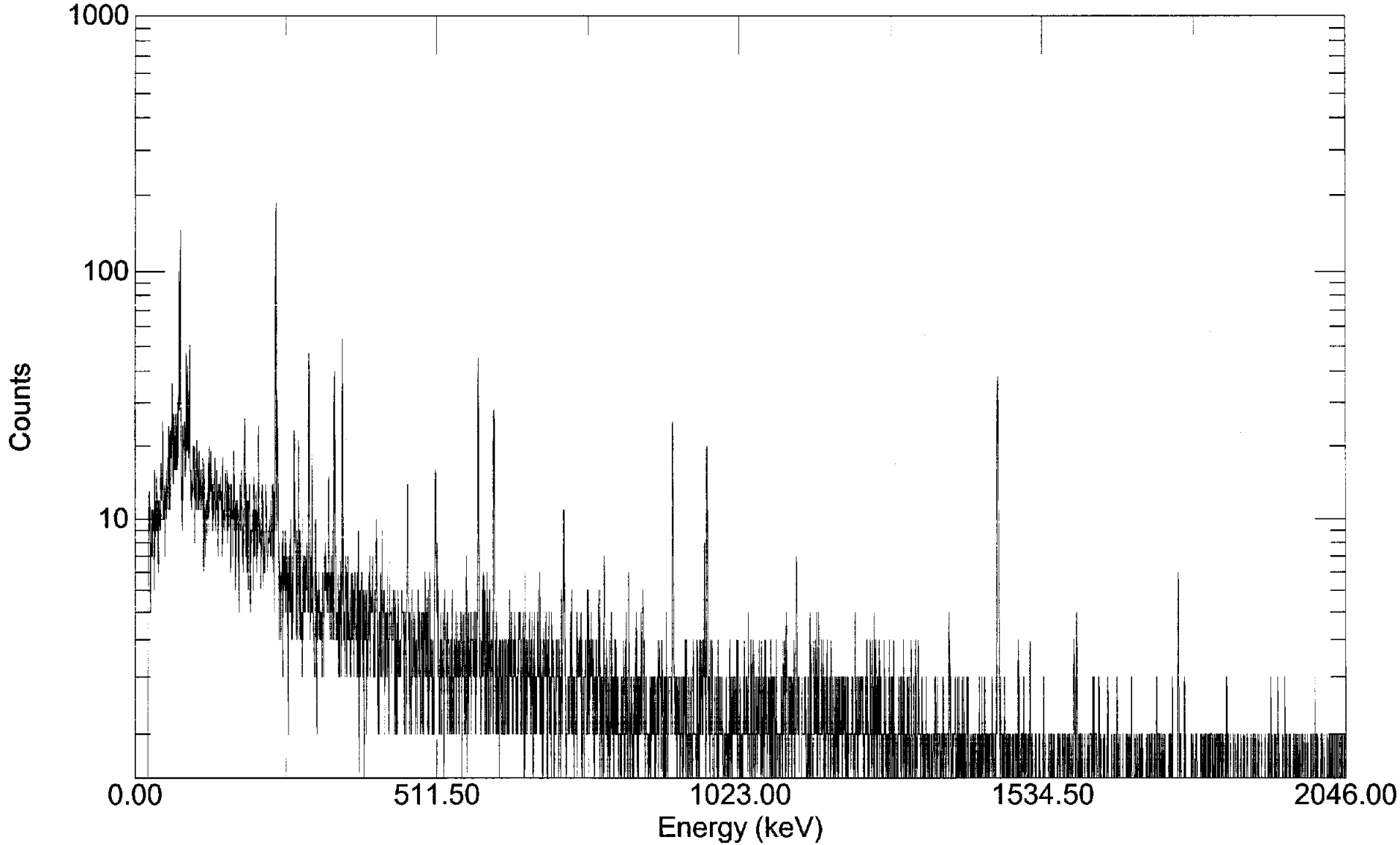
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKCF1AC

7357010_KEKCF1AC_F7L200251-010



Acquired: 23-Dec-2007 1:42:39 PM
File: C:\User\spectra\KEKCF1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.86 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,971

Sample Description: 7357010_KEKCH1AC_F7L200251-011

Spectrum Filename: KEKCH1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:43:08PM		
Live Time:	1800.00	Real Time:	1961.56
Dead Time:	8.24 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1559

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.76	74.65	405.17	402.83	0.224	10.98	0.711	PB-214	
307.14	76.99	381.00	486.00	0.270	9.22	0.797	PB-214	
334.96	83.95	247.50	83.50	0.046	28.80	0.650	TA-182	
347.06	86.97	440.72	46.28	0.026	65.81	0.991		s
358.26	89.77	161.33	145.67	0.081	16.85	0.841	PB-214	sM
612.19	153.20	93.33	83.67	0.046	23.75	0.753	CS-136	
742.25	185.70	156.00	151.00	0.084	20.21	1.008	U-235	s
836.31	209.20	62.00	121.00	0.067	12.94	0.686	AC-228	
1081.42	270.44	50.67	111.33	0.062	15.48	0.714	AC-228	s
2043.03	510.73	52.50	168.50	0.094	13.63	1.072	TL-208	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.31	46.56	177.26	54.74	0.030	38.42	0.802	
AM-241	1	237.25	59.54	298.98	-3.31	-0.002	2431.75	0.761	s
TH-234	1	252.80	63.42	256.83	106.17	0.059	25.33	0.758	s
EU-155	1	347.38	87.05	327.56	182.05	0.101	15.89	0.788	s
TH-234	1	369.56	92.59	277.01	68.99	0.038	26.67	0.795	D
U-235	1	372.61	93.35	262.72	12.80	0.007	22.34	0.795	s D
AC-228	1	372.61	93.35	362.13	52.26	0.029	48.32	0.795	D
EU-155	1	420.49	105.31	218.96	40.52	0.023	53.98	0.808	
EU-152	1	486.61	121.83	224.65	-2.75	-0.002	773.25	0.824	s
EU-154	1	493.53	123.56	214.40	3.44	0.002	603.60	0.826	s
Pa-234	1	524.63	131.33	268.08	8.96	0.005	260.50	0.834	s
U-235	1	571.81	143.12	177.98	24.21	0.013	72.84	0.847	
U-235	1	654.58	163.79	151.79	22.00	0.012	74.97	0.867	s
U-235	1	820.73	205.30	138.44	5.61	0.003	299.77	0.909	s
PB-212	1	954.31	238.68	179.31	1181.69	0.656	3.78	0.953	
RA-224	1	963.54	240.99	127.81	78.19	0.043	23.37	0.944	D
PB-214	1	967.59	242.00	171.46	50.54	0.028	39.25	0.945	D
TL-208	1	1107.76	277.02	99.67	93.33	0.052	25.69	1.251	s
I-131	1	1138.42	284.68	71.67	6.90	0.004	177.58	0.987	s
PB-214	1	1180.37	295.16	39.91	140.09	0.078	11.72	0.889	
PB-212	1	1200.54	300.20	45.50	104.50	0.058	16.83	0.952	s
AC-228	1	1353.15	338.33	74.67	231.33	0.129	11.06	0.970	s
EU-152	1	1379.44	344.90	48.71	5.21	0.003	194.36	1.045	
PB-214	1	1406.99	351.79	55.21	244.79	0.136	9.02	1.231	s
I-131	1	1449.80	362.48	42.87	-1.62	-0.001	578.63	1.065	s
BE-7	1	1910.04	477.50	51.38	-2.62	-0.001	392.09	1.173	s
CS-134	1	2253.16	563.25	48.12	0.44	0.000	2236.00	1.252	s
CS-134	1	2277.45	569.32	42.77	0.00	0.000	824.62	1.258	s D
Pa-234	1	2278.05	569.47	38.89	1.35	0.001	151.97	1.258	s D
TL-208	1	2333.47	583.32	21.08	345.92	0.192	6.01	1.278	
CS-134	1	2420.54	605.08	36.97	4.99	0.003	177.98	1.290	s
BI-214	1	2438.37	609.54	15.73	159.27	0.088	8.84	1.347	s
I-131	1	2545.58	636.34	42.48	0.14	0.000	6372.12	1.319	s
CS-137	1	2646.89	661.66	68.25	-6.25	-0.003	1113.55	1.342	s
EU-154	1	2899.77	724.87	60.64	-12.49	-0.007	92.63	1.397	s
BI-212	1	2910.27	727.49	28.69	64.15	0.036	17.19	1.400	s
PA-234M	1	3066.35	766.51	44.43	-0.13	0.000	7465.04	1.434	s
EU-152	1	3117.26	779.24	32.48	-5.07	-0.003	165.13	1.445	s
BI-212	1	3144.51	786.05	30.15	6.44	0.004	126.89	1.451	s
CS-134	1	3183.78	795.87	23.44	0.00	0.000	684.69	1.460	s
CS-134	1	3206.35	801.51	31.62	-3.32	-0.002	245.82	1.465	s
TL-208	1	3443.73	860.85	22.30	29.58	0.016	29.12	1.516	
EU-154	1	3488.55	872.06	29.22	-2.99	-0.002	262.08	1.527	s
Pa-234	1	3521.90	880.40	31.89	-3.38	-0.002	242.21	1.533	s
Pa-234	1	3534.22	883.48	17.13	5.59	0.003	113.03	1.535	s
AC-228	1	3645.57	911.31	11.67	222.33	0.124	7.82	1.524	

Pa-234	1	3780.63	945.08	20.49	6.51	0.004	105.80	1.588	s
EU-152	1	3850.31	962.51	29.13	1.15	0.001	670.39	1.603	s
AC-228	1	3873.75	968.36	7.33	171.67	0.095	8.89	1.222	s
EU-154	1	3983.74	995.87	28.72	-5.03	-0.003	157.04	1.630	s
PA-234M	1	4004.26	1001.00	49.88	0.00	0.000	998.75	1.633	s
EU-154	1	4016.75	1004.12	21.53	-0.59	0.000	1120.62	1.637	s
EU-152	1	4446.48	1111.58	29.34	-2.02	-0.001	386.50	1.723	s
BI-214	1	4482.32	1120.54	28.23	35.04	0.019	27.30	1.730	s
CO-60	1	4692.08	1172.99	21.86	4.55	0.003	152.70	1.772	s
EU-154	1	5097.03	1274.27	25.08	-2.99	-0.002	244.19	1.850	s
CO-60	1	5331.71	1332.97	15.77	4.95	0.003	121.96	1.894	s
EU-152	1	5630.45	1407.69	15.36	0.76	0.000	740.40	1.950	s
K-40	1	5843.59	1461.00	0.00	232.00	0.129	6.57	1.730	
BI-214	1	7059.21	1765.14	1.85	31.15	0.017	17.41	0.667	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
Pa-234	N	1	7.849E-001	131.29	7.849E-001	%	(		6.920E+000	G		1.6E+012	18.00
			7.849E-001	569.47	7.849E-001	&			1.853E+001	G		1.6E+012	8.20
			7.849E-001	946.02	3.554E+000	%			1.299E+001	G		1.6E+012	13.40
			7.849E-001	883.24	4.023E+000	&			1.585E+001	G		1.6E+012	9.60
			7.849E-001	880.53	-3.890E+000	%			3.337E+001	G		1.6E+012	6.00
I-131	T F I	1	-6.326E-002	364.48	-6.326E-002	&	(		1.301E+000	G		8.0E+000	81.70
			-6.326E-002	284.30	2.869E+000	%			1.753E+001	G		8.0E+000	6.14
			-6.326E-002	636.97	1.064E-001	&			2.431E+001	G		8.0E+000	7.17
			5.993E+001	300.03	8.534E+001	*			2.788E+001	G		7.0E+002	3.28
PB-212	N	1	5.993E+001	238.63	5.993E+001		(	P	3.302E+000	G		7.0E+002	43.30
			5.973E-001	1408.00	3.648E-001	%			1.010E+001	G		4.9E+003	21.00
EU-152	T F	1	5.973E-001	344.29	5.973E-001	%	(		4.037E+000	G		4.9E+003	26.50
			5.973E-001	121.78	-1.502E-001	&			3.964E+000	G		4.9E+003	28.58
			5.973E-001	778.92	-2.443E+000	%			1.411E+001	G		4.9E+003	12.94
			5.973E-001	964.11	5.845E-001	%			1.416E+001	G		4.9E+003	14.61
			5.973E-001	1112.07	-1.231E+000	%			1.707E+001	G		4.9E+003	13.64
AC-228	N	1	5.531E+001	911.16	5.437E+001		(		4.555E+000	G		2.1E+003	29.00
			5.531E+001	968.97	7.330E+001	+			6.545E+000	G		2.1E+003	17.46
			5.531E+001	338.32	5.756E+001	*	(		1.069E+001	G		2.1E+003	12.01
			5.531E+001	93.35	1.519E+001	-	}	E	2.107E+001	G	A	2.1E+003	5.56
CO-60	T F	1	4.786E-001	1332.50	4.786E-001	&	(		2.050E+000	G		1.9E+003	99.98
			4.786E-001	1173.24	3.965E-001	%			2.135E+000	G		1.9E+003	99.90
TH-234	N	1	4.301E+001	63.29	4.301E+001	*	(	P	3.135E+001	G		1.6E+012	4.82
			4.301E+001	92.59	2.003E+001	-		P	2.330E+001	G		1.6E+012	5.58
RA-224	N	1	4.222E+001	240.99	4.222E+001		(		2.991E+001	G		7.0E+002	4.10
PB-210	N	1	4.019E+001	46.54	4.019E+001	%	(	P	4.755E+001	G		8.1E+003	4.25
CS-137	T F I	1	-3.992E-001	661.66	-3.992E-001	%	(	P	2.632E+000	G		1.1E+004	85.21
U-235	N	1	3.562E+000	143.79	3.562E+000	%	(	P	9.548E+000	G		2.6E+011	10.96
			3.562E+000	205.33	2.187E+000	%			2.245E+001	G		2.6E+011	5.01
			3.562E+000	163.38	7.355E+000	%		P	2.010E+001	G		2.6E+011	5.08
			3.562E+000	93.35	3.562E+000	!		E	2.177E+001	X		2.6E+011	5.81
Bi-212	N	1	3.198E+001	727.33	3.198E+001		(		1.379E+001	G		7.0E+002	11.82

				3.198E+001	785.51	3.676E+001	%			1.616E+002G	7.0E+002	1.10
EU-155	T F I		1	3.004E+000	105.31	3.004E+000	%	(		5.312E+000G	1.8E+003	21.20
				3.004E+000	86.54	9.847E+000	*			4.708E+000G	A 1.8E+003	30.70
CS-134	T F I		1	2.577E-001	604.71	2.577E-001	%	(		1.602E+000G	7.5E+002	97.62
				2.577E-001	795.87	0.000E+000	&			1.876E+000G	7.5E+002	85.53
				2.577E-001	569.32	0.000E+000	&		}	1.022E+001G	7.5E+002	15.38
				2.577E-001	801.95	-2.440E+000	%			2.126E+001G	7.5E+002	8.69
				2.577E-001	563.24	2.495E-001	&			1.988E+001G	7.5E+002	8.35
K-40		N	1	2.268E+002	1460.83	2.268E+002		(		7.204E+000G	4.7E+011	10.67
TL-208	F	N	1	1.999E+001	583.02	1.999E+001		(	P	1.393E+000G	7.0E+002	84.50
				1.999E+001	277.28	3.693E+001	*			1.948E+001G	7.0E+002	6.31
				1.999E+001	860.56	1.612E+001	-			1.347E+001G	7.0E+002	12.42
PB-214		N	1	1.983E+001	351.93	2.017E+001	*	(	P	3.076E+000G	5.8E+005	37.60
				1.983E+001	295.09	1.915E+001		(	P	4.396E+000G	5.8E+005	19.30
				1.983E+001	242.00	1.511E+001	-			1.905E+001G	5.8E+005	7.43
AM-241	T		1	-1.885E-001	59.54	-1.885E-001	*	(	P	4.739E+000G	1.6E+005	35.90
BI-214		N	1	1.800E+001	609.31	1.753E+001	@	(	P	2.332E+000G	5.8E+005	46.09
				1.800E+001	1120.29	1.946E+001	?	(		1.525E+001G	5.8E+005	15.10
				1.800E+001	1764.49	2.484E+001	+		P	7.211E+000G	5.8E+005	15.40
EU-154	T F I		1	-1.670E+000	873.23	-1.670E+000	%	(		1.558E+001G	3.1E+003	12.27
				-1.670E+000	123.10	1.320E-001	%			2.718E+000G	3.1E+003	40.79
				-1.670E+000	1274.54	-7.901E-001	%			6.894E+000G	3.1E+003	35.19
				-1.670E+000	723.36	-3.622E+000	%			1.131E+001G	3.1E+003	20.22
				-1.670E+000	1004.77	-2.513E-001	&			1.037E+001G	3.1E+003	18.01
				-1.670E+000	996.33	-3.620E+000	%			1.991E+001G	3.1E+003	10.60
BE-7		N P C	1	-1.019E+000	477.60	-1.019E+000	%	(		1.405E+001G	5.3E+001	10.52
PA-234M		N	1	0.000E+000	1001.00	0.000E+000	%	(		3.257E+002G	1.6E+012	.84
				0.000E+000	766.41	-2.645E+000	%			7.070E+002G	1.6E+012	.29

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-1.019E+000	-1.020E+000	392.09	392.10	1.405E+001
K-40		2.268E+002	2.268E+002	6.57	7.19	7.204E+000
CO-60	#	4.786E-001	4.786E-001	121.96	121.99	2.050E+000
I-131	#	-6.326E-002	-6.365E-002	578.63	578.64	1.301E+000
CS-134	#	2.577E-001	2.577E-001	177.98	178.01	1.602E+000
EU-154	#	-1.670E+000	-1.670E+000	262.08	262.10	1.558E+001
PB-214		1.983E+001	1.983E+001	7.54	8.07	3.076E+000
BI-212	#	3.198E+001	3.198E+001	17.19	17.43	1.379E+001
BI-214		1.800E+001	1.800E+001	9.22	9.66	2.332E+000
Pa-234	#	7.849E-001	7.849E-001	260.50	260.52	6.920E+000
TH-234		4.301E+001	4.301E+001	28.71	28.95	3.135E+001
CS-137	#	-3.992E-001	-3.992E-001	2,227.11	2,227.11	2.632E+000
EU-152	#	5.973E-001	5.973E-001	194.36	194.38	4.037E+000
EU-155	#	3.004E+000	3.004E+000	53.98	54.08	5.312E+000
TL-208		1.999E+001	1.999E+001	6.08	6.73	1.393E+000
PB-210		4.019E+001	4.019E+001	50.54	50.69	4.755E+001
PB-212		5.993E+001	5.993E+001	3.81	4.84	3.302E+000
RA-224		4.222E+001	4.222E+001	23.37	23.56	2.991E+001
AC-228		5.531E+001	5.531E+001	6.77	7.36	4.555E+000
PA-234M	#			998.75	998.76	3.257E+002
U-235	#	3.562E+000	3.562E+000	80.29	80.34	9.548E+000
AM-241	#	-1.885E-001	-1.885E-001	4,863.49	4,863.49	4.739E+000

= All peaks for activity calculation had bad shape

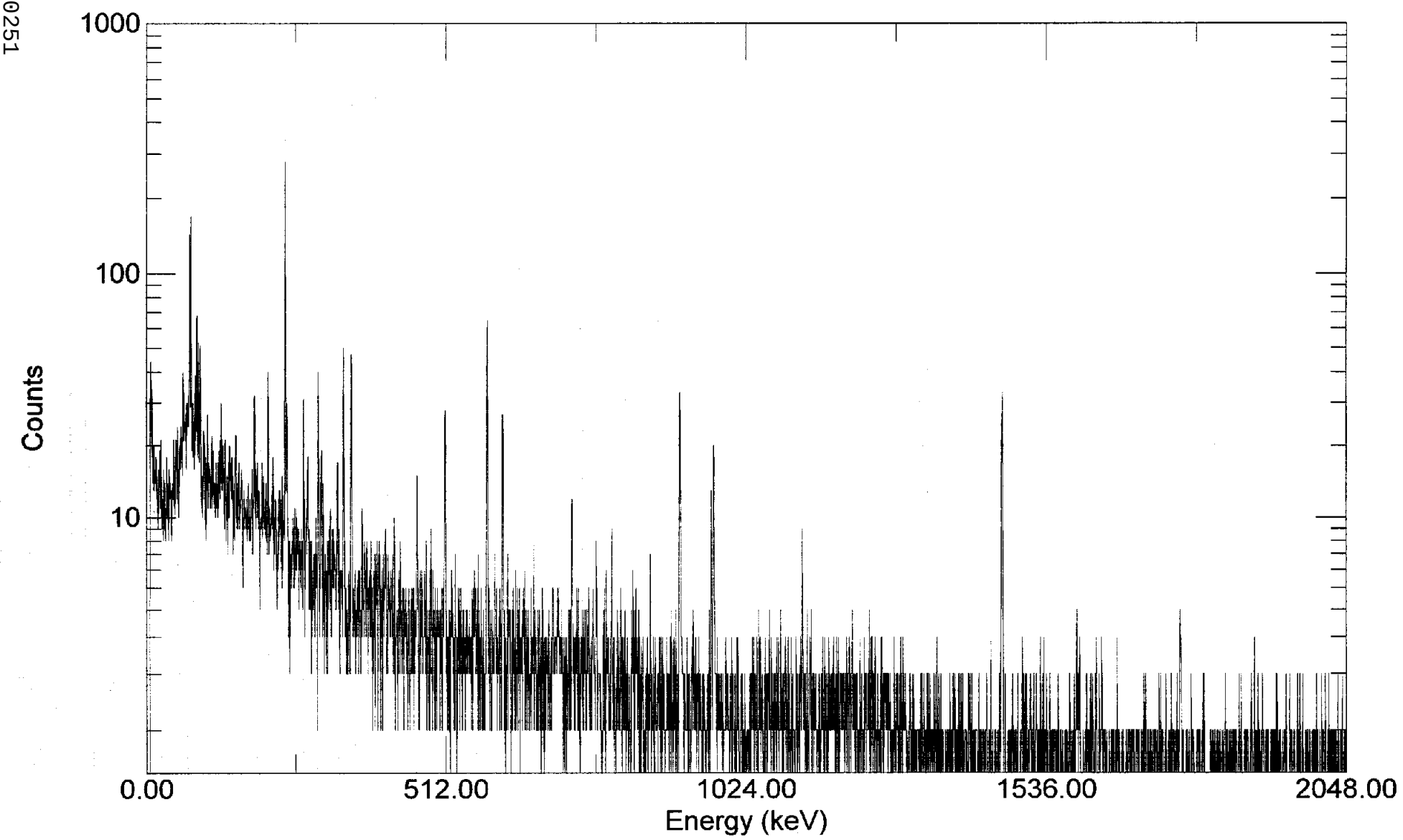
Total Activity (37.74 to 2,000.57 keV) 485.05 Bq/sample

Analyzed by: 403293

Laboratory: STL- St Louis

KEKCH1AC

7357010_KEKCH1AC_F7L200251-011



Acquired: 23-Dec-2007 1:43:07 PM
File: C:\User\spectra\KEKCH1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1961.56 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,970

Sample Description: 7357010_KEKCJ1AC_F7L200251-012

Spectrum Filename: KEKCJ1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 1:43:41PM		
Live Time:	1800.00	Real Time:	1818.42
Dead Time:	1.01 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2047

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.71	74.64	291.00	205.00	0.114	18.05	0.848	PB-214	
307.85	77.18	276.67	384.33	0.214	10.35	1.032	PB-214	
742.67	185.86	137.50	120.50	0.067	23.92	0.922	RA-226	s
1353.35	338.50	104.63	15.37	0.009	97.49	0.570		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.85	46.43	105.77	65.23	0.036	21.29	0.945	s
AM-241	1	238.31	59.80	198.71	23.78	0.013	86.29	0.846	s
TH-234	1	252.48	63.34	256.66	35.00	0.019	41.20	0.850	s
EU-155	1	347.46	87.08	272.95	73.45	0.041	33.88	0.874	s
TH-234	1	371.81	93.16	331.35	30.18	0.017	44.35	0.881	s
U-235	1	372.56	93.35	295.51	0.00	0.000	2186.32	0.882	s D
AC-228	1	372.56	93.35	235.14	65.36	0.036	2.53	0.882	s D
EU-155	1	422.31	105.79	132.99	30.05	0.017	57.26	0.894	s
EU-152	1	490.56	122.84	130.77	5.13	0.003	318.41	0.912	s
EU-154	1	491.55	123.09	131.16	9.18	0.005	179.42	0.913	s
Pa-234	1	524.25	131.27	193.58	-6.79	-0.004	292.50	0.922	s
U-235	1	576.58	144.35	129.85	23.86	0.013	70.58	0.935	s
U-235	1	648.93	162.43	87.78	10.52	0.006	129.71	0.955	s
U-235	1	819.39	205.03	102.32	7.10	0.004	204.95	0.999	s
PB-212	1	953.80	238.63	108.67	515.33	0.286	5.12	1.034	D
RA-224	1	963.22	240.99	165.24	56.76	0.032	34.67	1.036	D
PB-214	1	967.26	242.00	99.43	62.57	0.035	25.84	1.037	D
TL-208	1	1102.89	275.90	65.12	5.94	0.003	196.48	1.074	s
I-131	1	1137.06	284.44	81.16	-0.45	0.000	2815.17	1.081	s
PB-214	1	1180.09	295.20	47.50	163.50	0.091	11.63	1.352	s
PB-212	1	1200.14	300.21	81.05	23.61	0.013	57.72	1.097	s
AC-228	1	1353.80	338.62	57.19	76.29	0.042	18.10	1.136	s
EU-152	1	1379.20	344.96	53.56	12.85	0.007	85.27	1.142	
PB-214	1	1407.82	352.12	34.38	278.62	0.155	7.31	1.315	s
I-131	1	1458.66	364.83	59.95	-3.95	-0.002	281.42	1.163	s
BE-7	1	1909.47	477.51	28.15	4.77	0.003	163.97	1.277	s
CS-134	1	2248.57	562.27	22.99	7.36	0.004	99.24	1.363	s
CS-134	1	2276.76	569.32	25.06	-1.41	-0.001	-36.51	1.369	s D
Pa-234	1	2277.35	569.47	37.13	-1.00	-0.001	-125.72	1.369	s D
TL-208	1	2332.42	583.24	19.41	160.59	0.089	10.20	1.350	
CS-134	1	2426.69	606.80	41.75	-8.46	-0.005	113.30	1.403	s
BI-214	1	2436.73	609.31	2.13	186.87	0.104	7.27	1.441	s
I-131	1	2554.52	638.75	33.09	-4.33	-0.002	193.76	1.435	s
CS-137	1	2646.14	661.66	42.37	19.87	0.011	49.43	1.459	s
EU-154	1	2887.24	721.92	46.25	-6.78	-0.004	147.04	1.519	s
BI-212	1	2908.60	727.27	36.50	22.94	0.013	42.70	1.523	s
PA-234M	1	3065.20	766.41	38.00	0.00	0.000	871.78	1.561	s
EU-152	1	3111.04	777.87	24.27	1.19	0.001	593.39	1.573	s
BI-212	1	3144.54	786.24	25.11	1.94	0.001	372.00	1.579	s
CS-134	1	3183.03	795.87	30.23	0.00	0.000	777.50	1.589	s
CS-134	1	3207.92	802.09	27.22	-0.20	0.000	3733.21	1.595	s
TL-208	1	3442.29	860.68	25.48	8.35	0.005	92.19	1.650	s
EU-154	1	3492.03	873.11	25.57	2.60	0.001	281.63	1.662	s
Pa-234	1	3521.83	880.56	30.04	-1.68	-0.001	467.28	1.669	s
Pa-234	1	3532.73	883.29	32.17	-2.40	-0.001	340.64	1.672	s
AC-228	1	3644.85	911.31	36.83	79.24	0.044	15.60	1.698	s

Pa-234	1	3782.92	945.83	19.51	1.98	0.001	323.90	1.731	s
EU-152	1	3852.12	963.13	51.57	-5.27	-0.003	197.62	1.748	s
AC-228	1	3877.28	969.42	35.42	38.39	0.021	27.22	1.752	s
EU-154	1	3984.93	996.33	41.00	0.00	0.000	905.54	1.778	s
PA-234M	1	4002.89	1000.82	29.28	-0.19	0.000	4021.81	1.782	s
EU-154	1	4018.44	1004.71	25.86	2.31	0.001	318.04	1.785	s
EU-152	1	4448.02	1112.10	34.07	-3.29	-0.002	257.07	1.884	s
BI-214	1	4481.34	1120.43	31.56	9.03	0.005	94.04	1.891	s
CO-60	1	4692.58	1173.24	29.99	0.00	0.000	774.49	1.939	s
EU-154	1	5091.69	1273.02	19.75	0.10	0.000	6470.86	2.030	s
CO-60	1	5324.45	1331.21	23.44	-1.70	-0.001	410.55	2.081	s
EU-152	1	5631.62	1408.00	96.42	0.00	0.000	1388.69	2.147	s
K-40	1	5844.06	1461.11	0.00	346.00	0.192	5.38	1.798	
BI-214	1	7061.23	1765.43	9.24	18.63	0.010	32.69	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
CS-137	T F I	1	9.380E-001	661.66	9.380E-001	%	(P	1.560E+000G		1.1E+004	85.21
BI-212	N	1	8.473E+000	727.33	8.473E+000	*	(	1.140E+001G		7.0E+002	11.82
			8.473E+000	785.51	8.233E+000	%		1.105E+002G		7.0E+002	1.10
TL-208	F N	1	6.840E+000	583.02	6.840E+000		(P	9.898E-001G		7.0E+002	84.50
			6.840E+000	277.28	1.721E+000	&		1.168E+001G		7.0E+002	6.31
			6.840E+000	860.56	3.392E+000	&		1.065E+001G		7.0E+002	12.42
			-4.298E-001	880.53	-1.442E+000	%		2.422E+001G		1.6E+012	6.00
Pa-234	N	1	-4.298E-001	131.29	-4.298E-001	%	(	4.279E+000G		1.6E+012	18.00
			-4.298E-001	569.47	-4.298E-001	%		1.337E+001G		1.6E+012	8.20
			-4.298E-001	946.02	8.068E-001	%		9.507E+000G		1.6E+012	13.40
			-4.298E-001	883.24	-1.288E+000	%		1.565E+001G		1.6E+012	9.60
PB-210	N	1	3.895E+001	46.54	3.895E+001	*	(P	3.023E+001G		8.1E+003	4.25
CS-134	T F I	1	-3.223E-001	604.71	-3.223E-001	%	(	1.250E+000G		7.5E+002	97.62
			-3.223E-001	795.87	0.000E+000	&		1.562E+000G		7.5E+002	85.53
			-3.223E-001	569.32	-3.223E-001	%		5.966E+000G		7.5E+002	15.38
			-3.223E-001	801.95	-1.082E-001	&		1.476E+001G		7.5E+002	8.69
			-3.223E-001	563.24	3.076E+000	&		1.047E+001G		7.5E+002	8.35
K-40	N	1	2.599E+002	1460.83	2.599E+002		(	5.536E+000G		4.7E+011	10.67
U-235	N	1	2.545E+000	143.79	2.545E+000	%	(	5.953E+000G		2.6E+011	10.96
			2.545E+000	205.33	2.022E+000	%		1.420E+001G		2.6E+011	5.01
			2.545E+000	163.38	2.556E+000	&		1.127E+001G		2.6E+011	5.08
			2.545E+000	93.35	0.000E+000	%	} E	1.488E+001X		2.6E+011	5.81
RA-224	N	1	2.242E+001	240.99	2.242E+001		(	2.473E+001G		7.0E+002	4.10
PB-212	N	1	1.911E+001	238.63	1.911E+001		(P	1.902E+000G		7.0E+002	43.30
			1.911E+001	300.03	1.413E+001	%		2.672E+001G		7.0E+002	3.28
PB-214	N	1	1.668E+001	351.93	1.684E+001	@	(P	1.815E+000G		5.8E+005	37.60
			1.668E+001	295.09	1.638E+001	*	(	3.489E+000G		5.8E+005	19.30
			1.668E+001	242.00	1.368E+001	-		1.076E+001G		5.8E+005	7.43
EU-155	T F I	1	1.605E+000	105.31	1.605E+000	%	(	3.015E+000G		1.8E+003	21.20
			1.605E+000	86.54	2.872E+000			3.116E+000G	A	1.8E+003	30.70
BI-214	N	1	1.517E+001	609.31	1.517E+001	*	(P	7.727E-001G		5.8E+005	46.09
			1.517E+001	1120.29	3.783E+000	%		1.210E+001G		5.8E+005	15.10

			1.517E+001	1764.49	1.162E+001	-			1.052E+001G		5.8E+005	15.40
AC-228	N	1	1.370E+001	911.16	1.447E+001	@	(		5.659E+000G		2.1E+003	29.00
			1.370E+001	968.97	1.227E+001		(		9.732E+000G		2.1E+003	17.46
			1.370E+001	338.32	1.392E+001		(		6.923E+000G		2.1E+003	12.01
			1.370E+001	93.35	1.370E+001	!		E	1.555E+001G	A	2.1E+003	5.56
BE-7	N P C	1	1.363E+000	477.60	1.363E+000	%	(		7.848E+000G		5.3E+001	10.52
PA-234M	N	1	-1.307E+000	1001.00	-1.307E+000	%	(		1.915E+002G		1.6E+012	.84
			-1.307E+000	766.41	0.000E+000	%			4.883E+002G		1.6E+012	.29
CO-60	T F	1	-1.251E-001	1332.50	-1.251E-001	&	(		1.863E+000G		1.9E+003	99.98
			-1.251E-001	1173.24	0.000E+000	%			1.861E+000G		1.9E+003	99.90
I-131	T F I	1	-1.136E-001	364.48	-1.136E-001	%	(		1.114E+000G		8.0E+000	81.70
			-1.136E-001	284.30	-1.380E-001	%			1.361E+001G		8.0E+000	6.14
			-1.136E-001	636.97	-2.352E+000	&			1.602E+001G		8.0E+000	7.17
EU-154	T F I	1	1.083E+000	873.23	1.083E+000	&	(		1.093E+001G		3.1E+003	12.27
			1.083E+000	123.10	2.542E-001	%			1.552E+000G		3.1E+003	40.79
			1.083E+000	1274.54	1.957E-002	%			4.714E+000G		3.1E+003	35.19
			1.083E+000	723.36	-1.456E+000	%			7.392E+000G		3.1E+003	20.22
			1.083E+000	1004.77	7.389E-001	%			8.443E+000G		3.1E+003	18.01
			1.083E+000	996.33	0.000E+000	&			1.755E+001G		3.1E+003	10.60
			1.079E+000	778.92	4.253E-001	&			9.186E+000G		4.9E+003	12.94
			1.079E+000	964.11	-2.005E+000	%			1.377E+001G		4.9E+003	14.61
			1.079E+000	1112.07	-1.514E+000	&			1.378E+001G		4.9E+003	13.64
			1.079E+000	1408.00	0.000E+000	%			1.788E+001G		4.9E+003	21.00
EU-152	T F	1	1.079E+000	344.29	1.079E+000	%	(		3.093E+000G		4.9E+003	26.50
			1.079E+000	121.78	2.023E-001	%			2.209E+000G		4.9E+003	28.58
TH-234	N	1	1.062E+001	63.29	1.062E+001	%	(	P	2.348E+001G		1.6E+012	4.82
			1.062E+001	92.59	6.319E+000	%		P	1.833E+001G		1.6E+012	5.58
AM-241	T	1	1.028E+000	59.54	1.028E+000	*	(		2.955E+000G		1.6E+005	35.90

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
K-40		2.599E+002	2.599E+002	5.38	6.12	5.536E+000
CO-60	#	-1.251E-001	-1.251E-001	410.55	410.56	1.863E+000
I-131	#	-1.136E-001	-1.143E-001	281.42	281.44	1.114E+000
CS-134	#	-3.223E-001	-3.223E-001	113.30	113.34	1.250E+000
EU-154	#	1.083E+000	1.083E+000	281.63	281.65	1.093E+001
BE-7	#	1.363E+000	1.365E+000	163.97	164.00	7.848E+000
CS-137	#	9.380E-001	9.380E-001	51.29	51.37	1.560E+000
EU-152	#	1.079E+000	1.079E+000	85.27	85.31	3.093E+000
EU-155	#	1.605E+000	1.605E+000	57.26	57.36	3.015E+000
TL-208		6.840E+000	6.840E+000	10.35	10.75	9.898E-001
BI-212	#	8.473E+000	8.474E+000	42.70	42.80	1.140E+001
BI-214	#	1.517E+001	1.517E+001	7.36	7.90	7.727E-001
RA-224		2.242E+001	2.242E+001	34.67	34.80	2.473E+001
AC-228	#	1.370E+001	1.370E+001	12.07	12.41	5.659E+000
TH-234	#	1.062E+001	1.062E+001	65.63	65.74	2.348E+001
PA-234M	#	-1.307E+000	-1.307E+000	4,021.81	4,021.81	1.915E+002
U-235	#	2.545E+000	2.545E+000	70.58	70.65	5.953E+000
PB-210	#	3.895E+001	3.895E+001	29.15	29.41	3.023E+001
PB-212		1.911E+001	1.912E+001	5.22	6.01	1.902E+000
PB-214		1.668E+001	1.668E+001	6.89	7.46	1.815E+000
Pa-234	#	-4.298E-001	-4.298E-001	292.50	292.52	4.279E+000
AM-241	#	1.028E+000	1.028E+000	86.29	86.38	2.955E+000

= All peaks for activity calculation had bad shape

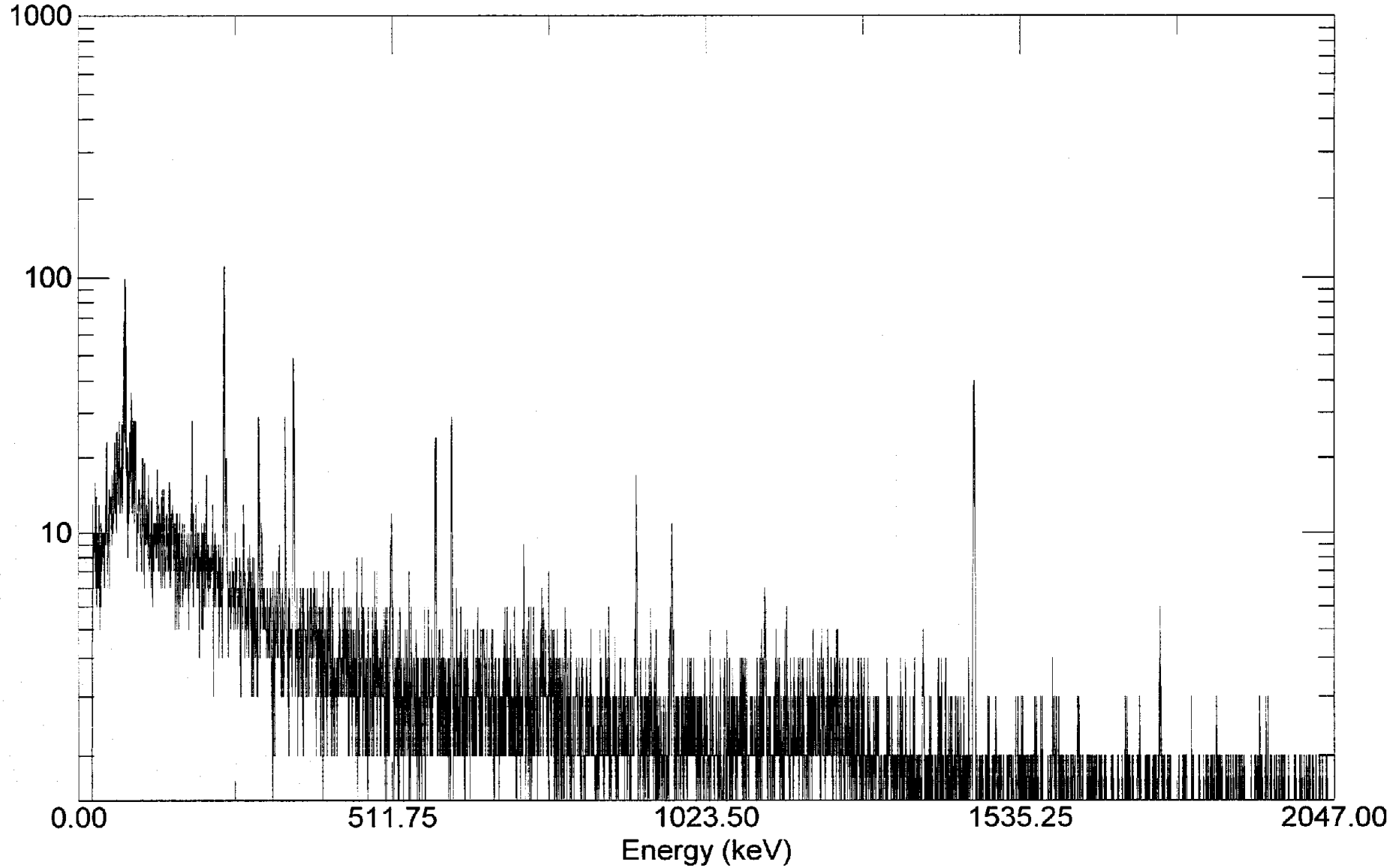
Total Activity (37.72 to 2,000.15 keV) 379.05 Bq/sample

Analyzed by: 403293

Laboratory: Test America

KEKCJ1AC

7357010_KEKCJ1AC_F7L200251-012



Acquired: 23-Dec-2007 1:43:40 PM
File: C:\User\spectra\KEKCJ1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1818.42 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,972

Sample Description: 7357010_KEKCK1AC_F7L200251-013

Spectrum Filename: KEKCK1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 2:23:28PM		
Live Time:	1800.00	Real Time:	1811.58
Dead Time:	0.64 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1260

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
184.56	46.35	204.84	19.16	0.011	108.07	0.639		s
298.22	74.77	378.67	302.33	0.168	13.60	0.938	PB-214	
307.75	77.15	323.00	473.00	0.263	8.75	0.655	PB-214	
347.67	87.13	196.14	201.86	0.112	12.08	1.004	PB-214	
358.90	89.94	190.67	123.33	0.069	20.89	0.683	PB-214	M
743.13	186.00	92.00	151.00	0.084	13.68	1.142	PA-234	s
836.12	209.25	161.04	143.96	0.080	15.00	1.000	AC-228	s
1081.33	270.55	91.67	126.33	0.070	19.39	0.748	AC-228	s
1178.96	294.96	285.46	59.54	0.033	42.17	1.056		s
1405.54	351.60	365.89	83.11	0.046	34.35	0.983	PB-214	s
1850.00	462.71	18.00	77.00	0.043	15.85	0.573	CS-138	s
2435.79	609.15	274.52	28.48	0.016	84.39	1.358		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.96	46.45	237.90	18.05	0.010	45.36	0.813	s
AM-241	1	236.29	59.29	328.55	4.70	0.003	547.12	0.824	s
TH-234	1	251.77	63.16	224.90	75.10	0.042	23.21	0.894	
EU-155	1	341.16	85.51	475.31	-72.01	-0.040	44.41	0.849	
TH-234	1	369.50	92.59	297.74	86.26	0.048	18.37	0.855	D
AC-228	1	372.54	93.35	267.78	136.62	0.076	1.83	0.855	D
U-235	1	372.54	93.35	271.54	7.16	0.004	38.73	0.855	s D
EU-155	1	421.60	105.61	228.92	46.95	0.026	47.85	0.866	s
EU-152	1	483.63	121.12	244.66	-10.63	-0.006	210.36	0.881	s
EU-154	1	492.00	123.22	245.59	10.53	0.006	212.81	0.882	s
Pa-234	1	522.59	130.86	317.44	-26.18	-0.015	98.23	0.890	s
U-235	1	573.14	143.50	242.92	13.22	0.007	131.18	0.901	s
U-235	1	651.11	162.99	223.45	-14.86	-0.008	179.06	0.919	s
U-235	1	823.17	206.01	162.68	12.02	0.007	129.27	0.957	s
PB-212	1	953.20	238.52	161.58	785.42	0.436	4.49	0.996	
RA-224	1	958.99	239.96	956.83	-229.82	-0.128	20.15	0.989	s
PB-214	1	965.72	241.65	284.70	74.48	0.041	30.97	0.990	s
TL-208	1	1109.19	277.52	116.00	101.00	0.056	27.61	1.250	s
I-131	1	1139.01	284.97	74.92	11.60	0.006	109.55	1.028	s
PB-214	1	1179.36	295.06	105.68	186.25	0.103	10.08	1.037	s
PB-212	1	1198.06	299.73	53.67	55.33	0.031	27.66	1.030	
AC-228	1	1351.10	337.99	121.91	269.09	0.149	12.38	0.703	s
EU-152	1	1377.14	344.50	87.60	-3.00	-0.002	444.63	1.081	s
PB-214	1	1406.20	351.76	111.40	287.91	0.160	7.45	1.088	s
I-131	1	1457.80	364.67	59.31	9.71	0.005	116.65	1.099	s
BE-7	1	1911.78	478.15	49.13	11.22	0.006	93.27	1.198	s
CS-134	1	2253.39	563.55	52.27	14.31	0.008	76.17	1.273	s
CS-134	1	2276.47	569.32	50.72	0.00	0.000	0.00	1.278	s D
Pa-234	1	2277.07	569.47	43.99	-4.73	-0.003	-190.32	1.278	s D
TL-208	1	2331.62	583.11	30.92	338.08	0.188	6.38	1.380	
CS-134	1	2418.04	604.71	527.04	0.00	0.000	3246.66	1.309	s
BI-214	1	2435.91	609.18	56.27	232.57	0.129	7.48	1.313	
I-131	1	2552.87	638.41	42.39	0.23	0.000	3996.01	1.337	s
CS-137	1	2647.07	661.96	42.97	19.24	0.011	53.31	1.358	s
EU-154	1	2905.98	726.68	62.15	11.90	0.007	98.05	1.411	s
BI-212	1	2907.59	727.08	40.82	53.93	0.030	21.59	1.414	
PA-234M	1	3072.11	768.21	35.28	29.99	0.017	33.44	1.447	s
EU-152	1	3118.95	779.92	41.85	-5.18	-0.003	181.90	1.458	s
BI-212	1	3139.89	785.15	35.43	13.12	0.007	69.84	1.463	s
CS-134	1	3178.31	794.76	29.55	17.91	0.010	49.01	1.472	s
CS-134	1	3205.49	801.55	38.38	6.87	0.004	133.10	1.477	s
TL-208	1	3440.82	860.38	8.67	54.33	0.030	18.46	1.281	
EU-154	1	3496.03	874.17	39.14	-3.21	-0.002	281.06	1.537	s
Pa-234	1	3525.63	881.57	30.12	0.19	0.000	4029.19	1.543	s
Pa-234	1	3538.31	884.74	24.33	2.89	0.002	248.79	1.546	s

AC-228	1	3643.61	911.06	11.81	204.19	0.113	7.42	1.560	
Pa-234	1	3783.07	945.92	35.08	1.81	0.001	468.07	1.598	s
EU-152	1	3857.55	964.54	42.91	19.69	0.011	52.17	1.613	s
AC-228	1	3875.91	969.13	36.41	89.33	0.050	13.62	1.617	s
EU-154	1	3991.05	997.91	33.76	-5.52	-0.003	154.94	1.640	s
PA-234M	1	4002.99	1000.89	22.45	11.30	0.006	66.34	1.643	s
EU-154	1	4023.06	1005.91	40.93	-3.27	-0.002	282.39	1.647	s
EU-152	1	4446.71	1111.80	34.75	-4.08	-0.002	210.08	1.735	s
BI-214	1	4480.06	1120.14	35.12	36.96	0.021	23.58	1.741	s
CO-60	1	4690.35	1172.70	42.02	-5.68	-0.003	166.76	1.784	s
EU-154	1	5098.41	1274.69	24.89	2.58	0.001	280.18	1.866	s
CO-60	1	5334.61	1333.72	29.53	-3.40	-0.002	232.73	1.912	s
EU-152	1	5631.56	1407.94	20.26	9.25	0.005	76.29	1.972	s
K-40	1	5842.14	1460.57	12.54	412.46	0.229	4.85	1.921	
BI-214	1	7057.39	1764.28	21.54	26.42	0.015	25.76	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
CS-137	T F I	1	8.425E-001	661.66	8.425E-001 %	(	1.456E+000G		1.1E+004	85.21
AC-228	N	1	3.284E+001	911.07	3.284E+001	(P	3.011E+000G		2.1E+003	29.00
			3.284E+001	968.97	2.492E+001 -	P	8.600E+000G		2.1E+003	17.46
			3.284E+001	338.32	5.147E+001 +	P	1.036E+001G		2.1E+003	12.01
			3.284E+001	93.35	3.284E+001 -	E	1.898E+001X	A	2.1E+003	5.56
PB-212	N	1	3.265E+001	238.63	3.244E+001	(P	2.558E+000G		7.0E+002	43.30
			3.265E+001	300.03	3.548E+001	(	2.363E+001G		7.0E+002	3.28
BE-7	N P C	1	3.155E+000	477.60	3.155E+000 %	(	9.949E+000G		5.3E+001	10.52
EU-155	T F I	1	2.904E+000	105.31	2.904E+000 *	(	4.528E+000G		1.8E+003	21.20
			2.904E+000	86.54	-3.207E+000 %		4.646E+000G		1.8E+003	30.70
I-131	T F I	1	2.885E-001	364.48	2.885E-001 %	(	1.147E+000G		8.0E+000	81.70
			2.885E-001	284.30	3.821E+000 %		1.418E+001G		8.0E+000	6.14
			2.885E-001	636.97	1.169E-001 %		1.675E+001G		8.0E+000	7.17
EU-152	T F	1	-2.636E-001	344.29	-2.636E-001 &	(	4.068E+000G		4.9E+003	26.50
			-2.636E-001	121.78	-4.893E-001 %		3.480E+000G		4.9E+003	28.58
			-2.636E-001	778.92	-1.675E+000 %		1.062E+001G		4.9E+003	12.94
			-2.636E-001	964.11	6.542E+000 %		1.104E+001G		4.9E+003	14.61
			-2.636E-001	1112.07	-1.608E+000 %		1.188E+001G		4.9E+003	13.64
			-2.636E-001	1408.00	2.817E+000 %		7.215E+000G		4.9E+003	21.00
K-40	N	1	2.545E+002	1460.83	2.545E+002	(P	1.186E+001G		4.7E+011	10.67
TH-234	N	1	2.294E+001	63.29	2.554E+001	(P	2.468E+001G		1.6E+012	4.82
			2.294E+001	92.59	2.069E+001	(P	1.994E+001G		1.6E+012	5.58
AM-241	T	1	2.273E-001	59.54	2.273E-001 &	(	4.214E+000G		1.6E+005	35.90
CO-60	T F	1	-2.084E-001	1332.50	-2.084E-001 %	(	1.720E+000G		1.9E+003	99.98
			-2.084E-001	1173.24	-3.175E-001 %		1.840E+000G		1.9E+003	99.90
			-1.938E+000	883.24	1.372E+000 %		1.222E+001G		1.6E+012	9.60
			-1.938E+000	880.53	1.465E-001 %		2.147E+001G		1.6E+012	6.00
Pa-234	N	1	-1.938E+000	131.29	-1.938E+000 &	(	6.346E+000G		1.6E+012	18.00
			-1.938E+000	569.47	-1.938E+000 %		1.376E+001G		1.6E+012	8.20
			-1.938E+000	946.02	6.478E-001 %		1.083E+001G		1.6E+012	13.40
			1.869E+001	295.09	2.005E+001	(P	5.450E+000G		5.8E+005	19.30
			1.869E+001	242.00	1.810E+001 *	(P	1.977E+001G		5.8E+005	7.43
PB-214	N	1	1.869E+001	351.93	1.811E+001 @	(P	3.264E+000G		5.8E+005	37.60
BI-212	N	1	1.819E+001	727.33	1.819E+001	(	1.096E+001G		7.0E+002	11.82
			1.819E+001	785.51	5.018E+001 %		1.164E+002G		7.0E+002	1.10
BI-214	N	1	1.777E+001	609.31	1.777E+001	(P	2.878E+000G		5.8E+005	46.09
			1.777E+001	1120.29	1.322E+001 -	P	1.084E+001G		5.8E+005	15.10
			1.777E+001	1764.49	1.318E+001 -	P	1.214E+001G		5.8E+005	15.40
U-235	N	1	1.647E+000	143.79	1.647E+000 *	(P	9.386E+000G		2.6E+011	10.96
			1.647E+000	205.33	3.893E+000 %	P	2.012E+001G		2.6E+011	5.01
			1.647E+000	163.38	-4.198E+000 %	P	2.044E+001G		2.6E+011	5.08
			1.647E+000	93.35	1.647E+000 !	E	1.829E+001X		2.6E+011	5.81
PA-234	N	1	1.594E+002	1001.00	6.728E+001 %	(	1.476E+002G		1.6E+012	.84
			1.594E+002	766.41	4.217E+002 ?	(	4.274E+002G		1.6E+012	.29

TL-208	F	N	1	1.366E+001	583.02	1.366E+001		(	P	1.156E+000G	7.0E+002	84.50
				1.366E+001	277.28	3.180E+001	+			1.665E+001G	7.0E+002	6.31
				1.366E+001	860.56	1.961E+001	+			5.929E+000G	7.0E+002	12.42
				-1.185E+000	1274.54	4.356E-001	%			4.378E+000G	3.1E+003	35.19
				-1.185E+000	723.36	2.338E+000	&			7.748E+000G	3.1E+003	20.22
				-1.185E+000	1004.77	-9.065E-001	%			9.024E+000G	3.1E+003	18.01
				-1.185E+000	996.33	-2.585E+000	%			1.396E+001G	3.1E+003	10.60
EU-154	T F I		1	-1.185E+000	873.23	-1.185E+000	%	(		1.176E+001G	3.1E+003	12.27
				-1.185E+000	123.10	3.399E-001	&			2.446E+000G	3.1E+003	40.79
PB-210		N	1	1.140E+001	46.54	1.140E+001	%	(	P	4.711E+001G	8.1E+003	4.25
RA-224		N	1	-1.009E+002	240.99	-1.009E+002	*	(		6.449E+001G	7.0E+002	4.10
CS-134	T F I		1	0.000E+000	604.71	0.000E+000	%	(		3.936E+000G	7.5E+002	97.62
				0.000E+000	795.87	8.886E-001	%			1.392E+000G	7.5E+002	85.53
				0.000E+000	569.32	0.000E+000	%			7.834E+000G	7.5E+002	15.38
				0.000E+000	801.95	3.374E+000	%			1.551E+001G	7.5E+002	8.69
				0.000E+000	563.24	5.709E+000	%			1.452E+001G	7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	3.155E+000	3.159E+000	93.27	93.32	9.949E+000
K-40		2.545E+002	2.545E+002	5.00	5.79	1.186E+001
CO-60	<	-2.084E-001	-2.084E-001	232.73	232.75	1.720E+000
I-131	<	2.885E-001	2.910E-001	116.65	116.69	1.147E+000
CS-134	<			3,246.66	3,246.66	3.936E+000
CS-137	<	8.425E-001	8.425E-001	53.31	53.39	1.456E+000
EU-152	<	-2.636E-001	-2.636E-001	444.63	444.64	4.068E+000
EU-155	<	2.904E+000	2.904E+000	47.85	47.97	4.528E+000
TL-208		1.366E+001	1.366E+001	6.55	7.15	1.156E+000
BI-212	<	1.819E+001	1.819E+001	21.59	21.79	1.096E+001
BI-214	<	1.777E+001	1.777E+001	7.85	8.37	2.878E+000
TH-234		2.294E+001	2.294E+001	22.62	22.92	2.468E+001
PA-234M	<	1.594E+002	1.594E+002	33.44	33.56	1.476E+002
U-235	<	1.647E+000	1.647E+000	168.31	168.33	9.386E+000
EU-154	<	-1.185E+000	-1.185E+000	281.06	281.07	1.176E+001
RA-224	<	-1.009E+002	-1.009E+002	20.15	20.37	6.449E+001
PB-210	<	1.140E+001	1.140E+001	119.41	119.47	4.711E+001
PB-212		3.265E+001	3.266E+001	4.62	5.50	2.558E+000
PB-214	<	1.869E+001	1.869E+001	7.76	8.27	3.264E+000
AC-228		3.284E+001	3.284E+001	7.59	8.12	3.011E+000
Pa-234	<	-1.938E+000	-1.938E+000	98.23	98.27	6.346E+000
AM-241	<	2.273E-001	2.273E-001	547.12	547.13	4.214E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 356.64 Bq/sample

Analyzed by: _____

403293

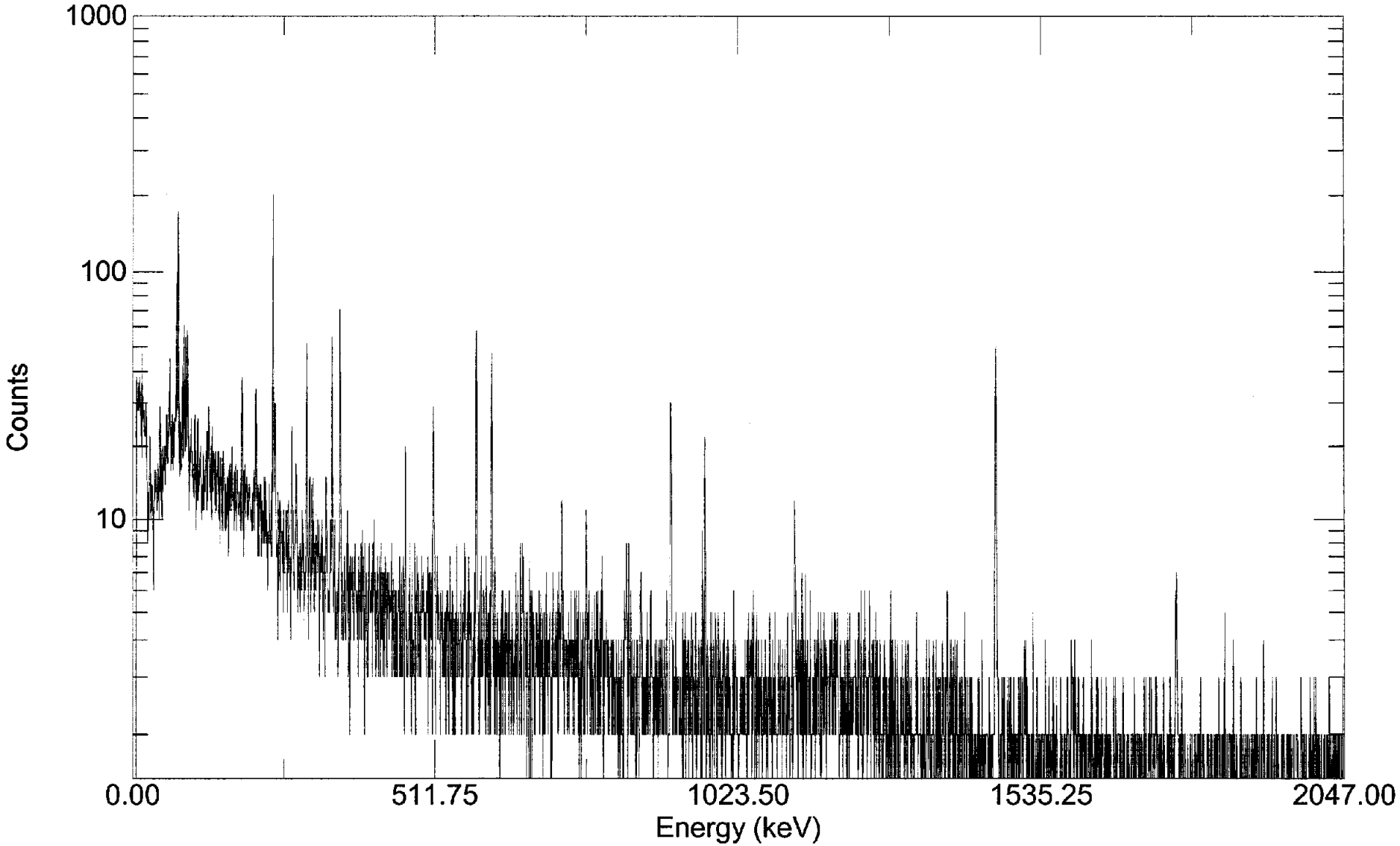
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKCK1AC

7357010_KEKCK1AC_F7L200251-013



Acquired: 23-Dec-2007 2:23:28 PM
File: C:\User\spectra\KEKCK1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.58 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,973

Sample Description: 7357010_KEKCM1AC_F7L200251-014

Spectrum Filename: KEKCM1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 2:23:56PM		
Live Time:	1800.00	Real Time:	1815.42
Dead Time:	0.85 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1451

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.18	74.88	546.00	219.00	0.122	22.38	0.899	PB-214	
307.22	77.14	425.00	385.00	0.214	11.66	1.127	BI-207	s
347.28	87.14	366.83	49.17	0.027	56.91	0.911		s
741.29	185.55	211.50	280.50	0.156	13.55	1.050	U-235	s
1354.56	338.74	142.51	52.49	0.029	35.00	0.583	AC-228	s
2436.80	609.14	547.75	58.25	0.032	58.31	1.677		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.75	46.55	143.53	43.47	0.024	31.94	0.814	
AM-241	1	241.95	60.84	330.89	-17.66	-0.010	147.59	0.878	s
TH-234	1	250.09	62.87	286.02	106.98	0.059	25.07	0.785	s
EU-155	1	346.20	86.87	479.63	121.85	0.068	26.99	0.906	s
TH-234	1	370.34	92.90	309.50	197.50	0.110	17.03	1.497	s
AC-228	1	372.14	93.35	743.40	0.00	0.000	2817.80	0.913	s D
U-235	1	372.14	93.35	348.40	10.22	0.006	27.80	0.913	s D
EU-155	1	419.71	105.23	260.33	6.26	0.003	366.61	0.925	s
EU-152	1	486.91	122.01	227.78	3.11	0.002	688.69	0.942	s
EU-154	1	490.24	122.85	217.19	-2.50	-0.001	836.45	0.943	s
Pa-234	1	524.63	131.43	272.59	-6.22	-0.003	377.73	0.952	s
U-235	1	574.01	143.77	292.24	18.75	0.010	117.35	0.964	s
U-235	1	652.83	163.45	214.68	26.00	0.014	82.08	0.984	s
U-235	1	828.25	207.27	202.39	-15.19	-0.008	134.95	1.027	s
PB-212	1	953.22	238.48	248.75	439.25	0.244	8.70	1.275	s
RA-224	1	959.72	240.11	721.81	-130.45	-0.072	30.41	1.062	
PB-214	1	967.25	241.99	191.67	196.33	0.109	17.07	0.781	s
TL-208	1	1109.18	277.44	137.09	16.28	0.009	104.66	1.098	s
I-131	1	1133.54	283.53	119.60	-6.58	-0.004	238.40	1.105	s
PB-214	1	1179.36	294.97	76.82	465.18	0.258	6.11	1.168	s
PB-212	1	1200.64	300.29	91.83	86.17	0.048	28.94	1.814	s
AC-228	1	1352.89	338.32	114.92	69.53	0.039	24.05	1.158	s
EU-152	1	1377.99	344.59	85.34	-8.86	-0.005	151.28	1.164	s
PB-214	1	1406.72	351.77	93.20	756.80	0.420	4.80	1.304	s
I-131	1	1457.83	364.54	72.73	12.55	0.007	100.16	1.184	s
BE-7	1	1912.54	478.14	66.22	8.27	0.005	143.40	1.292	s
CS-134	1	2251.75	562.90	47.10	0.02	0.000	43557.93	1.372	s
CS-134	1	2277.45	569.32	67.42	0.51	0.000	977.19	1.378	s D
Pa-234	1	2278.04	569.47	59.35	-1.08	-0.001	-161.42	1.378	s D
TL-208	1	2331.80	582.90	36.96	164.04	0.091	10.74	1.562	
CS-134	1	2431.15	607.73	448.95	3.37	0.002	891.50	1.410	s
BI-214	1	2437.16	609.23	62.03	518.15	0.288	4.80	1.415	s
I-131	1	2537.51	634.31	17.41	2.40	0.001	254.35	1.440	s
CS-137	1	2647.73	661.85	49.12	18.31	0.010	58.97	1.462	s
EU-154	1	2899.47	724.77	65.56	-6.27	-0.003	186.88	1.518	s
BI-212	1	2906.54	726.53	15.50	64.50	0.036	19.62	0.408	s
PA-234M	1	3072.41	767.99	51.85	47.01	0.026	26.11	1.556	s
EU-152	1	3111.94	777.87	29.27	-0.66	0.000	1166.02	1.567	s
BI-212	1	3141.27	785.20	45.32	3.48	0.002	278.42	1.572	s
CS-134	1	3178.55	794.52	21.18	7.78	0.004	91.01	1.582	s
CS-134	1	3218.32	804.46	38.91	-1.19	-0.001	749.83	1.587	s
TL-208	1	3446.08	861.39	5.00	43.00	0.024	19.87	0.487	s
EU-154	1	3493.35	873.21	29.73	7.15	0.004	114.17	1.649	s
Pa-234	1	3521.63	880.28	20.80	2.17	0.001	305.53	1.655	s
Pa-234	1	3533.65	883.28	32.92	-2.80	-0.002	296.04	1.657	s

AC-228	1	3643.62	910.77	34.91	82.37	0.046	14.49	1.681	s
Pa-234	1	3792.89	948.09	34.79	-0.47	0.000	1798.31	1.710	s
EU-152	1	3854.75	963.55	64.94	-2.19	-0.001	524.31	1.726	s
AC-228	1	3875.25	968.68	50.27	27.83	0.015	40.71	1.730	s
EU-154	1	3986.71	996.55	41.92	0.33	0.000	2799.29	1.753	s
PA-234M	1	4004.52	1001.00	32.75	0.00	0.000	809.26	1.756	s
EU-154	1	4016.83	1004.08	28.32	-0.83	0.000	911.36	1.760	s
EU-152	1	4447.74	1111.81	26.53	7.22	0.004	107.55	1.847	s
BI-214	1	4480.14	1119.92	32.61	103.31	0.057	12.26	1.854	s
CO-60	1	4684.15	1170.93	29.85	0.96	0.001	811.04	1.896	s
EU-154	1	5096.62	1274.08	33.57	-1.43	-0.001	580.60	1.975	s
CO-60	1	5332.93	1333.18	30.42	-1.36	-0.001	581.87	2.019	s
EU-152	1	5630.82	1407.69	26.88	3.03	0.002	248.63	2.076	s
K-40	1	5841.13	1460.30	11.21	325.79	0.181	5.45	1.768	
BI-214	1	7054.49	1763.87	11.11	76.07	0.042	12.49	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
CO-60	T F	1	-8.290E-002	1332.50	-8.290E-002	%	(	1.738E+000G		1.9E+003	99.98
			-8.290E-002	1173.24	5.318E-002	%		1.560E+000G		1.9E+003	99.90
AM-241	T	1	-7.806E-001	59.54	-7.806E-001	&	(	3.867E+000G		1.6E+005	35.90
CS-137	T F I	1	7.775E-001	661.66	7.775E-001	%	(	1.502E+000G		1.1E+004	85.21
			-7.390E-001	1112.07	2.810E+000	%		1.040E+001G		4.9E+003	13.64
			-7.390E-001	1408.00	9.226E-001	&		8.179E+000G		4.9E+003	21.00
EU-152	T F	1	-7.390E-001	344.29	-7.390E-001	%	(	3.818E+000G		4.9E+003	26.50
			-7.390E-001	121.78	1.328E-001	%		3.119E+000G		4.9E+003	28.58
			-7.390E-001	778.92	-2.080E-001	%		8.800E+000G		4.9E+003	12.94
			-7.390E-001	964.11	-7.160E-001	%		1.315E+001G		4.9E+003	14.61
TL-208	F N	1	6.399E+000	583.02	6.399E+000		(P	1.211E+000G		7.0E+002	84.50
			6.399E+000	277.28	4.841E+000	%		1.703E+001G		7.0E+002	6.31
			6.399E+000	860.56	1.519E+001	*		4.638E+000G		7.0E+002	12.42
RA-224	N	1	-5.389E+001	240.99	-5.389E+001		(	5.284E+001G		7.0E+002	4.10
PB-214	N	1	4.585E+001	351.93	4.526E+001	*	(P	2.852E+000G		5.8E+005	37.60
			4.585E+001	295.09	4.738E+001	@	(P	4.436E+000G		5.8E+005	19.30
			4.585E+001	242.00	4.489E+001	*	(	1.537E+001G		5.8E+005	7.43
Pa-234	N	1	-4.274E-001	131.29	-4.274E-001	%	(	5.475E+000G		1.6E+012	18.00
			-4.274E-001	569.47	-4.274E-001	&		1.525E+001G		1.6E+012	8.20
			-4.274E-001	946.02	-1.634E-001	&		1.060E+001G		1.6E+012	13.40
			-4.274E-001	883.24	-1.303E+000	%		1.372E+001G		1.6E+012	9.60
			-4.274E-001	880.53	1.610E+000	&		1.782E+001G		1.6E+012	6.00
TH-234	N	1	3.892E+001	63.29	3.331E+001	*	(P	2.538E+001G		1.6E+012	4.82
			3.892E+001	92.59	4.376E+001	*	(P	1.877E+001G		1.6E+012	5.58
BI-214	N	1	3.796E+001	609.31	3.829E+001		(P	2.912E+000G		5.8E+005	46.09
			3.796E+001	1120.29	3.654E+001		(P	1.037E+001G		5.8E+005	15.10
			3.796E+001	1764.49	3.836E+001	?	(P	9.199E+000G		5.8E+005	15.40
I-131	T F I	1	3.548E-001	364.48	3.548E-001	&	(	1.200E+000G		8.0E+000	81.70
			3.548E-001	284.30	-2.047E+000	&		1.671E+001G		8.0E+000	6.14
			3.548E-001	636.97	1.177E+000	%		1.087E+001G		8.0E+000	7.17
EU-155	T F I	1	3.108E+000	105.31	3.584E-001	%	(	4.459E+000G		1.8E+003	21.20
			3.108E+000	86.54	5.007E+000	*	(	4.305E+000G		1.8E+003	30.70
EU-154	T F I	1	2.584E+000	873.23	2.584E+000	&	(	1.016E+001G		3.1E+003	12.27
			2.584E+000	123.10	-7.487E-002	&		2.139E+000G		3.1E+003	40.79
			2.584E+000	1274.54	-2.392E-001	%		4.983E+000G		3.1E+003	35.19
			2.584E+000	723.36	-1.198E+000	%		7.727E+000G		3.1E+003	20.22
			2.584E+000	1004.77	-2.272E-001	%		7.514E+000G		3.1E+003	18.01
			2.584E+000	996.33	1.511E-001	&		1.516E+001G		3.1E+003	10.60
PB-210	N	1	2.519E+001	46.54	2.519E+001	%	(P	3.391E+001G		8.1E+003	4.25
BE-7	N P C	1	2.233E+000	477.60	2.233E+000	&	(	1.097E+001G		5.3E+001	10.52
U-235	N	1	2.173E+000	143.79	2.173E+000	%	(P	9.546E+000G		2.6E+011	10.96
			2.173E+000	205.33	-4.608E+000	&		2.094E+001G		2.6E+011	5.01
			2.173E+000	163.38	6.846E+000	%		1.869E+001G		2.6E+011	5.08
			2.173E+000	93.35	2.173E+000	!		E 1.906E+001X		2.6E+011	5.81

Bi-212	N	1	2.117E+001	727.33	2.117E+001	@	(		6.910E+000G		7.0E+002	11.82
			2.117E+001	785.51	1.300E+001	%			1.271E+002G		7.0E+002	1.10
K-40	N	1	2.013E+002	1460.83	2.013E+002		(	P	1.131E+001G		4.7E+011	10.67
PB-212	N	1	1.706E+001	238.63	1.706E+001		(	P	2.960E+000G		7.0E+002	43.30
			1.706E+001	300.03	5.229E+001	+			2.875E+001G		7.0E+002	3.28
PA-234	N	1	1.675E+002	1001.00	0.000E+000	%	(		1.722E+002G		1.6E+012	.84
			1.675E+002	766.41	6.444E+002	?	(		4.971E+002G		1.6E+012	.29
			1.289E+001	93.35	0.000E+000	+		} E	1.992E+001X	A	2.1E+003	5.56
AC-228	N	1	1.289E+001	911.07	1.300E+001	@	(	P	4.771E+000G		2.1E+003	29.00
			1.289E+001	968.97	7.632E+000	%			9.804E+000G		2.1E+003	17.46
			1.289E+001	338.32	1.263E+001	*	(	P	9.566E+000G		2.1E+003	12.01
CS-134 T F I		1	1.168E-001	604.71	1.168E-001	&	(		3.520E+000G		7.5E+002	97.62
			1.168E-001	795.87	3.769E-001	%			1.170E+000G		7.5E+002	85.53
			1.168E-001	569.32	1.074E-001	&		}	8.625E+000G		7.5E+002	15.38
			1.168E-001	801.95	-5.683E-001	%			1.523E+001G		7.5E+002	8.69
			1.168E-001	563.24	8.575E-003	%			1.335E+001G		7.5E+002	8.35

Analysis Codes:

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S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	2.233E+000	2.235E+000	143.40	143.43	1.097E+001
K-40		2.013E+002	2.013E+002	5.63	6.35	1.131E+001
CO-60	<	-8.290E-002	-8.290E-002	581.87	581.88	1.738E+000
I-131	<	3.548E-001	3.579E-001	100.16	100.20	1.200E+000
CS-134	<	1.168E-001	1.168E-001	891.50	891.50	3.520E+000
EU-154	<	2.584E+000	2.584E+000	114.17	114.20	1.016E+001
PB-210		2.519E+001	2.519E+001	47.76	47.91	3.391E+001
PB-212		1.706E+001	1.706E+001	9.11	9.58	2.960E+000
PB-214	#	4.585E+001	4.585E+001	4.86	5.65	2.852E+000
BI-212	#	2.117E+001	2.117E+001	19.62	19.83	6.910E+000
Pa-234	<	-4.274E-001	-4.274E-001	377.73	377.74	5.475E+000
TH-234	#	3.892E+001	3.892E+001	18.20	18.57	2.538E+001
CS-137	<	7.775E-001	7.775E-001	58.97	59.04	1.502E+000
EU-152	<	-7.390E-001	-7.390E-001	151.28	151.31	3.818E+000
EU-155	<	3.108E+000	3.108E+000	26.99	27.19	4.459E+000
TL-208		6.399E+000	6.400E+000	11.26	11.62	1.211E+000
RA-224	<	-5.389E+001	-5.390E+001	30.41	30.56	5.284E+001
BI-214	<	3.796E+001	3.796E+001	4.86	5.66	2.912E+000
AC-228	<	1.289E+001	1.289E+001	14.46	14.74	4.771E+000
PA-234M	<	1.675E+002	1.675E+002	26.11	26.27	1.722E+002
U-235	<	2.173E+000	2.173E+000	130.77	130.80	9.546E+000
AM-241	<	-7.806E-001	-7.806E-001	147.59	147.64	3.867E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 330.66 Bq/sample

Analyzed by: _____

403293

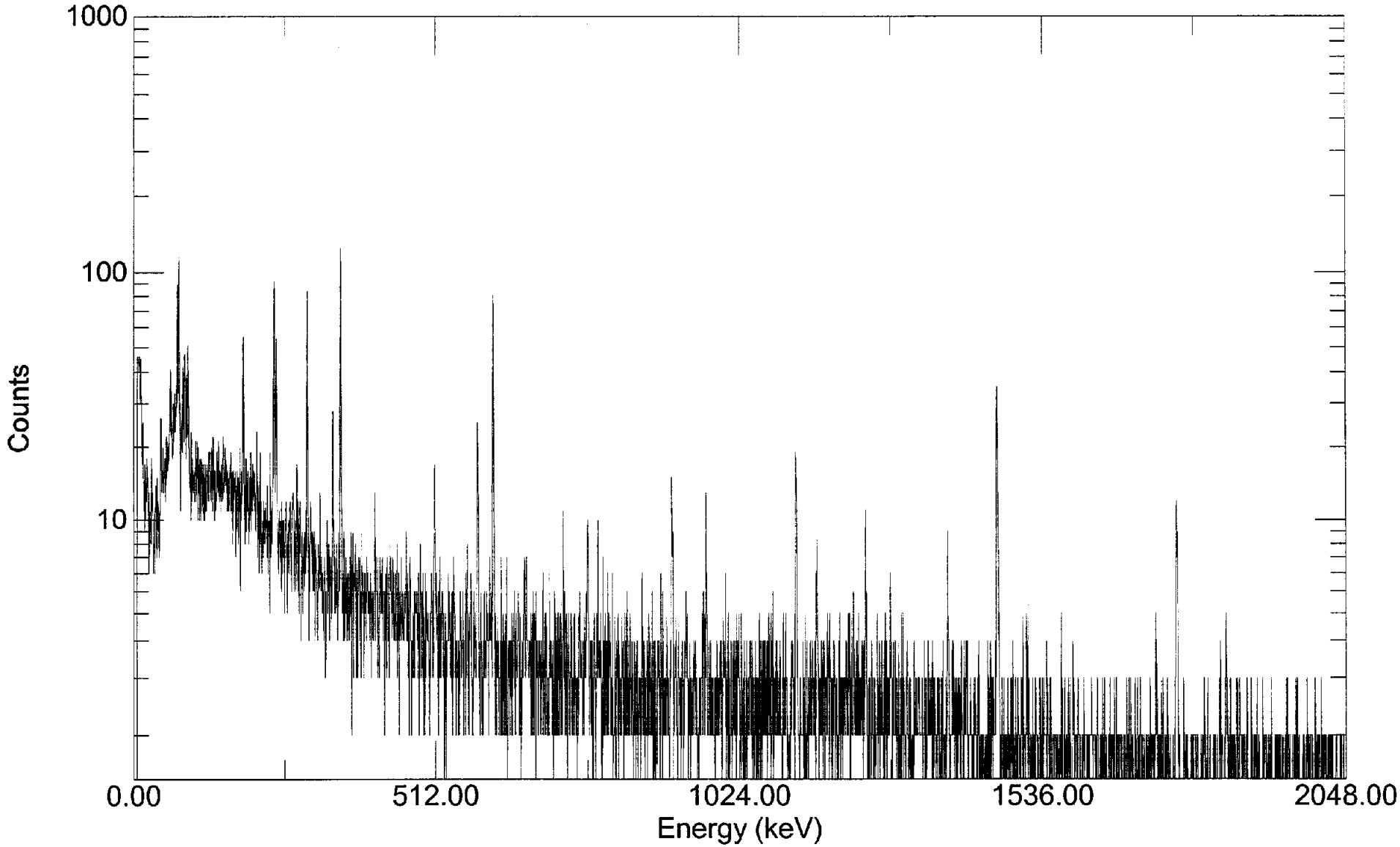
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKCM1AC

7357010_KEKCM1AC_F7L200251-014



Acquired: 23-Dec-2007 2:23:56 PM
File: C:\User\spectra\KEKCM1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1815.42 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,974

Sample Description: 7357010_KEKCP1AC_F7L200251-015

Spectrum Filename: KEKCP1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 2:24:35PM		
Live Time:	1800.00	Real Time:	1804.70
Dead Time:	0.26 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1580

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.56	74.69	297.50	245.50	0.136	15.16	0.619	PB-214	s
308.33	77.13	163.33	433.67	0.241	6.80	0.771	PB-214	
348.67	87.22	302.17	39.83	0.022	63.73	1.082		s
359.89	90.03	121.67	83.33	0.046	24.23	0.736	PB-214	M
408.55	102.20	43.17	28.83	0.016	38.36	0.286		s
743.72	186.01	138.00	211.00	0.117	14.04	1.011	PA-234	s
835.00	208.84	80.02	65.98	0.037	22.79	0.652	LU-177	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.32	46.37	185.81	54.19	0.030	38.76	0.797	
AM-241	1	237.87	59.51	224.18	-18.32	-0.010	117.95	0.830	s
TH-234	1	252.85	63.26	212.36	121.64	0.068	22.46	0.866	
EU-155	1	348.92	87.28	253.52	129.67	0.072	19.46	0.854	s
TH-234	1	370.14	92.59	210.76	78.24	0.043	21.32	0.859	D
U-235	1	373.18	93.35	234.99	12.54	0.007	24.66	0.860	s D
AC-228	1	373.18	93.35	222.17	62.59	0.035	2.96	0.860	D
EU-155	1	421.03	105.32	171.56	24.05	0.013	79.68	0.871	s
EU-152	1	489.40	122.41	190.60	13.50	0.008	147.14	0.885	s
EU-154	1	496.67	124.23	201.57	-15.51	-0.009	131.96	0.886	s
Pa-234	1	521.71	130.50	166.79	-0.99	-0.001	1850.55	0.894	s
U-235	1	575.74	144.01	194.50	23.67	0.013	85.82	0.904	s
U-235	1	652.39	163.18	157.62	11.98	0.007	150.96	0.922	s
U-235	1	821.05	205.35	148.36	8.06	0.004	216.50	0.958	s
PB-212	1	953.69	238.52	113.29	320.71	0.178	8.08	1.002	
RA-224	1	959.25	239.91	563.23	-140.67	-0.078	25.31	0.988	
PB-214	1	966.81	241.80	103.33	155.67	0.086	15.78	0.916	s
TL-208	1	1107.93	277.08	81.93	16.71	0.009	80.42	1.019	
I-131	1	1135.03	283.86	59.96	-3.73	-0.002	298.17	1.025	s
PB-214	1	1179.78	295.05	67.54	360.46	0.200	7.19	1.058	
PB-212	1	1196.80	299.30	42.00	48.00	0.027	30.62	0.602	s
AC-228	1	1351.20	337.91	39.67	73.33	0.041	20.47	0.390	s
EU-152	1	1374.37	343.70	61.96	-7.53	-0.004	152.30	1.076	s
PB-214	1	1406.31	351.68	52.91	576.09	0.320	4.97	1.005	
I-131	1	1459.10	364.88	41.14	3.03	0.002	304.43	1.092	s
BE-7	1	1908.76	477.29	27.20	5.89	0.003	131.92	1.185	s
CS-134	1	2259.73	565.02	32.41	0.43	0.000	1888.12	1.254	s
CS-134	1	2276.94	569.32	27.96	0.91	0.001	686.22	1.259	s D
Pa-234	1	2277.54	569.47	30.18	-0.15	0.000	-165.46	1.259	s D
TL-208	1	2330.55	582.72	15.68	131.32	0.073	10.80	1.316	
CS-134	1	2418.53	604.71	846.16	5.48	0.003	752.05	1.286	s
BI-214	1	2435.72	609.01	31.08	404.92	0.225	5.82	1.430	
I-131	1	2555.83	639.02	23.75	-2.00	-0.001	351.39	1.312	s
CS-137	1	2644.21	661.11	37.77	13.36	0.007	70.60	1.331	s
EU-154	1	2898.98	724.78	46.82	-10.61	-0.006	96.27	1.378	s
BI-212	1	2906.88	726.75	19.72	25.76	0.014	31.35	1.381	
PA-234M	1	3067.23	766.82	36.58	-0.01	0.000	65345.61	1.411	s
EU-152	1	3122.72	780.69	9.45	8.21	0.005	63.45	1.420	s
BI-212	1	3142.25	785.57	23.41	18.44	0.010	43.81	1.425	s
CS-134	1	3187.72	796.93	22.24	-0.87	0.000	776.53	1.433	s
CS-134	1	3216.60	804.15	24.21	-4.32	-0.002	168.10	1.437	s
TL-208	1	3440.66	860.13	4.50	34.50	0.019	22.31	0.392	s
EU-154	1	3491.39	872.80	29.35	1.76	0.001	440.60	1.490	s
Pa-234	1	3518.97	879.70	18.97	1.29	0.001	485.17	1.495	s
Pa-234	1	3531.69	882.87	21.37	3.14	0.002	215.93	1.497	s

AC-228	1	3644.49	911.06	0.00	77.00	0.043	11.40	1.233	
Pa-234	1	3783.72	945.84	21.05	-0.29	0.000	2279.99	1.543	s
EU-152	1	3866.42	966.50	35.33	-7.02	-0.004	125.60	1.556	s
AC-228	1	3875.84	968.85	2.67	38.33	0.021	18.09	0.620	s
EU-154	1	3985.84	996.33	25.15	0.13	0.000	5639.87	1.579	s
PA-234M	1	4004.29	1000.94	20.11	5.42	0.003	124.71	1.582	s
EU-154	1	4019.53	1004.75	30.74	-5.25	-0.003	155.64	1.585	s
EU-152	1	4450.73	1112.46	23.21	2.29	0.001	304.38	1.659	s
BI-214	1	4480.72	1119.95	9.65	100.35	0.056	11.07	1.117	s
CO-60	1	4694.55	1173.35	18.34	2.93	0.002	214.50	1.701	s
EU-154	1	5096.98	1273.85	14.25	5.68	0.003	102.95	1.768	s
CO-60	1	5335.21	1333.34	12.13	3.39	0.002	155.12	1.806	s
EU-152	1	5634.17	1407.99	11.76	7.37	0.004	75.46	1.854	s
K-40	1	5844.17	1460.42	2.83	171.17	0.095	7.58	0.569	s
BI-214	1	7059.96	1763.90	0.00	74.00	0.041	11.62	1.398	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
EU-152	T F	1	-8.978E-001	344.29	-8.978E-001	% (	4.698E+000G		4.9E+003	26.50
			-8.978E-001	121.78	7.613E-001	&	3.780E+000G		4.9E+003	28.58
			-8.978E-001	778.92	4.128E+000	%	8.571E+000G		4.9E+003	12.94
			-8.978E-001	964.11	-3.736E+000	%	1.619E+001G		4.9E+003	14.61
			-8.978E-001	1112.07	1.472E+000	%	1.615E+001G		4.9E+003	13.64
			-8.978E-001	1408.00	3.753E+000	%	9.525E+000G		4.9E+003	21.00
			-8.941E-002	946.02	-1.631E-001	%	1.376E+001G		1.6E+012	13.40
			-8.941E-002	883.24	2.363E+000	&	1.827E+001G		1.6E+012	9.60
			-8.941E-002	880.53	1.552E+000	%	2.765E+001G		1.6E+012	6.00
Pa-234	N	1	-8.941E-002	131.29	-8.941E-002	% (	5.689E+000G		1.6E+012	18.00
			-8.941E-002	569.47	-8.941E-002	%	1.719E+001G		1.6E+012	8.20
CS-137	T F I	1	8.888E-001	661.66	8.888E-001	* (	2.086E+000G		1.1E+004	85.21
TL-208	F N	1	7.901E+000	583.02	7.901E+000	(P	1.273E+000G		7.0E+002	84.50
			7.901E+000	277.28	6.880E+000	%	1.848E+001G		7.0E+002	6.31
			7.901E+000	860.56	1.965E+001	+	7.175E+000G		7.0E+002	12.42
RA-224	N	1	-7.900E+001	240.99	-7.900E+001	(	6.363E+001G		7.0E+002	4.10
TH-234	N	1	5.262E+001	63.29	5.262E+001	(P	3.055E+001G		1.6E+012	4.82
			5.262E+001	92.59	2.346E+001	- P	2.110E+001G		1.6E+012	5.58
PA-234	N	1	5.191E+001	1001.00	5.191E+001	& (	2.262E+002G		1.6E+012	[illegible].84
			5.191E+001	766.41	-2.860E-001	%	6.749E+002G		1.6E+012	[illegible].29
EU-155	T F I	1	5.046E+000	105.31	1.838E+000	* (	4.873E+000G		1.8E+003	21.20
			5.046E+000	86.54	7.262E+000	& (	4.307E+000G		1.8E+003	30.70
PB-214	N	1	4.986E+001	351.93	4.941E+001	(P	3.139E+000G		5.8E+005	37.60
			4.986E+001	295.09	5.129E+001	(P	5.835E+000G		5.8E+005	19.30
			4.986E+001	242.00	4.841E+001	* (	1.557E+001G		5.8E+005	7.43
BI-214	N	1	4.641E+001	609.31	4.641E+001	(P	3.288E+000G		5.8E+005	46.09
			4.641E+001	1120.29	5.855E+001	+ P	1.003E+001G		5.8E+005	15.10
			4.641E+001	1764.49	6.307E+001	+	6.282E+000G		5.8E+005	15.40
PB-210	N	1	4.490E+001	46.54	4.490E+001	% (P	5.488E+001G		8.1E+003	4.25
U-235	N	1	3.603E+000	143.79	3.603E+000	% (	1.030E+001G		2.6E+011	10.96
			3.603E+000	205.33	3.269E+000	%	2.411E+001G		2.6E+011	5.01
			3.603E+000	163.38	4.152E+000	%	2.121E+001G		2.6E+011	5.08
			3.603E+000	93.35	3.603E+000	!	2.131E+001X	E	2.6E+011	5.81
CO-60	T F	1	3.460E-001	1332.50	3.460E-001	& (	1.933E+000G		1.9E+003	99.98
			3.460E-001	1173.24	2.690E-001	&	2.078E+000G		1.9E+003	99.90
CS-134	T F I	1	2.945E-001	604.71	2.945E-001	& (	7.433E+000G		7.5E+002	97.62
			2.945E-001	795.87	-6.721E-002	&	1.913E+000G		7.5E+002	85.53
			2.945E-001	569.32	2.945E-001	%	8.855E+000G		7.5E+002	15.38
			2.945E-001	801.95	-3.316E+000	%	1.968E+001G		7.5E+002	8.69
			2.945E-001	563.24	2.527E-001	&	1.727E+001G		7.5E+002	8.35
BE-7	N P C	1	2.383E+000	477.60	2.383E+000	% (	1.094E+001G		5.3E+001	10.52
AC-228	N	1	1.879E+001	911.07	1.970E+001	(	1.885E+000G		2.1E+003	29.00
			1.879E+001	968.97	1.714E+001	(	4.615E+000G		2.1E+003	17.46
			1.879E+001	338.32	1.899E+001	(	8.302E+000G		2.1E+003	12.01

			1.879E+001	93.35	1.879E+001			E	2.167E+001	X	A 2.1E+003	5.56
K-40	N	1	1.773E+002	1460.83	1.773E+002		(	P	1.093E+001	G	4.7E+011	10.67
PB-212	N	1	1.692E+001	238.63	1.692E+001		(	P	2.759E+000	G	7.0E+002	43.30
			1.692E+001	300.03	4.080E+001	+			2.797E+001	G	7.0E+002	3.28
BI-212	N	1	1.339E+001	727.33	1.339E+001		(		1.217E+001	G	7.0E+002	11.82
			1.339E+001	785.51	1.099E+002	%			1.505E+002	G	7.0E+002	1.10
			1.237E-001	636.97	-1.533E+000	%			1.946E+001	G	8.0E+000	7.17
I-131	T F I	1	1.237E-001	364.48	1.237E-001	&	(		1.329E+000	G	8.0E+000	81.70
			1.237E-001	284.30	-1.613E+000	%			1.678E+001	G	8.0E+000	6.14
AM-241	T	1	-1.125E+000	59.54	-1.125E+000	%	(		4.450E+000	G	1.6E+005	35.90
			1.030E+000	123.10	-6.131E-001	%			2.723E+000	G	3.1E+003	40.79
			1.030E+000	1274.54	1.585E+000	%			5.667E+000	G	3.1E+003	35.19
			1.030E+000	723.36	-3.209E+000	%			1.047E+001	G	3.1E+003	20.22
			1.030E+000	1004.77	-2.345E+000	%			1.275E+001	G	3.1E+003	18.01
			1.030E+000	996.33	9.491E-002	%			1.966E+001	G	3.1E+003	10.60
EU-154	T F I	1	1.030E+000	873.23	1.030E+000	%	(		1.632E+001	G	3.1E+003	12.27

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	2.945E-001	2.946E-001	752.05	752.06	7.433E+000
CS-137	<	8.888E-001	8.888E-001	70.60	70.66	2.086E+000
EU-155	<	5.046E+000	5.047E+000	19.46	19.75	4.873E+000
PB-214		4.986E+001	4.986E+001	5.02	5.78	3.139E+000
BI-212	<	1.339E+001	1.339E+001	31.35	31.48	1.217E+001
BI-214		4.641E+001	4.641E+001	5.89	6.56	3.288E+000
TH-234		5.262E+001	5.262E+001	25.42	25.68	3.055E+001
PA-234M	<	5.191E+001	5.191E+001	124.71	124.74	2.262E+002
BE-7	<	2.383E+000	2.387E+000	131.92	131.95	1.094E+001
K-40		1.773E+002	1.773E+002	7.71	8.24	1.093E+001
CO-60	<	3.460E-001	3.460E-001	155.12	155.15	1.933E+000
I-131	<	1.237E-001	1.247E-001	304.43	304.45	1.329E+000
EU-152	<	-8.978E-001	-8.978E-001	152.30	152.33	4.698E+000
EU-154	<	1.030E+000	1.030E+000	440.60	440.61	1.632E+001
TL-208		7.901E+000	7.901E+000	10.98	11.35	1.273E+000
RA-224	<	-7.900E+001	-7.901E+001	25.31	25.48	6.363E+001
PB-210		4.490E+001	4.490E+001	53.65	53.79	5.488E+001
PB-212		1.692E+001	1.692E+001	8.32	8.84	2.759E+000
AC-228		1.879E+001	1.879E+001	9.87	10.28	1.885E+000
Pa-234	<	-8.941E-002	-8.941E-002	1.850.55	1.850.55	5.689E+000
U-235	<	3.603E+000	3.603E+000	85.82	85.87	1.030E+001
AM-241	<	-1.125E+000	-1.125E+000	117.95	118.01	4.450E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 369.83 Bq/sample

Analyzed by: _____

403293

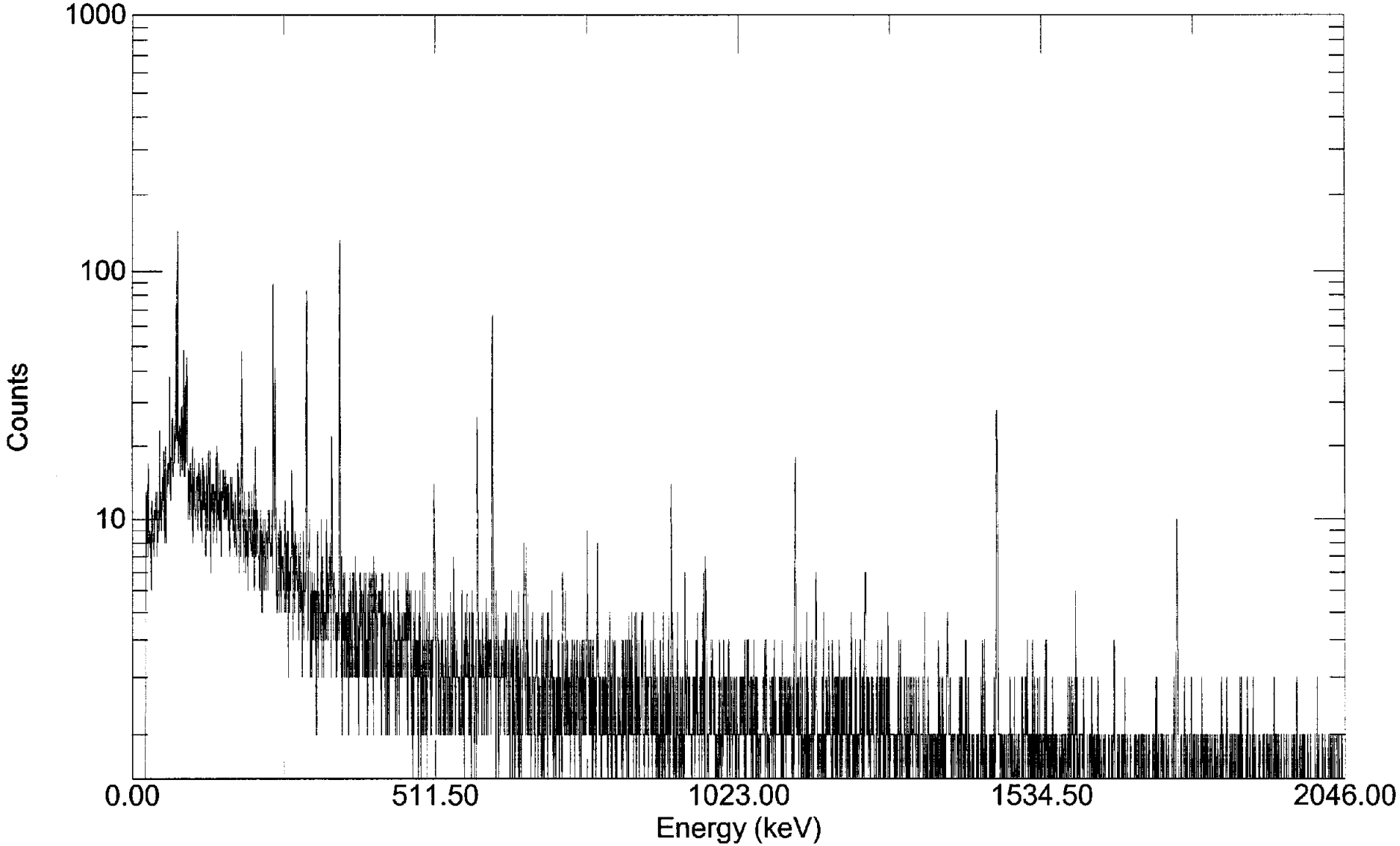
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKCP1AC

7357010_KEKCP1AC_F7L200251-015



Acquired: 23-Dec-2007 2:24:35 PM
File: C:\User\spectra\KEKCP1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.70 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,976

Sample Description: 7357010_KEKCQ1AC_F7L200251-016

Spectrum Filename: KEKCQ1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 2:25:05PM		
Live Time:	1800.00	Real Time:	1915.36
Dead Time:	6.02 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2334

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.91	74.69	258.00	217.00	0.121	16.29	0.866	PB-214	
307.12	76.99	216.00	333.00	0.185	10.39	0.798	PB-214	
323.28	81.03	108.17	52.83	0.029	35.88	0.750	SB-125	
346.89	86.93	223.01	24.99	0.014	86.85	0.404		s
742.86	185.85	65.17	154.83	0.086	12.99	1.177	U-235	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.64	46.65	124.93	59.07	0.033	28.97	0.895	
AM-241	1	239.75	60.16	190.81	12.58	0.007	124.44	0.761	s
TH-234	1	251.45	63.08	192.83	83.17	0.046	28.18	0.583	s
EU-155	1	347.16	86.99	202.45	69.01	0.038	31.54	0.788	s
TH-234	1	369.75	92.64	176.19	172.81	0.096	14.99	0.904	s
AC-228	1	372.61	93.35	180.60	32.85	0.018	5.59	0.795	s D
U-235	1	372.61	93.35	180.60	8.20	0.005	30.57	0.795	s D
EU-155	1	422.37	105.78	174.50	-14.27	-0.008	133.59	0.808	
EU-152	1	487.33	122.01	137.48	11.54	0.006	146.69	0.824	s
EU-154	1	492.27	123.25	142.98	4.03	0.002	422.78	0.826	s
Pa-234	1	522.75	130.86	131.03	14.77	0.008	112.62	0.834	s
U-235	1	573.89	143.63	138.54	15.50	0.009	94.73	0.847	s
U-235	1	652.92	163.38	155.81	-0.77	0.000	1428.01	0.867	
U-235	1	820.91	205.35	81.27	19.12	0.011	70.50	0.909	s
PB-212	1	953.92	238.58	94.81	305.19	0.170	8.62	0.918	
PB-214	1	966.59	241.75	50.67	130.33	0.072	13.64	0.885	s
RA-224	1	967.66	242.01	38.50	134.44	0.075	10.82	0.944	
TL-208	1	1110.08	277.60	72.37	-2.94	-0.002	412.70	0.980	s
I-131	1	1139.06	284.84	52.62	6.85	0.004	154.60	0.987	
PB-214	1	1179.76	295.01	57.58	257.42	0.143	9.56	0.934	s
PB-212	1	1200.63	300.23	60.92	6.60	0.004	171.77	1.002	s
AC-228	1	1352.53	338.18	51.45	38.52	0.021	30.88	1.040	s
EU-152	1	1376.63	344.20	84.88	-13.01	-0.007	103.94	1.045	s
PB-214	1	1407.62	351.94	54.54	397.46	0.221	6.83	1.174	
I-131	1	1457.80	364.48	60.29	0.00	0.000	1098.05	1.065	s
BE-7	1	1910.43	477.59	68.31	0.00	0.000	1168.87	1.173	s
CS-134	1	2255.56	563.85	30.71	-3.30	-0.002	243.59	1.252	s
CS-134	1	2277.45	569.32	24.16	0.01	0.000	583.00	1.258	s D
Pa-234	1	2278.05	569.47	14.80	2.22	0.001	65.69	1.258	s D
TL-208	1	2334.46	583.57	20.42	113.58	0.063	12.16	1.170	
CS-134	1	2418.20	604.50	31.58	6.45	0.004	129.29	1.290	s
BI-214	1	2438.17	609.49	20.73	248.27	0.138	6.99	1.566	s
I-131	1	2548.19	636.99	26.18	3.77	0.002	198.69	1.319	s
CS-137	1	2649.10	662.21	18.58	110.42	0.061	12.27	1.359	s
EU-154	1	2888.89	722.15	31.12	-5.67	-0.003	145.35	1.397	s
BI-212	1	2907.02	726.68	0.00	46.00	0.026	14.74	0.625	s
PA-234M	1	3065.96	766.41	33.00	0.00	0.000	812.40	1.434	s
EU-152	1	3114.29	778.50	20.72	3.75	0.002	179.33	1.445	s
BI-212	1	3142.55	785.56	0.00	44.00	0.024	15.08	0.750	s
CS-134	1	3180.43	795.03	15.91	8.14	0.005	77.66	1.460	s
CS-134	1	3204.08	800.94	28.88	-5.43	-0.003	146.39	1.465	s
TL-208	1	3439.35	859.76	4.00	20.00	0.011	31.62	1.008	s
EU-154	1	3497.84	874.38	15.41	-0.08	0.000	7392.83	1.527	s
Pa-234	1	3522.44	880.53	14.89	0.00	0.000	545.68	1.533	s
Pa-234	1	3534.90	883.65	19.15	2.26	0.001	282.34	1.535	s
AC-228	1	3645.25	911.24	20.64	38.99	0.022	22.98	1.559	s

Pa-234	1	3780.44	945.04	16.11	5.56	0.003	110.49	1.588	s
EU-152	1	3857.21	964.23	25.72	2.08	0.001	352.31	1.603	s
AC-228	1	3876.56	969.07	30.02	8.60	0.005	96.34	1.607	s
EU-154	1	3989.61	997.33	16.14	5.17	0.003	118.47	1.630	s
PA-234M	1	4004.96	1001.17	27.22	-1.68	-0.001	445.01	1.633	s
EU-154	1	4019.44	1004.79	17.92	6.39	0.004	101.71	1.637	s
EU-152	1	4449.43	1112.31	28.97	-2.75	-0.002	283.09	1.723	s
BI-214	1	4482.71	1120.63	3.83	64.17	0.036	14.17	0.500	s
CO-60	1	4693.66	1173.39	21.04	-1.07	-0.001	615.36	1.772	s
EU-154	1	5095.57	1273.90	20.20	-1.62	-0.001	400.12	1.850	s
CO-60	1	5333.49	1333.41	13.23	-0.66	0.000	794.02	1.894	s
EU-152	1	5634.06	1408.59	9.92	5.63	0.003	89.60	1.950	s
K-40	1	5843.93	1461.09	0.00	221.00	0.123	6.73	1.715	
BI-214	1	7056.82	1764.54	8.01	30.65	0.017	20.60	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
AC-228	N	1	9.550E+000	911.16	9.536E+000	(	5.840E+000G		2.1E+003	29.00
			9.550E+000	968.97	3.672E+000	%	1.206E+001G		2.1E+003	17.46
			9.550E+000	338.32	9.583E+000	(	8.991E+000G		2.1E+003	12.01
			9.550E+000	93.35	9.550E+000	+ E	1.899E+001G	A	2.1E+003	5.56
RA-224	N	1	7.259E+001	240.99	7.259E+001	(	1.708E+001G		7.0E+002	4.10
AM-241	T	1	7.155E-001	59.54	7.155E-001	% (P	3.816E+000G		1.6E+005	35.90
CS-137	T F I	1	7.052E+000	661.66	7.052E+000	* (P	1.456E+000G		1.1E+004	85.21
TL-208	F N	1	6.563E+000	583.02	6.563E+000	(P	1.373E+000G		7.0E+002	84.50
			6.563E+000	277.28	-1.165E+000	%	1.676E+001G		7.0E+002	6.31
			6.563E+000	860.56	1.090E+001	+	6.557E+000G		7.0E+002	12.42
CO-60	T F	1	-6.337E-002	1332.50	-6.337E-002	% (	1.900E+000G		1.9E+003	99.98
			-6.337E-002	1173.24	-9.301E-002	%	2.099E+000G		1.9E+003	99.90
PB-210	N	1	4.337E+001	46.54	4.337E+001	(P	4.024E+001G		8.1E+003	4.25
TH-234	N	1	4.253E+001	63.29	3.369E+001	@ (P	2.731E+001G		1.6E+012	4.82
			4.253E+001	92.59	5.016E+001	* (P	1.874E+001G		1.6E+012	5.58
EU-154	T F I	1	-4.197E-002	873.23	-4.197E-002	% (	1.173E+001G		3.1E+003	12.27
			-4.197E-002	123.10	1.543E-001	&	2.239E+000G		3.1E+003	40.79
			-4.197E-002	1274.54	-4.287E-001	%	6.260E+000G		3.1E+003	35.19
			-4.197E-002	723.36	-1.645E+000	%	8.328E+000G		3.1E+003	20.22
			-4.197E-002	1004.77	2.723E+000	%	9.564E+000G		3.1E+003	18.01
			-4.197E-002	996.33	3.716E+000	%	1.542E+001G		3.1E+003	10.60
PB-214	N	1	3.420E+001	351.93	3.275E+001	(P	3.059E+000G		5.8E+005	37.60
			3.420E+001	295.09	3.520E+001	@ (P	5.206E+000G		5.8E+005	19.30
			3.420E+001	242.00	3.897E+001	* (	1.073E+001G		5.8E+005	7.43
CS-134	T F I	1	3.331E-001	604.71	3.331E-001	% (	1.492E+000G		7.5E+002	97.62
			3.331E-001	795.87	6.043E-001	%	1.581E+000G		7.5E+002	85.53
			3.331E-001	569.32	3.582E-003	&	7.965E+000G		7.5E+002	15.38
			3.331E-001	801.95	-3.992E+000	%	2.040E+001G		7.5E+002	8.69
			3.331E-001	563.24	-1.874E+000	%	1.619E+001G		7.5E+002	8.35
BI-214	N	1	2.660E+001	609.31	2.732E+001	(P	2.633E+000G		5.8E+005	46.09
			2.660E+001	1120.29	3.563E+001	+	6.571E+000G		5.8E+005	15.10
			2.660E+001	1764.49	2.444E+001	? (P	1.268E+001G		5.8E+005	15.40

BI-212	N	1	2.293E+001	727.33	2.293E+001		(		3.674E+000G		7.0E+002	11.82
			2.293E+001	785.51	2.513E+002	+			4.208E+001G		7.0E+002	1.10
U-235	N	1	2.282E+000	143.79	2.282E+000	%	(	P	8.470E+000G		2.6E+011	10.96
			2.282E+000	205.33	7.458E+000	%			1.745E+001G		2.6E+011	5.01
			2.282E+000	163.38	-2.563E-001	&		P	2.036E+001G		2.6E+011	5.08
			2.282E+000	93.35	2.282E+000	?		E	1.818E+001X		2.6E+011	5.81
K-40	N	1	2.160E+002	1460.83	2.160E+002		(		7.204E+000G		4.7E+011	10.67
PB-212	N	1	1.548E+001	238.63	1.548E+001		(	P	2.439E+000G		7.0E+002	43.30
			1.548E+001	300.03	5.388E+000	&			3.192E+001G		7.0E+002	3.28
			-1.539E+001	766.41	0.000E+000	&			6.171E+002G		1.6E+012	.29
PA-234M	N	1	-1.539E+001	1001.00	-1.539E+001	&	(		2.471E+002G		1.6E+012	.84
EU-152 T F		1	-1.490E+000	344.29	-1.490E+000	%	(		5.230E+000G		4.9E+003	26.50
			-1.490E+000	121.78	6.305E-001	%			3.134E+000G		4.9E+003	28.58
			-1.490E+000	778.92	1.807E+000	&			1.153E+001G		4.9E+003	12.94
			-1.490E+000	964.11	1.056E+000	&			1.339E+001G		4.9E+003	14.61
			-1.490E+000	1112.07	-1.681E+000	%			1.698E+001G		4.9E+003	13.64
			-1.490E+000	1408.00	2.711E+000	%			8.369E+000G		4.9E+003	21.00
Pa-234	N	1	1.294E+000	131.29	1.294E+000	*	(		4.909E+000G		1.6E+012	18.00
			1.294E+000	569.47	1.294E+000	&			1.204E+001G		1.6E+012	8.20
			1.294E+000	946.02	3.035E+000	%			1.168E+001G		1.6E+012	13.40
			1.294E+000	883.24	1.625E+000	%			1.664E+001G		1.6E+012	9.60
			1.294E+000	880.53	0.000E+000	&			2.379E+001G		1.6E+012	6.00
EU-155 T F I		1	-1.058E+000	105.31	-1.058E+000	%	(		4.764E+000G		1.8E+003	21.20
			-1.058E+000	86.54	3.733E+000				3.733E+000G	A	1.8E+003	30.70
BE-7	N P C	1	0.000E+000	477.60	0.000E+000	%	(		1.604E+001G		5.3E+001	10.52
I-131 T F I		1	0.000E+000	364.48	0.000E+000	%	(		1.523E+000G		8.0E+000	81.70
			0.000E+000	284.30	2.847E+000	%			1.518E+001G		8.0E+000	6.14
			0.000E+000	636.97	2.771E+000	%			1.951E+001G		8.0E+000	7.17

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#			1,168.87	1,168.87	1.604E+001
K-40		2.160E+002	2.160E+002	6.73	7.34	7.204E+000
CO-60	#	-6.337E-002	-6.338E-002	794.02	794.02	1.900E+000
I-131	#			1,098.05	1,098.05	1.523E+000
CS-134	#	3.331E-001	3.331E-001	129.29	129.33	1.492E+000
EU-154	#	-4.197E-002	-4.197E-002	7,392.83	7,392.83	1.173E+001
EU-155	#	-1.058E+000	-1.058E+000	133.59	133.64	4.764E+000
PB-214		3.420E+001	3.420E+001	6.03	6.68	3.059E+000
BI-212		2.293E+001	2.294E+001	14.74	15.03	3.674E+000
BI-214		2.660E+001	2.660E+001	7.18	7.74	2.633E+000
CS-137	#	7.052E+000	7.052E+000	12.97	13.29	1.456E+000
EU-152	#	-1.490E+000	-1.490E+000	103.94	103.98	5.230E+000
TL-208		6.563E+000	6.563E+000	12.56	12.88	1.373E+000
PB-210		4.337E+001	4.337E+001	37.44	37.64	4.024E+001
PB-212		1.548E+001	1.548E+001	8.81	9.30	2.439E+000
RA-224		7.259E+001	7.260E+001	10.82	11.22	1.708E+001
AC-228	#	9.550E+000	9.550E+000	19.24	19.46	5.840E+000
Pa-234	#	1.294E+000	1.294E+000	112.62	112.66	4.909E+000
U-235	#	2.282E+000	2.282E+000	109.85	109.89	8.470E+000
AM-241	#	7.155E-001	7.155E-001	157.22	157.26	3.816E+000
TH-234	#	4.253E+001	4.253E+001	16.97	17.37	2.731E+001
PA-234M	#	-1.539E+001	-1.539E+001	445.01	445.02	2.471E+002

= All peaks for activity calculation had bad shape

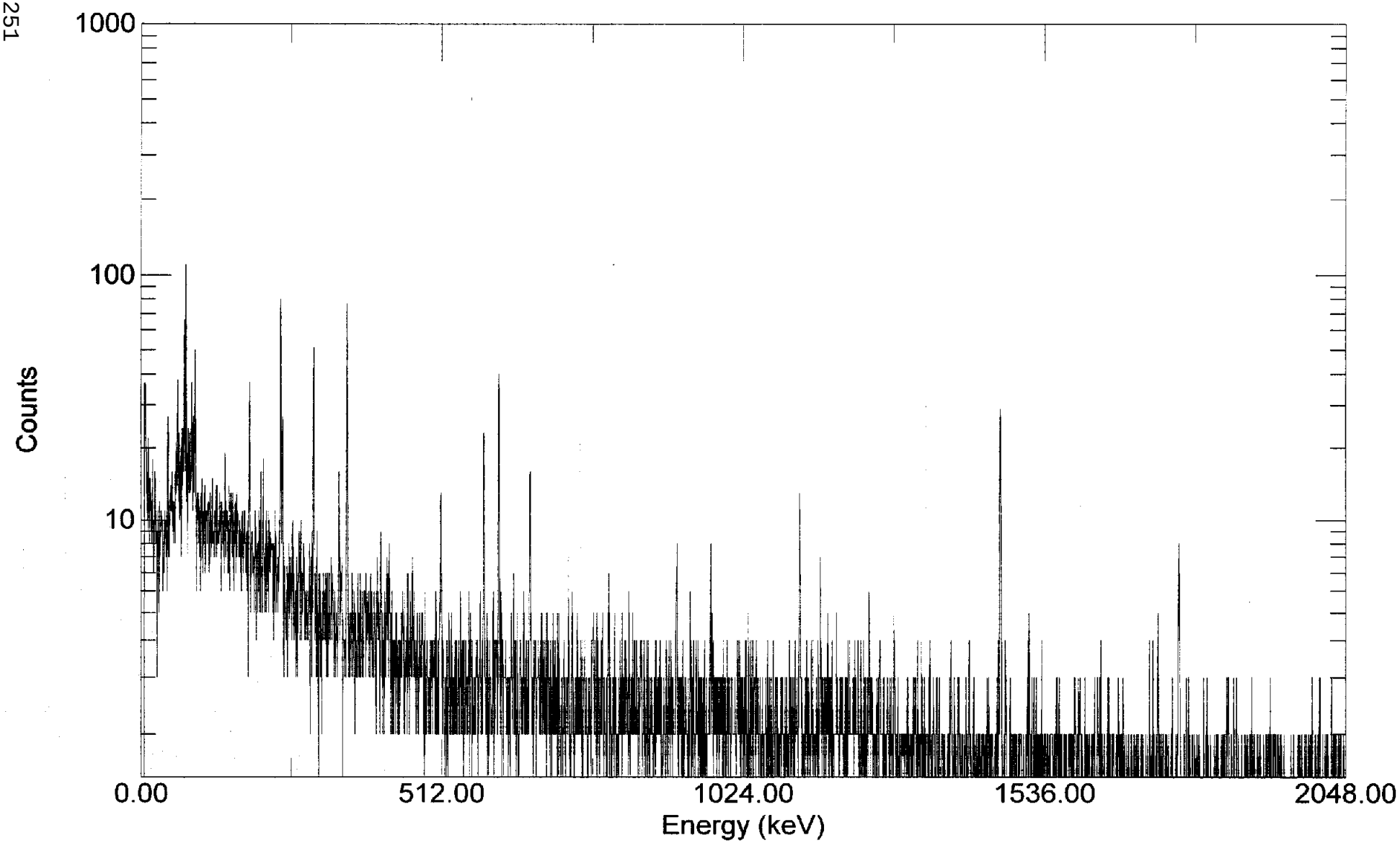
Total Activity (37.74 to 2,000.57 keV) 487.34 Bq/sample

Analyzed by: 403293

Laboratory: STL- St Louis

KEKCQ1AC

7357010_KEKCQ1AC_F7L200251-016



Acquired: 23-Dec-2007 2:25:05 PM
File: C:\User\spectra\KEKCQ1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1915.36 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,975

Sample Description: 7357010_KEKCR1AC_F7L200251-017

Spectrum Filename: KEKCR1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 2:25:38PM		
Live Time:	1800.00	Real Time:	1819.42
Dead Time:	1.07 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1976

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.53	74.80	316.94	330.04	0.183	9.41	0.862	PB-214	D
307.69	77.14	465.00	534.00	0.297	9.16	0.891	PB-214	
323.38	81.06	150.00	53.00	0.029	39.03	0.800	SB-125	
334.93	83.95	226.37	99.63	0.055	23.59	0.509	TA-182	s
347.64	87.12	236.18	199.82	0.111	12.98	0.986	PB-214	s
358.47	89.83	170.00	92.00	0.051	25.38	0.755	PB-214	M
573.11	143.48	212.94	28.06	0.016	75.92	0.438		s
742.39	185.79	212.67	301.33	0.167	11.94	1.083	U-235	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.92	46.70	142.10	94.90	0.053	18.28	0.610	s
AM-241	1	238.52	59.85	435.22	-27.90	-0.016	107.42	0.846	s
TH-234	1	254.10	63.74	338.08	130.92	0.073	23.91	0.956	
EU-155	1	345.32	86.54	485.88	8.69	0.005	360.37	0.874	s
TH-234	1	370.95	92.95	371.96	304.04	0.169	13.64	0.928	s
U-235	1	372.56	93.35	357.88	21.50	0.012	12.43	0.882	s D
AC-228	1	372.56	93.35	357.88	68.91	0.038	2.62	0.882	s D
EU-155	1	420.23	105.26	301.74	3.42	0.002	721.22	0.894	s
EU-152	1	477.77	119.65	160.72	2.10	0.001	857.83	0.912	s
EU-154	1	491.32	123.03	265.44	1.26	0.001	1826.41	0.913	s
Pa-234	1	523.08	130.97	326.44	-12.10	-0.007	213.18	0.922	s
U-235	1	574.00	143.70	293.65	40.44	0.022	61.96	0.935	s
U-235	1	652.73	163.38	285.81	0.00	0.000	2390.84	0.955	s
U-235	1	820.13	205.22	197.59	35.51	0.020	58.44	0.999	
PB-212	1	954.09	238.70	301.21	693.79	0.385	7.38	1.145	
RA-224	1	959.70	240.11	739.22	-162.68	-0.090	24.90	1.036	
PB-214	1	967.28	242.00	137.50	249.50	0.139	10.83	0.935	
TL-208	1	1107.04	276.93	44.00	37.00	0.021	34.36	0.300	s
I-131	1	1131.45	283.04	74.85	1.15	0.001	1063.47	1.081	s
PB-214	1	1180.93	295.40	73.33	525.67	0.292	5.52	1.030	
PB-212	1	1198.99	299.92	103.00	19.23	0.011	78.06	1.097	s
AC-228	1	1353.40	338.51	82.75	81.59	0.045	19.27	1.136	s
EU-152	1	1376.87	344.38	71.49	4.72	0.003	257.71	1.142	s
PB-214	1	1407.47	352.03	87.88	837.12	0.465	4.46	1.165	
I-131	1	1455.91	364.14	85.99	-0.22	0.000	5948.27	1.163	s
BE-7	1	1909.41	477.50	52.56	9.00	0.005	118.64	1.277	s
CS-134	1	2253.90	563.61	45.48	3.91	0.002	248.84	1.363	s
CS-134	1	2276.76	569.32	61.50	0.00	0.000	905.54	1.369	s D
Pa-234	1	2277.35	569.47	55.25	-1.78	-0.001	-163.35	1.369	s D
TL-208	1	2332.53	583.26	47.41	175.59	0.098	13.30	1.127	
CS-134	1	2406.32	601.71	26.84	13.92	0.008	59.05	1.403	s
BI-214	1	2437.32	609.46	38.30	607.70	0.338	4.73	1.557	
I-131	1	2544.34	636.21	27.48	6.12	0.003	127.63	1.435	s
CS-137	1	2646.69	661.79	45.30	50.95	0.028	22.95	1.459	s
EU-154	1	2893.42	723.47	54.08	-5.08	-0.003	209.40	1.519	s
BI-212	1	2908.47	727.23	32.39	15.59	0.009	57.52	1.523	s
PA-234M	1	3065.20	766.41	67.45	0.00	0.000	1161.44	1.561	s
EU-152	1	3118.92	779.84	34.26	4.51	0.003	189.63	1.573	s
BI-212	1	3152.73	788.29	29.36	4.52	0.003	175.90	1.579	s
CS-134	1	3179.82	795.06	39.25	3.24	0.002	279.12	1.589	s
CS-134	1	3206.42	801.71	41.26	-0.11	0.000	7976.19	1.595	s
TL-208	1	3435.48	858.98	26.73	-1.45	-0.001	509.34	1.650	s
EU-154	1	3494.58	873.75	35.64	1.89	0.001	452.87	1.662	s
Pa-234	1	3523.17	880.90	41.73	-1.75	-0.001	527.25	1.669	s
Pa-234	1	3533.22	883.41	37.08	0.63	0.000	1365.79	1.672	s
AC-228	1	3645.84	911.56	37.68	78.12	0.043	15.86	1.698	s

Pa-234	1	3784.57	946.24	30.00	3.68	0.002	216.71	1.731	s
EU-152	1	3854.91	963.83	37.66	10.46	0.006	88.53	1.748	s
AC-228	1	3875.49	968.97	45.55	18.61	0.010	56.29	1.752	s
EU-154	1	3983.91	996.08	23.17	-0.31	0.000	2227.65	1.778	s
PA-234M	1	4003.60	1001.00	65.62	0.00	0.000	1145.62	1.782	s
EU-154	1	4018.69	1004.77	35.91	-4.27	-0.002	204.33	1.785	s
EU-152	1	4449.59	1112.49	36.80	-1.15	-0.001	751.12	1.884	s
BI-214	1	4482.28	1120.66	7.50	138.50	0.077	10.27	1.594	
CO-60	1	4670.51	1167.72	16.20	0.36	0.000	1611.42	1.939	s
EU-154	1	5098.45	1274.71	31.95	-1.90	-0.001	427.68	2.030	s
CO-60	1	5353.60	1338.50	16.30	-0.13	0.000	4554.20	2.081	s
EU-152	1	5607.45	1401.96	14.30	6.56	0.004	90.44	2.147	s
K-40	1	5845.32	1461.43	26.74	182.93	0.102	8.41	2.192	s
BI-214	1	7059.34	1764.96	0.00	79.00	0.044	11.25	0.658	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
CO-60	T F	1	-9.261E-003	1332.50	-9.261E-003	% (	1.587E+000G		1.9E+003	99.98
			-9.261E-003	1173.24	2.341E-002	&	1.415E+000G		1.9E+003	99.90
EU-154	T F I	1	7.861E-001	873.23	7.861E-001	% (	1.271E+001G		3.1E+003	12.27
			7.861E-001	123.10	3.495E-002	%	2.176E+000G		3.1E+003	40.79
			7.861E-001	1274.54	-3.818E-001	%	5.847E+000G		3.1E+003	35.19
			7.861E-001	723.36	-1.092E+000	%	7.947E+000G		3.1E+003	20.22
			7.861E-001	1004.77	-1.365E+000	%	9.794E+000G		3.1E+003	18.01
			7.861E-001	996.33	-1.653E-001	%	1.356E+001G		3.1E+003	10.60
Pa-234	N	1	-7.662E-001	131.29	-7.662E-001	& (	5.505E+000G		1.6E+012	18.00
			-7.662E-001	569.47	-7.662E-001	%	1.605E+001G		1.6E+012	8.20
			-7.662E-001	946.02	1.503E+000	%	1.152E+001G		1.6E+012	13.40
			-7.662E-001	883.24	3.401E-001	%	1.670E+001G		1.6E+012	9.60
			-7.662E-001	880.53	-1.501E+000	&	2.813E+001G		1.6E+012	6.00
TL-208	F N	1	7.479E+000	583.02	7.479E+000	(	1.482E+000G	P	7.0E+002	84.50
			7.479E+000	277.28	1.072E+001	+	9.741E+000G		7.0E+002	6.31
			7.479E+000	860.56	-5.908E-001	%	1.088E+001G		7.0E+002	12.42
RA-224	N	1	-6.425E+001	240.99	-6.425E+001	(	5.111E+001G		7.0E+002	4.10
I-131	T F I	1	-6.338E-003	364.48	-6.338E-003	% (	1.319E+000G		8.0E+000	81.70
			-6.338E-003	284.30	3.517E-001	%	1.310E+001G		8.0E+000	6.14
			-6.338E-003	636.97	3.323E+000	%	1.473E+001G		8.0E+000	7.17
BI-212	N	1	5.757E+000	727.33	5.757E+000	% (	1.080E+001G		7.0E+002	11.82
			5.757E+000	785.51	1.917E+001	%	1.186E+002G		7.0E+002	1.10
PB-210	N	1	5.666E+001	46.54	5.666E+001	* (	3.479E+001G	P	8.1E+003	4.25
CS-134	T F I	1	5.301E-001	604.71	5.301E-001	% (	1.022E+000G		7.5E+002	97.62
			5.301E-001	795.87	1.786E-001	%	1.760E+000G		7.5E+002	85.53
			5.301E-001	569.32	0.000E+000	%	8.443E+000G	}	7.5E+002	15.38
			5.301E-001	801.95	-6.227E-002	%	1.783E+001G		7.5E+002	8.69
			5.301E-001	563.24	1.636E+000	&	1.427E+001G		7.5E+002	8.35
TH-234	N	1	5.257E+001	63.29	3.973E+001	(	2.683E+001G	P	1.6E+012	4.82
			5.257E+001	92.59	6.365E+001	* (	1.938E+001G	P	1.6E+012	5.58
PB-214	N	1	5.167E+001	351.93	5.059E+001	(	2.804E+000G	P	5.8E+005	37.60
			5.167E+001	295.09	5.266E+001	(	4.269E+000G		5.8E+005	19.30

			5.167E+001	242.00	5.457E+001		(		1.254E+001G		5.8E+005	7.43
BI-214	N	1	4.932E+001	609.31	4.934E+001		(	P	2.561E+000G		5.8E+005	46.09
			4.932E+001	1120.29	5.801E+001	+			6.481E+000G		5.8E+005	15.10
			4.932E+001	1764.49	4.926E+001		(		4.596E+000G		5.8E+005	15.40
U-235	N	1	4.313E+000	143.79	4.313E+000	%	(		8.807E+000G		2.6E+011	10.96
			4.313E+000	205.33	1.011E+001	%			1.943E+001G		2.6E+011	5.01
			4.313E+000	163.38	0.000E+000	%			1.981E+001G		2.6E+011	5.08
			4.313E+000	93.35	4.313E+000	!		E	1.823E+001X		2.6E+011	5.81
			3.962E-001	964.11	3.981E+000	%			1.191E+001G		4.9E+003	14.61
			3.962E-001	1112.07	-5.302E-001	%			1.427E+001G		4.9E+003	13.64
			3.962E-001	1408.00	2.418E+000	%			7.499E+000G		4.9E+003	21.00
EU-152 T F		1	3.962E-001	344.29	3.962E-001	%	(		3.538E+000G		4.9E+003	26.50
			3.962E-001	121.78	8.273E-002	%			2.438E+000G		4.9E+003	28.58
			3.962E-001	778.92	1.613E+000	%			1.073E+001G		4.9E+003	12.94
BE-7	N P C	1	2.576E+000	477.60	2.576E+000	&	(		1.044E+001G		5.3E+001	10.52
PB-212	N	1	2.573E+001	238.63	2.573E+001		(	P	3.100E+000G		7.0E+002	43.30
			2.573E+001	300.03	1.150E+001	%			2.992E+001G		7.0E+002	3.28
CS-137 T F I		1	2.405E+000	661.66	2.405E+000	?	(	P	1.608E+000G		1.1E+004	85.21
EU-155 T F I		1	1.825E-001	105.31	1.825E-001	&	(		4.469E+000G		1.8E+003	21.20
			1.825E-001	86.54	3.397E-001	%			4.122E+000G	A	1.8E+003	30.70
AC-228	N	1	1.445E+001	911.16	1.427E+001		(		5.718E+000G		2.1E+003	29.00
			1.445E+001	968.97	5.949E+000	%			1.092E+001G		2.1E+003	17.46
			1.445E+001	338.32	1.488E+001	*	(		8.227E+000G		2.1E+003	12.01
			1.445E+001	93.35	1.445E+001	+		E	1.905E+001G	A	2.1E+003	5.56
K-40	N	1	1.374E+002	1460.83	1.374E+002		(		2.013E+001G		4.7E+011	10.67
AM-241 T		1	-1.205E+000	59.54	-1.205E+000	*	(		4.317E+000G		1.6E+005	35.90
PA-234M	N	1	0.000E+000	1001.00	0.000E+000	%	(		2.774E+002G		1.6E+012	.84
			0.000E+000	766.41	0.000E+000	%			6.366E+002G		1.6E+012	.29

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	2.576E+000	2.579E+000	118.64	118.68	1.044E+001
K-40	#	1.374E+002	1.374E+002	8.41	8.90	2.013E+001
CO-60	#	-9.261E-003	-9.261E-003	4,554.20	4,554.20	1.587E+000
I-131	#	-6.338E-003	-6.394E-003	5,948.27	5,948.27	1.319E+000
CS-134	#	5.301E-001	5.302E-001	59.05	59.12	1.022E+000
EU-154	#	7.861E-001	7.861E-001	452.87	452.88	1.271E+001
PB-210	#	5.666E+001	5.666E+001	22.92	23.25	3.479E+001
PB-212		2.573E+001	2.574E+001	7.48	8.06	3.100E+000
PB-214		5.167E+001	5.167E+001	4.32	5.19	2.804E+000
BI-212	#	5.757E+000	5.757E+000	57.52	57.59	1.080E+001
CS-137	#	2.405E+000	2.405E+000	23.29	23.47	1.608E+000
EU-152	#	3.962E-001	3.962E-001	257.71	257.72	3.538E+000
EU-155	#	1.825E-001	1.825E-001	721.22	721.23	4.469E+000
TL-208		7.479E+000	7.480E+000	13.48	13.79	1.482E+000
BI-214		4.932E+001	4.932E+001	4.75	5.56	2.561E+000
RA-224	#	-6.425E+001	-6.426E+001	24.90	25.08	5.111E+001
AC-228	#	1.445E+001	1.445E+001	12.48	12.80	5.718E+000
TH-234		5.257E+001	5.257E+001	14.90	15.35	2.683E+001
PA-234M	#			1,145.62	1,145.62	2.774E+002
U-235	#	4.313E+000	4.313E+000	61.96	62.03	8.807E+000
AM-241	#	-1.205E+000	-1.205E+000	107.42	107.49	4.317E+000
Pa-234	#	-7.662E-001	-7.662E-001	213.18	213.20	5.505E+000

= All peaks for activity calculation had bad shape

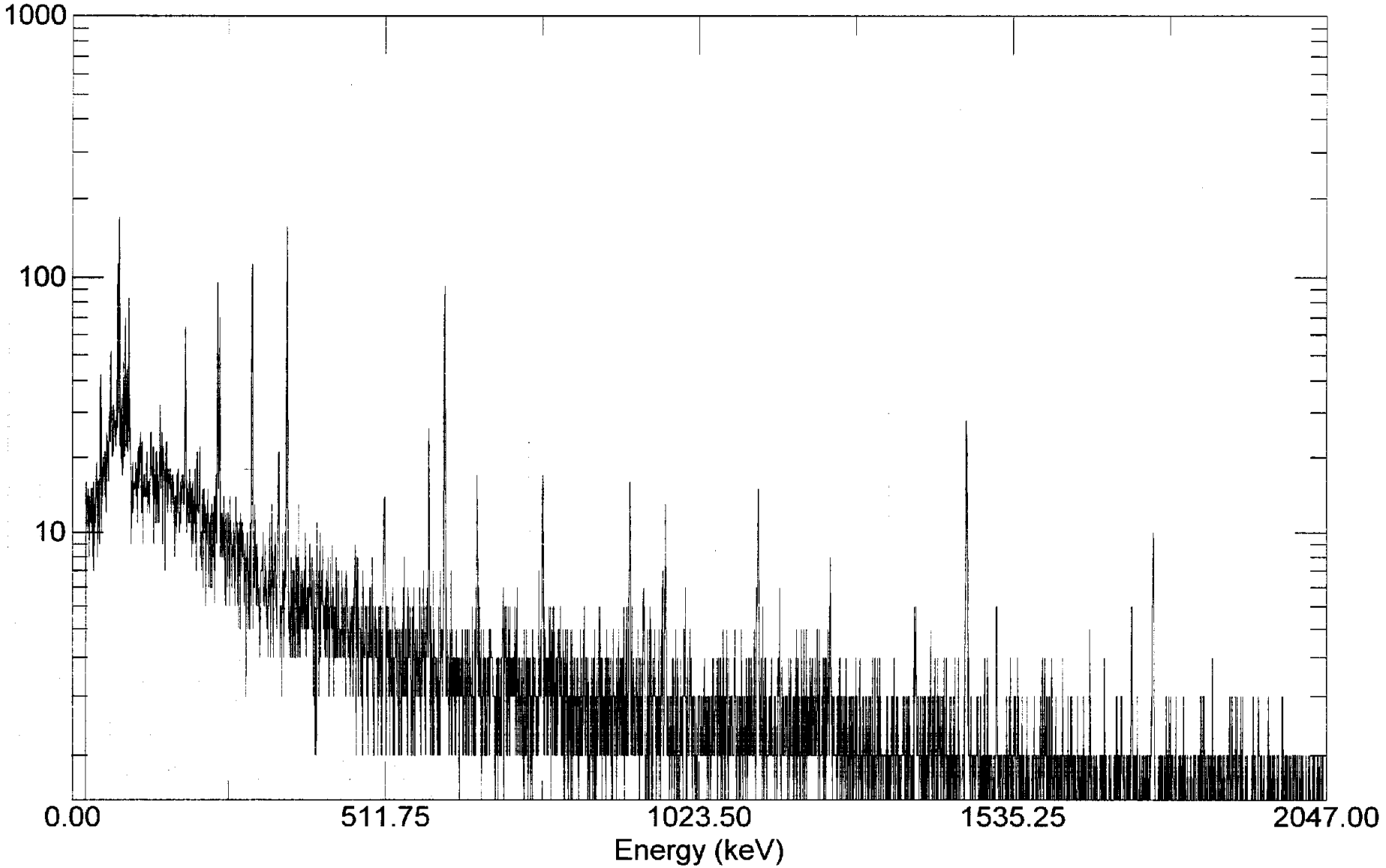
Total Activity (37.72 to 2,000.15 keV) 245.83 Bq/sample

Analyzed by: 403293

Laboratory: Test America

KEKCR1AC

7357010_KEKCR1AC_F7L200251-017



Acquired: 23-Dec-2007 2:25:38 PM
File: C:\User\spectra\KEKCR1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1819.42 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,977

Sample Description: 7357010_KEQKR1AA_F7L230000-010B

Spectrum Filename: KEQKR1AA.An1

Acquisition Information

Start Time:	23-Dec-2007 3:03:33PM		
Live Time:	1800.00	Real Time:	1809.64
Dead Time:	0.53 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2271

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty Sigma%	FWHM keV	Suspected Nuclide	Code

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.46	46.33	49.46	20.54	0.011	23.38	1.029	s
AM-241	1	236.22	59.27	39.21	4.19	0.002	217.04	0.824	s
TH-234	1	252.72	63.39	58.56	-2.56	-0.001	27.95	0.327	s
EU-155	1	343.88	86.18	43.49	2.24	0.001	421.66	0.849	s
TH-234	1	369.95	92.70	74.51	24.49	0.014	17.02	1.065	s
AC-228	1	372.54	93.35	29.93	-1.18	-0.001	-178.40	0.855	s D
U-235	1	372.54	93.35	29.93	4.33	0.002	22.80	0.855	s D
EU-155	1	419.04	104.98	26.16	8.76	0.005	89.24	0.866	s
EU-152	1	484.09	121.24	34.34	-3.52	-0.002	241.55	0.881	s
EU-154	1	491.32	123.05	32.63	-0.62	0.000	1305.66	0.882	s
Pa-234	1	524.87	131.43	38.87	-4.28	-0.002	211.81	0.890	s
U-235	1	574.75	143.90	29.34	8.01	0.004	67.53	0.901	s
U-235	1	653.75	163.65	30.98	-4.87	-0.003	402.43	0.919	s
U-235	1	818.80	204.92	26.89	-4.09	-0.002	367.27	0.957	s
PB-212	1	952.37	238.31	29.58	0.42	0.000	27.48	0.639	s
RA-224	1	961.77	240.66	34.25	-0.23	0.000	3529.47	0.989	s
PB-214	1	969.56	242.61	36.17	-6.42	-0.004	1284.23	0.990	s
TL-208	1	1104.34	276.30	18.43	-0.86	0.000	710.50	1.021	s
I-131	1	1135.08	283.99	21.31	5.60	0.003	124.00	1.028	s
PB-214	1	1179.17	295.01	23.02	-1.99	-0.001	81.77	1.037	s
PB-212	1	1196.40	299.32	14.15	3.49	0.002	161.67	1.042	s
AC-228	1	1352.23	338.27	20.59	-1.85	-0.001	191.74	1.076	s
EU-152	1	1375.51	344.09	12.98	6.08	0.003	93.11	1.081	s
PB-214	1	1407.31	352.04	28.62	-8.52	-0.005	174.68	1.088	s
I-131	1	1457.07	364.48	31.28	0.00	0.000	790.96	1.099	s
BE-7	1	1907.39	477.06	18.79	-1.45	-0.001	430.29	1.198	s
CS-134	1	2253.72	563.63	19.56	-2.93	-0.002	221.28	1.273	s
CS-134	1	2276.47	569.32	19.63	0.00	0.000	0.00	1.278	s D
Pa-234	1	2277.07	569.47	19.67	-0.77	0.000	-67.04	1.278	s D
TL-208	1	2331.90	583.18	16.65	3.01	0.002	43.89	1.290	s
CS-134	1	2418.04	604.71	32.00	0.00	0.000	800.00	1.309	s
BI-214	1	2435.24	609.01	24.24	-5.06	-0.003	85.87	1.313	
I-131	1	2547.11	636.97	8.54	0.00	0.000	413.38	1.337	s
CS-137	1	2642.77	660.89	16.65	-3.06	-0.002	197.32	1.358	s
EU-154	1	2892.67	723.36	41.38	0.00	0.000	909.69	1.411	s
BI-212	1	2906.44	726.80	11.06	3.58	0.002	141.46	1.414	s
PA-234M	1	3063.06	765.95	16.57	1.08	0.001	539.24	1.447	s
EU-152	1	3115.80	779.13	13.69	4.07	0.002	137.72	1.458	s
BI-212	1	3139.09	784.95	13.74	2.07	0.001	263.23	1.463	s
CS-134	1	3183.06	795.94	14.35	-1.33	-0.001	412.64	1.472	s
CS-134	1	3208.49	802.30	11.33	1.67	0.001	295.53	1.477	s
TL-208	1	3441.38	860.52	8.11	1.79	0.001	236.64	1.527	s
EU-154	1	3492.60	873.32	13.61	0.64	0.000	828.27	1.537	s
Pa-234	1	3518.70	879.84	16.45	-1.60	-0.001	367.85	1.543	s
Pa-234	1	3532.30	883.24	0.00	0.00	0.000	100.00	1.546	s

AC-228	1	3642.81	910.86	16.49	-1.76	-0.001	168.86	1.569	s
Pa-234	1	3783.57	946.05	11.99	-1.13	-0.001	444.35	1.598	s
EU-152	1	3859.94	965.14	8.82	3.10	0.002	146.97	1.613	s
AC-228	1	3869.87	967.62	16.49	-6.09	-0.003	191.02	1.617	s
EU-154	1	3984.73	996.33	23.87	0.00	0.000	690.88	1.640	s
PA-234M	1	4003.99	1001.14	4.43	1.59	0.001	203.76	1.643	s
EU-154	1	4018.52	1004.77	24.05	0.00	0.000	693.57	1.647	s
EU-152	1	4447.80	1112.07	0.00	0.00	0.000	100.00	1.735	s
BI-214	1	4480.66	1120.29	5.75	-5.75	-0.003	100.00	1.741	s
CO-60	1	4692.51	1173.24	0.00	0.00	0.000	100.00	1.784	s
EU-154	1	5097.46	1274.45	6.65	-0.14	0.000	2639.50	1.866	s
CO-60	1	5329.72	1332.50	0.00	0.00	0.000	100.00	1.912	s
EU-152	1	5626.73	1406.73	6.54	1.75	0.001	219.96	1.972	s
K-40	1	5842.44	1460.65	16.79	-6.37	-0.004	62.06	2.013	s
BI-214	1	7068.85	1767.15	15.16	-4.62	-0.003	2531.07	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
			9.974E-001	163.38	-1.376E+000	%	P	8.091E+000G		2.6E+011	5.08
			9.974E-001	93.35	9.974E-001	?	E	6.489E+000X		2.6E+011	5.81
U-235	N	1	9.974E-001	143.79	9.974E-001	% (	P	3.482E+000G		2.6E+011	10.96
			9.974E-001	205.33	-1.326E+000	%	P	8.703E+000G		2.6E+011	5.01
PA-234	N	1	9.439E+000	1001.00	9.439E+000	% (		7.450E+001G		1.6E+012	.84
			9.439E+000	766.41	1.526E+001	&		3.049E+002G		1.6E+012	.29
TH-234	N	1	-8.713E-001	63.29	-8.713E-001	% (	P	1.305E+001G		1.6E+012	4.82
			-8.713E-001	92.59	5.874E+000	%	P	1.030E+001G		1.6E+012	5.58
EU-155	T F I	1	5.417E-001	105.31	5.417E-001	& (		1.642E+000G		1.8E+003	21.20
			5.417E-001	86.54	9.977E-002	%		1.489E+000G		1.8E+003	30.70
PB-214	N	1	-5.357E-001	351.93	-5.357E-001	& (	P	1.739E+000G		5.8E+005	37.60
			-5.357E-001	295.09	-2.142E-001	%	P	2.699E+000G		5.8E+005	19.30
			-5.357E-001	242.00	-1.561E+000	%	P	7.469E+000G		5.8E+005	7.43
EU-152	T F	1	5.339E-001	344.29	5.339E-001	% (		1.712E+000G		4.9E+003	26.50
			5.339E-001	121.78	-1.619E-001	%		1.382E+000G		4.9E+003	28.58
			5.339E-001	778.92	1.316E+000	%		6.449E+000G		4.9E+003	12.94
			5.339E-001	964.11	1.029E+000	%		5.499E+000G		4.9E+003	14.61
			5.339E-001	1112.07	0.000E+000	&		2.901E+000G		4.9E+003	13.64
			5.339E-001	1408.00	5.333E-001	%		4.455E+000G		4.9E+003	21.00
BE-7	N P C	1	-4.084E-001	477.60	-4.084E-001	% (		6.444E+000G		5.3E+001	10.52
K-40	N	1	-3.932E+000	1460.83	-3.932E+000	% (	P	1.346E+001G		4.7E+011	10.67
BI-214	N	1	-3.864E-001	609.31	-3.864E-001	% (	P	1.960E+000G		5.8E+005	46.09
			-3.864E-001	1120.29	-2.056E+000	%	P	4.965E+000G		5.8E+005	15.10
			-3.864E-001	1764.49	-2.307E+000	%	P	1.040E+001G		5.8E+005	15.40
Pa-234	N	1	-3.165E-001	131.29	-3.165E-001	% (		2.351E+000G		1.6E+012	18.00
			-3.165E-001	569.47	-3.165E-001	%		9.571E+000G		1.6E+012	8.20
			-3.165E-001	946.02	-4.031E-001	%		6.736E+000G		1.6E+012	13.40
			-3.165E-001	883.24	0.000E+000	%		3.504E+000G		1.6E+012	9.60
			-3.165E-001	880.53	-1.212E+000	%		1.640E+001G		1.6E+012	6.00
			-2.835E-001	968.97	-1.698E+000	%	P	6.035E+000G		2.1E+003	17.46
			-2.835E-001	338.32	-3.541E-001	%	P	4.563E+000G		2.1E+003	12.01
			-2.835E-001	93.35	-2.835E-001	?	E	6.780E+000X	A	2.1E+003	5.56
AC-228	N	1	-2.835E-001	911.07	-2.835E-001	% (	P	3.479E+000G		2.1E+003	29.00
			2.352E-001	723.36	0.000E+000	%		6.420E+000G		3.1E+003	20.22
			2.352E-001	1004.77	0.000E+000	%		7.092E+000G		3.1E+003	18.01
			2.352E-001	996.33	0.000E+000	%		1.194E+001G		3.1E+003	10.60
EU-154	T F I	1	2.352E-001	873.23	2.352E-001	& (		7.345E+000G		3.1E+003	12.27
			2.352E-001	123.10	-2.008E-002	&		9.473E-001G		3.1E+003	40.79
			2.352E-001	1274.54	-2.343E-002	%		2.484E+000G		3.1E+003	35.19
AM-241	T	1	2.024E-001	59.54	2.024E-001	& (		1.542E+000G		1.6E+005	35.90
PB-212	N	1	1.721E-002	238.63	1.721E-002	% (	P	1.159E+000G		7.0E+002	43.30
			1.721E-002	300.03	2.236E+000	%		1.298E+001G		7.0E+002	3.28
CS-137	T F I	1	-1.338E-001	661.66	-1.338E-001	% (		9.513E-001G		1.1E+004	85.21
PB-210	N	1	1.297E+001	46.54	1.297E+001	* (	P	2.241E+001G		8.1E+003	4.25

TL-208	F	N	1	1.215E-001	583.02	1.215E-001	%	(	P	8.776E-001G	7.0E+002	84.50
				1.215E-001	277.28	-2.722E-001	%			7.152E+000G	7.0E+002	6.31
				1.215E-001	860.56	6.473E-001	%			5.768E+000G	7.0E+002	12.42
BI-212		N	1	1.209E+000	727.33	1.209E+000	%	(		6.141E+000G	7.0E+002	11.82
				1.209E+000	785.51	7.898E+000	&			7.643E+001G	7.0E+002	1.10
RA-224		N	1	-1.031E-001	240.99	-1.031E-001	%	(		1.317E+001G	7.0E+002	4.10
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(		4.523E-001G	1.9E+003	99.98
				0.000E+000	1173.24	0.000E+000	%			4.119E-001G	1.9E+003	99.90
I-131	T F I		1	0.000E+000	364.48	0.000E+000	&	(		8.548E-001G	8.0E+000	81.70
				0.000E+000	284.30	1.845E+000	%			7.979E+000G	8.0E+000	6.14
				0.000E+000	636.97	0.000E+000	%			8.276E+000G	8.0E+000	7.17
CS-134	T F I		1	0.000E+000	604.71	0.000E+000	%	(		1.043E+000G	7.5E+002	97.62
				0.000E+000	795.87	-6.591E-002	%			1.011E+000G	7.5E+002	85.53
				0.000E+000	569.32	0.000E+000	%			5.097E+000G	7.5E+002	15.38
				0.000E+000	801.95	8.196E-001	%			9.034E+000G	7.5E+002	8.69
				0.000E+000	563.24	-1.169E+000	%			9.303E+000G	7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-4.084E-001	-4.091E-001	430.29	430.30	6.444E+000
K-40	<	-3.932E+000	-3.932E+000	184.23	184.25	1.346E+001
CO-60	<			100.00	100.04	4.523E-001
I-131	<			790.96	790.97	8.548E-001
CS-134	<			800.00	800.01	1.043E+000
CS-137	<	-1.338E-001	-1.338E-001	197.32	197.35	9.513E-001
EU-152	<	5.339E-001	5.339E-001	93.11	93.16	1.712E+000
EU-155	<	5.417E-001	5.417E-001	89.24	89.30	1.642E+000
TL-208	<	1.215E-001	1.215E-001	174.01	174.03	8.776E-001
EU-154	<	2.352E-001	2.352E-001	828.27	828.28	7.345E+000
RA-224	<	-1.031E-001	-1.032E-001	3,529.47	3,529.47	1.317E+001
PB-210	#	1.297E+001	1.297E+001	56.91	57.04	2.241E+001
PB-212	<	1.721E-002	1.721E-002	1,538.83	1,538.84	1.159E+000
PB-214	<	-5.357E-001	-5.357E-001	420.53	420.54	1.739E+000
Pa-234	<	-3.165E-001	-3.165E-001	211.81	211.83	2.351E+000
AM-241	<	2.024E-001	2.024E-001	217.04	217.07	1.542E+000
BI-212	<	1.209E+000	1.209E+000	141.46	141.49	6.141E+000
BI-214	<	-3.864E-001	-3.864E-001	283.25	283.27	1.960E+000
AC-228	<	-2.835E-001	-2.835E-001	629.26	629.26	3.479E+000
TH-234	<	-8.713E-001	-8.713E-001	430.44	430.46	1.305E+001
PA-234M	<	9.439E+000	9.439E+000	203.76	203.78	7.450E+001
U-235	<	9.974E-001	9.974E-001	99.09	99.14	3.482E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 0.00 Bq/sample

Analyzed by: _____

403605

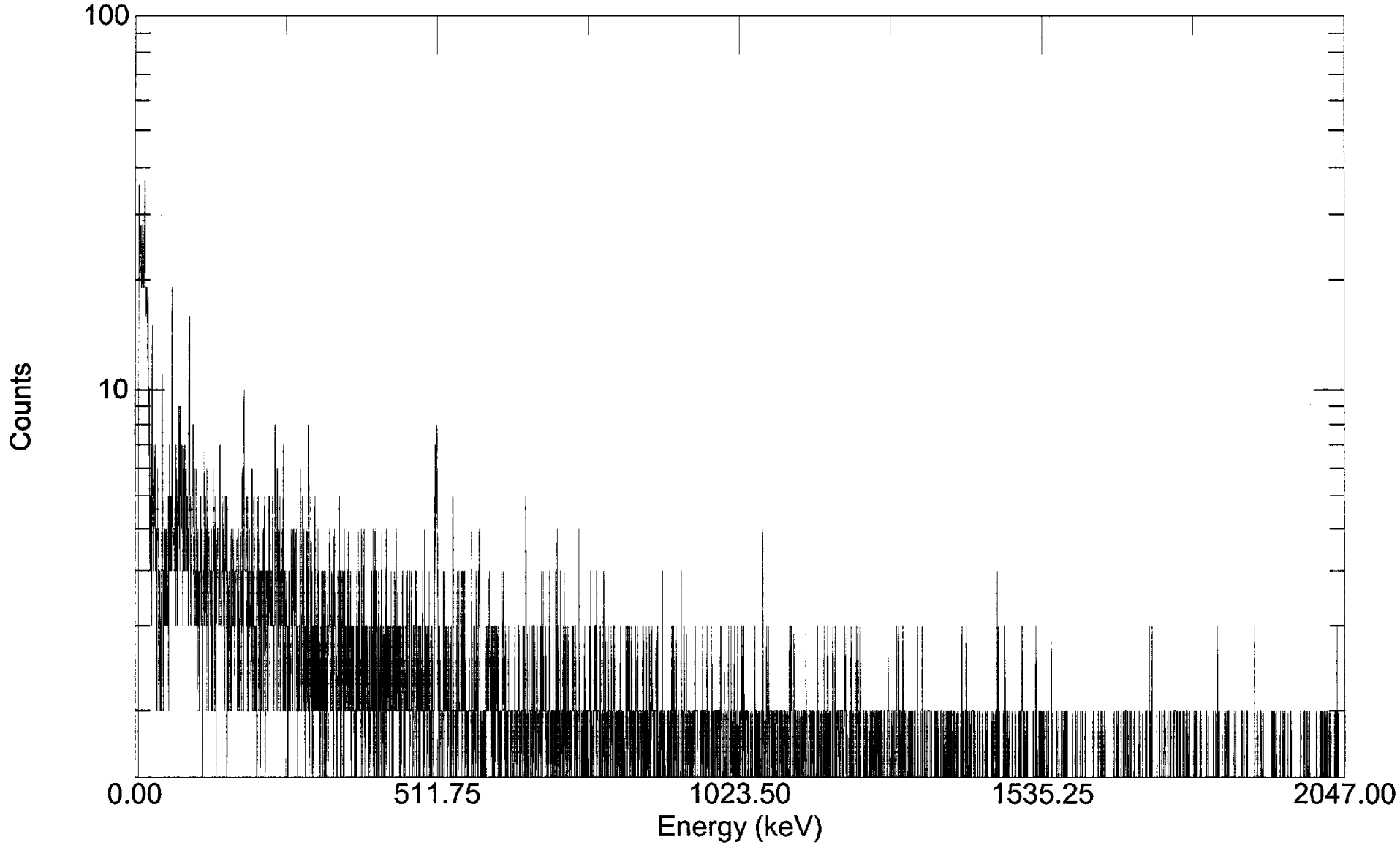
Reviewed by: _____

Supervisor

Laboratory: Test America

KEQKR1AA

7357010_KEQKR1AA_F7L230000-010B



Acquired: 23-Dec-2007 3:03:33 PM
File: C:\User\spectra\KEQKR1AA.spc
Detector: #0 Ge 1 SN/242

Real Time: 1809.64 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,978

Sample Description: 7357010_KEQKR1AC_F7L230000-010C

Spectrum Filename: KEQKR1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:04:26PM		
Live Time:	1800.00	Real Time:	1824.48
Dead Time:	1.34 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2004 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1307

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
144.98	36.62	1728.00	267.00	0.148	27.65	1.091	CE-144	s
350.30	87.90	9785.61	1125.39	0.625	12.78	0.973	PB-214	s
487.04	122.05	2346.67	248.33	0.138	28.31	1.063	CO-57	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.57	46.51	9750.69	26985.30	14.992	1.03	0.937	s
AM-241	1	236.52	59.48	7443.00	31293.00	17.385	0.86	0.911	s
TH-234	1	245.24	61.66	3253.78	-771.65	-0.429	11.36	0.882	s
EU-155	1	350.50	87.95	3121.26	6003.71	3.335	1.84	0.906	s
TH-234	1	363.37	91.16	1573.02	-54.31	-0.030	198.51	0.912	s
U-235	1	372.14	93.35	1992.48	-2.29	-0.001	-1918.15	0.913	s D
AC-228	1	372.14	93.35	1883.85	128.07	0.071	36.41	0.913	s D
EU-155	1	412.03	103.31	1157.27	-21.40	-0.012	225.87	0.925	s
EU-152	1	486.47	121.90	1740.03	865.97	0.481	7.61	0.942	s
EU-154	1	491.26	123.10	1691.94	6.70	0.004	869.09	0.943	s
Pa-234	1	524.34	131.36	1608.15	-0.25	0.000	22535.29	0.952	s
U-235	1	572.41	143.37	1438.26	-4.20	-0.002	2610.11	0.964	s
U-235	1	650.47	162.86	1222.77	24.12	0.013	206.07	0.984	s
U-235	1	822.06	205.72	1424.00	-11.00	-0.006	486.22	1.027	s
PB-212	1	953.72	238.61	1081.58	189.42	0.105	32.38	0.771	s
RA-224	1	961.35	240.51	1525.43	-43.48	-0.024	127.95	1.062	s
PB-214	1	966.85	241.89	1478.61	-2.15	-0.001	2525.25	1.063	s
TL-208	1	1106.26	276.71	1053.28	33.77	0.019	136.98	1.098	s
I-131	1	1134.55	283.78	1108.99	-37.37	-0.021	127.08	1.105	s
PB-214	1	1186.62	296.78	855.11	-1.21	-0.001	1490.60	1.116	s
PB-212	1	1199.84	300.09	1030.91	-19.87	-0.011	229.66	1.121	s
AC-228	1	1354.55	338.74	1098.57	22.64	0.013	189.95	1.158	s
EU-152	1	1378.66	344.76	1039.31	-23.50	-0.013	195.10	1.164	s
PB-214	1	1407.63	352.00	1073.13	29.50	0.016	120.26	1.171	s
I-131	1	1457.68	364.50	937.52	38.56	0.021	113.44	1.184	s
BE-7	1	1904.81	476.21	906.24	21.39	0.012	200.18	1.292	
CS-134	1	2249.74	562.40	479.73	32.65	0.018	96.47	1.372	s
CS-134	1	2277.45	569.32	567.42	2.23	0.001	1189.04	1.378	s D
Pa-234	1	2278.04	569.47	502.05	-0.04	0.000	-389.88	1.378	s D
TL-208	1	2332.23	583.01	684.53	26.72	0.015	107.44	1.390	s
CS-134	1	2408.24	602.00	430.45	13.54	0.008	218.36	1.410	s
BI-214	1	2435.36	608.78	608.89	40.89	0.023	73.96	1.415	s
I-131	1	2538.80	634.63	461.25	21.68	0.012	141.76	1.440	s
CS-137	1	2646.19	661.47	435.00	12245.00	6.803	0.99	1.624	
EU-154	1	2893.28	723.22	504.57	35.22	0.020	91.77	1.518	s
BI-212	1	2909.72	727.33	563.01	-2.16	-0.001	1555.43	1.521	s
PA-234M	1	3064.59	766.04	570.97	29.42	0.016	116.32	1.556	s
EU-152	1	3117.33	779.22	587.15	16.75	0.009	206.05	1.567	s
BI-212	1	3140.93	785.12	577.78	9.35	0.005	365.03	1.572	s
CS-134	1	3180.62	795.04	618.85	32.69	0.018	109.02	1.582	s
CS-134	1	3208.21	801.94	688.25	-8.71	-0.005	427.45	1.587	s
TL-208	1	3442.62	860.53	806.45	12.05	0.007	334.60	1.638	s
EU-154	1	3488.83	872.08	714.76	0.10	0.000	38638.91	1.649	s
Pa-234	1	3523.83	880.83	782.57	-27.61	-0.015	144.54	1.655	s
Pa-234	1	3530.35	882.46	738.30	-13.10	-0.007	294.59	1.657	s

AC-228	1	3643.85	910.83	830.05	27.37	0.015	138.95	1.681	s
Pa-234	1	3791.69	947.79	992.83	-5.49	-0.003	812.93	1.710	s
EU-152	1	3859.52	964.75	921.20	29.46	0.016	146.87	1.726	s
AC-228	1	3873.16	968.16	840.71	-7.39	-0.004	556.42	1.730	s
EU-154	1	3985.85	996.33	713.48	0.00	0.000	3777.50	1.753	s
PA-234M	1	4001.32	1000.20	686.26	-20.15	-0.011	185.21	1.756	s
EU-154	1	4017.86	1004.33	699.82	-0.18	0.000	20909.94	1.760	s
EU-152	1	4448.78	1112.07	636.02	0.00	0.000	3566.56	1.847	s
BI-214	1	4481.18	1120.18	544.01	47.84	0.027	67.65	1.854	s
CO-60	1	4691.56	1172.78	437.33	9455.67	5.253	1.28	1.911	
EU-154	1	5111.08	1277.70	74.28	-4.10	-0.002	301.53	1.975	s
CO-60	1	5328.08	1331.97	63.00	8593.00	4.774	1.12	2.094	s
EU-152	1	5627.53	1406.87	40.43	-0.06	0.000	15376.43	2.076	s
K-40	1	5842.48	1460.63	50.82	-3.21	-0.002	116.76	2.115	s
BI-214	1	7048.58	1762.39	26.34	-1.92	-0.001	1577.65	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
PB-212	N	1	7.358E+000	238.63	7.358E+000		(P	6.059E+000G		7.0E+002	43.30
			7.358E+000	300.03	-1.206E+001	%		9.245E+001G		7.0E+002	3.28
BI-212	N	1	-7.086E-001	727.33	-7.086E-001	&	(	3.717E+001G		7.0E+002	11.82
			-7.086E-001	785.51	3.488E+001	&		4.280E+002G		7.0E+002	1.10
BE-7	N P C	1	5.774E+000	477.60	5.774E+000	%	(	3.859E+001G		5.3E+001	10.52
CO-60	T F	1	5.246E+002	1332.50	5.256E+002	@	(	2.428E+000G		1.9E+003	99.98
			5.246E+002	1173.24	5.237E+002		(	5.547E+000G		1.9E+003	99.90
CS-137	T F I	1	5.200E+002	661.66	5.200E+002		(	4.243E+000G		1.1E+004	85.21
U-235	N	1	-4.865E-001	143.79	-4.865E-001	&	(P	2.079E+001G		2.6E+011	10.96
			-4.865E-001	205.33	-3.337E+000	&		5.418E+001G		2.6E+011	5.01
			-4.865E-001	163.38	6.350E+000	%		4.362E+001G		2.6E+011	5.08
			-4.865E-001	93.35	-4.865E-001	&	E	4.479E+001X		2.6E+011	5.81
CS-134	T F I	1	4.698E-001	604.71	4.698E-001	%	(	3.448E+000G		7.5E+002	97.62
			4.698E-001	795.87	1.584E+000	%		5.746E+000G		7.5E+002	85.53
			4.698E-001	569.32	4.698E-001	&		2.395E+001G		7.5E+002	15.38
			4.698E-001	801.95	-4.174E+000	&		5.991E+001G		7.5E+002	8.69
			4.698E-001	563.24	1.256E+001	&		4.032E+001G		7.5E+002	8.35
AC-228	N	1	4.317E+000	911.07	4.317E+000	%	(P	2.161E+001G		2.1E+003	29.00
			4.317E+000	968.97	-2.025E+000	%		3.780E+001G		2.1E+003	17.46
			4.317E+000	338.32	4.113E+000	%	P	2.855E+001G		2.1E+003	12.01
			4.317E+000	93.35	2.844E+001	&	} E	4.680E+001X	A	2.1E+003	5.56
EU-154	T F I	1	3.537E-002	873.23	3.537E-002	&	(	4.600E+001G		3.1E+003	12.27
			3.537E-002	123.10	2.008E-001	%		5.825E+000G		3.1E+003	40.79
			3.537E-002	1274.54	-6.873E-001	%		7.191E+000G		3.1E+003	35.19
			3.537E-002	723.36	6.728E+000	&		2.052E+001G		3.1E+003	20.22
			3.537E-002	1004.77	-4.888E-002	&		3.441E+001G		3.1E+003	18.01
			3.537E-002	996.33	0.000E+000	&		5.866E+001G		3.1E+003	10.60
BI-214	N	1	3.021E+000	609.31	3.021E+000	%	(P	8.697E+000G		5.8E+005	46.09
			3.021E+000	1120.29	1.692E+001	%	P	3.940E+001G		5.8E+005	15.10
			3.021E+000	1764.49	-9.685E-001	%	P	1.343E+001G		5.8E+005	15.40
TH-234	N	1	-2.403E+002	63.29	-2.403E+002		(P	8.362E+001G		1.6E+012	4.82
			-2.403E+002	92.59	-1.203E+001	%	P	4.155E+001G		1.6E+012	5.58
K-40	N	1	-1.983E+000	1460.83	-1.983E+000	%	(P	2.220E+001G		4.7E+011	10.67
			1.824E+001	1408.00	-1.781E-002	%		9.845E+000G		4.9E+003	21.00
EU-152	T F	1	1.824E+001	344.29	-1.961E+000	&	(	1.276E+001G		4.9E+003	26.50
			1.824E+001	121.78	3.698E+001	*	(	8.416E+000G		4.9E+003	28.58
			1.824E+001	778.92	5.279E+000	%		3.644E+001G		4.9E+003	12.94
			1.824E+001	964.11	9.622E+000	%		4.708E+001G		4.9E+003	14.61
			1.824E+001	1112.07	0.000E+000	%		4.680E+001G		4.9E+003	13.64
RA-224	N	1	-1.796E+001	240.99	-1.796E+001	&	(	7.631E+001G		7.0E+002	4.10
PB-214	N	1	1.764E+000	351.93	1.764E+000	%	(P	9.291E+000G		5.8E+005	37.60
			1.764E+000	295.09	-1.234E-001	&	P	1.415E+001G		5.8E+005	19.30
			1.764E+000	242.00	-4.925E-001	%		4.159E+001G		5.8E+005	7.43
Pa-234	N	1	-1.730E-002	131.29	-1.730E-002	&	(	1.303E+001G		1.6E+012	18.00

				-1.730E-002	569.47	-1.730E-002	&			4.232E+001G	1.6E+012	8.20
				-1.730E-002	946.02	-1.927E+000	&			5.250E+001G	1.6E+012	13.40
				-1.730E-002	883.24	-6.103E+000	&			6.024E+001G	1.6E+012	9.60
				-1.730E-002	880.53	-2.053E+001	&			9.895E+001G	1.6E+012	6.00
PB-210		N	1	1.563E+004	46.54	1.563E+004	*	(	P	2.682E+002G	8.1E+003	4.25
EU-155	T F I		1	1.454E+002	105.31	-1.225E+000	%	(		9.229E+000G	1.8E+003	21.20
				1.454E+002	86.54	2.467E+002	?	(		1.081E+001G	1.8E+003	30.70
AM-241	T		1	1.383E+003	59.54	1.383E+003	*	(		1.789E+001G	1.6E+005	35.90
PA-234		N	1	-1.181E+002	1001.00	-1.181E+002	&	(		7.314E+002G	1.6E+012	.84
				-1.181E+002	766.41	4.033E+002	%			1.564E+003G	1.6E+012	.29
I-131	T F I		1	1.090E+000	364.48	1.090E+000	*	(		4.111E+000G	8.0E+000	81.70
				1.090E+000	284.30	-1.163E+001	&			4.915E+001G	8.0E+000	6.14
				1.090E+000	636.97	1.064E+001	%			5.045E+001G	8.0E+000	7.17
TL-208	F	N	1	1.042E+000	583.02	1.042E+000	%	(	P	4.862E+000G	7.0E+002	84.50
				1.042E+000	277.28	1.004E+001	%			4.577E+001G	7.0E+002	6.31
				1.042E+000	860.56	4.255E+000	&			4.770E+001G	7.0E+002	12.42

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	5.774E+000		200.18	200.20	3.859E+001
K-40	<	-1.983E+000	-1.983E+000	524.48	524.49	2.220E+001
CO-60		5.246E+002	8.564E+002	0.85	2.97	2.428E+000
I-131	<	1.090E+000		113.44	113.48	4.111E+000
CS-134	<	4.698E-001	1.642E+000	218.36	218.38	3.448E+000
EU-154	<	3.537E-002	4.777E-002	38.638.91	38.638.91	4.600E+001
PB-212		7.358E+000	2.845E+001	35.92	36.05	6.059E+000
PB-214	<	1.764E+000	1.767E+000	157.79	157.82	9.291E+000
BI-212	<	-7.086E-001	-2.740E+000	1.555.43	1.555.43	3.717E+001
CS-137		5.200E+002	5.668E+002	0.99	3.07	4.243E+000
EU-152	<	1.824E+001	2.208E+001	7.61	8.14	1.276E+001
EU-155	<	1.454E+002	2.448E+002	1.84	3.83	9.229E+000
TL-208	<	1.042E+000	4.030E+000	139.44	139.47	4.862E+000
RA-224	<	-1.796E+001	-6.945E+001	127.95	127.98	7.631E+001
PB-210	#	1.563E+004	1.755E+004	1.03	4.03	2.682E+002
BI-214	<	3.021E+000	3.026E+000	86.53	86.57	8.697E+000
AC-228	<	4.317E+000	6.765E+000	150.02	150.04	2.161E+001
PA-234M	<	-1.181E+002	-1.181E+002	185.21	185.23	7.314E+002
U-235	<	-4.865E-001	-4.865E-001	3.943.10	3.943.10	2.079E+001
AM-241	#	1.383E+003	1.391E+003	0.86	3.96	1.789E+001
Pa-234	<	-1.730E-002	-1.730E-002	22.535.29	22.535.29	1.303E+001
TH-234	<	-2.403E+002	-2.403E+002	11.73	12.29	8.362E+001

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 18,069.12 Bq/sample

Analyzed by: _____

403605

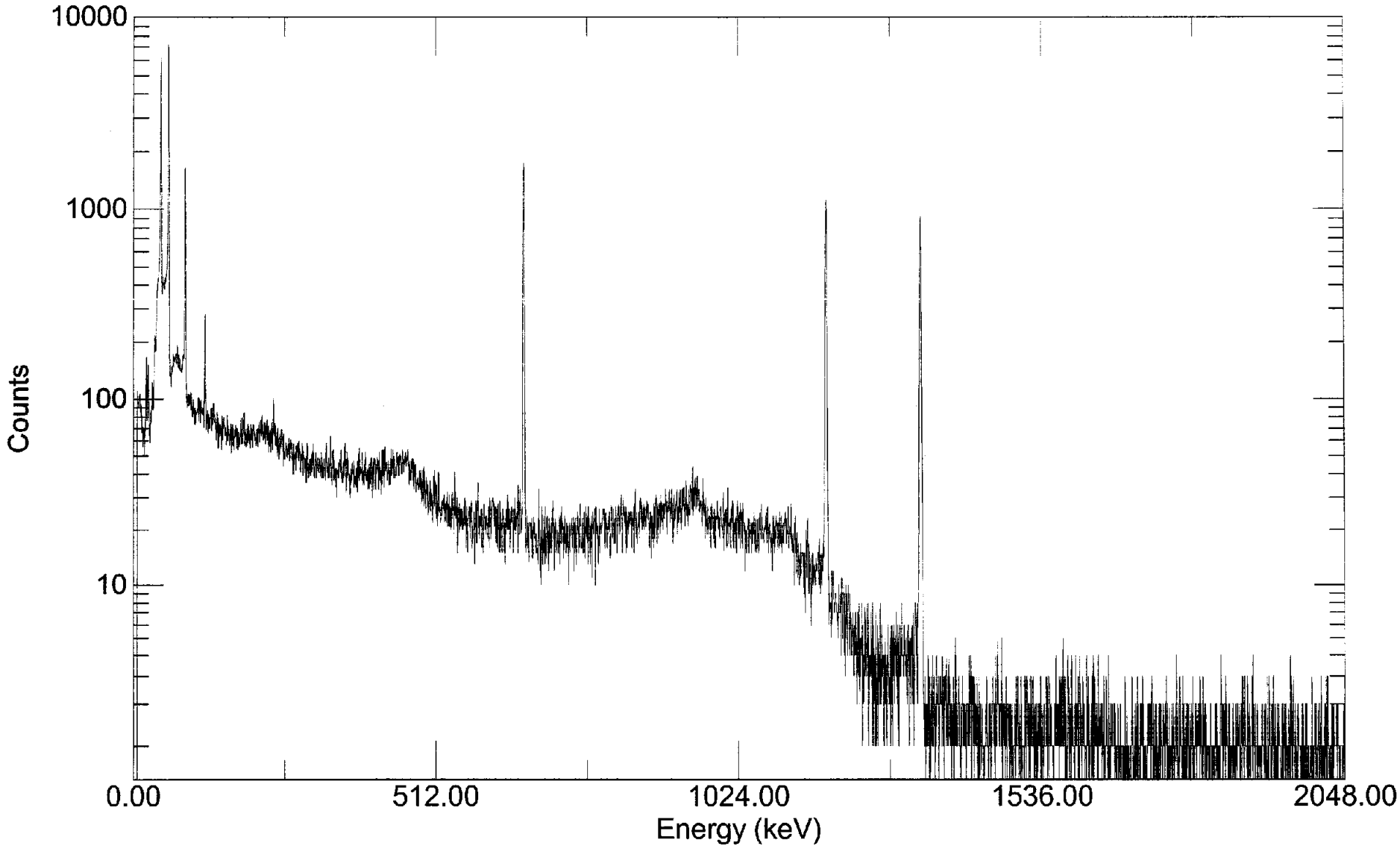
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEQKR1AC

7357010_KEQKR1AC_F7L230000-010C



Acquired: 23-Dec-2007 3:04:26 PM
File: C:\User\spectra\KEQKR1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1824.48 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

PROJECT NO. 03-3040.30/TA

Great Lakes NS Remediation

Lot #: F7L200260

John Eberline
Cabrera Services Inc
633 Stablestone Dr
Chesterfield, MO 63017

TESTAMERICA LABORATORIES, INC.

Ivan Vania
Project Manager

December 27, 2007

13715 Rider Trail North Earth City, MO 63045 tel 314.298.8566 fax 314.298.8757 www.testamericainc.com

Case Narrative
LOT NUMBER: F7L200260

This report contains the analytical results for the 17 samples received under chain of custody by TestAmerica St. Louis on December 20, 2007. These samples are associated with your Great Lakes NS Remediation project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Gamma Spectroscopy - Cesium-137 & Hits (EML GA-01-R MOD)
The reporting limit for Actinium-228 was not met. There is activity in the samples above the MDA.
Affected Samples:
F7L200260 (1): SU9-184-1
F7L200260 (3): SU10-212-1
F7L200260 (4): SU10-214PR
F7L200260 (5): SU10-214PR FD
F7L200260 (8): SU11-216-2
F7L200260 (9): SU11-220-1
F7L200260 (10): SU11-224-2
F7L200260 (11): SU11-228-1
F7L200260 (12): SU12-303-3
F7L200260 (13): SU12-307-1
F7L200260 (14): SU12-307-2
F7L200260 (15): SU13-329-1
F7L200260 (16): SU13-B18-1
F7L200260 (17): SU13-B19-1

There were no other nonconformances or observations noted with any analysis on this lot.

F7L200260

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	SU9-184-1			2007-07-25 / 1620	KEKC3	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	SU10-198-1			2007-07-13 / 1350	KEKC7	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	SU10-212-1			2007-07-13 / 1410	KEKDC	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	SU10-214PR			2007-11-07 / 1010	KEKDE	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	SU10-214PR FD			2007-11-07 / 1010	KEKDK	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	SU10B-038			2007-11-07 / 1300	KEKDR	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	SU10B-041PR			2007-11-12 / 820	KEKDX	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

F7L200260 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD
Date Received: 2007-12-20
Analytical Due Date: 2008-01-04
Report Due Date: 2008-01-07
Report Type: W
EDD Code: 00

Project Manager: IV
Quote #: 77996
SDG:
Project: 03-3040.30/TA
Great Lakes NS Remediation
PO#:
Report to:
Client: 1352406 Cabrera Services, Inc.
#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	SU11-216-2			2007-07-24 / 1410	KEKD4	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	SU11-220-1			2007-08-02 / 1355	KEKD8	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	SU11-224-2			2007-07-24 / 1400	KEKEC	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	SU11-228-1			2007-08-02 / 1505	KEKEG	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	SU12-303-3			2007-07-24 / 1026	KEKEM	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	SU12-307-1			2007-07-24 / 1030	KEKEW	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	SU12-307-2			2007-07-24 / 1030	KEKE1	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F7L200260

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
15	SU13-329-1			2007-07-24 / 1526	KEKE2	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
16	SU13-B18-1			2007-08-22 / 900	KEKE4	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
17	SU13-B19-1			2007-08-22 / 1000	KEKE5	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 3
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 1 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ____W_____			
(314) 703-6784 Phone	TAT if different from Below __15days_____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU9-184-1	7/25/07	1620	Grab	Soil	1		X	
SU10-198-1	7/13/07	1350	Grab	Soil	1		X	
SU10-212-1	7/13/07	1410	Grab	Soil	1		X	
SU10-214PR	11/7/07	1010	Grab	Soil	1		X	
SU10-214PR FD	11/7/07	1010	Grab	Soil	1		X	
SU10B-038	11/7/07	1300	Grab	Soil	1		X	
SU10B-041PR	11/12/07	0820	Grab	Soil	1		X	
SU11-216-2	7/24/07	1410	Grab	Soil	1		X	
SU11-220-1	8/2/07	1355	Grab	Soil	1		X	
SU11-224-2	7/24/07	1400	Grab	Soil	1		X	
SU11-228-1	8/2/07	1505	Grab	Soil	1		X	
SU12-303-3	7/24/07	1026	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABLORA	12/13/07 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 3
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 2 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ___W___			
(314) 703-6784 Phone	TAT if different from Below ___15days___			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU12-307-1	7/24/07	1030	Grab	Soil	1		X	
SU12-307-2	7/24/07	1030	Grab	Soil	1		X	
SU13-329-1	7/24/07	1526	Grab	Soil	1		X	
SU13-B18-1	8/22/07	0900	Grab	Soil	1		X	
SU13-B19-1	8/22/07	1000	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABRERA	12/13/07, 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Lot #(s): F7L200251, 260, 261, 271

- 1412 -

Condition Upon Receipt Form

Client: Cabrera
Quote No: 77996
COC/RFA No: 2,3,4,1
Initiated By:
Date: 12-20-07
Time: 0830

Shipping Information

Shipper Name: Client
Shipping # (s):*
1. N/A
2. ↓
3.
4.
5.
6.
7.
8.
9.
10.

Multiple Packages (Y) N
Sample Temperature (s):**
1. Ambient
2. ↓
3.
4.
5.
6.
7.
8.
9.
10.

*Numbered shipping lines correspond to Numbered Sample Temp lines

**Sample must be received at 4°C ± 2°C- If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid or Rad tests- Liquid or Solids

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y (N)	Are there custody seals present on the cooler?	8.	Y (N)	Are there custody seals present on bottles?
2.	Y N (N/A)	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	Do custody seals on bottles appear to be tampered with?
3.	(Y) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N (N/A)	Was sample received with proper pH[1]? (If not, make note below)
4.	(Y) N	Sample received with Chain of Custody?	11.	Y N	If N/A- Was pH taken by original TestAmerica lab?
5.	(Y) N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	(Y) N	Sample received in proper containers?
6.	Y (N)	Was sample received broken?	13.	Y N (N/A)	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	(Y) N	Is sample volume sufficient for analysis?	14.	Y N	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX and soils.

Notes:

Corrective Action:
☐ Client Contact Name: Informed by:
☐ Sample(s) processed "as is"
☐ Sample(s) on hold until: If released, notify:
Project Management Review: Sheryl A Adam Date: 12-21-07

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

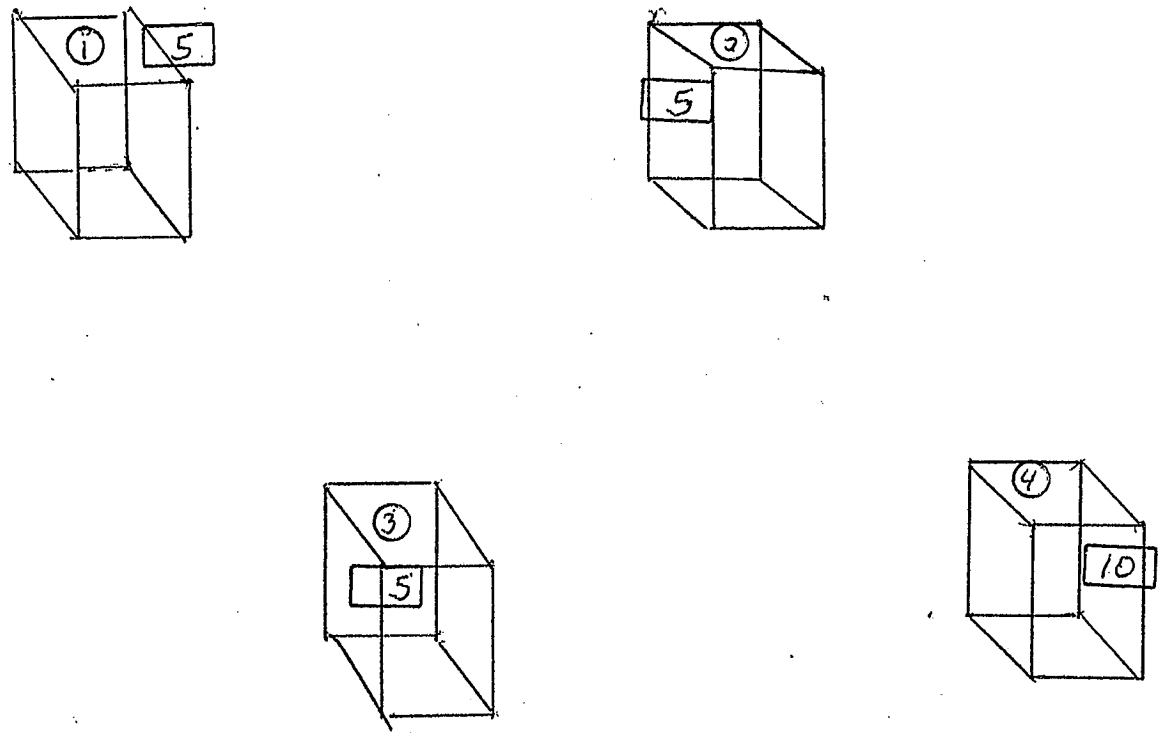
Revision 2

OP-001-02 Radiological Survey Sheet

Radiological Surveys

Location: Sample Containers Site: GLNTC PPV Areas	RWP# 003	Survey # 03-3040, 30-272	Survey Type:	pg. 1 of 1

Smear (CPM/100 cm²)						circle one
Direct Count (CPM/Direct Frisk)						
No.	α	β	No.	α	β	
1	0	62	26			
2	0	65	27			
3	1	49	28			
4	1	53	29			
5			30			
6			31			
7			32			
8			33			
9			34			
10			35	N		
11			36			
12	N		37			
13			38			
14			39			
15			40			
16			41			
17			42			
18			43			
19		A	44			
20			45			
21			46			
22			47		A	
23			48			
24			49			
25			50			



Comments	Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	γ Bkg	Cal. Due
	K. Gordon	12/13/07	Bicron	L8541F	N/A	N/A	N/A	N/A	5	6/17/08
			2929	163827	.3649	.2385	.15	44.2	N/A	9/7/08
	Reviewed By:	Date:								
		12/13/07								

Key	
■	A/S Location
-	Boundary
○	Smear
□	Dose Rate μR /hr
*	Direct Reading CPM/direct frisk
△	Grab Sample

METHODS SUMMARY

F7L200260

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Cesium-137 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F7L200260

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
KEKC3	001	SU9-184-1	07/25/07	16:20
KEKC7	002	SU10-198-1	07/13/07	13:50
KEKDC	003	SU10-212-1	07/13/07	14:10
KEKDE	004	SU10-214PR	11/07/07	10:10
KEKDK	005	SU10-214PR FD	11/07/07	10:10
KEKDR	006	SU10B-038	11/07/07	13:00
KEKDX	007	SU10B-041PR	11/12/07	08:20
KEKD4	008	SU11-216-2	07/24/07	14:10
KEKD8	009	SU11-220-1	08/02/07	13:55
KEKEC	010	SU11-224-2	07/24/07	14:00
KEKEG	011	SU11-228-1	08/02/07	15:05
KEKEM	012	SU12-303-3	07/24/07	10:26
KEKEW	013	SU12-307-1	07/24/07	10:30
KEKE1	014	SU12-307-2	07/24/07	10:30
KEKE2	015	SU13-329-1	07/24/07	15:26
KEKE4	016	SU13-B18-1	08/22/07	09:00
KEKE5	017	SU13-B19-1	08/22/07	10:00

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Cabrera Services, Inc.

Client Sample ID: SU9-184-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-001
Work Order: KEKC3
Matrix: SOLID

Date Collected: 07/25/07 1620
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.60**		**0.28**	0.25	**0.24**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU9-184-1 DUP

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-001X
Work Order: KEKC3
Matrix: SOLID

Date Collected: 07/25/07 1620
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.17**		**0.32**	0.25	**0.48**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10-198-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-002
Work Order: KEKC7
Matrix: SOLID

Date Collected: 07/13/07 1350
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.63**		**0.34**	0.25	**0.13**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10-212-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-003
Work Order: KEKDC
Matrix: SOLID

Date Collected: 07/13/07 1410
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.53**		**0.41**	0.25	**0.42**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10-214PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-004
Work Order: KEKDE
Matrix: SOLID

Date Collected: 11/07/07 1010
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.14**		**0.26**	0.25	**0.29**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10-214PR FD

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-005
Work Order: KEKDK
Matrix: SOLID

Date Collected: 11/07/07 1010
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.71**		**0.29**	0.25	**0.33**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10B-038

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-006
Work Order: KEKDR
Matrix: SOLID

Date Collected: 11/07/07 1300
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**3.89**		**0.54**	0.25	**0.23**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU10B-041PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-007
Work Order: KEKDX
Matrix: SOLID

Date Collected: 11/12/07 0820
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**2.05**		**0.36**	0.25	**0.1**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU11-216-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-008
Work Order: KEKD4
Matrix: SOLID

Date Collected: 07/24/07 1410
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**0.96**		**0.24**	0.25	**0.34**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU11-220-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-009
Work Order: KEKD8
Matrix: SOLID

Date Collected: 08/02/07 1355
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**2.38**		**0.35**	0.25	**0.40**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU11-224-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-010
Work Order: KEKEC
Matrix: SOLID

Date Collected: 07/24/07 1400
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.28**		**0.30**	0.25	**0.34**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU11-228-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-011
Work Order: KEKEG
Matrix: SOLID

Date Collected: 08/02/07 1505
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.01**		**0.31**	0.25	**0.46**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU12-303-3

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-012
Work Order: KEKEM
Matrix: SOLID

Date Collected: 07/24/07 1026
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.10**		**0.27**	0.25	**0.37**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU12-307-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-013
Work Order: KEKEW
Matrix: SOLID

Date Collected: 07/24/07 1030
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**4.00**		**0.42**	0.25	**0.29**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU12-307-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-014
Work Order: KEKE1
Matrix: SOLID

Date Collected: 07/24/07 1030
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**			**Batch # 7360292**	**Yld %**
Actinium 228	**4.40**		**0.57**	0.25	**0.27**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU13-329-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-015
Work Order: KEKE2
Matrix: SOLID

Date Collected: 07/24/07 1526
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**0.76**		**0.25**	0.25	**0.38**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU13-B18-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-016
Work Order: KEKE4
Matrix: SOLID

Date Collected: 08/22/07 0900
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**2.41**		**0.39**	0.25	**0.51**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU13-B19-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200260-017
Work Order: KEKE5
Matrix: SOLID

Date Collected: 08/22/07 1000
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360292**	**Yld %**
Actinium 228	**1.51**		**0.45**	0.25	**0.36**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

METHOD BLANK REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200260
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC		Prep Date	Analysis Date	Lab Sample ID
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**Batch # 7360292**		**Yld %**			**F7L260000-292B**
Actinium 228	-0.06	U	4.5	0.2	0.2		12/26/07	12/26/07	

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC

U Result is less than the sample detection limit.

Laboratory Control Sample Report

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200260
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID QC Control Limits
Gamma Cs-137 & Hits by DOE GA-01-R MOD.		**pCi/g**		**GA-01-R MOD**		**F7L260000-292C**	
Americium 241	103	107	8.5	1.4		104	(85 - 118)
Cesium 137	40.0	43.3	2.7	0.4		108	(91 - 120)
Cobalt 60	62.7	65.6	3.9	0.4		105	(91 - 112)
	Batch #:	7360292		**Analysis Date:**	12/26/07		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200260 Date Sampled: 07/25/07
Matrix: SOLID Date Received: 12/20/07

Parameter	SAMPLE Result	Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result	Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**			**F7L200260-001**	
Actinium 228	**1.60**	**0.28**		**1.17**	**0.32**		31	%RPD
	Batch #:	7360292	(Sample)	7360292	(Duplicate)			

NOTE(S)

Data are incomplete without the case narrative.
Calculations are performed before rounding to avoid round-off error in calculated results

GAMMA SPECTROSCOPY

Gamma Spectroscopy

Cesium-137

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Analysis Report for Gamma Spectroscopy

Batch: 7360292 **Operator:** 60040

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-001	KEKC31AC	294.80g	2.00	GammaVision	GV01	12 / 26 / 07 14:08	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.595E+000	pCi/g	2.766E-001	2.609E-001	2.439E-001	1.020E-001	6.54

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-001X	KEKC31AD	294.80g	2.00	GammaVision	GV04	12 / 26 / 07 14:47	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.166E+000	pCi/g	3.226E-001	3.156E-001	4.842E-001	2.103E-001	2.41

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-002	KEKC71AC	383.50g	2.00	GammaVision	GV04	12 / 26 / 07 14:08	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.633E+000	pCi/g	3.393E-001	3.260E-001	1.329E-001	4.201E-002	12.29

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-003	KEKDC1AC	325.50g	2.00	GammaVision	GV05	12 / 26 / 07 14:09	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.534E+000	pCi/g	4.108E-001	4.012E-001	4.208E-001	0.000E+000	3.64

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-004	KEKDE1AC	378.60g	2.00	GammaVision	GV07	12 / 26 / 07 14:10	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.137E+000	pCi/g	2.561E-001	2.476E-001	2.904E-001	0.000E+000	3.92

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-005	KEKDK1AC	381.00g	2.00	GammaVision	GV01	12 / 26 / 07 14:46	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.713E+000	pCi/g	2.933E-001	2.762E-001	3.308E-001	1.500E-001	5.18

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-006	KEKDR1AC	377.40g	2.00	GammaVision	GV05	12 / 26 / 07 14:46	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	3.894E+000	pCi/g	5.378E-001	4.889E-001	2.300E-001	0.000E+000	16.93

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-007	KEKDX1AC	363.80g	2.00	GammaVision	GV07	12 / 26 / 07 14:47	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.046E+000	pCi/g	3.596E-001	3.398E-001	9.999E-002	0.000E+000	20.46

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-008	KEKD41AC	372.40g	2.00	GammaVision	GV01	12 / 26 / 07 15:38	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	9.605E-001	pCi/g	2.371E-001	2.306E-001	3.406E-001	1.545E-001	2.82

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-009	KEKD81AC	334.80g	2.00	GammaVision	GV03	12 / 26 / 07 15:38	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.381E+000	pCi/g	3.507E-001	3.229E-001	3.976E-001	1.815E-001	5.99

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-010	KEKEC1AC	356.50g	2.00	GammaVision	GV04	12 / 26 / 07 15:39	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.284E+000	pCi/g	3.004E-001	2.911E-001	3.401E-001	1.437E-001	3.78

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-011	KEKEG1AC	342.50g	2.00	GammaVision	GV05	12 / 26 / 07 15:39	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.014E+000	pCi/g	3.109E-001	3.054E-001	4.585E-001	0.000E+000	2.21

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-012	KEKEM1AC	319.20g	2.00	GammaVision	GV07	12 / 26 / 07 15:40	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.104E+000	pCi/g	2.747E-001	2.673E-001	3.651E-001	0.000E+000	3.02

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-013	KEKEW1AC	363.00g	2.00	GammaVision	GV01	12 / 26 / 07 16:17	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.004E+000	pCi/g	4.174E-001	3.481E-001	2.870E-001	1.273E-001	13.95

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-014	KEKE11AC	378.40g	2.00	GammaVision	GV03	12 / 26 / 07 16:18	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.402E+000	pCi/g	5.716E-001	5.125E-001	2.703E-001	1.199E-001	16.29

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-015	KEKE21AC	354.40g	2.00	GammaVision	GV04	12 / 26 / 07 16:19	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	7.591E-001	pCi/g	2.453E-001	2.414E-001	3.765E-001	1.618E-001	2.02

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-016	KEKE41AC	313.70g	2.00	GammaVision	GV05	12 / 26 / 07 16:18	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.406E+000	pCi/g	3.917E-001	3.664E-001	5.076E-001	0.000E+000	4.74

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200260-017	KEKE51AC	348.80g	2.00	GammaVision	GV07	12 / 26 / 07 16:18	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.512E+000	pCi/g	4.539E-001	4.455E-001	3.625E-001	0.000E+000	4.17

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L260000-292B	KER4G1AA	372.80g	2.00	GammaVision	GV01	12 / 26 / 07 17:00	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	-5.848E-002	pCi/g	4.455E+000	4.455E+000	2.275E-001	9.793E-002	-0.26

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L260000-292C	KER4G1AC	351.20g	2.00	GammaVision	GV03	12 / 26 / 07 17:00	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AM-241	1493	1.070E+002	pCi/g	8.476E+000	1.837E+000	1.383E+000	6.866E-001	77.38
CO-60	1515	6.561E+001	pCi/g	3.885E+000	1.080E+000	3.637E-001	1.714E-001	180.40
CS-137	1518	4.333E+001	pCi/g	2.679E+000	9.254E-001	4.123E-001	2.013E-001	105.11

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery
F7L260000-292C	KER4G1AC	CS-137	4.333E+001	pCi/g	4.002E+001	108.28%
		CO-60	6.561E+001	pCi/g	6.272E+001	104.61%
		AM-241	1.070E+002	pCi/g	1.031E+002	103.74%

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity		Dup Activity	RPD	RER	DER	Flag
F7L200260-001	F7L200260-001X	AC-228	1.595E+000	pCi/g	1.166E+000	31.09%	7.164E-001	2.020E+000	

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Instrument Checks

TestAmerica **STL**

Gamma Spectroscopy Daily Check Summary

Detector: 1

Measurement Date/Time: 12/26/2007 7:43:38

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	3.250	3.500	3.693	4.250	4.500	ok
Total Activity (Bq)	1841.0	1880.0	1936.5	1996.0	2035.0	ok
Peak Shift (keV)	-0.3000	-0.2000	-0.1193	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	0.9944	1.0500	1.1000	ok
Avg FWTM Ratio	0.9000	0.9500	1.0036	1.1000	1.1500	ok

Detector: 3

Measurement Date/Time: 12/26/2007 7:44:32

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.500	2.750	3.095	3.250	3.500	ok
Total Activity (Bq)	1835.0	1874.0	1947.2	1990.0	2029.0	ok
Peak Shift (keV)	-0.3000	-0.2500	-0.1686	0.2500	0.3000	ok
Avg FWHM Ratio	0.8500	0.9000	1.0571	1.1500	1.2500	ok
Avg FWTM Ratio	0.9000	0.9500	1.1792	1.1500	1.2500	High

Detector: 4

Measurement Date/Time: 12/26/2007 7:44:20

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.150	1.200	1.430	1.450	1.500	ok
Total Activity (Bq)	1833.7	1872.3	1939.6	1988.2	2026.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1839	0.2500	0.5000	ok
Avg FWHM Ratio	0.7000	0.8000	0.9414	1.1000	1.2500	ok
Avg FWTM Ratio	0.7000	0.8000	0.9679	1.1000	1.2500	ok

Detector: 5

Measurement Date/Time: 12/26/2007 7:46:49

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.865	2.000	2.250	ok
Total Activity (Bq)	1837.9	1876.6	1929.5	1992.7	2031.4	ok
Peak Shift (keV)	-0.2500	-0.1750	0.0844	0.1750	0.2500	ok
Avg FWHM Ratio	0.8500	0.9000	0.9794	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0020	1.1500	1.2000	ok

Gamma Spectroscopy Daily Check Summary

Detector: 6 **Measurement Date/Time:** 12/26/2007 7:45:40

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.350	2.600	2.724	3.150	3.400	ok
Total Activity (Bq)	1829.3	1867.8	1888.0	1983.3	2021.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1428	0.2500	0.5000	ok
Avg FWHM Ratio	0.7500	0.9000	0.9913	1.1500	1.3000	ok
Avg FWTM Ratio	0.7500	0.9000	1.0441	1.1500	1.3000	ok

Detector: 7 **Measurement Date/Time:** 12/26/2007 7:46:09

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	0.750	1.000	1.292	1.750	2.000	ok
Total Activity (Bq)	1850.0	1875.0	1913.1	1975.0	2000.0	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.0172	0.2500	0.5000	ok
Avg FWHM Ratio	0.8000	0.8500	1.0381	1.1500	1.2000	ok
Avg FWTM Ratio	0.8000	0.8500	1.0748	1.2000	1.2500	ok

Notes: Low and High are 2 sigma warning limits. Minimum (<MIN) and Maximum (>MAX) are 3 sigma control limits (Fail).

Analyst SE

Date 12/26/7

GammaVision V6.01 QA Background Report 12/26/2007 6:35:19 AM

Detector: 1 Ge 1 SN/242
Measurement Number: 1281
Data Acquired On: 12/26/2007 6:15:11 AM
Real Time: 1206.34 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	3.25	3.50	3.69	4.25	4.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:31 AM

Detector: 3 Ge 3 SN/155
Measurement Number: 1210
Data Acquired On: 12/26/2007 6:15:19 AM
Real Time: 1208.62 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.50	2.75	3.10	3.25	3.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:33 AM

Detector: 4 Ge 4 SN/181
Measurement Number: 102
Data Acquired On: 12/26/2007 6:15:29 AM
Real Time: 1202.16 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.15	1.20	1.43	1.45	1.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:45 AM

Detector: 5 Ge 5 SN/157
Measurement Number: 248
Data Acquired On: 12/26/2007 6:15:41 AM
Real Time: 1200.00 Sec.
Live Time: 1143.82 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.86	2.00	2.25

GammaVision V6.01 QA Background Report 12/26/2007 6:35:55 AM

Detector: 6 Ge 6 SN/164
Measurement Number: 176
Data Acquired On: 12/26/2007 6:15:50 AM
Real Time: 1203.80 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.35	2.60	2.72	3.15	3.40

GammaVision V6.01 QA Background Report 12/26/2007 6:36:17 AM

Detector: 7 Ge 7 SN/154
Measurement Number: 342
Data Acquired On: 12/26/2007 6:16:00 AM
Real Time: 1213.76 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	0.75	1.00	1.29	1.75	2.00

GammaVision V6.01 QA Background Report 12/26/2007 7:36:06 AM

Detector: 8 Ge 8 SN/174
Measurement Number: 1229
Data Acquired On: 12/26/2007 7:15:19 AM
Real Time: 1245.20 Sec.
Live Time: 1200.00 Sec.
Status: Warning (Below Low Limit)

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.44	2.00	2.25

DB Analysis ID: 32,997

Sample Description: 03-0366

Spectrum Filename: QA101260.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:12:57AM		
Live Time:	1800.00	Real Time:	1821.34
Dead Time:	1.17 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 air filter 74140-334 1_05_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\GE1 AF interp_165_quad 01_05_07.Clb		
Energy Created:	05-Jan-2007 1:55:09PM	Efficiency Created:	05-Jan-2007 1:58:17PM
Zero Offset:	0.112 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.11 keV
Stop Channel:	8,000 for an energy of 1999.43 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differences: 0.1856

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.343E+002	6.233E+002	1.73	5.96	1.245E+000
CS-137	3.505E+002	3.908E+002	2.07	6.41	2.868E+000
AM-241	9.154E+002	9.224E+002	1.01	9.33	4.521E+000

= All peaks for activity calculation had bad shape

Total Activity (25.11 to 1,999.43 keV) 1,600.31 Bq/SA

Analyzed by: _____

403605

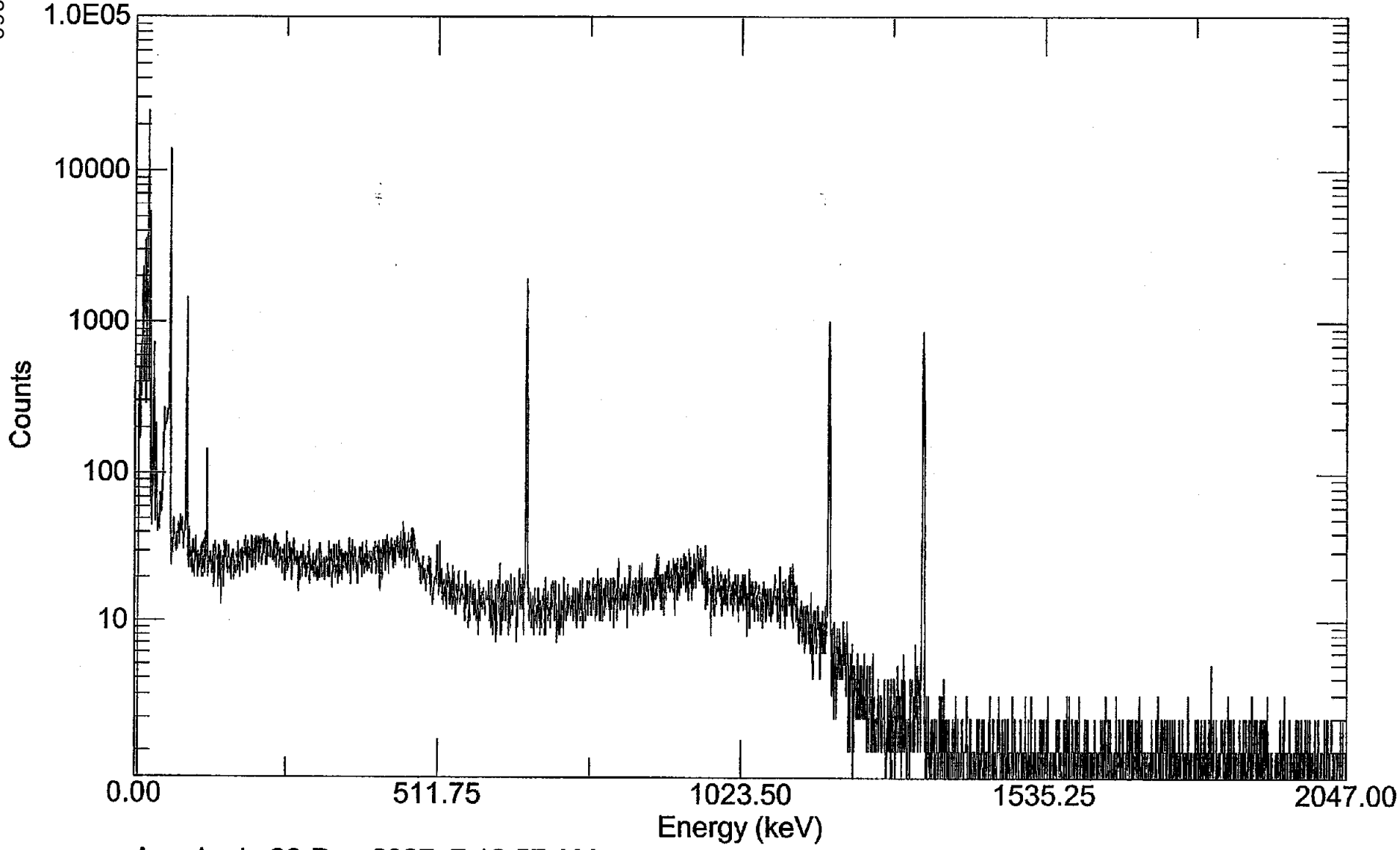
Reviewed by: _____

Supervisor

Laboratory: Test America

QA101260

03-0366



Acquired: 26-Dec-2007 7:12:57 AM
File: C:\User\spectra\QA101260.spc
Detector: #0 Ge 1 SN/242

Real Time: 1821.34 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,999

Sample Description: 03-0368

Spectrum Filename: QA301295.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:13:13AM		
Live Time:	1800.00	Real Time:	1827.76
Dead Time:	1.52 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 Air filter 74140_334 interp_122_quad 01_09_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Air filter interp_122_quad 01_09_07.Clb		
Energy Created:	09-Jan-2007 10:31:35AM	Efficiency Created:	09-Jan-2007 10:36:46AM
Zero Offset:	0.372 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.35 keV
Stop Channel:	8,000 for an energy of 2000.41 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2201

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60		3.378E+002	6.298E+002	1.75	5.96	2.007E+000
CS-137		3.582E+002	3.993E+002	2.04	6.21	2.940E+000
AM-241	#	9.112E+002	9.181E+002	1.00	9.33	4.742E+000

= All peaks for activity calculation had bad shape

Total Activity (25.35 to 2,000.41 keV) 1,607.20 Bq/SA

Analyzed by: _____

403605

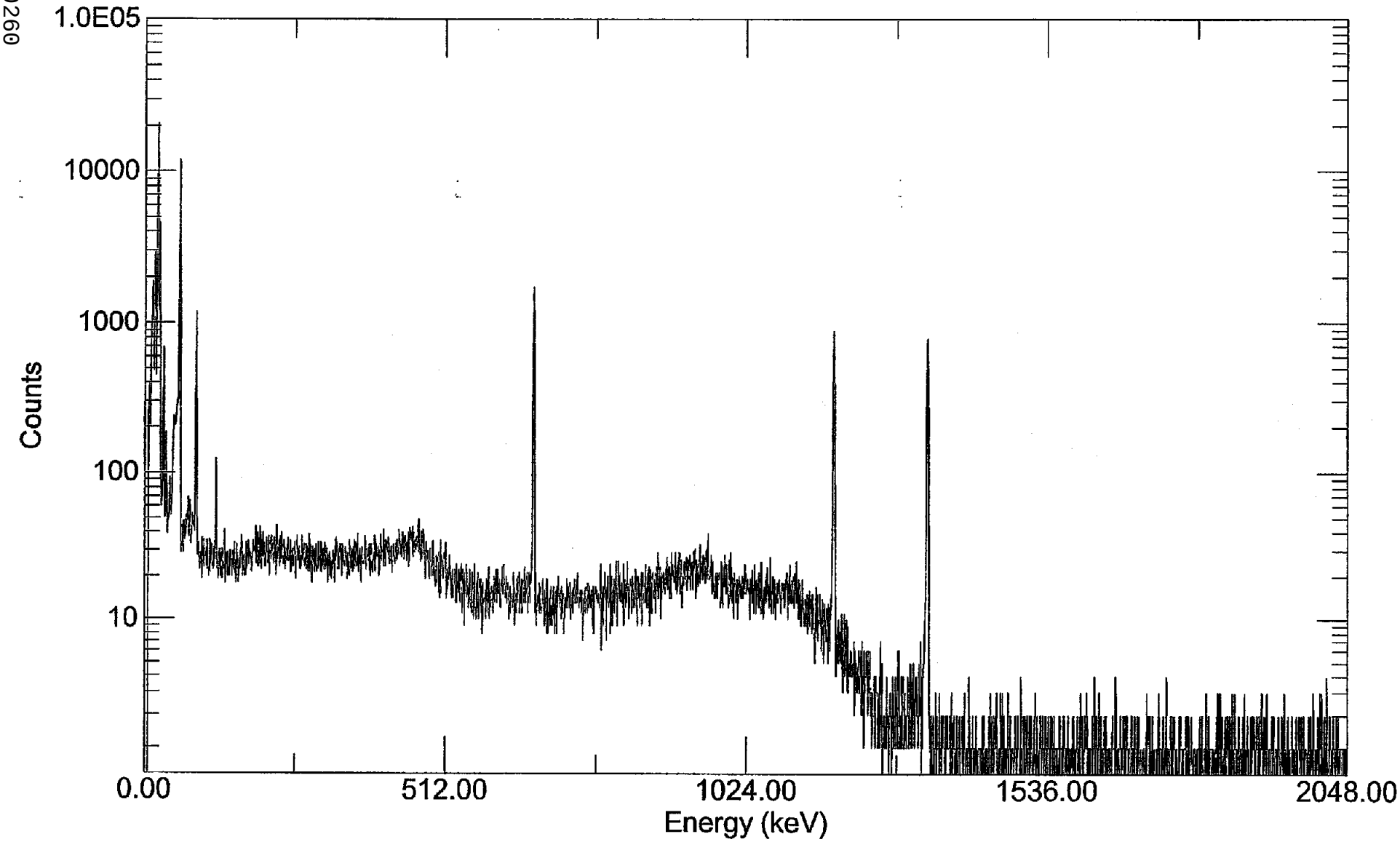
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA301295

03-0368



Acquired: 26-Dec-2007 7:13:13 AM
File: C:\User\spectra\QA301295.spc
Detector: #0 Ge 3 SN/155

Real Time: 1827.76 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,998

Sample Description: 03-0371

Spectrum Filename: QA400105.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:13:29AM		
Live Time:	1800.00	Real Time:	1810.98
Dead Time:	0.61 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4 AirFilterCal_74140_334_05_08_07(EE)		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4 AirFilterCal_74140_334_05_08_07		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	08-May-2007 1:39:26PM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.03 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1839

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CS-137	3.503E+002	3.906E+002	2.58	6.48	3.718E+000
AM-241	9.212E+002	9.282E+002	1.11	9.27	4.778E+000
CO-60	3.330E+002	6.208E+002	2.18	6.09	1.080E+000

= All peaks for activity calculation had bad shape

Total Activity (25.03 to 1,998.47 keV) 1,604.52 Bq/SA

Analyzed by: _____

403605

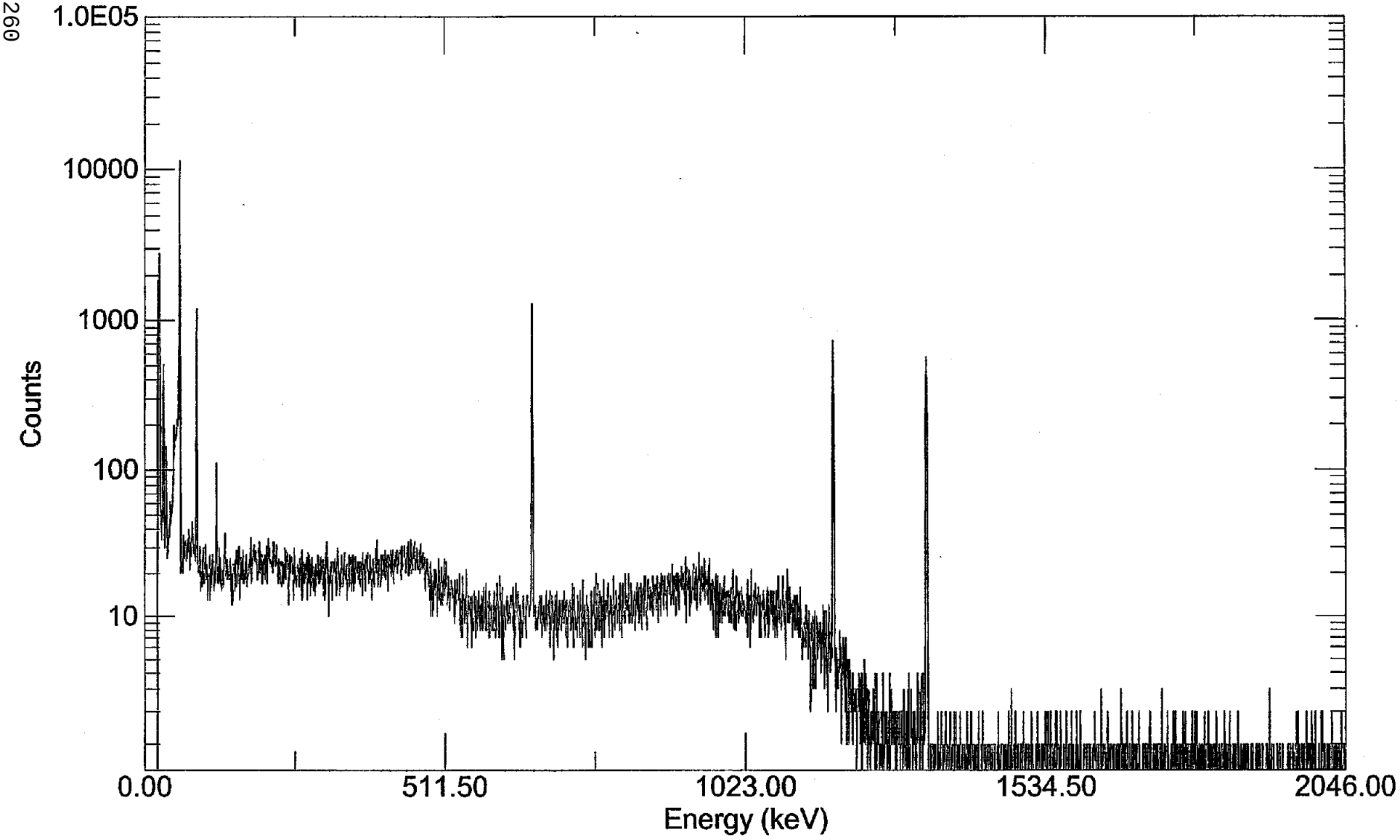
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA400105

03-0371



Acquired: 26-Dec-2007 7:13:29 AM
File: C:\User\spectra\QA400105.spc
Detector: #0 Ge 4 SN/181

Real Time: 1810.98 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:46:47AM Page 1

DB Analysis ID: 33,002

Sample Description: 03-0370

Spectrum Filename: QA500095.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:14:40AM		
Live Time:	1800.00	Real Time:	1901.16
Dead Time:	5.32 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 airfilter 74140-334_032707 interp_165_quad		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 airfilter_032707_interp165quad.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	28-Mar-2007 6:10:41PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.25 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1296

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.303E+002	6.158E+002	2.12	6.08	1.326E+000
CS-137	3.465E+002	3.864E+002	2.42	6.53	3.127E+000
AM-241	9.203E+002	9.273E+002	1.06	9.34	4.708E+000

= All peaks for activity calculation had bad shape

Total Activity (25.25 to 2,000.57 keV) 1,597.21 Bq/SA

Analyzed by: _____

403605

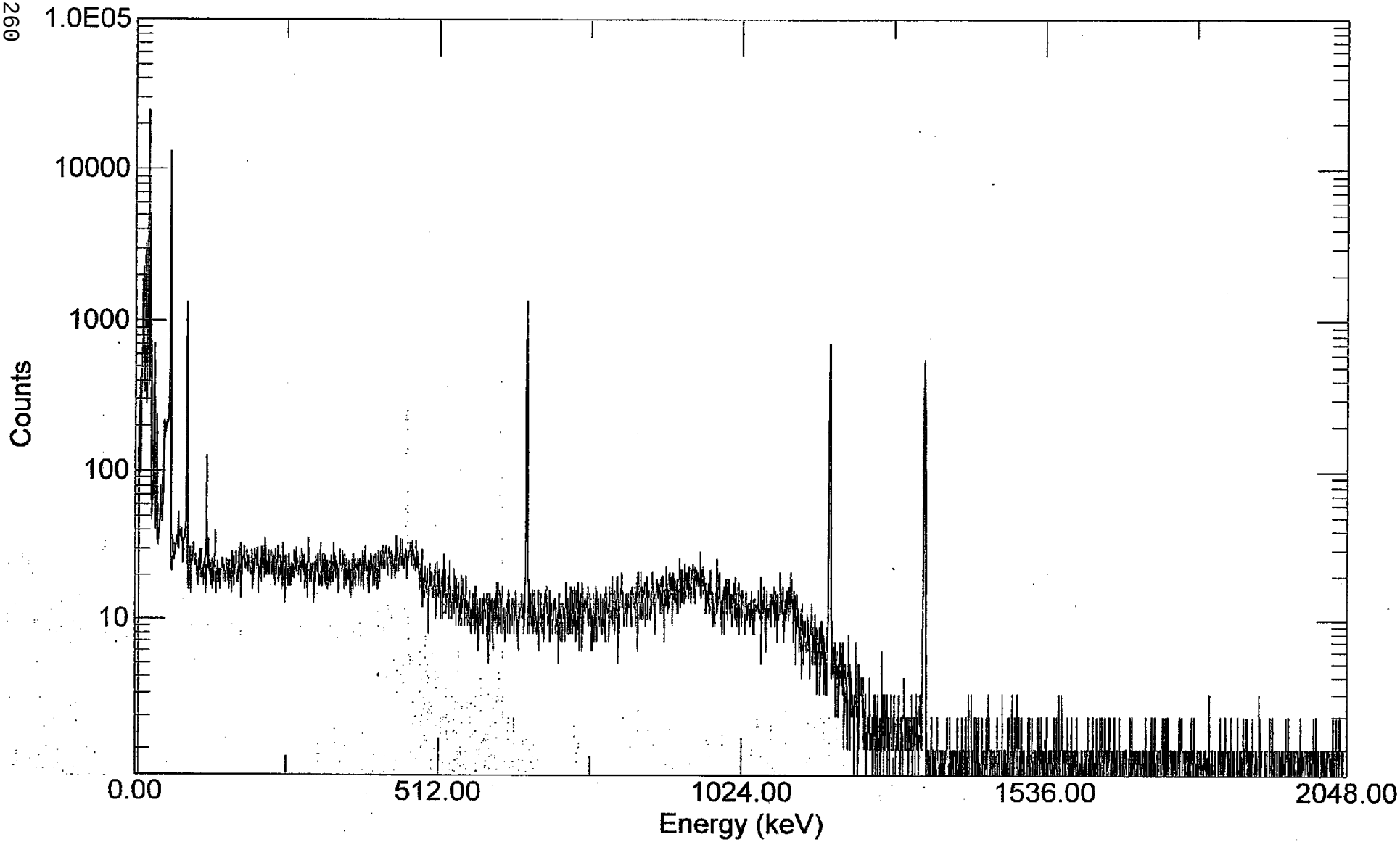
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA500095

03-0370



Acquired: 26-Dec-2007 7:14:40 AM
File: C:\User\spectra\QA500095.spc
Detector: #0 Ge 5 SN/157

Real Time: 1901.16 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:45:37AM Page 1

DB Analysis ID: 33,000

Sample Description: 03-0369

Spectrum Filename: QA600038.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:14:51AM		
Live Time:	1800.00	Real Time:	1812.32
Dead Time:	0.68 %		
Detector ID:	6		

Detector System: Ge 6 SN/164

Calibration

Description:	Ge6 airfilter 741470-336_12_13_07		
Filename:	C:\User\Calibrations\Ge 6 post 09_07_07\Ge6 _airfilter_12_13_07.Clb		
Energy Created:	13-Dec-2007 10:15:45AM	Efficiency Created:	13-Dec-2007 10:32:26AM
Zero Offset:	0.226 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.22 keV
Stop Channel:	8,000 for an energy of 1999.85 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differences: 0.1428

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.219E+002	6.000E+002	1.51	5.89	1.332E+000
CS-137	3.628E+002	4.045E+002	1.74	6.22	2.206E+000
AM-241	8.768E+002	8.835E+002	2.00	9.44	1.213E+001

= All peaks for activity calculation had bad shape

Total Activity (25.22 to 1,999.85 keV) 1,561.50 Bq/SA

Analyzed by: _____

403605

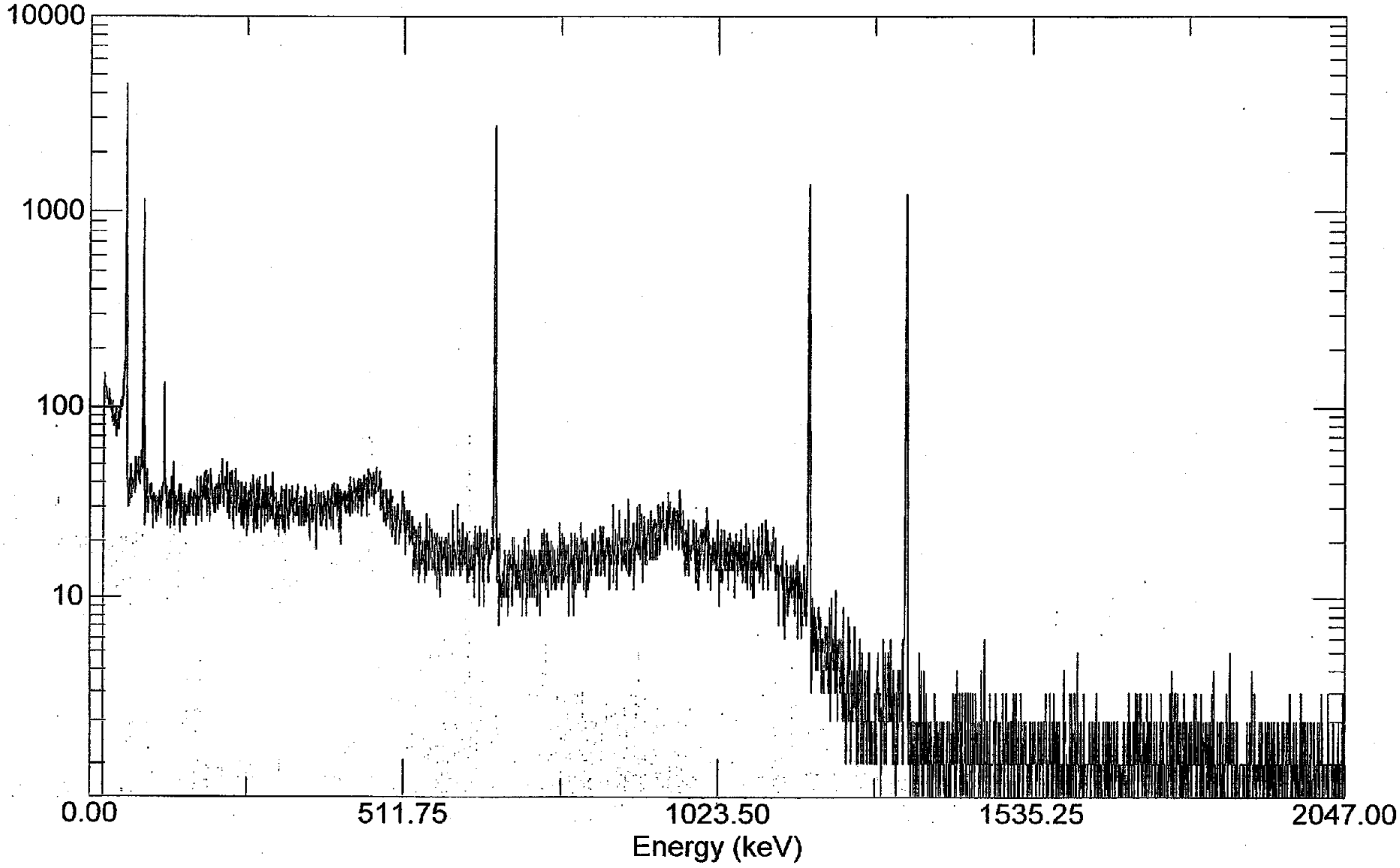
Reviewed by: _____

Supervisor

Laboratory: Test America

QA600038

03-0369



Acquired: 26-Dec-2007 7:14:51 AM
File: C:\User\spectra\QA600038.spc
Detector: #0 Ge 6 SN/164

Real Time: 1812.32 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:46:07AM Page 1

DB Analysis ID: 33,001

Sample Description: 03-0372

Spectrum Filename: QA700212.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:15:04AM		
Live Time:	1800.00	Real Time:	1831.58
Dead Time:	1.72 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 air filter 74140-334 01_04_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 air filter 01_04_07.Clb		
Energy Created:	04-Jan-2007 9:44:57AM	Efficiency Created:	04-Jan-2007 9:55:23AM
Zero Offset:	0.082 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.08 keV
Stop Channel:	8,000 for an energy of 2000.16 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0421

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.270E+002	6.096E+002	1.93	6.02	1.346E+000
CS-137	3.415E+002	3.808E+002	2.19	6.26	3.055E+000
AM-241	9.158E+002	9.228E+002	0.94	8.44	4.242E+000

= All peaks for activity calculation had bad shape

Total Activity (25.08 to 2,000.16 keV) 1,584.31 Bq/SA

Analyzed by: _____

403605

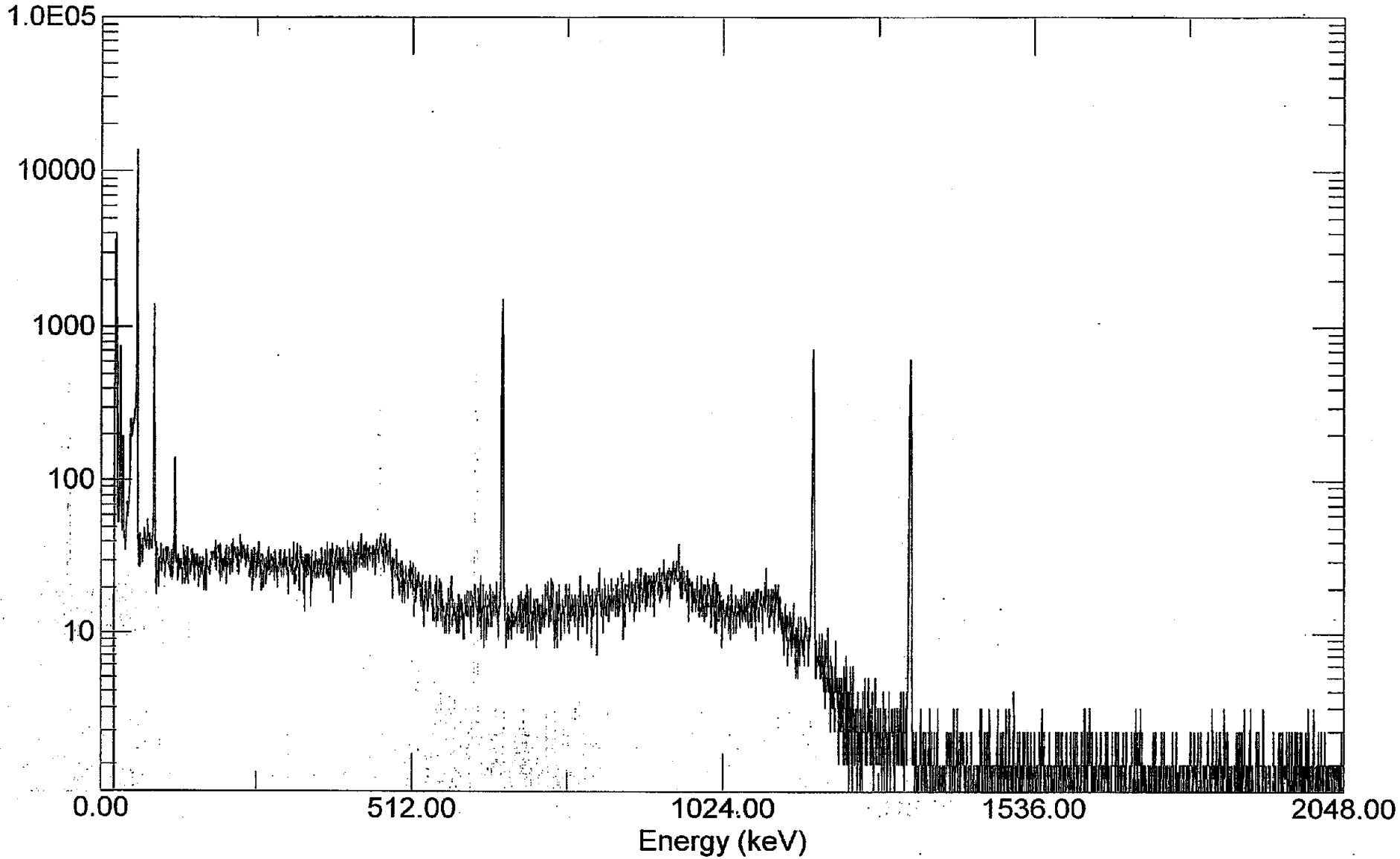
Reviewed by: _____

Supervisor

Laboratory: Test America

QA700212

03-0372



Acquired: 26-Dec-2007 7:15:04 AM
File: C:\User\spectra\QA700212.spc
Detector: #0 Ge 7 SN/154

Real Time: 1831.58 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

TestAmerica STL

Gamma Vision Long Backgrounds

November 2007

Ge1 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    1
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1

Sample description
     Ge1 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge1 bkgd\Ge1 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 20:12:47
       Live time:              43200
       Real time:              43454
       Dead time:                  0.59 %
       Detector ID:                    1

Detector system
     Ge 1 SN/242


Calibration
       Filename:                   GE1 AF interp_165_quad 01_05_07.Clb
     Ge1 air filter 74140-334 1_05_07


       Energy Calibration
            Created:               05-Jan-2007 13:55:09
            Zero offset:           0.112 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.471E-09 keV/channel^2

       Efficiency Calibration
            Created:               05-Jan-2007 13:58:17
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.63 %
            Log(Eff):             -5.325680E-02 + (-3.688631E-01*Log(E) ) +
                                   ( -3.389960E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.61keV )
       Stop channel:            8000 (  1999.43keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    2
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1
                                       Page 1
```

Ge1 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 26 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1584

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.48	1145.	8.01	0.82	7.917E-02	29.46	20.350	1.645E+00	I129
					29.78	37.840	8.846E-01	I129
33.55	364.	19.14	1.08	7.930E-02	33.61	10.230	1.039E+00	I129
39.64	367.	17.70	0.72	7.948E-02	39.57	7.500	1.425E+00	I129
43.95	83.	36.93	0.77	7.961E-02				
46.49	615.	6.96	0.78	7.969E-02	46.54	4.250	4.202E+00	PB210
63.22	886.	6.96	0.78	7.996E-02	63.29	4.820	5.319E+00	TH234
74.91	250.	16.22	0.81	7.953E-02				
77.12	227.	16.57	0.81	7.945E-02				
84.26	190.	20.36	0.82	7.919E-02	83.79	25.180	2.206E-01	RA223
92.53	1212.	5.11	1.09	7.822E-02	92.59	5.570	6.442E+00	TH234
143.45	191.	27.71	1.47	6.596E-02	143.76	10.960	6.125E-01	U235
185.73	526.	9.46	0.72	5.472E-02	185.71	57.200	3.892E-01	U235
205.37	116.	29.90	0.76	5.087E-02	205.31	5.010	1.050E+00	U235
216.58	124.	37.90	0.67	4.893E-02				
238.22	550.	10.88	0.92	4.561E-02	238.63	43.300	6.455E-01	PB212
241.65	168.	26.87	0.76	4.508E-02	242.00	7.430	1.164E+00	PB214
294.87	221.	20.40	1.06	3.889E-02	295.22	19.300	6.822E-01	PB214
321.82	106.	28.71	0.51	3.640E-02				
338.11	118.	0.12	1.08	3.504E-02	338.28	2.790	1.406E+00	RA223
351.65	288.	15.45	1.27	3.402E-02	351.93	37.600	5.210E-01	PB214
510.67	1595.	4.49	2.58	2.544E-02				
558.30	154.	21.25	1.00	2.370E-02				
582.63	214.	22.14	1.61	2.290E-02	583.19	84.500	2.562E-01	TL208
609.26	279.	18.64	1.59	2.209E-02	609.31	46.090	6.342E-01	BI214
678.61	106.	27.09	0.86	2.025E-02				
910.54	225.	19.20	0.94	1.591E-02				
968.65	78.	33.31	1.64	1.511E-02	968.97	15.800	PBC<MDA	AC228
1119.75	138.	28.36	0.92	1.337E-02	1120.29	15.100	1.582E+00	BI214
1460.80	301.	11.17	1.75	1.066E-02	1460.83	10.670	6.124E+00	K40
1764.41	115.	18.86	0.40	9.048E-03	1764.49	15.400	1.916E+00	BI214

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 3
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1
Page 2

Ge1 background 11_21_07.Rpt

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
175.36	43.91	424.	83.	0.002	73.85	0.772	EU-155	lD
299.08	74.87	807.	207.	0.005	48.16	0.699	PB-214	
307.91	77.08	673.	174.	0.004	52.38	0.864	PB-214	
573.39	143.45	712.	191.	0.004	55.42	1.469	TC-99M	l
742.53	185.73	586.	526.	0.012	18.92	0.716	U-235	l
821.10	205.37	381.	116.	0.003	59.80	0.757	U-235	l
865.96	216.58	565.	124.	0.003	75.80	0.669	TB-160	s
2042.53	510.67	504.	1595.	0.037	8.97	2.583	TL-208	s
2233.07	558.30	218.	154.	0.004	42.50	0.999	Y-91M	s
2714.42	678.61	154.	106.	0.002	54.18	0.859	AG-110M	sM
3642.42	910.54	329.	109.	0.003	50.65	0.937	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.69	29.78	1412.	1845.	0.043	0.03	0.757D
I-129	133.99	33.61	705.	256.	0.006	31.86	0.761D
I-129	158.11	39.64	963.	367.	0.008	35.40	0.717s
PB-210	184.97	46.35	1060.	707.	0.016	20.60	0.662s
TH-234	252.44	63.22	832.	886.	0.020	13.92	0.776
RA-223	336.52	84.24	1308.	175.	0.004	60.22	0.815s
TH-234	369.70	92.53	789.	1212.	0.028	10.22	1.090s
RA-223	576.53	144.23	937.	32.	0.001	0.79	0.880D
Ra-226	744.47	186.21	938.	426.	0.010	22.51	0.924D
PB-212	952.51	238.22	700.	550.	0.013	21.77	0.919s
RA-224	959.36	239.93	1373.	-223.	-0.005	48.86	0.980
PB-214	966.24	241.65	538.	168.	0.004	53.74	0.758s
PB-214	1179.17	294.87	453.	221.	0.005	40.80	1.059
AC-228	1352.99	338.32	729.	118.	0.003	0.23	1.078D
PB-214	1406.31	351.65	405.	288.	0.007	30.91	1.275
TL-208	2330.44	582.63	348.	214.	0.005	44.27	1.612s
BI-214	2436.97	609.26	441.	279.	0.006	37.28	1.586s
AC-228	3644.09	910.96	250.	115.	0.003	43.01	1.596s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 4
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	3874.95	968.65	299.	78.	0.002	66.62	1.642s
BI-214	4479.56	1119.75	190.	138.	0.003	56.71	0.922s
K-40	5844.32	1460.80	94.	301.	0.007	22.35	1.747
BI-214	7059.40	1764.41	47.	115.	0.003	37.72	0.398s

s - Peak fails shape tests.

Ge1 background 11_21_07.Rpt

D - Peak area deconvoluted.
A Derived peak area.

```
*****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak -------------
Name   Code  Activity     Energy   Activity Code MDA Value
             Bq/sample     keV     Bq/sample     Bq/sample      COMMENTS
-----------------------------------------------------------------------------

Be-7     C  -2.5924E-02
                          477.61-2.592E-02 %(  8.962E-01 1.02E+03 G
                             1 of   1 peaks found

K-40     N   6.1244E+00
                         1460.83 6.124E+00  (  9.744E-01 1.12E+01 G
                             1 of   1 peaks found

CO-60    F   8.3359E-03
                         1332.50 8.336E-03 &(  1.027E-01 3.57E+02 G
                         1173.24 7.132E-02 %   1.179E-01 5.06E+01 G
                             2 of   2 peaks found

I-129    I   1.4251E+00
                           29.78 1.425E+00 }   1.374E-01 1.37E-02 X
                           33.61 7.311E-01 -   3.607E-01 1.59E+01 X
                           39.57 1.425E+00 *(  5.721E-01 1.77E+01 G
                           34.61-4.163E-01 %   1.957E+00 1.41E+02 X
                             4 of   5 peaks found

CS-137   I  -6.5179E-03
                          661.66-6.518E-03 &(  1.302E-01 5.91E+02 G
                             1 of   1 peaks found

TL-208   N   2.5616E-01
                          583.19 2.562E-01 @(  1.073E-01 2.21E+01 G
                          860.56 4.219E-01 %   9.305E-01 6.68E+01 G
                             2 of   2 peaks found

PB-210   N   4.8319E+00
                           46.54 4.832E+00 *(  1.055E+00 1.03E+01 G
                             1 of   1 peaks found

PB-212   N   6.4547E-01
                          238.63 6.455E-01 @(  1.479E-01 1.09E+01 G
                          300.10 1.825E-01 %   2.408E+00 3.93E+02 G
                             2 of   2 peaks found

PB-214   N   5.7564E-01
                          351.93 5.210E-01  (  1.748E-01 1.55E+01 G
                          295.22 6.822E-01  (  3.145E-01 2.04E+01 G
                          242.00 1.164E+00 +   7.653E-01 2.69E+01 G
                             3 of   3 peaks found
```

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 5
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

BI-214   N   6.3420E-01
                          609.31 6.342E-01 *(  2.286E-01 1.86E+01 G
                         1764.49 1.916E+00 +   5.739E-01 1.89E+01 G
```

```
                                Ge1 background 11_21_07.Rpt
                              1120.29 1.582E+00 +   7.673E-01 2.84E+01 G
                               768.36 5.845E-01 %   2.258E+00 1.16E+02 G
                                  4 of   4 peaks found

RA-223    N    3.4520E-01
                               83.79 2.037E-01 *   1.987E-01 3.01E+01 X
                              269.46 1.066E-01 &(  5.409E-01 1.52E+02 G
                              154.21 4.946E-01 %   9.325E-01 5.73E+01 G
                              144.23 3.452E-01 }   1.590E+00 3.93E-01 G
                              323.87-5.721E-01 %   2.109E+00 1.11E+02 G
                                  5 of   6 peaks found

RA-224    N   -2.7848E+00
                              240.99-2.785E+00  (  2.190E+00 2.44E+01 G
                                  1 of   1 peaks found

AC-228    N    6.9099E-01
                              911.20 6.508E-01  (  4.310E-01 2.15E+01 G
                              968.97 7.567E-01 *(  8.074E-01 3.33E+01 G
                              338.32 6.910E-01 }   7.535E-01 1.16E-01 G
                                  3 of   3 peaks found

TH-234    N    5.3187E+00
                               63.29 5.319E+00  (  8.239E-01 6.96E+00 G
                               92.59 6.442E+00 +   7.098E-01 5.11E+00 G
                                  2 of   2 peaks found

U-235     N    1.3269E-01
                              185.71 3.695E-02 }(  1.143E-01 9.33E+01 G
                              143.76 2.880E-01 }(  4.162E-01 4.42E+01 G
                              163.36 5.461E-01 }(  1.152E+00 6.40E+01 G
                              205.31 4.668E-01 }(  1.258E+00 8.14E+01 G
                                  4 of   4 peaks found

Ra-226    N    5.0340E+00
                              186.21 5.034E+00 }(  1.717E+00 1.13E+01 G
                                  1 of   1 peaks found

AM-241    T    1.7879E-02
                               59.54 1.788E-02 %(  1.230E-01 2.06E+02 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
```



```
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
```

to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	84.24	1308.	175.	0.004	60.22	2.037E-01
RA-223	144.23	937.	32.	0.001	0.79	3.452E-01
RA-224	239.93	1373.	-223.	-0.005	48.86	-2.785E+00
AC-228	910.96	250.	115.	0.003	43.01	6.508E-01
AC-228	968.65	299.	78.	0.002	66.62	7.567E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.5924E-02	2.0493E+03%	8.962E-01
K-40		6.1244E+00	2.2349E+01%	9.744E-01
CO-60	#A	8.3359E-03	7.1489E+02%	1.027E-01
I-129		1.4251E+00	3.5397E+01%	5.721E-01
CS-137	#A	-6.5179E-03	1.1826E+03%	1.302E-01
TL-208	#	2.5616E-01	4.4272E+01%	1.073E-01
PB-210	#	4.8319E+00	2.0595E+01%	1.055E+00
PB-212	#	6.4547E-01	2.1768E+01%	1.479E-01
PB-214		5.7564E-01	2.5595E+01%	1.748E-01
BI-214		6.3420E-01	3.7279E+01%	2.286E-01
RA-223	#A	3.4520E-01	7.1896E+01%	5.409E-01
RA-224	#A	-2.7848E+00	4.8862E+01%	2.190E+00
AC-228	#	6.9099E-01	3.9651E+01%	4.310E-01
TH-234		5.3187E+00	1.3922E+01%	8.239E-01

U-235	A	1.3269E-01	8.8419E+01%	1.258E+00
Ra-226		5.0340E+00	2.5148E+01%	1.717E+00
AM-241	#A	1.7879E-02	4.1232E+02%	1.230E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.

Ge1 background 11_21_07.Rpt

F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (39.4 to 1999.4 keV) 1.981E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge2 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    1
STL- St Louis                    Spectrum name: Ge2 background 11_21_07.An1

Sample description
     Ge2 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge2 bkgd\Ge2 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:39:03
       Live time:             43200
       Real time:             43328
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     Ge 2 SN/182


Calibration
       Filename:                   Ge2 AF w_spacer 72002 poly. 121206 no Hg
                                   .Clb
     Ge2 72002-334 Air Filter Poly no Hg 121206


       Energy Calibration
            Created:               13-Dec-2006 07:56:27
            Zero offset:           0.102 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.874E-09 keV/channel^2

       Efficiency Calibration
            Created:               13-Dec-2006 07:58:09
            Type:                  Polynomial
            Uncertainty:           1.400 %
            Coefficients:         -0.388770  -4.607021   0.563706
                                  -0.059383   0.002602  -0.000047

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.60keV )
       Stop channel:            8000 (  1999.97keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
       Fraction Limit:             0.000%
       Background width:           average of three points.

       Half lives decay limit:    12.000
                                      Page 1
```

Ge2 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 2
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 3 cutoff 20.00000 %
Energy Calibration
Normalized diff: 1.0000

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
36.01	548.	9.94	2.31	1.554E-04	34.61	2.419	0.000E+00	I129
54.77	448.	20.63	0.48	2.979E-02				
70.79	795.	10.76	0.57	4.706E-02				
82.34	140.	38.03	1.07	5.505E-02				
104.48	141.	28.68	0.56	6.052E-02				
142.56	15.	0.90	1.13	5.781E-02	144.23	3.220	PBC<MDA	RA223
151.40	922.	7.90	0.80	5.654E-02				
172.73	246.	28.01	0.59	5.240E-02				
180.30	97.	34.82	0.46	5.091E-02				
270.17	94.	30.57	0.82	3.630E-02	269.46	13.700	4.365E-01	RA223
432.95	145.	13.12	1.10	2.330E-02				
774.09	107.	14.98	1.25	1.393E-02				

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
143.68	36.01	765.	548.	0.013	16.63	2.308	CS-137	sM
218.74	54.77	1948.	448.	0.010	41.27	0.482	LU-177	sM
282.83	70.79	1564.	795.	0.018	21.52	0.570	AU-198	sM
417.63	104.48	526.	141.	0.003	57.36	0.563	U-235	sM
605.36	151.40	549.	1148.	0.027	8.26	0.797	KR-85M	sM
690.68	172.73	768.	246.	0.006	56.02	0.592	-	sM
1080.54	270.17	183.	94.	0.002	61.15	0.819	AC-228	l
1731.80	432.95	50.	145.	0.003	26.23	1.105	J-134	sM
3096.58	774.09	25.	107.	0.002	23.42	1.245	W-187	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

Ge2 background 11_21_07.Rpt
This section based on library: long bkgd_pbc.lib

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 3
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
RA-223	329.04	82.34	1346.	140.	0.003	76.05	1.072s
RA-223	576.67	144.23	742.	15.	0.000	1.79	1.128D
RA-223	610.25	152.62	1317.	-226.	-0.005	47.36	1.137s
AC-228	1353.21	338.32	271.	-3.	0.000	-12.93	1.306D

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-4.6117E-02					
			477.61	-4.612E-02	%(	5.044E-01 3.17E+02	G
			1 of 1 peaks found				
K-40	N	-1.7222E-01					
			1460.83	-1.722E-01	%(	8.611E-01 1.44E+02	G
			1 of 1 peaks found				
CO-60	F	-8.3377E-03					
			1332.50	-8.338E-03	%(	7.747E-02 2.62E+02	G
			1173.24	6.175E-04	%	7.327E-02 3.29E+03	G
			2 of 2 peaks found				
I-129	I	-1.9497E-01					
			39.57	-1.950E-01	%(	1.419E+01 2.19E+03	G
			1 of 5 peaks found				
CS-137	I	-9.4394E-04					
			661.66	-9.439E-04	&(	6.847E-02 2.06E+03	G
			1 of 1 peaks found				
TL-208	N	-4.4122E-03					
			583.19	-4.412E-03	&(	6.480E-02 4.21E+02	G
			860.56	7.613E-04	&	4.117E-01 1.48E+04	G
			2 of 2 peaks found				
PB-210	N	-4.5169E-01					
			46.54	-4.517E-01	&(	8.363E+00 5.56E+02	G
			1 of 1 peaks found				
PB-212	N	-1.7207E-02					
			238.63	-1.721E-02	&(	1.488E-01 2.58E+02	G
			300.10	-4.113E-01	&	2.107E+00 1.53E+02	G
			2 of 2 peaks found				

```
                                Ge2 background 11_21_07.Rpt
PB-214    N    7.0784E-02
                              351.93 7.078E-02 %(  1.628E-01 6.95E+01 G
                              295.22-7.852E-02 &   3.395E-01 1.29E+02 G
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 ORTEC      g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    4
 STL- St Louis                   Spectrum name: Ge2 background 11_21_07.An1

 Nuclide  Ave activity    Energy    Activity  Code Peak MDA  Comments
                              242.00 1.721E-01 &   7.907E-01 1.37E+02 G
                                 3 of   3 peaks found

BI-214    N   -3.4801E-03
                              609.31-3.480E-03 &(  1.312E-01 1.08E+03 G
                             1764.49-1.363E-02 %   5.148E-01 1.02E+03 G
                             1120.29-1.887E-02 %   4.717E-01 6.99E+02 G
                              768.36 1.538E-01 &   1.164E+00 2.17E+02 G
                                 4 of   4 peaks found

RA-223    N    1.8540E-01
                               83.79 2.337E-01 *   2.900E-01 3.80E+01 X
                              269.46 1.854E-01 %(  4.423E-01 7.21E+01 G
                              154.21-1.660E+00 +   1.263E+00 2.37E+01 G
                              144.23 1.854E-01 }   1.612E+00 8.96E-01 G
                              323.87-2.960E-01 &   1.561E+00 1.57E+02 G
                              338.28 2.760E-01 }   2.283E+00 1.90E+02 G
                                 6 of   6 peaks found

RA-224    N    2.7670E-01
                              240.99 2.767E-01 &(  1.525E+00 1.65E+02 G
                                 1 of   1 peaks found

AC-228    N   -2.2436E-02
                              911.20-2.244E-02 %(  2.287E-01 2.88E+02 G
                              338.32-2.244E-02 }   5.553E-01 ******** G
                                 2 of   3 peaks found

TH-234    N    2.5408E-01
                               63.29 2.541E-01 %(  2.384E+00 2.82E+02 G
                               92.59-6.697E-02 %   1.236E+00 5.52E+02 G
                                 2 of   2 peaks found

U-235     N    6.1680E-02
                              185.71 2.368E-03 }(  1.010E-01 1.27E+03 G
                              143.76 1.920E-02 }(  5.448E-01 8.46E+02 G
                              163.36 5.295E-01 }(  1.179E+00 6.74E+01 G
                              205.31 3.574E-01 }(  1.228E+00 1.03E+02 G
                                 4 of   4 peaks found

Ra-226    N    0.0000E+00
                                 0 of   1 peaks found

AM-241    T    0.0000E+00
                                 0 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
```

Ge2 background 11_21_07.Rpt

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 5
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	82.34	1346.	140.	0.003	76.05	2.337E-01
RA-223	152.62	1317.	-226.	-0.005	47.36	-1.660E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-4.6117E-02	6.3413E+02%	5.044E-01
K-40	#A	-1.7222E-01	2.8889E+02%	8.611E-01
CO-60	#A	-8.3377E-03	5.2415E+02%	7.747E-02
I-129	#A	-1.9497E-01	4.3718E+03%	1.419E+01
CS-137	#A	-9.4394E-04	4.1142E+03%	6.847E-02
TL-208	#A	-4.4122E-03	8.4236E+02%	6.480E-02
PB-210	#A	-4.5169E-01	1.1128E+03%	8.363E+00
PB-212	#A	-1.7207E-02	5.1525E+02%	1.488E-01
PB-214	#A	7.0784E-02	1.3902E+02%	1.628E-01
BI-214	#A	-3.4801E-03	2.1577E+03%	1.312E-01
RA-223	#A	1.8540E-01	1.4419E+02%	4.423E-01
RA-224	#A	2.7670E-01	3.2921E+02%	1.525E+00
AC-228	#A	-2.2436E-02	5.7610E+02%	2.287E-01
TH-234	#A	2.5408E-01	5.6341E+02%	2.384E+00
U-235	#A	6.1680E-02	1.3487E+02%	1.228E+00
Ra-226	#A	0.0000E+00	7.4987E+03%	1.636E+00
AM-241	#A	0.0000E+00	1.4307E+04%	4.288E-01

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Page 5

Ge2 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.0 keV) 0.000E+00 Bq/sample

Analyzed by: _____
402630

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge3 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    1
STL- St Louis                    Spectrum name: Ge3 background 11_21_07.An1

Sample description
     Ge3 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge3 Bkd post 5_8_06\Ge3 background
                    11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 20:14:21
       Live time:              43200
       Real time:              44044
       Dead time:                  1.92 %
       Detector ID:                    3

Detector system
     Ge 3 SN/155


Calibration
       Filename:                   Ge3 Air filter interp_122_quad 01_09_07.
                                   Clb
     Ge3 Air filter 74140_334 interp_122_quad 01_09_07


       Energy Calibration
            Created:               09-Jan-2007 10:31:35
            Zero offset:           0.372 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.457E-08 keV/channel^2

       Efficiency Calibration
            Created:               09-Jan-2007 10:36:46
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.114144E-01 + (-2.846233E-01*Log(E) ) +
                                   ( -4.247676E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.85keV )
       Stop channel:            8000 (  2000.41keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    2
                                   Page 1
```

Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.0700

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
46.63	517.	11.73	0.85	8.618E-02	46.54	4.250	3.266E+00	PB210
63.31	592.	12.93	0.85	8.723E-02	63.29	4.820	3.262E+00	TH234
72.12	210.	21.86	0.87	8.589E-02				
74.95	648.	7.63	0.87	8.546E-02				
84.56	371.	11.37	0.88	8.406E-02	83.79	25.180	4.057E-01	RA223
87.41	211.	18.65	0.88	8.364E-02				
92.67	628.	10.80	1.19	8.268E-02	92.59	5.570	3.156E+00	TH234
143.71	8.	1.77	0.94	6.882E-02	143.76	10.960	PBC<MDA	U235
185.84	362.	17.45	1.25	5.738E-02	185.71	57.200	2.556E-01	U235
					186.21	3.590	4.080E+00	Ra226
238.33	498.	13.20	1.16	4.774E-02	238.63	43.300	5.582E-01	PB212
294.85	179.	32.86	0.88	4.062E-02				
338.11	52.	0.25	1.13	3.652E-02	338.28	2.790	1.113E+00	RA223
351.95	221.	17.02	1.15	3.541E-02	351.93	37.600	3.840E-01	PB214
569.39	140.	24.12	0.46	2.406E-02				
583.08	191.	16.67	0.43	2.359E-02	583.19	84.500	2.218E-01	TL208
609.47	167.	20.68	1.40	2.275E-02	609.31	46.090	3.679E-01	BI214
675.97	198.	19.41	0.25	2.087E-02				
1460.77	269.	12.60	0.77	1.067E-02	1460.83	10.670	5.472E+00	K40
1763.99	57.	24.52	2.37	8.978E-03	1764.49	15.400	9.488E-01	BI214

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
287.30	72.26	948.	210.	0.005	43.72	0.865	W-187	1D
299.20	75.10	1479.	687.	0.016	24.09	0.945	PB-214	
347.97	87.28	676.	184.	0.004	51.12	0.891	PB-214	
1178.99	294.85	656.	179.	0.004	65.71	0.885	PB-214	1

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Page 2

Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
2277.83	569.39	207.	140.	0.003	48.24	0.461	PA-234	s
2704.31	675.97	179.	198.	0.005	38.82	0.248	AU-198	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	116.48	29.46	1393.	-40.	-0.001	-33.03	0.821D
I-129	117.77	29.78	1360.	-75.	-0.002	-33.03	0.821D
PB-210	185.24	46.63	861.	517.	0.012	23.47	0.850
TH-234	252.02	63.31	1092.	592.	0.014	25.87	0.855s
RA-223	337.47	84.65	1341.	292.	0.007	37.32	0.877s
TH-234	369.57	92.67	882.	628.	0.015	21.59	1.192s
RA-223	576.02	144.23	823.	8.	0.000	3.54	0.939D
Ra-226	744.09	186.21	808.	362.	0.008	24.55	1.253D
PB-212	952.74	238.33	764.	498.	0.012	26.39	1.163s
RA-224	959.55	240.03	1211.	-150.	-0.003	67.51	1.037s
AC-228	1353.01	338.32	649.	52.	0.001	0.49	1.134D
PB-214	1407.56	351.95	596.	221.	0.005	34.04	1.148s
TL-208	2332.62	583.08	190.	191.	0.004	33.35	0.427s
BI-214	2438.23	609.47	511.	167.	0.004	41.37	1.396s
K-40	5843.24	1460.77	80.	269.	0.006	25.20	0.766s
BI-214	7055.28	1763.99	68.	57.	0.001	49.04	2.372s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-1.0312E-01					
			477.61	-1.031E-01	&(	7.955E-01 2.29E+02	G
			1 of 1 peaks found				
K-40	N	5.4719E+00					
			1460.83	5.472E+00	(	9.030E-01 1.26E+01	G
			1 of 1 peaks found				

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 4
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 1.3070E-02					

```
                                Ge3 background 11_21_07.Rpt
                              1332.50 1.307E-02 &(  1.156E-01 2.59E+02 G
                              1173.24 4.078E-02 %   1.050E-01 7.74E+01 G
                                  2 of   2 peaks found

I-129     I  -5.4321E-02
                               29.78-5.432E-02 }   1.270E-01 ******** X
                               29.46-5.432E-02 }   2.391E-01 ******** X
                               33.61-2.491E-03 %   3.687E-01 4.40E+03 X
                               39.57-5.432E-02 %(  5.521E-01 3.04E+02 G
                               34.61-2.405E-01 &   1.844E+00 2.30E+02 X
                                  5 of   5 peaks found

CS-137    I   2.9708E-02
                              661.66 2.971E-02 &(  9.574E-02 9.65E+01 G
                                  1 of   1 peaks found

TL-208    N   2.2178E-01
                              583.19 2.218E-01 *(  7.773E-02 1.67E+01 G
                              860.56 3.902E-01 %   8.439E-01 6.55E+01 G
                                  2 of   2 peaks found

PB-210    N   3.2658E+00
                               46.54 3.266E+00  (  8.816E-01 1.17E+01 G
                                  1 of   1 peaks found

PB-212    N   5.5819E-01
                              238.63 5.582E-01 *(  1.474E-01 1.32E+01 G
                              300.10-8.649E-02 %   2.144E+00 7.37E+02 G
                                  2 of   2 peaks found

PB-214    N   3.8402E-01
                              351.93 3.840E-01 *(  2.025E-01 1.70E+01 G
                              295.22 2.825E-01 %   3.796E-01 4.12E+01 G
                              242.00-1.394E-01 %   8.727E-01 1.87E+02 G
                                  3 of   3 peaks found

BI-214    N   3.6794E-01
                              609.31 3.679E-01 *(  2.385E-01 2.07E+01 G
                             1764.49 9.488E-01 +   6.898E-01 2.45E+01 G
                             1120.29 5.281E-01 %   7.381E-01 4.32E+01 G
                              768.36 5.301E-01 %   1.791E+00 1.01E+02 G
                                  4 of   4 peaks found

RA-223    N   8.8424E-02
                               83.79 3.193E-01 *   1.894E-01 1.87E+01 X
                              269.46 8.842E-02 %(  5.004E-01 1.69E+02 G
                              154.21 1.288E-01 %   8.834E-01 2.05E+02 G
                              144.23 8.842E-02 }   1.424E+00 1.77E+00 G
                              323.87-1.253E-01 %   1.965E+00 4.67E+02 G
                                  5 of   6 peaks found

RA-224    N  -1.7921E+00
                              240.99-1.792E+00 &(  1.966E+00 3.38E+01 G
                                  1 of   1 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    5
 STL- St Louis                   Spectrum name: Ge3 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.8991E-01
                              911.20 2.899E-01 %(  4.109E-01 4.37E+01 G
```

```
                                Ge3 background 11_21_07.Rpt
                              968.97 2.921E-01 %   6.997E-01 7.23E+01 G
                              338.32 2.899E-01 }   6.828E-01 2.46E-01 G
                                 3 of   3 peaks found

TH-234    N   3.2051E+00
                               63.29 3.262E+00 *(  8.629E-01 1.29E+01 G
                               92.59 3.156E+00 *(  7.091E-01 1.08E+01 G
                                 2 of   2 peaks found

U-235     N   0.0000E+00
                              143.76 1.575E-01 }   4.364E-01 8.36E+01 G
                              163.36 1.070E-02 }   1.003E+00 2.79E+03 G
                              205.31 3.099E-01 }   1.189E+00 1.15E+02 G
                                 3 of   4 peaks found

Ra-226    N   4.0797E+00
                              186.21 4.080E+00 }(  1.522E+00 1.23E+01 G
                                 1 of   1 peaks found

AM-241    T   3.0063E-02
                               59.54 3.006E-02 %(  1.121E-01 1.12E+02 G
                                 1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    6
 STL- St Louis                    Spectrum name: Ge3 background 11_21_07.An1

   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy    Counts     Counts     Cts/Sec  2 Sigma %
                                   Page 5
```

Ge3 background 11_21_07.Rpt

RA-223	84.65	1341.	292.	0.007	37.32	3.193E-01
RA-224	240.03	1211.	-150.	-0.003	67.51	-1.792E+00
PB-214	351.95	596.	221.	0.005	34.04	3.840E-01
BI-214	609.47	511.	167.	0.004	41.37	3.679E-01
BI-214	1763.99	68.	57.	0.001	49.04	9.488E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty Counting 2 Sigma	MDA Bq/sample
Be-7	#A	-1.0312E-01	4.5896E+02%	7.955E-01
K-40		5.4719E+00	2.5202E+01%	9.030E-01
CO-60	#A	1.3070E-02	5.1750E+02%	1.156E-01
I-129	#A	-5.4321E-02	6.0811E+02%	5.521E-01
CS-137	#A	2.9708E-02	1.9304E+02%	9.574E-02
TL-208	#	2.2178E-01	3.3349E+01%	7.773E-02
PB-210		3.2658E+00	2.3466E+01%	8.816E-01
PB-212	#	5.5819E-01	2.6390E+01%	1.474E-01
PB-214	#	3.8402E-01	3.4038E+01%	2.025E-01
BI-214	#	3.6794E-01	4.1367E+01%	2.385E-01
RA-223	#A	8.8424E-02	3.3888E+02%	5.004E-01
RA-224	#A	-1.7921E+00	6.7509E+01%	1.966E+00
AC-228	#A	2.8991E-01	8.7364E+01%	4.109E-01
TH-234	#	3.2051E+00	1.6848E+01%	8.629E-01
U-235	#A	0.0000E+00	2.3063E+02%	1.189E+00
Ra-226	#	4.0797E+00	2.4547E+01%	1.522E+00
AM-241	#A	3.0063E-02	2.2457E+02%	1.121E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.4 keV) 1.680E+01 Bq/sample

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 7
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge4 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 1
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Sample description
Ge4 background 11_21_07

Spectrum Filename: C:\User\spectra\Ge4 Bkd post 09_07\Ge4 background 11_21_07.An1

Acquisition information

Start time:	21-Nov-2007 21:20:23
Live time:	43200
Real time:	43294
Dead time:	0.22 %
Detector ID:	4

Detector system
Ge 4 SN/181

Calibration

Filename:	Ge4 AirFilterCal_74140_334_05_08_07(EE).Clb

Ge4 AirFilterCal_74140_334_05_08_07(EE)

Energy Calibration

Created:	08-May-2007 13:28:13
Zero offset:	0.017 keV
Gain:	0.250 keV/channel
Quadratic:	-3.910E-08 keV/channel^2

Efficiency Calibration

Created:	08-May-2007 13:39:26
Type:	Polynomial
Uncertainty:	0.775 %
Coefficients:	-0.437839 -4.768164 0.564688
	-0.057886 0.002608 -0.000044

Library Files

Main analysis library:	long bkgd_pbc.lib
Library Match Width:	0.750
Peak stripping:	Library based

Analysis parameters

Analysis engine:	Env32 G53W4.21
Start channel:	90 (22.53keV)
Stop channel:	8000 (1998.47keV)
Peak rejection level:	40.000%
Peak search sensitivity:	3
Sample Size:	1.0000E+00
Activity scaling factor:	1.0000E+00/(1.0000E+00* 1.0000E+00) = 1.0000E+00
Detection limit method:	Reg. Guide 4.16 Method
Random error:	0.0000000E+00
Systematic error:	0.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.

Ge4 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 2
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1398

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.44	117.	0.15	0.80	5.859E-02	29.46	20.350	PBC<MDA	I129
46.39	500.	10.13	0.83	6.160E-02	46.54	4.250	4.417E+00	PB210
63.30	385.	12.06	0.82	6.390E-02	63.29	4.820	2.891E+00	TH234
74.86	126.	20.28	0.84	6.352E-02				
77.23	163.	16.49	0.85	6.347E-02				
92.41	578.	13.01	1.06	6.276E-02	92.59	5.570	3.825E+00	TH234
144.26	17.	0.88	0.90	5.339E-02	143.76	10.960	PBC<MDA	U235
185.83	266.	18.20	1.03	4.428E-02	185.71	57.200	2.430E-01	U235
					186.21	3.590	3.880E+00	Ra226
238.37	223.	16.36	1.06	3.532E-02	238.63	43.300	3.379E-01	PB212
294.99	85.	32.83	1.03	2.863E-02	295.22	19.300	PBC<MDA	PB214
338.12	34.	0.42	1.07	2.500E-02	338.28	2.790	1.109E+00	RA223
351.60	126.	21.13	1.08	2.404E-02	351.93	37.600	3.223E-01	PB214
510.71	983.	5.17	2.12	1.675E-02				
582.75	103.	27.40	0.89	1.482E-02	583.19	84.500	1.899E-01	TL208
608.54	126.	15.99	1.63	1.422E-02	609.31	46.090	4.449E-01	BI214
1024.06	31.	31.88	0.48	8.934E-03				
1119.29	112.	21.18	1.36	8.239E-03	1120.29	15.100	2.075E+00	BI214
1460.75	68.	19.15	1.89	6.425E-03	1460.83	10.670	2.293E+00	K40

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
299.14	74.83	277.	115.	0.003	50.65	0.818	PB-214	
308.62	77.21	295.	148.	0.003	42.44	0.888	PB-214	
2042.44	510.71	228.	983.	0.023	10.33	2.116	TL-208	s
4096.82	1024.06	19.	31.	0.001	63.76	0.479	SR-91	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 3
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Ge4 background 11_21_07.Rpt

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.01	29.78	664.	117.	0.003	0.29	0.804D
PB-210	185.42	46.39	458.	500.	0.012	20.27	0.834s
TH-234	253.01	63.30	424.	385.	0.009	24.12	0.816
TH-234	369.42	92.41	822.	578.	0.013	26.02	1.057s
RA-223	576.64	144.23	522.	17.	0.000	1.75	0.905D
Ra-226	744.51	186.21	462.	266.	0.006	25.94	1.035D
PB-212	953.09	238.37	289.	223.	0.005	32.72	1.055
PB-214	1179.54	294.99	347.	85.	0.002	65.66	1.034s
AC-228	1352.85	338.32	320.	34.	0.001	0.85	1.071D
PB-214	1405.98	351.60	291.	126.	0.003	42.26	1.082s
TL-208	2331.16	582.87	184.	52.	0.001	78.17	1.269s
BI-214	2433.85	608.54	80.	126.	0.003	31.98	1.627s
BI-214	4478.11	1119.29	52.	112.	0.003	42.36	1.355s
K-40	5845.49	1460.75	51.	68.	0.002	38.29	1.887

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	2.5364E-01					
			477.61	2.536E-01	&(	7.571E-01 8.94E+01	G
			1 of 1 peaks found				
K-40	N	2.2933E+00					
			1460.83	2.293E+00	(	1.211E+00 1.91E+01	G
			1 of 1 peaks found				
CO-60	F	3.0919E-02					
			1332.50	3.092E-02	%(	1.270E-01 1.20E+02	G
			1173.24	-1.824E-03	%	1.272E-01 1.99E+03	G
			2 of 2 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 4
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
I-129	I 1.2169E-01					
		29.78	1.217E-01	}	1.282E-01 1.45E-01	X
		33.61	9.651E-03	%	3.713E-01 1.14E+03	X
		39.57	1.217E-01	%(	5.647E-01 1.39E+02	G

```
                                Ge4 background 11_21_07.Rpt
                               34.61 5.812E-01 %   1.700E+00 8.81E+01 X
                                 4 of   5 peaks found

CS-137    I   6.1529E-02
                               661.66 6.153E-02 &(  1.199E-01 5.93E+01 G
                                 1 of   1 peaks found

TL-208    N   9.7012E-02
                               583.19 9.701E-02 ?(  1.219E-01 3.91E+01 G
                               860.56 5.068E-02 %   8.374E-01 4.76E+02 G
                                 2 of   2 peaks found

PB-210    N   4.4166E+00
                                46.54 4.417E+00 @(  9.062E-01 1.01E+01 G
                                 1 of   1 peaks found

PB-212    N   3.3787E-01
                               238.63 3.379E-01  (  1.241E-01 1.64E+01 G
                               300.10 4.578E-01 %   2.233E+00 1.45E+02 G
                                 2 of   2 peaks found

PB-214    N   3.3387E-01
                               351.93 3.223E-01  (  2.104E-01 2.11E+01 G
                               295.22 3.563E-01 *(  3.752E-01 3.28E+01 G
                               242.00-8.994E-02 %   9.155E-01 3.02E+02 G
                                 3 of   3 peaks found

BI-214    N   4.4492E-01
                               609.31 4.449E-01  (  1.567E-01 1.60E+01 G
                              1764.49 3.905E-01 %   9.161E-01 7.06E+01 G
                              1120.29 2.075E+00 +   6.787E-01 2.12E+01 G
                               768.36 3.163E-02 %   2.265E+00 2.07E+03 G
                                 4 of   4 peaks found

RA-223    N   2.3215E-01
                                83.79-2.020E-04 %   1.551E-01 2.27E+04 X
                               269.46 2.321E-01 &(  4.980E-01 6.50E+01 G
                               154.21-5.419E-02 %   8.607E-01 4.71E+02 G
                               144.23 2.321E-01 }   1.470E+00 8.75E-01 G
                               323.87 1.302E-01 &   2.085E+00 4.74E+02 G
                                 5 of   6 peaks found

RA-224    N  -3.8759E-01
                               240.99-3.876E-01 %(  1.566E+00 1.21E+02 G
                                 1 of   1 peaks found

AC-228    N   2.7907E-01
                               911.20 2.791E-01 &(  4.692E-01 5.16E+01 G
                               968.97 2.956E-01 %   7.776E-01 7.89E+01 G
                               338.32 2.791E-01 }   7.075E-01 4.24E-01 G
                                 3 of   3 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    5
STL- St Louis                   Spectrum name: Ge4 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234    N   3.3918E+00
                               63.29 2.891E+00  (  7.418E-01 1.21E+01 G
                               92.59 3.825E+00  (  9.027E-01 1.30E+01 G
                                 2 of   2 peaks found
```

Ge4 background 11_21_07.Rpt

```
U-235     N    0.0000E+00
                          143.76 1.399E-01 }   4.508E-01 9.69E+01 G
                          163.36 3.179E-01 }   9.891E-01 9.36E+01 G
                          205.31 9.367E-02 }   9.329E-01 2.94E+02 G
                             3 of   4 peaks found

Ra-226    N    3.8798E+00
                          186.21 3.880E+00 }(  1.500E+00 1.30E+01 G
                             1 of   1 peaks found

AM-241    T    1.6676E-02
                           59.54 1.668E-02 %(  1.068E-01 1.91E+02 G
                             1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    6
STL- St Louis                    Spectrum name: Ge4 background 11_21_07.An1


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy    Counts     Counts     Cts/Sec  2 Sigma %
-----------------------------------------------------------------------
PB-214     294.99      347.       85.     0.002     65.66   3.563E-01
PB-214     351.60      291.      126.     0.003     42.26   3.223E-01
K-40      1460.75       51.       68.     0.002     38.29   2.293E+00
  P - Peakbackground subtraction

*****   S U M M A R Y   O F   N U C L I D E S   I N   S A M P L E   *****
        Time of Count   Uncertainty  2 Sigma
Nuclide   Activity        Counting                MDA
                                  Page 5
```

Ge4 background 11_21_07.Rpt

		Bq/sample		Bq/sample
Be-7	#A	2.5364E-01	1.7871E+02%	7.571E-01
K-40	#	2.2933E+00	3.8293E+01%	1.211E+00
CO-60	#A	3.0919E-02	2.4072E+02%	1.270E-01
I-129	#A	1.2169E-01	2.7780E+02%	5.647E-01
CS-137	#A	6.1529E-02	1.1860E+02%	1.199E-01
TL-208	#A	9.7012E-02	7.8165E+01%	1.219E-01
PB-210	#	4.4166E+00	2.0270E+01%	9.062E-01
PB-212		3.3787E-01	3.2718E+01%	1.241E-01
PB-214	#	3.3387E-01	3.9044E+01%	2.104E-01
BI-214	#	4.4492E-01	3.1983E+01%	1.567E-01
RA-223	#A	2.3215E-01	1.3001E+02%	4.980E-01
RA-224	#A	-3.8759E-01	2.4185E+02%	1.566E+00
AC-228	#A	2.7907E-01	1.0319E+02%	4.692E-01
TH-234		3.3918E+00	1.7740E+01%	7.418E-01
U-235	#A	0.0000E+00	5.8869E+02%	9.329E-01
Ra-226	#	3.8798E+00	2.5937E+01%	1.500E+00
AM-241	#A	1.6676E-02	3.8177E+02%	1.068E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 1998.5 keV) 1.257E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 7
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Laboratory: STL- St Louis

Ge5 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    1
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1

Sample description
     Ge5 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge5 bkgd\Ge5 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:23:41
       Live time:              43200
       Real time:              44675
       Dead time:                  3.30 %
       Detector ID:                    5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   Ge5 airfilter_032707_interp165quad.Clb
     Ge5 airfilter 74140-334_032707 interp_165_quad


       Energy Calibration
            Created:               28-Mar-2007 18:08:23
            Zero offset:           0.272 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.070E-08 keV/channel^2

       Efficiency Calibration
            Created:               28-Mar-2007 18:10:41
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.34 %
            Log(Eff):              1.077627E+00 + (-7.017228E-01*Log(E) ) +
                                   ( -1.776439E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (     22.75keV )
       Stop channel:            8000 (   2000.57keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method

       Random error:              0.0000000E+00
       Systematic error:          0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    2
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1
                                       Page 1
```

Ge5 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1877

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.93	102.	0.14	0.75	7.146E-02	29.46	20.350	PBC<MDA	I129
46.66	414.	12.87	0.65	7.098E-02	46.54	4.250	3.179E+00	PB210
59.65	80.	33.94	0.71	7.060E-02	59.54	35.700	7.300E-02	AM241
63.18	340.	14.64	0.84	7.034E-02	63.29	4.820	2.322E+00	TH234
74.83	114.	25.18	0.78	6.946E-02				
77.10	91.	30.11	0.78	6.929E-02				
84.34	74.	32.20	0.44	6.875E-02				
92.62	549.	10.31	1.09	6.772E-02	92.59	5.570	3.367E+00	TH234
185.73	327.	15.49	0.92	4.627E-02	185.71	57.200	2.861E-01	U235
					186.21	3.590	4.570E+00	Ra226
238.72	164.	27.40	0.69	3.699E-02	238.63	43.300	2.362E-01	PB212
338.06	31.	0.43	1.04	2.700E-02	338.28	2.790	PBC<MDA	RA223
351.81	195.	22.22	0.90	2.606E-02				
511.11	1014.	5.24	2.08	1.851E-02				
583.25	90.	23.25	0.78	1.638E-02	583.19	84.500	1.505E-01	TL208
609.47	162.	20.78	1.01	1.572E-02	609.31	46.090	5.158E-01	BI214
662.05	150.	19.17	1.43	1.456E-02	661.66	85.210	2.798E-01	CS137
1173.48	41.	36.79	1.77	8.488E-03	1173.24	99.900	PBC<MDA	CO60
1332.05	125.	20.63	1.02	7.518E-03				
1461.10	43.	27.61	1.99	6.882E-03	1460.83	10.670	1.351E+00	K40
1764.57	44.	23.86	0.33	5.736E-03	1764.49	15.400	1.162E+00	BI214

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
298.47	74.83	392.	106.	0.002	67.56	0.809	PB-214	s
307.56	77.10	307.	79.	0.002	75.51	0.760	PB-214	
1407.10	351.81	306.	195.	0.005	44.45	0.904	PB-214	l
2044.52	511.11	240.	1014.	0.023	10.47	2.077	TL-208	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 3
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1
Page 2

Ge5 background 11_21_07.Rpt

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected
5328.04	1332.05	79.	100.	0.002	32.20	1.021	CO-60 s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.14	29.78	830.	102.	0.002	0.28	0.749D
PB-210	185.71	46.66	583.	414.	0.010	25.73	0.654s
AM-241	237.70	59.65	260.	80.	0.002	67.89	0.710
TH-234	251.85	63.18	534.	340.	0.008	29.27	0.841s
TH-234	369.69	92.62	568.	549.	0.013	20.62	1.088s
RA-223	576.28	144.23	424.	-4.	0.000	-30.17	0.847D
Ra-226	744.31	186.21	464.	327.	0.008	21.65	0.916D
PB-212	954.48	238.72	410.	164.	0.004	54.79	0.693s
RA-223	1352.94	338.28	354.	-2.	0.000	-30.17	1.040D
AC-228	1353.09	338.32	340.	31.	0.001	0.85	1.040D
PB-214	1407.50	351.92	329.	125.	0.003	44.77	1.053s
TL-208	2333.17	583.25	87.	90.	0.002	46.51	0.781s
BI-214	2438.11	609.47	176.	162.	0.004	41.57	1.012
CS-137	2648.46	662.05	116.	150.	0.003	38.34	1.432s
CO-60	4694.02	1173.48	96.	41.	0.001	73.58	1.772s
K-40	5843.97	1461.10	49.	43.	0.001	55.23	1.988
BI-214	7056.93	1764.57	11.	44.	0.001	47.72	0.329s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	2.9643E-03					
			477.61	2.964E-03	%(	9.373E-01 9.29E+03	G
			1 of 1 peaks found				
K-40	N	1.3513E+00					
			1460.83	1.351E+00	?(	1.110E+00 2.76E+01	G
			1 of 1 peaks found				

D

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 4
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 9.5390E-02					
		1332.50	7.761E-02	%(	1.333E-01 5.28E+01	G
		1173.24	1.132E-01	(	1.318E-01 3.68E+01	G

Page 3

```
                                Ge5 background 11_21_07.Rpt
                                  2 of   2 peaks found

I-129     I   8.6894E-02
                                29.78 8.689E-02 }   1.172E-01 1.40E-01 X
                                33.61-3.808E-02 &   3.942E-01 3.09E+02 X
                                39.57 8.689E-02 %(  4.761E-01 1.64E+02 G
                                34.61-1.386E-01 %   1.664E+00 3.58E+02 X
                                  4 of   5 peaks found

CS-137    I   2.7980E-01
                               661.66 2.798E-01 @(  9.868E-02 1.92E+01 G
                                  1 of   1 peaks found

TL-208    N   1.5053E-01
                               583.19 1.505E-01 *(  7.723E-02 2.33E+01 G
                               860.56 1.989E-01 %   9.708E-01 1.44E+02 G
                                  2 of   2 peaks found

PB-210    N   3.1792E+00
                                46.54 3.179E+00  (  8.839E-01 1.29E+01 G
                                  1 of   1 peaks found

PB-212    N   2.3621E-01
                               238.63 2.362E-01  (  1.402E-01 2.74E+01 G
                               300.10 3.484E-01 %   2.091E+00 1.79E+02 G
                                  2 of   2 peaks found

PB-214    N   2.9533E-01
                               351.93 2.953E-01  (  2.061E-01 2.24E+01 G
                               295.22 2.432E-01 %   3.647E-01 4.60E+01 G
                               242.00 1.720E-01 &   8.469E-01 1.47E+02 G
                                  3 of   3 peaks found

BI-214    N   5.1580E-01
                               609.31 5.158E-01  (  2.058E-01 2.08E+01 G
                              1764.49 1.162E+00 +   4.698E-01 2.39E+01 G
                              1120.29 2.913E-01 &   7.470E-01 7.69E+01 G
                               768.36 7.370E-01 %   2.029E+00 8.25E+01 G
                                  4 of   4 peaks found

RA-223    N  -5.2038E-02
                                83.79-4.616E-02 %   1.480E-01 9.64E+01 X
                               269.46-5.204E-02 &(  5.080E-01 2.90E+02 G
                               154.21-7.645E-02 %   7.471E-01 2.90E+02 G
                               144.23-5.204E-02 }   1.255E+00 ******** G
                               323.87-8.898E-02 %   1.870E+00 6.20E+02 G
                               338.28-5.204E-02 }   2.778E+00 ******** G
                                  6 of   6 peaks found

RA-224    N  -7.1857E-01
                               240.99-7.186E-01 %(  1.725E+00 7.26E+01 G
                                  1 of   1 peaks found
```



```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.3763E-01
                               911.20 2.376E-01 %(  4.360E-01 5.60E+01 G
                               968.97 2.100E-01 %   7.716E-01 1.09E+02 G
                               338.32 2.376E-01 }   6.746E-01 4.26E-01 G
```

```
                          Ge5 background 11_21_07.Rpt
                            3 of   3 peaks found

TH-234    N   2.3217E+00
                          63.29 2.322E+00 @(  7.538E-01 1.46E+01 G
                          92.59 3.367E+00 +   6.983E-01 1.03E+01 G
                            2 of   2 peaks found

U-235     N   0.0000E+00
                         143.76 2.214E-01 }   3.882E-01 5.34E+01 G
                         163.36 4.277E-01 }   8.636E-01 6.13E+01 G
                         205.31 3.536E-01 }   1.095E+00 9.31E+01 G
                            3 of   4 peaks found

Ra-226    N   4.5696E+00
                         186.21 4.570E+00 }(  1.440E+00 1.08E+01 G
                            1 of   1 peaks found

AM-241    T   7.3002E-02
                          59.54 7.300E-02  (  7.142E-02 3.39E+01 G
                            1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    6
 STL- St Louis                   Spectrum name: Ge5 background 11_21_07.An1

   R - Coincidence Corrected            C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy    Counts     Counts     Cts/Sec  2 Sigma %

PB-214    351.92     329.       125.      0.003     44.77   2.953E-01
```

Ge5 background 11_21_07.Rpt

CO-60	1173.48	96.	41.	0.001	73.58	1.132E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	2.9643E-03	1.8576E+04%	9.373E-01
K-40	#	1.3513E+00	5.5227E+01%	1.110E+00
CO-60	#A	9.5390E-02	6.4328E+01%	1.333E-01
I-129	#A	8.6894E-02	3.2744E+02%	4.761E-01
CS-137	#	2.7980E-01	3.8336E+01%	9.868E-02
TL-208	#	1.5053E-01	4.6508E+01%	7.723E-02
PB-210	#	3.1792E+00	2.5734E+01%	8.839E-01
PB-212		2.3621E-01	5.4790E+01%	1.402E-01
PB-214	#	2.9533E-01	4.4766E+01%	2.061E-01
BI-214		5.1580E-01	4.1569E+01%	2.058E-01
RA-223	#A	-5.2038E-02	5.7978E+02%	5.080E-01
RA-224	#A	-7.1857E-01	1.4516E+02%	1.725E+00
AC-228	#A	2.3763E-01	1.1204E+02%	4.360E-01
TH-234	#	2.3217E+00	2.9270E+01%	7.538E-01
U-235	#A	0.0000E+00	1.8625E+02%	1.095E+00
Ra-226		4.5696E+00	2.1655E+01%	1.440E+00
AM-241		7.3002E-02	6.7890E+01%	7.142E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.6 keV) 1.268E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 7
STL- St Louis Spectrum name: Ge5 background 11_21_07.Anl

Laboratory: STL- St Louis

Ge7 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    1
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1

Sample description
     Ge7 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge7 bkgd\Ge7 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:50:18
       Live time:              43200
       Real time:              44220
       Dead time:                  2.31 %
       Detector ID:                    7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   Ge7 air filter 01_04_07.Clb
     Ge7 air filter 74140-334 01_04_07


       Energy Calibration
            Created:               04-Jan-2007 09:44:57
            Zero offset:           0.082 keV
            Gain:                  0.250 keV/channel
            Quadratic:             5.157E-09 keV/channel^2

       Efficiency Calibration
            Created:               04-Jan-2007 09:55:23
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.37 %
            Log(Eff):              6.564924E-01 + (-4.575726E-01*Log(E) ) +
                                   ( -3.880790E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.19 %
            Log(Eff):             -6.453588E+00 + ( 1.933612E+00*Log(E) ) +
                                   ( -2.285762E-01*Log(E)^2 )

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.58keV )
       Stop channel:            8000 (  2000.15keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

D

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    2
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1
                                       Page 1
```

Ge7 background 11_21_07.Rpt

Random error:	0.0000000E+00
Systematic error:	0.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 10 cutoff 20.00000 %

Energy Calibration

Normalized diff: 0.2579

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
23.39	188.	17.26	0.62	7.211E-02				
29.55	453.	11.10	0.94	7.991E-02	29.46	20.350	6.457E-01	I129
33.20	135.	27.90	0.47	8.331E-02				
40.27	166.	27.61	0.76	8.808E-02				
46.28	578.	11.03	0.77	9.072E-02	46.54	4.250	3.470E+00	PB210
63.10	498.	9.75	0.76	9.386E-02	63.29	4.820	2.548E+00	TH234
74.41	97.	24.75	0.88	9.388E-02				
77.06	125.	20.92	0.88	9.373E-02				
92.57	671.	8.34	0.99	9.212E-02	92.59	5.570	3.027E+00	TH234
143.96	102.	30.64	0.61	7.609E-02	143.76	10.960	2.842E-01	U235
145.13	1.	10.64	0.95	7.597E-02	144.23	3.220	PBC<MDA	RA223
185.59	330.	10.26	1.07	6.127E-02	185.71	57.200	2.178E-01	U235
197.70	154.	31.14	0.41	5.800E-02				
239.12	229.	23.87	1.02	4.911E-02	238.63	43.300	2.488E-01	PB212
337.98	32.	0.33	1.16	3.598E-02	338.28	2.790	PBC<MDA	RA223
346.03	83.	27.40	0.53	3.525E-02				
351.88	69.	36.45	1.18	3.471E-02	351.93	37.600	PBC<MDA	PB214
583.49	58.	39.50	1.42	2.168E-02	583.19	84.500	PBC<MDA	TL208

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
93.24	23.39	273.	188.	0.004	34.51	0.619	SN-113	s
117.91	29.55	519.	453.	0.010	22.20	0.936	TE-132	l
132.50	33.20	385.	135.	0.003	55.79	0.465	BA-139	l
160.78	40.27	527.	101.	0.002	67.63	0.756	EU-152	s
297.58	74.47	297.	91.	0.002	67.11	0.693	PB-214	
308.21	77.12	258.	104.	0.002	55.87	0.612	PB-214	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 3

Page 2

Ge7 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
575.58	143.96	252.	102.	0.002	61.28	0.606	U-235	l
742.11	185.59	232.	330.	0.008	20.52	1.073	U-235	l
790.56	197.70	412.	154.	0.004	62.28	0.414	KR-89	sM
1383.93	346.03	117.	83.	0.002	54.79	0.534	HF-181	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.81	29.78	642.	281.	0.007	24.80	0.827D
I-129	133.40	33.43	566.	89.	0.002	78.15	0.831s
PB-210	184.80	46.28	634.	578.	0.013	22.05	0.767
TH-234	252.09	63.10	413.	498.	0.012	19.50	0.762s
TH-234	370.01	92.57	492.	671.	0.016	16.68	0.985s
RA-223	576.67	144.23	412.	1.	0.000	21.28	0.954D
Ra-226	744.60	186.21	407.	266.	0.006	24.76	1.000D
PB-212	956.25	239.12	460.	229.	0.005	47.75	1.021s
AC-228	1353.09	338.32	350.	32.	0.001	0.67	1.164D
PB-214	1407.31	351.88	284.	69.	0.002	72.91	1.179s
TL-208	2333.81	583.49	232.	58.	0.001	79.01	1.417s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-2.6217E-01					
			477.61	-2.622E-01	%(	6.113E-01	7.04E+01 G
			1 of 1 peaks found				
K-40	N	-7.6775E-02					
			1460.83	-7.677E-02	%(	1.012E+00	3.78E+02 G
			1 of 1 peaks found				
CO-60	F	1.6295E-03					
			1332.50	1.630E-03	%(	9.943E-02	1.73E+03 G
			1173.24	3.709E-02	%	9.526E-02	7.70E+01 G
			2 of 2 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 4
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments

Page 3

Ge7 background 11_21_07.Rpt

```
I-129     I   2.2928E-01
                          29.78 2.147E-01 }   9.218E-02 1.24E+01 X
                          29.46 7.217E-02 }   1.816E-01 7.51E+01 X
                          33.61 2.419E-01     3.072E-01 3.91E+01 X
                          39.57 2.293E-01 %(  4.135E-01 5.49E+01 G
                          34.61-2.853E-01 &   1.439E+00 1.51E+02 X
                            5 of   5 peaks found

CS-137    I   2.5282E-02
                         661.66 2.528E-02 %(  9.732E-02 1.15E+02 G
                            1 of   1 peaks found

TL-208    N   7.3008E-02
                         583.19 7.301E-02 *(  9.303E-02 3.95E+01 G
                         860.56 4.559E-01 %   6.885E-01 4.66E+01 G
                            2 of   2 peaks found

PB-210    N   3.4696E+00
                          46.54 3.470E+00  (  7.203E-01 1.10E+01 G
                            1 of   1 peaks found

PB-212    N   2.4885E-01
                         238.63 2.488E-01 *(  1.116E-01 2.39E+01 G
                         300.10 4.881E-01 %   1.607E+00 9.88E+01 G
                            2 of   2 peaks found

PB-214    N   1.2280E-01
                         351.93 1.228E-01 @(  1.441E-01 3.65E+01 G
                         295.22 1.042E-01 &   2.667E-01 7.72E+01 G
                         242.00-7.215E-02 %   6.071E-01 2.50E+02 G
                            3 of   3 peaks found

BI-214    N   1.2372E-01
                         609.31 1.237E-01 %(  1.679E-01 4.20E+01 G
                        1764.49 3.233E-01 &   7.856E-01 7.30E+01 G
                        1120.29 1.921E-03 &   6.110E-01 9.08E+03 G
                         768.36-1.636E-02 &   1.410E+00 2.48E+03 G
                            4 of   4 peaks found

RA-223    N   5.2717E-03
                          83.79 6.497E-02 %   1.154E-01 5.41E+01 X
                         269.46 5.272E-03 &(  3.606E-01 2.02E+03 G
                         154.21 6.698E-02 &   5.727E-01 2.54E+02 G
                         144.23 5.272E-03 }   9.207E-01 1.06E+01 G
                         323.87 3.705E-01 &   1.454E+00 1.17E+02 G
                            5 of   6 peaks found

RA-224    N  -1.4485E-01
                         240.99-1.448E-01 %(  1.279E+00 2.63E+02 G
                            1 of   1 peaks found

AC-228    N   1.8327E-01
                         911.20 1.833E-01 %(  3.531E-01 5.87E+01 G
                         968.97 2.459E-01 %   5.187E-01 6.39E+01 G
                         338.32 1.833E-01 }   5.128E-01 3.35E-01 G
                            3 of   3 peaks found
```

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 5
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments

Page 4

Ge7 background 11_21_07.Rpt

```
TH-234    N   2.8048E+00
                          63.29 2.548E+00 @(  4.984E-01 9.75E+00 G
                          92.59 3.027E+00 @(  4.785E-01 8.34E+00 G
                            2 of   2 peaks found

U-235     N   3.7275E-02
                         185.71 2.114E-02 }(  7.270E-02 1.03E+02 G
                         163.36 2.303E-01 }(  6.865E-01 8.97E+01 G
                         205.31 2.573E-02 }(  8.217E-01 9.44E+02 G
                            3 of   4 peaks found

Ra-226    N   2.8025E+00
                         186.21 2.803E+00 }(  1.021E+00 1.24E+01 G
                            1 of   1 peaks found

AM-241    T   1.4071E-02
                          59.54 1.407E-02 %(  6.420E-02 1.36E+02 G
                            1 of   1 peaks found
```

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:	Peak Codes:
T - Thermal Neutron Activation	G - Gamma Ray
F - Fast Neutron Activation	X - X-Ray
I - Fission Product	P - Positron Decay
N - Naturally Occurring Isotope	S - Single-Escape
P - Photon Reaction	D - Double-Escape
C - Charged Particle Reaction	K - Key Line
M - No MDA Calculation	A - Not in Average
R - Coincidence Corrected	C - Coincidence Peak
H - Halflife limit exceeded	

- -

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 6
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	642.	281.	0.007	24.80	2.147E-01
I-129	33.43	566.	89.	0.002	78.15	2.419E-01

Ge7 background 11_21_07.Rpt

PB-214	351.88	284.	69.	0.002	72.91	1.228E-01
TL-208	583.49	232.	58.	0.001	79.01	7.301E-02

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.6217E-01	1.4087E+02%	6.113E-01
K-40	#A	-7.6775E-02	7.5553E+02%	1.012E+00
CO-60	#A	1.6295E-03	3.4689E+03%	9.943E-02
I-129	#A	2.2928E-01	1.0977E+02%	4.135E-01
CS-137	#A	2.5282E-02	2.2936E+02%	9.732E-02
TL-208	#A	7.3008E-02	7.9007E+01%	9.303E-02
PB-210		3.4696E+00	2.2051E+01%	7.203E-01
PB-212	#	2.4885E-01	4.7748E+01%	1.116E-01
PB-214	#A	1.2280E-01	7.2905E+01%	1.441E-01
BI-214	#A	1.2372E-01	8.3934E+01%	1.679E-01
RA-223	#A	5.2717E-03	4.0366E+03%	3.606E-01
RA-224	#A	-1.4485E-01	5.2575E+02%	1.279E+00
AC-228	#A	1.8327E-01	1.1731E+02%	3.531E-01
TH-234	#	2.8048E+00	1.2828E+01%	4.984E-01
U-235	A	3.7275E-02	1.7944E+02%	8.217E-01
Ra-226		2.8025E+00	2.7743E+01%	1.021E+00
AM-241	#A	1.4071E-02	2.7247E+02%	6.420E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.2 keV) 9.363E+00 Bq/sample

Analyzed by: _____
403605

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 7
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge8 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    1
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1

Sample description
     Ge8 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge8 bkgd\Ge8 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:52:01
       Live time:              43200
       Real time:              44857
       Dead time:                  3.69 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   Ge8 air filter interp_122_quad.Clb
     Ge8  air filter_interp>122<quad


       Energy Calibration
            Created:               06-Nov-2006 15:12:36
            Zero offset:           0.014 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.050E-09 keV/channel^2

       Efficiency Calibration
            Created:               06-Nov-2006 15:14:26
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.61 %
            Log(Eff):              5.381757E-01 + (-5.615420E-01*Log(E) ) +
                                   ( -2.515438E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:            90 (    22.52keV )
       Stop channel:           8000 (  2000.35keV )
       Peak rejection level:     40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    2
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1
                                       Page 1
```

Ge8 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1437

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
25.85	439.	17.91	0.98	7.362E-02				
29.52	518.	9.97	1.11	7.364E-02	29.46	20.350	7.999E-01	I129
63.12	715.	5.42	0.88	7.330E-02	63.29	4.820	4.686E+00	TH234
84.28	175.	21.65	0.90	7.044E-02	83.79	25.180	2.282E-01	RA223
92.47	1398.	5.34	1.10	6.915E-02	92.59	5.570	8.402E+00	TH234
143.63	200.	22.54	1.08	5.660E-02	143.76	10.960	7.488E-01	U235
185.64	683.	7.50	1.00	4.588E-02	185.71	57.200	6.026E-01	U235
238.54	182.	14.96	1.31	3.726E-02	238.63	43.300	2.605E-01	PB212
295.25	68.	38.42	1.04	3.113E-02	295.22	19.300	PBC<MDA	PB214
338.25	38.	0.33	1.07	2.772E-02	338.28	2.790	1.569E+00	RA223
511.02	945.	5.33	2.38	1.941E-02				
598.49	154.	25.28	0.27	1.689E-02				
609.45	64.	35.63	1.28	1.662E-02	609.31	46.090	PBC<MDA	BI214
898.43	68.	24.98	0.28	1.175E-02				
1461.18	53.	25.04	1.84	7.527E-03	1460.83	10.670	1.526E+00	K40

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
103.30	25.85	1327.	439.	0.010	25.33	0.977	CD-109	s
117.99	29.52	678.	518.	0.012	19.94	1.107	TE-132	l
742.34	185.64	388.	683.	0.016	15.00	0.995	U-235	l
2043.55	511.02	222.	945.	0.022	10.66	2.376	TL-208	s
2393.36	598.49	198.	154.	0.004	50.56	0.267	-	sM
3592.89	898.43	49.	68.	0.002	49.96	0.284	PA-234	s

D

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 3
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.

Ge8 background 11_21_07.Rpt

L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.04	29.78	1112.	348.	0.008	0.09	0.812D
TH-234	252.37	63.12	262.	715.	0.017	10.84	0.876
RA-223	337.73	84.47	568.	111.	0.003	63.59	0.858s
TH-234	369.72	92.47	715.	1398.	0.032	10.68	1.100s
U-235	574.85	143.76	431.	140.	0.003	45.31	1.085D
RA-223	576.73	144.23	414.	22.	0.001	0.55	0.910D
Ra-226	744.60	186.21	403.	563.	0.013	13.14	0.946D
PB-212	953.86	238.54	176.	182.	0.004	29.92	1.309s
PB-214	1180.65	295.25	305.	68.	0.002	76.83	1.036s
AC-228	1352.89	338.32	315.	38.	0.001	0.67	1.071D
BI-214	2437.17	609.45	229.	64.	0.001	71.27	1.282s
K-40	5843.55	1461.18	61.	53.	0.001	50.07	1.843s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-2.4489E-01					
			477.61	-2.449E-01	%(	7.495E-01 9.17E+01	G
			1 of 1 peaks found				
K-40	N	1.5256E+00					
			1460.83	1.526E+00	@(	1.130E+00 2.50E+01	G
			1 of 1 peaks found				
CO-60	F	-1.7283E-03					
			1332.50	-1.728E-03	&(	1.225E-01 2.02E+03	G
			1173.24	-2.257E-02	%	1.247E-01 1.62E+02	G
			2 of 2 peaks found				
I-129	I	2.8897E-01					
			29.78	2.890E-01	}	1.314E-01 4.30E-02	X
			33.61	1.305E-01	%	4.324E-01 9.98E+01	X

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 4
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		39.57	2.890E-01	%(	4.905E-01 5.17E+01	G
		34.61	6.433E-01	&	1.630E+00 7.66E+01	X
		4 of 5 peaks found				
CS-137	I	3.6626E-02				

```
                                Ge8 background 11_21_07.Rpt
                               661.66 3.663E-02 &(  1.022E-01 8.37E+01 G
                                  1 of   1 peaks found

TL-208    N   4.6043E-02
                               583.19 4.604E-02 &(  1.122E-01 7.35E+01 G
                               860.56 1.757E-01 %   7.705E-01 1.29E+02 G
                                  2 of   2 peaks found

PB-210    N   4.2338E-01
                                46.54 4.234E-01 %(  8.404E-01 6.03E+01 G
                                  1 of   1 peaks found

PB-212    N   2.6051E-01
                               238.63 2.605E-01  (  9.250E-02 1.50E+01 G
                               300.10 5.416E-01 %   1.886E+00 1.04E+02 G
                                  2 of   2 peaks found

PB-214    N   1.5095E-01
                               351.93 9.453E-02 %(  1.895E-01 6.09E+01 G
                               295.22 2.609E-01 *(  3.237E-01 3.84E+01 G
                               242.00 2.345E-01 %   7.541E-01 9.65E+01 G
                                  3 of   3 peaks found

BI-214    N   1.9362E-01
                               609.31 1.936E-01 *(  2.211E-01 3.56E+01 G
                              1764.49 4.167E-01 %   7.719E-01 5.68E+01 G
                              1120.29 1.241E-01 %   7.957E-01 1.88E+02 G
                               768.36-3.096E-01 &   1.899E+00 1.80E+02 G
                                  4 of   4 peaks found

RA-223    N   2.7553E-01
                                83.79 1.448E-01 *   1.483E-01 3.18E+01 X
                               269.46-8.982E-02 &(  4.789E-01 1.59E+02 G
                               154.21 2.897E-02 &   7.497E-01 7.65E+02 G
                               144.23 2.755E-01 }   1.244E+00 2.77E-01 G
                               323.87 1.690E-02 %   1.742E+00 3.03E+03 G
                                  5 of   6 peaks found

RA-224    N  -7.0362E-02
                               240.99-7.036E-02 &(  1.628E+00 6.86E+02 G
                                  1 of   1 peaks found

AC-228    N   2.7845E-01
                               911.20 2.784E-01 %(  4.056E-01 4.51E+01 G
                               968.97 3.615E-01 %   6.834E-01 5.76E+01 G
                               338.32 2.784E-01 }   6.330E-01 3.34E-01 G
                                  3 of   3 peaks found

TH-234    N   4.6861E+00
                                63.29 4.686E+00  (  5.121E-01 5.42E+00 G
                                92.59 8.402E+00 +   7.655E-01 5.34E+00 G
                                  2 of   2 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    5
STL- St Louis                   Spectrum name: Ge8 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235     N   1.2819E-01
                               185.71 5.276E-02 }(  1.331E-01 7.63E+01 G
                               143.76 5.218E-01 }(  3.715E-01 2.27E+01 G
                                  2 of   4 peaks found
```

Ge8 background 11_21_07.Rpt

```
Ra-226    N   7.9373E+00
                          186.21 7.937E+00 }(  1.356E+00 6.57E+00 G
                             1 of   1 peaks found

AM-241    T  -7.7932E-03
                          59.54-7.793E-03 &(  9.695E-02 3.70E+02 G
                             1 of   1 peaks found
```

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	1112.	348.	0.008	0.09	2.890E-01
RA-223	84.47	568.	111.	0.003	63.59	1.448E-01
RA-223	144.23	414.	22.	0.001	0.55	2.755E-01
PB-214	295.25	305.	68.	0.002	76.83	2.609E-01
BI-214	609.45	229.	64.	0.001	71.27	1.936E-01

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 6
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40		1461.18	61.	53.	0.001	50.07	1.526E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample

Ge8 background 11_21_07.Rpt

Be-7	#A	-2.4489E-01	1.8340E+02%	7.495E-01
K-40	#	1.5256E+00	5.0072E+01%	1.130E+00
CO-60	#A	-1.7283E-03	4.0408E+03%	1.225E-01
I-129	#A	2.8897E-01	1.0349E+02%	4.905E-01
CS-137	#A	3.6626E-02	1.6736E+02%	1.022E-01
TL-208	#A	4.6043E-02	1.4698E+02%	1.122E-01
PB-210	#A	4.2338E-01	1.2054E+02%	8.404E-01
PB-212		2.6051E-01	2.9920E+01%	9.250E-02
PB-214	#A	1.5095E-01	7.1988E+01%	1.895E-01
BI-214	#A	1.9362E-01	7.1268E+01%	2.211E-01
RA-223	#A	2.7553E-01	4.3437E+01%	4.789E-01
RA-224	#A	-7.0362E-02	1.3722E+03%	1.628E+00
AC-228	#A	2.7845E-01	9.0216E+01%	4.056E-01
TH-234		4.6861E+00	1.0837E+01%	5.121E-01
U-235	#A	1.2819E-01	4.5306E+01%	1.021E+00
Ra-226		7.9373E+00	1.4531E+01%	1.356E+00
AM-241	#A	-7.7932E-03	7.3956E+02%	9.695E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 2000.3 keV) 1.301E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Run Log

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/23/7	7356122	KSKF5IAD	1	30min	tuna can	[illegible]
		KSKFPIAC	3			
		KSKFTIAC	4			
		KSKFVIAC	5			
		KSKF0IAC	7			
		KSKF1IAC	1			
		KSKF5IAC	3			
		KSKF7IAC	4			
		KSKF8IAC	5			
		KSKF9IAC	7			
		KSKG0IAC	1			
		KSKGFIAC	3			
		KSKGGIAC	4			
		KSQKCIAA	5			
		KSQKCIAC	7			
12/20/7	Daily	Bkg + Source	1,3-8	20+30min	QA	SE
	7337395	KC6QE1AD	1	30min	tuna can	
		KC6QL1AD	3			
		KDCLL1AA	4			
		KDCLL1AC	5			
	M070859	1L0307-1	7			
		-2	1			
		-3	3			
		-4	4			
		-5	5			
	7337395	KC6QE1AE	7			
	M070858	2L1107-6	7			

Reviewed By: SE Date: 12/20/7

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/26/17	7353500	KEFØW1AG	5	1.5 hrs	1L Mam	SS
	M070859	1L7307-6	1	30 min	tuna can	
		-7	3			
		-8	4			
12/26/17	7355392	KEGTX1AA	7	2hrs	Solid 25mL	LW
	7346346	KDWLR1AH	1	30min	Tuna can	
		KDWL81AH	3			
		KDWL91AH	4			
		KDOWQ1AA	1			
		KDWLR1CK	3			
		DOOWQ1AC	4			
	7353500	KEGTE1AA	5	1.5hrs	1L mam	
	M070858	2L1707-3	1	30min	Tuna can	
		-4	3			
		-7	4			
		-8	1			
		2L1807-5	4			
		-6	5			
		-8	7			
	7355392	KENUG1AA	3	2hrs	25mL solid	
	7360292	KEKC31AC	1	30min	tuna can	C
		KEKC71AC	4			
		KEKDC1AC	5			
		KEKDE1AC	7			
		KEKC31AD	4			
		KEKD11AC	1			
		KEKDR1AC	5			

Reviewed By: [signature] Date: 12/26/17

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06
QC Type Codes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/26/7	7360242	KEKD41AC	7	30 min	Turn in	[illegible]
		KEKD41AC	1			[illegible]
		KEKD41AC	3			
		KEKEC1AC	4			
		KEKEB1AC	5			
		KEKEM1AC	7			
		KEKEW1AC	1			[illegible]
		KEKE11AC	3			
		KEKE21AC	4			
		KEKE41AC	5			
		KEKE51AC	7			
		KERG61AC	1			
		KERG61AC	3			
	7337325	KDLL1AC-AC	4			
	7360274	KEKG21AC	5			
		KEKH1M1AC	7			
		KEKH1Q1AC	1			
		KEKH1R1AC	3			
		KEKHV1AC	4			
		KEKHX1AC	5			
		KEKG21AD	7			
		KEKH11AC	1			
		KEKH31AC	3			
		KEKH41AC	4			
		KEKH51AC	5			
		KEKH61AC	7			
		KEKH91AC	1			

Reviewed By: [illegible] Date: 12/26/7

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06
QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/26/7	7360294	KEKJC1AC	3	30 min	tuna can	E
		KEKJE1AC	4			
		KEKJG1AC	5			
		KEKJJ1AC	7			
		KEKLC1AC	1			
		KERYL1AA	3			
		KERYL1AC	4			
	7357015	KEKAJ1AG	7	2hrs	1L Marn	
		KEQK01AC	5	1		
10/07/7	Daily	Bkg & Source	1,3-8	30+30min	CJA	SE
	7340388	KDHPX1AC	1	30min	tuna can	
		KDHP31AC	3			
		KDHP41AC	4			
		KDHP61AC	5			
		KDHP71AC	7			
		KDHPX1AE	4			
		KDLDN1AA	5			
		KDLDN1AC	7			
	7340390	KDAØ41AE	1			
		KDAØ81AE	3			
		KDG5C1AE	1			
		KDAØ41AF	3			
		KDLAØ1AA	4			
	7357015	KEKAJ1AF	5	3hrs	1L Marn	
		KEQKØ1AA	7	2hrs		
	7340390	KDLDØ1AC	1	30min	tuna Can	

Reviewed By:_____ Date:_____

Lab Code Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

C8137 1/4/08

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gamma Spectroscopy

Batch: 7360292 **Prep Analyst:** 403135

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200260-001	KEKC31AC	2.9480E+002 g	1.00	2.9480E+002 g	Tuna Can
F7L200260-001X	KEKC31AD	2.9480E+002 g	1.00	2.9480E+002 g	Tuna Can
F7L200260-002	KEKC71AC	3.8350E+002 g	1.00	3.8350E+002 g	Tuna Can
F7L200260-003	KEKDC1AC	3.2550E+002 g	1.00	3.2550E+002 g	Tuna Can
F7L200260-004	KEKDE1AC	3.7860E+002 g	1.00	3.7860E+002 g	Tuna Can
F7L200260-005	KEKDK1AC	3.8100E+002 g	1.00	3.8100E+002 g	Tuna Can
F7L200260-006	KEKDR1AC	3.7740E+002 g	1.00	3.7740E+002 g	Tuna Can
F7L200260-007	KEKDX1AC	3.6380E+002 g	1.00	3.6380E+002 g	Tuna Can
F7L200260-008	KEKD41AC	3.7240E+002 g	1.00	3.7240E+002 g	Tuna Can
F7L200260-009	KEKD81AC	3.3480E+002 g	1.00	3.3480E+002 g	Tuna Can
F7L200260-010	KEKEC1AC	3.5650E+002 g	1.00	3.5650E+002 g	Tuna Can
F7L200260-011	KEKEG1AC	3.4250E+002 g	1.00	3.4250E+002 g	Tuna Can
F7L200260-012	KEKEM1AC	3.1920E+002 g	1.00	3.1920E+002 g	Tuna Can
F7L200260-013	KEKEW1AC	3.6300E+002 g	1.00	3.6300E+002 g	Tuna Can
F7L200260-014	KEKE11AC	3.7840E+002 g	1.00	3.7840E+002 g	Tuna Can
F7L200260-015	KEKE21AC	3.5440E+002 g	1.00	3.5440E+002 g	Tuna Can
F7L200260-016	KEKE41AC	3.1370E+002 g	1.00	3.1370E+002 g	Tuna Can

SampID	WRKNO	Aliquot	Dilution	Adjusted_Aliquot	GeometryDesc
F7L200260-017	KEKE51AC	3.4880E+002 g	1.00	3.4880E+002 g	Tuna Can
F7L260000-292B	KER4G1AA	3.7280E+002 g	1.00	3.7280E+002 g	Tuna Can
F7L260000-292C	KER4G1AC	3.5120E+002 g	1.00	3.5120E+002 g	Tuna Can

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
F7L260000-292C	GV Tuna Can	AM-241	2.289E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	1.031E+002 pCi/g
F7L260000-292C	GV Tuna Can	CO-60	1.392E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	6.272E+001 pCi/g
F7L260000-292C	GV Tuna Can	CS-137	8.884E+001 dpm/g	351.20 g	4/1/2004 12:00:00AM	4.002E+001 pCi/g

Spiked By | Spike Verified By | Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐ STL-RC-0025	Preparation Of Samples For Gamma Spectroscopy	4.00
☐ STL-RD-0101	Daily Operations Of A Germanium Spectroscopy System	6.00
☐ STL-RD-0103	Maintenance Of The Germanium Spectroscopy System	0.00

Reviewed By: LR — Review Date: 12-27-07

Analyst/Relenquished By: [illegible] — Release Date: 12/26/07 — Received By: [illegible] — Receipt Date: 12/26/07

DB Analysis ID: 33,035

Sample Description: 7360292_KEKC31AC_F7L200260-001

Spectrum Filename: KEKC31AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:08:00PM		
Live Time:	1800.00	Real Time:	1810.38
Dead Time:	0.57 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1158

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
358.49	89.84	105.00	70.00	0.039	26.73	0.850	PB-214	M
743.21	186.02	110.00	188.00	0.104	14.09	0.840	PA-234	s
268.25	67.28	272.17	95.83	0.053	39.20	0.331	TA-182	s
297.75	74.65	304.00	199.00	0.111	19.24	0.770	PB-214	
307.63	77.12	166.83	321.17	0.178	8.77	0.850	PB-214	
348.26	87.28	99.84	165.16	0.092	11.57	0.836	PB-214	

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.73	46.65	143.46	70.54	0.039	23.58	0.641	
AM-241	1	238.49	59.84	204.98	11.98	0.007	171.50	0.824	s
TH-234	1	252.41	63.32	157.90	85.10	0.047	17.67	0.987	
EU-155	1	343.17	86.01	402.18	-67.72	-0.038	43.61	0.849	s
TH-234	1	369.50	92.59	204.61	70.39	0.039	17.13	0.855	D
U-235	1	372.54	93.35	176.97	12.32	0.007	18.40	0.855	s D
AC-228	1	372.54	93.35	227.93	72.38	0.040	1.97	0.855	D
EU-155	1	420.25	105.28	108.86	19.08	0.011	80.66	0.866	s
EU-152	1	482.37	120.81	160.22	-1.74	-0.001	1033.21	0.881	s
EU-154	1	491.64	123.13	175.41	12.24	0.007	155.71	0.882	s
Pa-234	1	529.03	132.47	172.82	-3.73	-0.002	501.28	0.890	
U-235	1	572.32	143.30	155.94	22.75	0.013	68.66	0.901	s
U-235	1	652.80	163.42	151.58	11.53	0.006	121.67	0.919	s
U-235	1	809.88	202.69	70.56	1.61	0.001	316.45	0.957	
PB-212	1	953.26	238.53	113.92	333.08	0.185	7.77	1.046	
RA-224	1	961.70	240.64	400.16	-0.28	0.000	10098.99	0.989	
PB-214	1	966.26	241.78	73.69	185.31	0.103	10.87	0.950	s
TL-208	1	1108.76	277.41	26.00	32.00	0.018	32.78	0.386	s
I-131	1	1134.04	283.73	86.08	4.95	0.003	268.61	1.028	s
PB-214	1	1179.65	295.13	67.88	265.13	0.147	8.53	0.960	
PB-212	1	1201.42	300.57	45.50	43.50	0.024	36.22	0.438	s
AC-228	1	1353.09	338.49	49.91	111.09	0.062	16.44	0.591	s
EU-152	1	1371.14	343.00	45.20	-0.49	0.000	1946.37	1.081	s
PB-214	1	1406.06	351.73	56.99	426.01	0.237	5.98	0.986	
I-131	1	1465.07	366.48	38.04	1.05	0.001	833.35	1.099	s
BE-7	1	1910.42	477.81	40.54	-0.85	0.000	1069.65	1.198	s
CS-134	1	2252.13	563.24	23.01	0.00	0.000	678.37	1.273	s
CS-134	1	2276.47	569.32	33.68	-1.89	-0.001	-41.71	1.278	s D
Pa-234	1	2277.07	569.47	22.68	-0.67	0.000	-138.36	1.278	s D
TL-208	1	2330.44	582.81	38.92	114.08	0.063	14.15	1.083	
CS-134	1	2427.45	607.06	61.81	-11.47	-0.006	101.35	1.309	s
BI-214	1	2435.63	609.11	38.29	346.71	0.193	6.62	1.287	
I-131	1	2541.90	635.67	26.36	8.01	0.004	97.34	1.337	s
CS-137	1	2645.51	661.57	32.31	74.52	0.041	15.83	1.358	
EU-154	1	2888.46	722.30	30.66	4.35	0.002	186.34	1.411	s
BI-212	1	2908.08	727.21	28.64	14.93	0.008	56.92	1.414	s
PA-234M	1	3066.58	766.83	34.36	0.32	0.000	2588.50	1.447	s
EU-152	1	3119.14	779.97	19.27	0.34	0.000	1808.10	1.458	s
BI-212	1	3141.52	785.56	26.60	6.49	0.004	119.12	1.463	s
CS-134	1	3182.76	795.87	44.31	0.00	0.000	941.38	1.472	s
CS-134	1	3201.34	800.51	31.95	-0.21	0.000	3843.13	1.477	s
TL-208	1	3442.03	860.68	7.67	30.33	0.017	27.06	0.382	s
EU-154	1	3492.78	873.36	40.00	-3.39	-0.002	269.07	1.537	s
Pa-234	1	3522.26	880.73	33.12	0.13	0.000	6307.49	1.543	s
Pa-234	1	3537.28	884.49	26.60	-1.09	-0.001	674.13	1.546	s

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AC-228	1	3643.90	911.14	8.81	105.19	0.058	10.37	0.743	s
Pa-234	1	3783.46	946.02	61.09	0.00	0.000	1105.37	1.598	s
EU-152	1	3855.52	964.03	33.95	7.04	0.004	123.03	1.613	s
AC-228	1	3876.02	969.16	3.25	55.75	0.031	13.02	0.781	s
EU-154	1	3994.98	998.89	24.01	0.27	0.000	2599.63	1.640	s
PA-234M	1	4002.16	1000.69	28.59	1.12	0.001	679.71	1.643	s
EU-154	1	4021.57	1005.54	27.81	0.01	0.000	84616.11	1.647	s
EU-152	1	4447.80	1112.07	81.78	0.00	0.000	1278.90	1.735	s
BI-214	1	4480.61	1120.27	34.86	45.91	0.026	20.29	1.741	s
CO-60	1	4692.51	1173.24	43.08	0.00	0.000	928.17	1.784	s
EU-154	1	5100.14	1275.12	31.55	-0.96	-0.001	830.75	1.866	s
CO-60	1	5330.63	1332.73	29.07	-4.64	-0.003	170.83	1.912	s
EU-152	1	5630.13	1407.58	11.45	10.83	0.006	53.63	1.972	s
K-40	1	5842.27	1460.60	12.54	362.46	0.201	5.16	1.837	
BI-214	1	7056.01	1763.94	18.20	35.00	0.019	20.50	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PA-234	N	1	6.688E+000	1001.00	6.688E+000 %	(	1.645E+002G		1.6E+012	.84
			6.688E+000	766.41	4.515E+000 %		4.223E+002G		1.6E+012	.29
AM-241	T	1	5.790E-001	59.54	5.790E-001 *	(	3.356E+000G		1.6E+005	35.90
BI-212	N	1	5.036E+000	727.33	5.036E+000 %	(	9.326E+000G		7.0E+002	11.82
			5.036E+000	785.51	2.480E+001 %		1.023E+002G		7.0E+002	1.10
TL-208	F N	1	4.609E+000	583.02	4.609E+000	(P	1.284E+000G		7.0E+002	84.50
			4.609E+000	277.28	1.007E+001 +		8.334E+000G		7.0E+002	6.31
			4.609E+000	860.56	1.095E+001 +		5.635E+000G		7.0E+002	12.42
PB-210	N	1	4.456E+001	46.54	4.456E+001	(P	3.697E+001G		8.1E+003	4.25
			-4.301E-002	121.78	-7.997E-002 &		2.840E+000G		4.9E+003	28.58
			-4.301E-002	778.92	1.115E-001 &		7.487E+000G		4.9E+003	12.94
			-4.301E-002	964.11	2.338E+000 %		9.923E+000G		4.9E+003	14.61
			-4.301E-002	1112.07	0.000E+000 %		1.766E+001G		4.9E+003	13.64
			-4.301E-002	1408.00	3.300E+000 %		5.631E+000G		4.9E+003	21.00
EU-152	T F	1	-4.301E-002	344.29	-4.301E-002 %	(	2.989E+000G		4.9E+003	26.50
CS-134	T F I	1	-4.115E-001	604.71	-4.115E-001 &	(	1.412E+000G		7.5E+002	97.62
			-4.115E-001	795.87	0.000E+000 &		1.674E+000G		7.5E+002	85.53
			-4.115E-001	569.32	-4.115E-001 %		6.493E+000G		7.5E+002	15.38
			-4.115E-001	801.95	-1.023E-001 %		1.427E+001G		7.5E+002	8.69
			-4.115E-001	563.24	0.000E+000 &		9.998E+000G		7.5E+002	8.35
CS-137	T F I	1	3.264E+000	661.66	3.264E+000	(	1.279E+000G		1.1E+004	85.21
I-131	T F I	1	3.131E-002	364.48	3.131E-002 %	(	9.344E-001G		8.0E+000	81.70
			3.131E-002	284.30	1.632E+000 %		1.514E+001G		8.0E+000	6.14
			3.131E-002	636.97	4.057E+000 %		1.350E+001G		8.0E+000	7.17
TH-234	N	1	2.894E+001	63.29	2.894E+001	(P	2.083E+001G		1.6E+012	4.82
			2.894E+001	92.59	1.689E+001 -	P	1.664E+001G		1.6E+012	5.58
CO-60	T F	1	-2.846E-001	1332.50	-2.846E-001 %	(	1.708E+000G		1.9E+003	99.98
			-2.846E-001	1173.24	0.000E+000 %		1.861E+000G		1.9E+003	99.90
U-235	N	1	2.834E+000	143.79	2.834E+000 *	(P	7.587E+000G		2.6E+011	10.96
			2.834E+000	205.33	5.197E-001 %	P	1.355E+001G		2.6E+011	5.01
			2.834E+000	163.38	3.256E+000 %	P	1.697E+001G		2.6E+011	5.08
			2.834E+000	93.35	2.834E+000 !		1.489E+001X	E	2.6E+011	5.81
			-2.760E-001	883.24	-5.197E-001 %		1.272E+001G		1.6E+012	9.60
			-2.760E-001	880.53	9.805E-002 &		2.242E+001G		1.6E+012	6.00
Pa-234	N	1	-2.760E-001	131.29	-2.760E-001 %	(	4.735E+000G		1.6E+012	18.00
			-2.760E-001	569.47	-2.760E-001 %		1.019E+001G		1.6E+012	8.20
			-2.760E-001	946.02	0.000E+000 &		1.399E+001G		1.6E+012	13.40
			2.739E+001	295.09	2.855E+001	(P	4.425E+000G		5.8E+005	19.30
			2.739E+001	242.00	4.503E+001 *	P	1.038E+001G		5.8E+005	7.43
PB-214	N	1	2.739E+001	351.93	2.680E+001	(P	2.383E+000G		5.8E+005	37.60
BI-214	N	1	2.649E+001	609.31	2.649E+001	(P	2.410E+000G		5.8E+005	46.09
			2.649E+001	1120.29	1.642E+001 -	P	1.081E+001G		5.8E+005	15.10
			2.649E+001	1764.49	1.745E+001 -	P	1.127E+001G		5.8E+005	15.40
BE-7	N P C	1	-2.380E-001	477.60	-2.380E-001 &	(	9.107E+000G		5.3E+001	10.52

K-40	N	1	2.237E+002	1460.83	2.237E+002		(	P		1.186E+001G	4.7E+011	10.67
AC-228	N	1	1.740E+001	911.07	1.692E+001	*	(	P		2.660E+000G	2.1E+003	29.00
			1.740E+001	968.97	1.555E+001		(	P		3.100E+000G	2.1E+003	17.46
			1.740E+001	338.32	2.125E+001	*	(	P		6.816E+000G	2.1E+003	12.01
			1.740E+001	93.35	1.740E+001				E	1.756E+001X	A 2.1E+003	5.56
PB-212	N	1	1.376E+001	238.63	1.376E+001		(	P		2.166E+000G	7.0E+002	43.30
			1.376E+001	300.03	2.789E+001	*				2.189E+001G	7.0E+002	3.28
EU-154 T F I		1	-1.253E+000	873.23	-1.253E+000	%	(			1.188E+001G	3.1E+003	12.27
			-1.253E+000	123.10	3.952E-001	%				2.081E+000G	3.1E+003	40.79
			-1.253E+000	1274.54	-1.625E-001	%				4.871E+000G	3.1E+003	35.19
			-1.253E+000	723.36	8.543E-001	%				5.601E+000G	3.1E+003	20.22
			-1.253E+000	1004.77	2.445E-003	%				7.569E+000G	3.1E+003	18.01
			-1.253E+000	996.33	1.253E-001	%				1.197E+001G	3.1E+003	10.60
RA-224	N	1	-1.230E-001	240.99	-1.230E-001	%	(			4.212E+001G	7.0E+002	4.10
EU-155 T F I		1	1.180E+000	105.31	1.180E+000	%	(			3.174E+000G	1.8E+003	21.20
			1.180E+000	86.54	-3.016E+000	%				4.283E+000G	1.8E+003	30.70

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-2.380E-001	-2.383E-001	1,069.65	1,069.65	9.107E+000
K-40		2.237E+002	2.237E+002	5.34	6.09	1.186E+001
CO-60	<	-2.846E-001	-2.846E-001	170.83	170.86	1.708E+000
I-131	<	3.131E-002	3.155E-002	833.35	833.35	9.344E-001
EU-154	<	-1.253E+000	-1.253E+000	269.07	269.09	1.188E+001
CS-134	<	-4.115E-001	-4.115E-001	101.35	101.39	1.412E+000
CS-137	<	3.264E+000	3.264E+000	15.83	16.09	1.279E+000
EU-152	<	-4.301E-002	-4.301E-002	1,946.37	1,946.37	2.989E+000
EU-155	<	1.180E+000	1.180E+000	80.66	80.73	3.174E+000
TL-208		4.609E+000	4.609E+000	15.26	15.53	1.284E+000
BI-212	<	5.036E+000	5.036E+000	56.92	56.99	9.326E+000
BI-214		2.649E+001	2.649E+001	6.84	7.43	2.410E+000
TH-234		2.894E+001	2.894E+001	25.33	25.60	2.083E+001
PA-234M	<	6.688E+000	6.688E+000	679.71	679.72	1.645E+002
U-235	<	2.834E+000	2.834E+000	79.95	80.01	7.587E+000
RA-224	<	-1.230E-001	-1.230E-001	10,098.99	10,098.99	4.212E+001
PB-210		4.456E+001	4.456E+001	33.43	33.65	3.697E+001
PB-212		1.376E+001	1.376E+001	8.31	8.83	2.166E+000
PB-214		2.739E+001	2.739E+001	5.38	6.10	2.383E+000
AC-228		1.740E+001	1.740E+001	8.18	8.67	2.660E+000
Pa-234	<	-2.760E-001	-2.760E-001	501.28	501.29	4.735E+000
AM-241	<	5.790E-001	5.790E-001	171.50	171.54	3.356E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 386.83 Bq/sample

Analyzed by: _____

403605

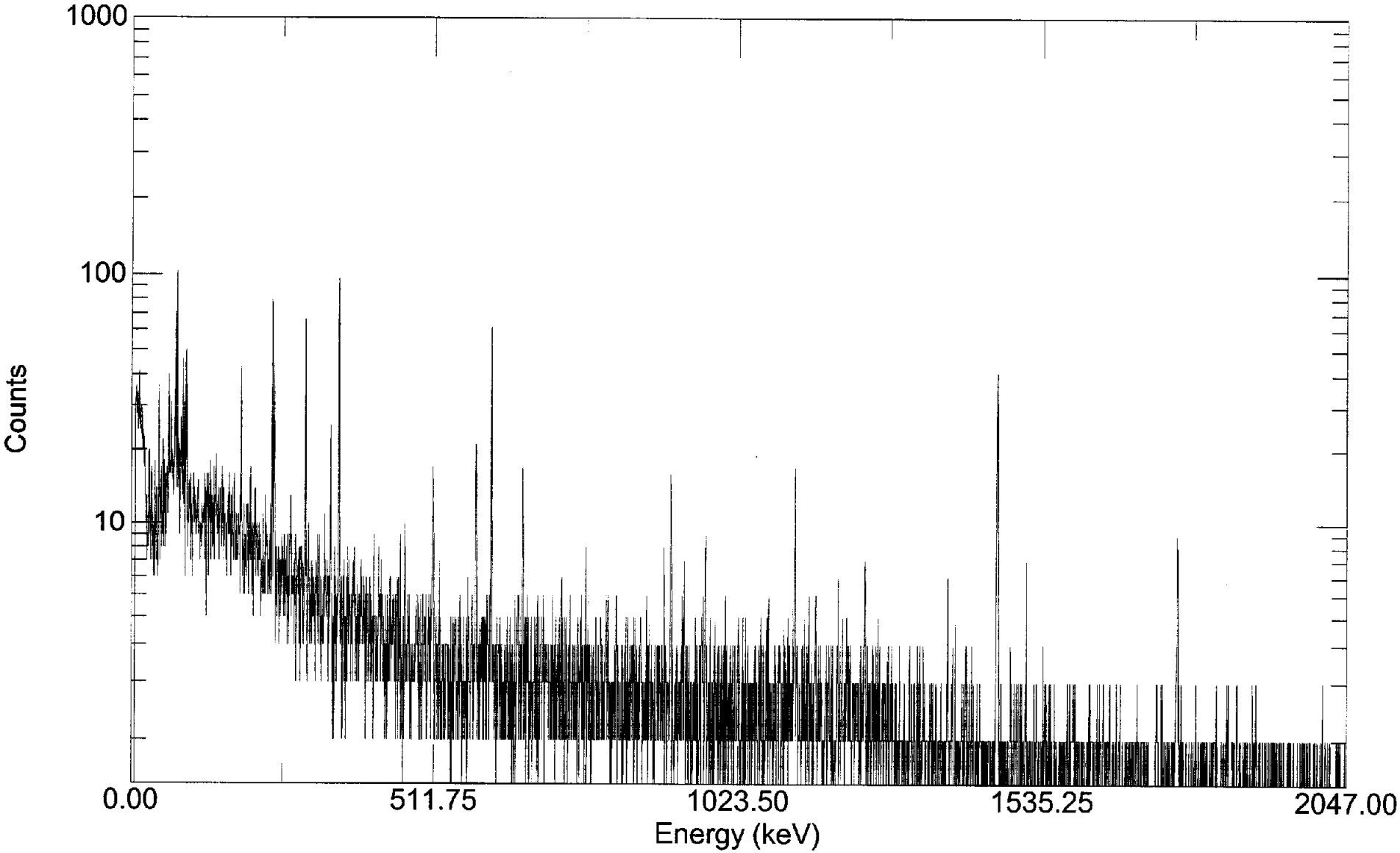
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKC31AC

7360292_KEKC31AC_F7L200260-001



Acquired: 26-Dec-2007 2:07:59 PM
File: C:\User\spectra\KEKC31AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.38 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,040

Sample Description: 7360292_KEKC31AD_F7L200260-001X

Spectrum Filename: KEKC31AD.An1

Acquisition Information

Start Time:	26-Dec-2007 2:47:13PM		
Live Time:	1800.00	Real Time:	1804.44
Dead Time:	0.25 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2654

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
212.26	53.10	67.17	53.83	0.030	30.33	0.741	LU-177	
253.08	63.32	160.01	16.99	0.009	108.08	0.521		s
298.88	74.77	237.00	170.00	0.094	19.67	1.137	BI-207	s
308.46	77.17	128.33	265.67	0.148	9.44	0.910	PB-214	
348.11	87.08	122.87	99.13	0.055	18.73	0.734	PB-214	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.51	46.42	113.81	69.19	0.038	23.88	0.412	s
AM-241	1	237.03	59.30	167.57	-6.57	-0.004	281.36	0.830	s
TH-234	1	252.69	63.22	207.85	41.99	0.023	36.22	0.834	s
EU-155	1	355.97	89.05	81.11	42.24	0.023	33.85	0.854	s
TH-234	1	370.84	92.77	244.14	43.62	0.024	33.30	0.859	s
U-235	1	373.18	93.35	201.01	11.03	0.006	24.33	0.860	s D
AC-228	1	373.18	93.35	288.24	0.00	0.000	2049.39	0.860	s D
EU-155	1	421.74	105.50	105.03	13.25	0.007	112.80	0.871	s
EU-152	1	488.85	122.28	119.15	-1.39	-0.001	1112.19	0.885	s
EU-154	1	493.15	123.35	133.78	-0.09	0.000	17332.70	0.886	s
Pa-234	1	524.56	131.21	124.70	16.68	0.009	97.79	0.894	s
U-235	1	575.20	143.87	145.13	20.83	0.012	84.68	0.904	s
U-235	1	651.59	162.97	72.80	2.84	0.002	428.62	0.922	s
U-235	1	816.64	204.25	76.68	-0.85	0.000	1467.83	0.958	s
PB-212	1	953.63	238.50	51.29	231.71	0.129	8.10	0.963	
RA-224	1	959.34	239.93	351.46	-90.07	-0.050	31.27	0.988	
PB-214	1	966.69	241.77	69.00	110.00	0.061	19.14	0.956	s
TL-208	1	1109.36	277.44	49.27	10.35	0.006	100.85	1.019	s
I-131	1	1137.04	284.36	63.08	-5.18	-0.003	221.27	1.025	s
PB-214	1	1179.10	294.88	41.04	219.96	0.122	9.14	0.995	
PB-212	1	1198.37	299.70	18.67	35.33	0.020	28.83	0.618	s
AC-228	1	1351.76	338.05	31.61	53.16	0.030	20.29	1.071	
EU-152	1	1368.11	342.13	38.65	1.36	0.001	649.87	1.076	s
PB-214	1	1406.08	351.63	20.24	313.76	0.174	6.10	0.909	s
I-131	1	1456.39	364.21	26.70	5.71	0.003	134.74	1.092	s
BE-7	1	1910.13	477.63	27.87	-1.60	-0.001	473.09	1.185	s
CS-134	1	2265.75	566.52	16.27	0.41	0.000	1411.59	1.254	s
CS-134	1	2276.94	569.32	30.46	-0.36	0.000	-37.70	1.259	s D
Pa-234	1	2277.54	569.47	27.70	2.48	0.001	59.40	1.259	s D
TL-208	1	2330.40	582.68	14.68	88.32	0.049	13.76	1.166	
CS-134	1	2427.35	606.91	23.49	-2.19	-0.001	320.06	1.286	s
BI-214	1	2435.37	608.92	9.25	227.75	0.127	6.83	1.241	
I-131	1	2550.42	637.67	23.56	-3.63	-0.002	196.30	1.312	s
CS-137	1	2644.81	661.26	3.83	86.17	0.048	11.87	1.402	s
EU-154	1	2892.04	723.05	29.89	-2.29	-0.001	344.61	1.378	s
BI-212	1	2907.52	726.91	16.48	12.77	0.007	52.96	1.381	s
PA-234M	1	3072.30	768.09	20.34	9.92	0.006	71.70	1.411	s
EU-152	1	3115.60	778.91	18.55	2.04	0.001	306.51	1.420	s
BI-212	1	3142.53	785.64	19.98	3.31	0.002	198.98	1.425	s
CS-134	1	3183.47	795.87	43.43	0.00	0.000	932.02	1.433	s
CS-134	1	3203.51	800.87	20.35	1.42	0.001	458.58	1.437	s
TL-208	1	3441.52	860.34	17.65	6.78	0.004	95.67	1.481	s
EU-154	1	3493.09	873.23	10.48	0.00	0.000	457.91	1.490	s
Pa-234	1	3523.45	880.81	19.09	-0.80	0.000	780.39	1.495	s
Pa-234	1	3544.65	886.11	11.92	-0.21	0.000	2346.66	1.497	s

AC-228	1	3643.28	910.75	14.81	48.00	0.027	18.35	1.518	s
Pa-234	1	3783.84	945.87	22.86	-1.92	-0.001	358.61	1.543	s
EU-152	1	3850.64	962.56	25.22	0.15	0.000	4722.86	1.556	s
AC-228	1	3874.74	968.58	22.18	28.45	0.016	29.99	1.559	s
EU-154	1	3986.91	996.60	23.89	-1.18	-0.001	594.69	1.579	s
PA-234M	1	4003.49	1000.74	17.50	5.46	0.003	116.49	1.582	s
EU-154	1	4019.80	1004.82	18.47	3.29	0.002	192.82	1.585	s
EU-152	1	4445.62	1111.18	15.50	1.74	0.001	328.22	1.659	s
BI-214	1	4480.00	1119.77	4.65	69.35	0.039	11.62	1.467	
CO-60	1	4698.41	1174.32	22.45	-0.31	0.000	2190.37	1.701	s
EU-154	1	5099.74	1274.54	62.88	0.00	0.000	1121.43	1.768	s
CO-60	1	5332.56	1332.68	11.30	3.03	0.002	167.25	1.806	s
EU-152	1	5629.13	1406.73	13.93	-0.35	0.000	1497.19	1.854	s
K-40	1	5843.55	1460.27	2.83	207.17	0.115	6.90	1.495	
BI-214	1	7059.06	1763.68	0.00	35.00	0.019	16.90	0.998	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak MDA Code	Peak Comments	
BI-212	N	1	6.639E+000	727.33	6.639E+000	% (	1.124E+001G		7.0E+002	11.82
			6.639E+000	785.51	1.971E+001	&	1.403E+002G		7.0E+002	1.10
BE-7	N P C	1	-6.483E-001	477.60	-6.483E-001	% (	1.106E+001G		5.3E+001	10.52
CS-137	T F I	1	5.735E+000	661.66	5.735E+000	@ (	7.876E-001G		1.1E+004	85.21
PB-210	N	1	5.733E+001	46.54	5.733E+001	(P	4.344E+001G		8.1E+003	4.25
TL-208	F N	1	5.314E+000	583.02	5.314E+000	(P	1.237E+000G		7.0E+002	84.50
			5.314E+000	277.28	4.260E+000	&	1.458E+001G		7.0E+002	6.31
			5.314E+000	860.56	3.862E+000	%	1.270E+001G		7.0E+002	12.42
PA-234	N	1	5.233E+001	1001.00	5.233E+001	& (	2.128E+002G		1.6E+012	.84
			5.233E+001	766.41	2.167E+002	&	5.183E+002G		1.6E+012	.29
RA-224	N	1	-5.058E+001	240.99	-5.058E+001	(	5.059E+001G		7.0E+002	4.10
AM-241	T	1	-4.034E-001	59.54	-4.034E-001	& (	3.870E+000G		1.6E+005	35.90
U-235	N	1	3.170E+000	143.79	3.170E+000	% (	8.956E+000G		2.6E+011	10.96
			3.170E+000	205.33	-3.429E-001	&	1.764E+001G		2.6E+011	5.01
			3.170E+000	163.38	9.849E-001	%	1.472E+001G		2.6E+011	5.08
			3.170E+000	93.35	3.170E+000	!	1.976E+001X	E	2.6E+011	5.81
CO-60	T F	1	3.089E-001	1332.50	3.089E-001	% (	1.875E+000G		1.9E+003	99.98
			3.089E-001	1173.24	-2.814E-002	%	2.273E+000G		1.9E+003	99.90
			2.840E+001	242.00	3.421E+001	+	1.288E+001G		5.8E+005	7.43
PB-214	N	1	2.840E+001	351.93	2.691E+001	@ (P	2.031E+000G		5.8E+005	37.60
			2.840E+001	295.09	3.130E+001	(P	4.634E+000G		5.8E+005	19.30
BI-214	N	1	2.704E+001	609.31	2.610E+001	(P	1.935E+000G		5.8E+005	46.09
			2.704E+001	1120.29	4.046E+001	+ P	7.441E+000G		5.8E+005	15.10
			2.704E+001	1764.49	2.983E+001	(	6.282E+000G		5.8E+005	15.40
I-131	T F I	1	2.326E-001	364.48	2.326E-001	& (	1.092E+000G		8.0E+000	81.70
			2.326E-001	284.30	-2.241E+000	%	1.718E+001G		8.0E+000	6.14
			2.326E-001	636.97	-2.779E+000	%	1.939E+001G		8.0E+000	7.17
K-40	N	1	2.146E+002	1460.83	2.146E+002	(P	1.093E+001G		4.7E+011	10.67
TH-234	N	1	1.817E+001	63.29	1.817E+001	% (P	3.023E+001G		1.6E+012	4.82
			1.817E+001	92.59	1.308E+001	% P	2.264E+001G		1.6E+012	5.58
EU-155	T F I	1	1.813E+000	105.31	1.013E+000	* (	3.858E+000G		1.8E+003	21.20
			1.813E+000	86.54	2.366E+000	* (	2.502E+000G		1.8E+003	30.70
EU-152	T F	1	1.628E-001	344.29	1.628E-001	% (	3.778E+000G		4.9E+003	26.50
			1.628E-001	121.78	-7.848E-002	&	3.021E+000G		4.9E+003	28.58
			1.628E-001	778.92	1.027E+000	%	1.146E+001G		4.9E+003	12.94
			1.628E-001	964.11	8.018E-002	%	1.390E+001G		4.9E+003	14.61
			1.628E-001	1112.07	1.119E+000	%	1.351E+001G		4.9E+003	13.64
			1.628E-001	1408.00	-1.808E-001	%	1.024E+001G		4.9E+003	21.00
			1.509E+000	880.53	-9.617E-001	%	2.773E+001G		1.6E+012	6.00
Pa-234	N	1	1.509E+000	131.29	1.509E+000	% (	4.952E+000G		1.6E+012	18.00
			1.509E+000	569.47	1.509E+000	%	1.654E+001G		1.6E+012	8.20
			1.509E+000	946.02	-1.099E+000	%	1.427E+001G		1.6E+012	13.40
			1.509E+000	883.24	-1.574E-001	%	1.416E+001G		1.6E+012	9.60
AC-228	N	1	1.272E+001	911.07	1.228E+001	@ (	5.281E+000G		2.1E+003	29.00

			1.272E+001	968.97	1.272E+001	*	(		1.103E+001G	2.1E+003	17.46
			1.272E+001	338.32	1.377E+001		(		7.487E+000G	2.1E+003	12.01
			1.272E+001	93.35	0.000E+000	%	}	E	2.065E+001X	A 2.1E+003	5.56
PB-212	N	1	1.222E+001	238.63	1.222E+001		(	P	1.903E+000G	7.0E+002	43.30
			1.222E+001	300.03	3.003E+001	+			1.942E+001G	7.0E+002	3.28
CS-134	T F I	1	-1.178E-001	604.71	-1.178E-001	%	(		1.360E+000G	7.5E+002	97.62
			-1.178E-001	795.87	0.000E+000	%			2.590E+000G	7.5E+002	85.53
			-1.178E-001	569.32	-1.178E-001	%			9.204E+000G	7.5E+002	15.38
			-1.178E-001	801.95	1.086E+000	&			1.822E+001G	7.5E+002	8.69
			-1.178E-001	563.24	2.402E-001	%			1.271E+001G	7.5E+002	8.35
			0.000E+000	723.36	-6.917E-001	%			8.528E+000G	3.1E+003	20.22
			0.000E+000	1004.77	1.470E+000	&			1.016E+001G	3.1E+003	18.01
			0.000E+000	996.33	-8.869E-001	%			1.921E+001G	3.1E+003	10.60
EU-154	T F I	1	0.000E+000	873.23	0.000E+000	%	(		1.039E+001G	3.1E+003	12.27
			0.000E+000	123.10	-3.732E-003	&			2.238E+000G	3.1E+003	40.79
			0.000E+000	1274.54	0.000E+000	%			1.107E+001G	3.1E+003	35.19

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-6.483E-001	-6.492E-001	473.09	473.10	1.106E+001
K-40		2.146E+002	2.146E+002	6.99	7.58	1.093E+001
CO-60	<	3.089E-001	3.089E-001	167.25	167.27	1.875E+000
I-131	<	2.326E-001	2.349E-001	134.74	134.77	1.092E+000
CS-134	<	-1.178E-001	-1.178E-001	320.06	320.08	1.360E+000
CS-137	#	5.735E+000	5.735E+000	11.87	12.22	7.876E-001
EU-152	<	1.628E-001	1.628E-001	649.87	649.88	3.778E+000
EU-155	<	1.813E+000	1.813E+000	33.85	34.02	3.858E+000
TL-208		5.314E+000	5.314E+000	14.10	14.39	1.237E+000
BI-212	<	6.639E+000	6.639E+000	52.96	53.04	1.124E+001
BI-214		2.704E+001	2.704E+001	6.98	7.56	1.935E+000
AC-228	<	1.272E+001	1.272E+001	13.53	13.83	5.281E+000
TH-234	<	1.817E+001	1.817E+001	50.05	50.18	3.023E+001
PA-234M	<	5.233E+001	5.233E+001	116.49	116.53	2.128E+002
U-235	<	3.170E+000	3.170E+000	84.68	84.73	8.956E+000
EU-154	<			457.91	457.92	1.039E+001
RA-224	<	-5.058E+001	-5.059E+001	31.27	31.41	5.059E+001
PB-210		5.733E+001	5.733E+001	31.07	31.31	4.344E+001
PB-212		1.222E+001	1.222E+001	8.42	8.94	1.903E+000
PB-214		2.840E+001	2.840E+001	5.58	6.28	2.031E+000
Pa-234	<	1.509E+000	1.509E+000	97.79	97.84	4.952E+000
AM-241	<	-4.034E-001	-4.034E-001	281.36	281.39	3.870E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 350.67 Bq/sample

Analyzed by: _____

403605

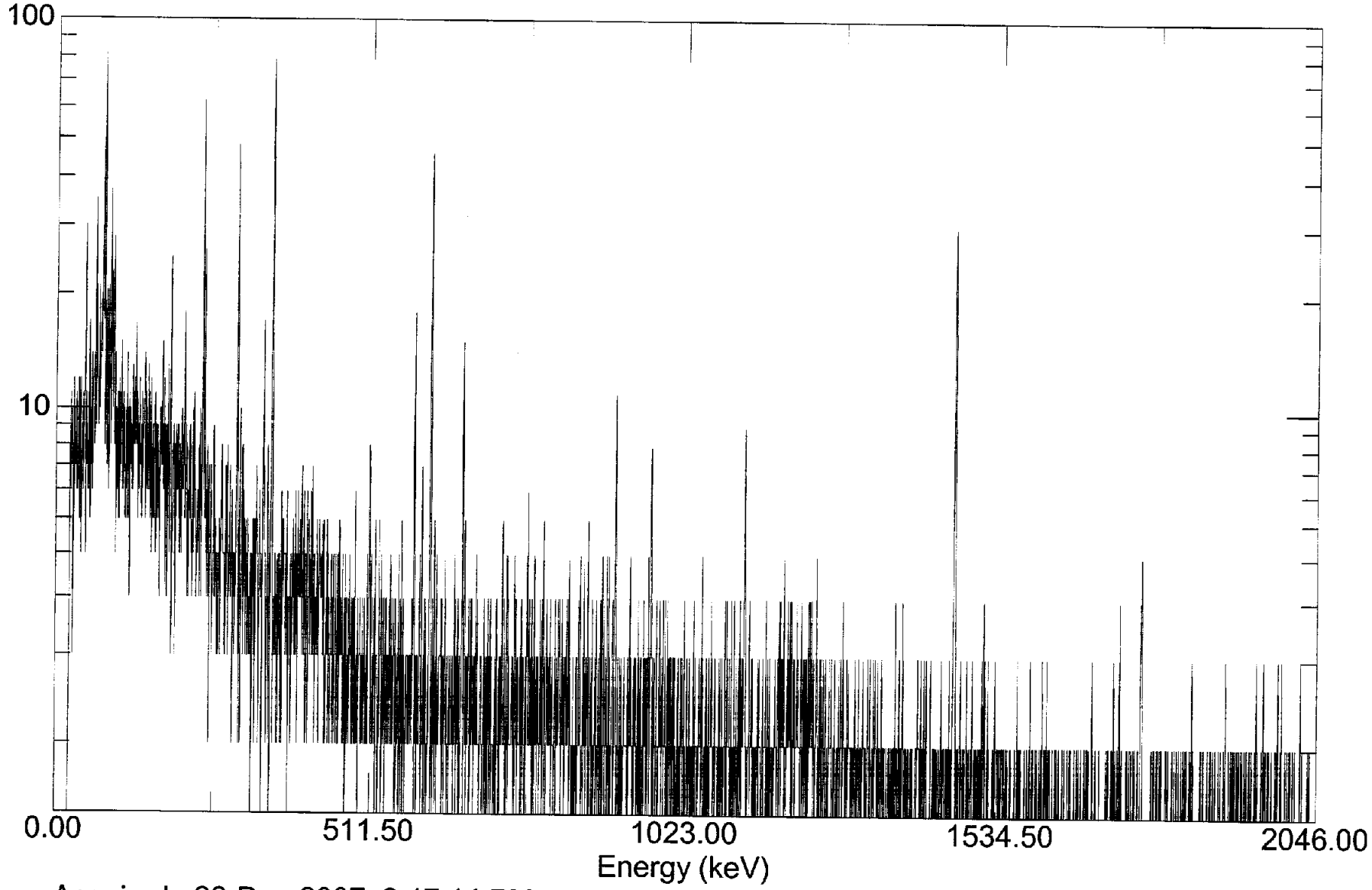
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKC31AD

7360292_KEKC31AD_F7L200260-001X



Acquired: 26-Dec-2007 2:47:14 PM
File: C:\User\spectra\KEKC31AD.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.44 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,036

Sample Description: 7360292_KEKC71AC_F7L200260-002

Spectrum Filename: KEKC71AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:08:56PM		
Live Time:	1800.00	Real Time:	1804.18
Dead Time:	0.23 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2175

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.24	74.86	224.83	156.17	0.087	21.17	0.731	PB-214	
308.44	77.16	162.50	243.50	0.135	11.70	0.738	PB-214	
348.76	87.24	154.12	130.88	0.073	16.01	0.646	PB-214	
742.20	185.63	68.00	75.00	0.042	24.43	0.952	U-235	
1180.39	295.20	126.58	18.42	0.010	89.46	1.250		s
1405.85	351.57	195.86	19.14	0.011	105.88	0.991		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.05	46.55	122.05	17.50	0.010	40.50	0.819	
AM-241	1	237.69	59.46	142.06	17.67	0.010	98.32	0.830	s
TH-234	1	253.45	63.41	212.88	25.95	0.014	49.72	0.834	s
EU-155	1	347.02	86.81	232.64	-5.88	-0.003	368.90	0.854	s
TH-234	1	371.53	92.94	234.13	36.85	0.020	36.01	0.859	s
AC-228	1	373.18	93.35	233.70	3.47	0.002	574.13	1.438	s D
U-235	1	373.18	93.35	172.32	0.08	0.000	229.00	0.860	s D
EU-155	1	421.54	105.44	141.36	23.04	0.013	75.89	0.871	s
EU-152	1	481.09	120.34	90.61	-3.88	-0.002	350.74	0.885	s
EU-154	1	491.96	123.05	122.95	6.41	0.004	247.90	0.886	s
Pa-234	1	516.87	129.29	100.64	18.91	0.011	78.47	0.894	s
U-235	1	571.90	143.05	113.12	0.16	0.000	9375.96	0.904	s
U-235	1	654.09	163.60	109.20	8.62	0.005	174.80	0.922	s
U-235	1	820.49	205.21	114.73	-18.33	-0.010	85.87	0.958	s
PB-212	1	953.39	238.44	149.29	445.71	0.248	8.26	0.852	
RA-224	1	959.40	239.95	398.78	-97.08	-0.054	30.81	0.988	s
PB-214	1	969.66	242.51	162.82	2.76	0.002	655.43	0.989	s
TL-208	1	1108.35	277.19	62.64	6.11	0.003	187.58	1.019	s
I-131	1	1138.11	284.63	85.39	-17.01	-0.009	80.57	1.025	s
PB-214	1	1180.13	295.14	41.86	99.10	0.055	13.04	1.034	s
PB-212	1	1200.20	300.15	20.00	51.00	0.028	23.01	0.595	s
AC-228	1	1351.67	338.02	54.00	119.00	0.066	18.73	0.982	
EU-152	1	1375.05	343.87	59.45	-9.28	-0.005	122.01	1.076	s
PB-214	1	1406.19	351.65	42.11	167.32	0.093	9.09	1.082	
I-131	1	1445.21	361.41	22.92	3.79	0.002	185.77	1.092	
BE-7	1	1912.14	478.14	23.67	4.23	0.002	169.64	1.185	s
CS-134	1	2256.71	564.27	46.78	-5.95	-0.003	167.72	1.254	s
CS-134	1	2276.94	569.32	29.47	12.22	0.007	62.21	1.259	s D
Pa-234	1	2277.54	569.47	40.35	2.82	0.002	47.66	1.259	s D
TL-208	1	2330.95	582.82	8.02	162.98	0.091	8.67	1.016	
CS-134	1	2431.30	607.90	59.32	1.95	0.001	562.60	1.286	s
BI-214	1	2435.58	608.97	9.42	116.58	0.065	9.83	1.001	
I-131	1	2547.52	636.95	15.85	4.68	0.003	128.78	1.312	s
CS-137	1	2644.17	661.10	10.50	78.50	0.044	14.29	1.085	
EU-154	1	2894.88	723.75	52.93	-8.08	-0.004	132.13	1.378	s
BI-212	1	2907.20	726.83	20.67	29.82	0.017	28.29	1.381	s
PA-234M	1	3073.43	768.37	12.48	15.70	0.009	40.62	1.411	s
EU-152	1	3110.57	777.65	13.32	3.80	0.002	145.29	1.420	s
BI-212	1	3139.32	784.84	18.69	3.30	0.002	193.16	1.425	s
CS-134	1	3183.83	795.96	33.18	-1.31	-0.001	629.24	1.433	s
CS-134	1	3217.45	804.36	22.57	-0.30	0.000	2229.21	1.437	s
TL-208	1	3439.58	859.86	15.79	12.65	0.007	52.56	1.481	s
EU-154	1	3492.13	872.99	21.02	2.15	0.001	309.31	1.490	s
Pa-234	1	3521.98	880.45	21.63	-3.16	-0.002	215.69	1.495	s
Pa-234	1	3529.10	882.23	18.60	-3.10	-0.002	204.48	1.497	s

AC-228	1	3643.93	910.92	0.00	90.00	0.050	10.54	1.062	s
Pa-234	1	3786.03	946.42	21.13	-2.14	-0.001	311.87	1.543	s
EU-152	1	3857.97	964.39	27.00	10.44	0.006	76.91	1.556	s
AC-228	1	3875.00	968.64	4.67	52.33	0.029	16.96	0.566	s
EU-154	1	3984.82	996.08	18.14	-1.64	-0.001	376.50	1.579	s
PA-234M	1	4003.98	1000.86	17.26	1.96	0.001	307.56	1.582	s
EU-154	1	4019.42	1004.72	20.24	-1.83	-0.001	355.09	1.585	s
EU-152	1	4449.20	1112.07	41.37	0.00	0.000	909.58	1.659	s
BI-214	1	4482.08	1120.29	44.65	-4.65	-0.003	894.43	1.665	s
CO-60	1	4696.43	1173.82	15.87	-0.06	0.000	10049.94	1.701	s
EU-154	1	5098.80	1274.31	17.18	2.85	0.002	214.27	1.768	s
CO-60	1	5331.84	1332.50	16.87	0.00	0.000	580.85	1.806	s
EU-152	1	5634.21	1408.00	0.00	0.00	0.000	100.00	1.854	s
K-40	1	5843.71	1460.31	10.73	209.15	0.116	7.12	1.887	
BI-214	1	7059.46	1763.78	8.95	4.91	0.003	97.27	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
TL-208	F N	1	9.806E+000	583.02	9.806E+000	(P	9.570E-001G		7.0E+002	84.50
			9.806E+000	277.28	2.516E+000	%	1.630E+001G		7.0E+002	6.31
			9.806E+000	860.56	7.209E+000	%	1.209E+001G		7.0E+002	12.42
RA-224	N	1	-5.452E+001	240.99	-5.452E+001	(	5.378E+001G		7.0E+002	4.10
CS-137	T F I	1	5.224E+000	661.66	5.224E+000	(	1.185E+000G		1.1E+004	85.21
U-235	N	1	2.443E-002	143.79	2.443E-002	& (	7.956E+000G		2.6E+011	10.96
			2.443E-002	205.33	-7.431E+000	&	2.133E+001G		2.6E+011	5.01
			2.443E-002	163.38	2.986E+000	&	1.781E+001G		2.6E+011	5.08
			2.443E-002	93.35	2.443E-002	% E	1.836E+001X		2.6E+011	5.81
PB-212	N	1	2.351E+001	238.63	2.351E+001	(P	3.146E+000G		7.0E+002	43.30
			2.351E+001	300.03	4.335E+001	+	2.002E+001G		7.0E+002	3.28
AC-228	N	1	2.317E+001	911.07	2.302E+001	(	1.885E+000G		2.1E+003	29.00
			2.317E+001	968.97	2.340E+001	(	5.714E+000G		2.1E+003	17.46
			2.317E+001	338.32	3.082E+001	+	9.569E+000G		2.1E+003	12.01
			2.317E+001	93.35	1.041E+000	+ } E	1.851E+001X	A	2.1E+003	5.56
K-40	N	1	2.167E+002	1460.83	2.167E+002	(P	1.862E+001G		4.7E+011	10.67
PA-234	N	1	1.882E+001	1001.00	1.882E+001	% (	2.115E+002G		1.6E+012	.84
			1.882E+001	766.41	3.430E+002	&	4.189E+002G		1.6E+012	.29
EU-155	T F I	1	1.761E+000	105.31	1.761E+000	* (	4.442E+000G		1.8E+003	21.20
			1.761E+000	86.54	-3.295E-001	&	4.132E+000G		1.8E+003	30.70
BE-7	N P C	1	1.715E+000	477.60	1.715E+000	& (	1.028E+001G		5.3E+001	10.52
Pa-234	N	1	1.711E+000	131.29	1.711E+000	% (	4.474E+000G		1.6E+012	18.00
			1.711E+000	569.47	1.711E+000	&	1.963E+001G		1.6E+012	8.20
			1.711E+000	946.02	-1.220E+000	%	1.378E+001G		1.6E+012	13.40
			1.711E+000	883.24	-2.338E+000	%	1.718E+001G		1.6E+012	9.60
			1.711E+000	880.53	-3.797E+000	%	2.931E+001G		1.6E+012	6.00
BI-212	N	1	1.551E+001	727.33	1.551E+001	(	1.243E+001G		7.0E+002	11.82
			1.551E+001	785.51	1.968E+001	&	1.362E+002G		7.0E+002	1.10
I-131	T F I	1	1.546E-001	364.48	1.546E-001	% (	1.020E+000G		8.0E+000	81.70
			1.546E-001	284.30	-7.358E+000	%	1.980E+001G		8.0E+000	6.14
			1.546E-001	636.97	3.586E+000	%	1.628E+001G		8.0E+000	7.17
PB-210	N	1	1.450E+001	46.54	1.450E+001	% (P	4.491E+001G		8.1E+003	4.25
PB-214	N	1	1.427E+001	351.93	1.435E+001	(P	2.826E+000G		5.8E+005	37.60
			1.427E+001	295.09	1.410E+001	(P	4.676E+000G		5.8E+005	19.30
			1.427E+001	242.00	8.599E-001	%	1.933E+001G		5.8E+005	7.43
BI-214	N	1	1.336E+001	609.31	1.336E+001	(P	1.950E+000G		5.8E+005	46.09
			1.336E+001	1120.29	-2.711E+000	% P	1.975E+001G		5.8E+005	15.10
			1.336E+001	1764.49	4.186E+000	%	1.419E+001G		5.8E+005	15.40
EU-154	T F I	1	1.254E+000	873.23	1.254E+000	% (	1.405E+001G		3.1E+003	12.27
			1.254E+000	123.10	2.534E-001	&	2.150E+000G		3.1E+003	40.79
			1.254E+000	1274.54	7.945E-001	&	6.147E+000G		3.1E+003	35.19
			1.254E+000	723.36	-2.444E+000	%	1.108E+001G		3.1E+003	20.22
			1.254E+000	1004.77	-8.185E-001	%	1.058E+001G		3.1E+003	18.01
			1.254E+000	996.33	-1.233E+000	%	1.701E+001G		3.1E+003	10.60

			1.123E+001	92.59	1.105E+001	%		P	2.219E+001G	1.6E+012	5.58
TH-234	N	1	1.123E+001	63.29	1.123E+001	%	(	P	3.058E+001G	1.6E+012	4.82
			-1.107E+000	1112.07	0.000E+000	%			2.097E+001G	4.9E+003	13.64
			-1.107E+000	1408.00	0.000E+000	%			3.755E+000G	4.9E+003	21.00
EU-152	T F	1	-1.107E+000	344.29	-1.107E+000	%	(		4.608E+000G	4.9E+003	26.50
			-1.107E+000	121.78	-2.187E-001	&			2.654E+000G	4.9E+003	28.58
			-1.107E+000	778.92	1.910E+000	&			9.920E+000G	4.9E+003	12.94
			-1.107E+000	964.11	5.557E+000	%			1.433E+001G	4.9E+003	14.61
AM-241	T	1	1.085E+000	59.54	1.085E+000	&	(		3.576E+000G	1.6E+005	35.90
CS-134	T F I	1	1.049E-001	604.71	1.049E-001	&	(		2.075E+000G	7.5E+002	97.62
			1.049E-001	795.87	-1.013E-001	&			2.291E+000G	7.5E+002	85.53
			1.049E-001	569.32	3.956E+000	&		}	1.058E+001G	7.5E+002	15.38
			1.049E-001	801.95	-2.321E-001	%			1.907E+001G	7.5E+002	8.69
			1.049E-001	563.24	-3.514E+000	%			2.043E+001G	7.5E+002	8.35
			0.000E+000	1173.24	-5.144E-003	%			1.950E+000G	1.9E+003	99.90
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		2.230E+000G	1.9E+003	99.98

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	<	1.546E-001	1.558E-001	185.77	185.79	1.020E+000
CS-134	<	1.049E-001	1.049E-001	562.60	562.61	2.075E+000
EU-154	<	1.254E+000	1.254E+000	309.31	309.33	1.405E+001
PB-210	<	1.450E+001	1.450E+001	88.68	88.77	4.491E+001
PB-212		2.351E+001	2.351E+001	8.43	8.94	3.146E+000
PB-214	<	1.427E+001	1.427E+001	8.22	8.71	2.826E+000
BI-212	<	1.551E+001	1.551E+001	28.29	28.44	1.243E+001
BE-7	<	1.715E+000	1.717E+000	169.64	169.66	1.028E+001
K-40	<	2.167E+002	2.167E+002	7.22	7.79	1.862E+001
CO-60	<			580.85	580.85	2.230E+000
CS-137		5.224E+000	5.224E+000	14.29	14.58	1.185E+000
EU-152	<	-1.107E+000	-1.107E+000	122.01	122.05	4.608E+000
EU-155	<	1.761E+000	1.761E+000	75.89	75.96	4.442E+000
TL-208		9.806E+000	9.807E+000	8.79	9.25	9.570E-001
RA-224	<	-5.452E+001	-5.453E+001	30.81	30.95	5.378E+001
BI-214		1.336E+001	1.336E+001	10.27	10.67	1.950E+000
AC-228		2.317E+001	2.317E+001	9.98	10.39	1.885E+000
PA-234M	<	1.882E+001	1.882E+001	307.56	307.57	2.115E+002
U-235	<	2.443E-002	2.443E-002	9,375.96	9,375.96	7.956E+000
AM-241	<	1.085E+000	1.085E+000	98.32	98.40	3.576E+000
Pa-234	<	1.711E+000	1.711E+000	78.47	78.53	4.474E+000
TH-234	<	1.123E+001	1.123E+001	80.43	80.51	3.058E+001

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 75.07 Bq/sample

Analyzed by: _____

403605

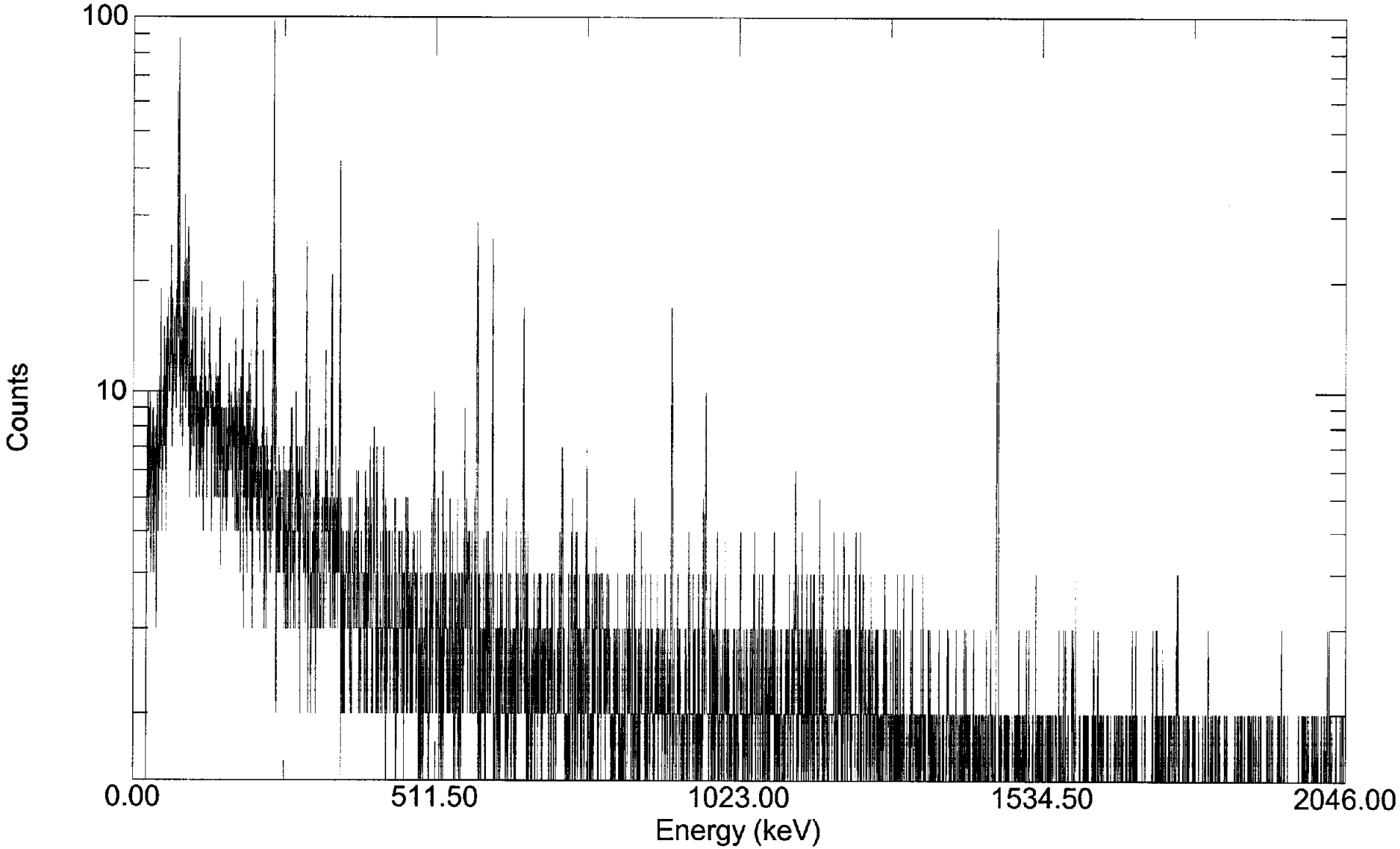
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKC71AC

7360292_KEKC71AC_F7L200260-002



Acquired: 26-Dec-2007 2:08:56 PM
File: C:\User\spectra\KEKC71AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.18 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,038

Sample Description: 7360292_KEKDC1AC_F7L200260-003

Spectrum Filename: KEKDC1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:09:34PM		
Live Time:	1800.00	Real Time:	1849.58
Dead Time:	2.68 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1897

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.21	74.77	245.00	149.00	0.083	21.29	0.794	PB-214	
307.24	77.02	168.67	253.33	0.141	10.67	0.882	PB-214	
347.42	87.06	265.64	41.36	0.023	57.86	0.832		s
370.76	92.89	299.00	0.00	0.000	2445.40	1.040		s
2044.14	511.01	22.00	99.00	0.055	15.71	0.678	TL-208	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.34	46.32	130.55	8.62	0.005	61.39	0.749	s
AM-241	1	236.74	59.41	146.31	15.28	0.008	93.89	0.761	s
TH-234	1	252.25	63.28	242.75	13.20	0.007	80.42	0.764	s
EU-155	1	348.00	87.20	215.82	100.64	0.056	22.92	0.788	s
TH-234	1	369.56	92.59	209.25	81.78	0.045	20.88	0.795	s
U-235	1	372.61	93.35	147.00	-1.29	-0.001	-35208.41	0.795	s D
AC-228	1	372.61	93.35	147.00	63.53	0.035	3.80	0.795	s D
EU-155	1	420.05	105.20	123.10	11.34	0.006	141.55	0.808	s
EU-154	1	489.99	122.67	101.57	-3.89	-0.002	369.57	0.826	s
EU-152	1	494.44	123.79	74.82	-1.94	-0.001	634.19	0.824	s
Pa-234	1	526.55	131.81	115.22	-0.28	0.000	5398.67	0.834	s
U-235	1	566.38	141.76	98.45	-2.45	-0.001	48601.42	0.847	s
U-235	1	655.49	164.02	112.11	18.20	0.010	76.78	0.867	s
U-235	1	820.80	205.32	83.23	5.49	0.003	238.78	0.909	s
PB-212	1	954.46	238.72	114.15	412.85	0.229	7.30	0.771	
RA-224	1	960.37	240.19	465.73	-117.27	-0.065	27.62	0.944	
PB-214	1	967.01	241.85	91.67	92.33	0.051	24.70	0.609	s
TL-208	1	1108.07	277.10	39.00	44.00	0.024	32.14	0.546	s
I-131	1	1130.14	282.61	48.57	7.81	0.004	131.12	0.987	s
PB-214	1	1181.19	295.37	23.91	191.09	0.106	8.51	0.884	s
PB-212	1	1200.52	300.20	49.44	29.18	0.016	38.78	1.002	
AC-228	1	1353.50	338.42	75.64	63.10	0.035	23.20	1.040	s
EU-152	1	1376.20	344.10	50.88	-5.95	-0.003	174.56	1.045	s
PB-214	1	1407.55	351.93	47.21	279.79	0.155	7.64	0.999	
I-131	1	1463.62	365.94	36.79	1.02	0.001	845.47	1.065	s
BE-7	1	1906.26	476.55	42.49	-7.57	-0.004	127.16	1.173	s
CS-134	1	2251.95	562.95	32.74	-2.41	-0.001	341.98	1.252	s
CS-134	1	2277.45	569.32	26.65	-0.76	0.000	-44.30	1.258	s D
Pa-234	1	2278.05	569.47	32.90	-0.04	0.000	-133.03	1.258	s D
TL-208	1	2333.75	583.39	17.25	125.75	0.070	11.02	1.075	
CS-134	1	2418.20	604.50	34.53	-4.59	-0.003	186.93	1.290	s
BI-214	1	2438.16	609.49	18.73	212.27	0.118	7.95	1.287	s
I-131	1	2547.78	636.89	27.14	-0.24	0.000	3112.21	1.319	s
CS-137	1	2646.74	661.62	31.43	14.61	0.008	40.46	1.342	s
EU-154	1	2878.74	719.61	10.13	4.34	0.002	114.35	1.397	s
BI-212	1	2910.81	727.63	18.84	10.92	0.006	63.82	1.400	s
PA-234M	1	3081.04	770.18	27.70	-3.66	-0.002	210.08	1.434	s
EU-152	1	3118.03	779.43	16.74	-1.62	-0.001	365.84	1.445	s
BI-212	1	3142.35	785.51	21.29	0.00	0.000	652.59	1.451	s
CS-134	1	3180.81	795.12	16.17	10.75	0.006	61.04	1.460	s
CS-134	1	3208.61	802.07	17.78	3.82	0.002	164.10	1.465	s
TL-208	1	3444.59	861.07	2.17	19.83	0.011	26.05	0.597	s
EU-154	1	3493.24	873.23	0.00	0.00	0.000	100.00	1.527	s
Pa-234	1	3520.50	880.05	16.48	4.39	0.002	139.31	1.533	s
Pa-234	1	3529.09	882.19	25.42	-2.87	-0.002	255.64	1.535	s
AC-228	1	3645.91	911.40	14.94	80.20	0.045	13.08	1.559	

Pa-234	1	3785.82	946.38	19.50	-0.89	0.000	708.36	1.588	s
EU-152	1	3856.77	964.12	39.12	1.90	0.001	471.17	1.603	s
AC-228	1	3877.26	969.24	23.00	23.81	0.013	35.08	1.607	s
EU-154	1	3992.53	998.07	19.12	-2.93	-0.002	218.80	1.630	s
PA-234M	1	4005.78	1001.38	22.37	3.21	0.002	215.74	1.633	s
EU-154	1	4018.02	1004.44	26.51	0.31	0.000	2347.98	1.637	s
EU-152	1	4432.61	1108.11	12.82	-0.24	0.000	2152.64	1.723	s
BI-214	1	4482.90	1120.68	0.00	89.00	0.049	10.60	0.464	s
CO-60	1	4686.86	1171.69	23.73	0.32	0.000	2172.79	1.772	s
EU-154	1	5099.41	1274.86	18.51	3.24	0.002	195.57	1.850	s
CO-60	1	5316.99	1329.28	8.61	-0.49	0.000	856.95	1.894	s
EU-152	1	5654.29	1413.65	3.24	0.10	0.000	2490.08	1.950	s
K-40	1	5844.73	1461.29	0.00	225.00	0.125	6.67	1.778	
BI-214	1	7059.05	1765.10	7.95	26.35	0.015	22.54	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
CS-137	T F I	1	9.329E-001	661.66	9.329E-001	%	(	P	1.842E+000	G		1.1E+004	85.21
AM-241	T	1	8.691E-001	59.54	8.691E-001	%	(	P	3.361E+000	G		1.6E+005	35.90
EU-155	T F I	1	8.404E-001	105.31	8.404E-001	%	(		4.034E+000	G		1.8E+003	21.20
			8.404E-001	86.54	5.444E+000	*			3.849E+000	G	A	1.8E+003	30.70
TL-208	F N	1	7.266E+000	583.02	7.266E+000		(	P	1.275E+000	G		7.0E+002	84.50
			7.266E+000	277.28	1.741E+001	*			1.259E+001	G		7.0E+002	6.31
			7.266E+000	860.56	1.081E+001	+			5.216E+000	G		7.0E+002	12.42
			-6.813E-001	964.11	9.660E-001	%			1.620E+001	G		4.9E+003	14.61
			-6.813E-001	1112.07	-1.444E-001	%			1.185E+001	G		4.9E+003	13.64
			-6.813E-001	1408.00	4.958E-002	%			5.341E+000	G		4.9E+003	21.00
EU-152	T F	1	-6.813E-001	344.29	-6.813E-001	%	(		4.119E+000	G		4.9E+003	26.50
			-6.813E-001	121.78	-1.061E-001	%			2.351E+000	G		4.9E+003	28.58
			-6.813E-001	778.92	-7.806E-001	&			1.050E+001	G		4.9E+003	12.94
RA-224	N	1	-6.332E+001	240.99	-6.332E+001		(		5.576E+001	G		7.0E+002	4.10
PB-210	N	1	6.327E+000	46.54	6.327E+000	%	(	P	4.109E+001	G		8.1E+003	4.25
			5.446E+000	785.51	0.000E+000	%			1.383E+002	G		7.0E+002	1.10
BI-212	N	1	5.446E+000	727.33	5.446E+000	%	(		1.144E+001	G		7.0E+002	11.82
CO-60	T F	1	-4.745E-002	1332.50	-4.745E-002	%	(		1.583E+000	G		1.9E+003	99.98
			-4.745E-002	1173.24	2.772E-002	%			2.214E+000	G		1.9E+003	99.90
I-131	T F I	1	4.001E-002	364.48	4.001E-002	&	(		1.213E+000	G		8.0E+000	81.70
			4.001E-002	284.30	3.248E+000	%			1.463E+001	G		8.0E+000	6.14
			4.001E-002	636.97	-1.743E-001	%			1.983E+001	G		8.0E+000	7.17
U-235	N	1	-3.601E-001	143.79	-3.601E-001	&	(	P	7.203E+000	G		2.6E+011	10.96
			-3.601E-001	205.33	2.142E+000	%			1.764E+001	G		2.6E+011	5.01
			-3.601E-001	163.38	6.084E+000	%		P	1.740E+001	G		2.6E+011	5.08
			-3.601E-001	93.35	-3.601E-001	!			1.647E+001	X	E	2.6E+011	5.81
BE-7	N P C	1	-2.944E+000	477.60	-2.944E+000	%	(		1.287E+001	G		5.3E+001	10.52
PA-234M	N	1	2.935E+001	1001.00	2.935E+001	%	(		2.263E+002	G		1.6E+012	.84
			2.935E+001	766.41	-7.658E+001	&			5.701E+002	G		1.6E+012	.29
Pa-234	N	1	-2.464E-002	131.29	-2.464E-002	%	(		4.618E+000	G		1.6E+012	18.00
			-2.464E-002	569.47	-2.464E-002	%			1.717E+001	G		1.6E+012	8.20
			-2.464E-002	946.02	-4.865E-001	%			1.271E+001	G		1.6E+012	13.40

			-2.464E-002	883.24	-2.065E+000	%			1.888E+001G		1.6E+012	9.60
			-2.464E-002	880.53	5.043E+000	%			2.486E+001G		1.6E+012	6.00
PB-214	N	1	2.450E+001	351.93	2.306E+001		(	P	2.862E+000G		5.8E+005	37.60
			2.450E+001	295.09	2.613E+001	@	(	P	3.486E+000G		5.8E+005	19.30
			2.450E+001	242.00	2.761E+001		(		1.415E+001G		5.8E+005	7.43
CS-134 T F I		1	-2.370E-001	604.71	-2.370E-001	%	(		1.553E+000G		7.5E+002	97.62
			-2.370E-001	795.87	7.983E-001	%			1.592E+000G		7.5E+002	85.53
			-2.370E-001	569.32	-2.370E-001	%			8.322E+000G		7.5E+002	15.38
			-2.370E-001	801.95	2.812E+000	%			1.644E+001G		7.5E+002	8.69
			-2.370E-001	563.24	-1.367E+000	%			1.667E+001G		7.5E+002	8.35
BI-214	N	1	2.277E+001	609.31	2.336E+001	@	(	P	2.518E+000G		5.8E+005	46.09
			2.277E+001	1120.29	4.942E+001	+			4.092E+000G		5.8E+005	15.10
			2.277E+001	1764.49	2.101E+001	?	(	P	1.263E+001G		5.8E+005	15.40
K-40	N	1	2.199E+002	1460.83	2.199E+002		(		7.204E+000G		4.7E+011	10.67
PB-212	N	1	2.114E+001	238.63	2.094E+001		(	P	2.662E+000G		7.0E+002	43.30
			2.114E+001	300.03	2.383E+001	?	(		2.897E+001G		7.0E+002	3.28
AC-228	N	1	1.847E+001	911.16	1.961E+001		(		5.067E+000G		2.1E+003	29.00
			1.847E+001	968.97	1.017E+001	-			1.070E+001G		2.1E+003	17.46
			1.847E+001	338.32	1.570E+001	*	(		1.076E+001G		2.1E+003	12.01
			1.847E+001	93.35	1.847E+001	+		E	1.721E+001G	A	2.1E+003	5.56
TH-234	N	1	1.522E+001	63.29	5.349E+000	*	(	P	3.051E+001G		1.6E+012	4.82
			1.522E+001	92.59	2.374E+001	*	(	P	2.035E+001G		1.6E+012	5.58
EU-154 T F I		1	0.000E+000	873.23	0.000E+000	&	(		4.115E+000G		3.1E+003	12.27
			0.000E+000	123.10	-1.492E-001	%			1.903E+000G		3.1E+003	40.79
			0.000E+000	1274.54	8.587E-001	&			6.024E+000G		3.1E+003	35.19
			0.000E+000	723.36	1.258E+000	%			5.088E+000G		3.1E+003	20.22
			0.000E+000	1004.77	1.326E-001	%			1.138E+001G		3.1E+003	18.01
			0.000E+000	996.33	-2.110E+000	%			1.661E+001G		3.1E+003	10.60

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-2.944E+000	-2.947E+000	127.16	127.19	1.287E+001
K-40		2.199E+002	2.199E+002	6.67	7.28	7.204E+000
CO-60	#	-4.745E-002	-4.745E-002	856.95	856.95	1.583E+000
I-131	#	4.001E-002	4.032E-002	845.47	845.47	1.213E+000
CS-134	#	-2.370E-001	-2.370E-001	186.93	186.95	1.553E+000
EU-154	#			100.00	100.04	4.115E+000
CS-137	#	9.329E-001	9.329E-001	57.77	57.84	1.842E+000
EU-152	#	-6.813E-001	-6.813E-001	174.56	174.58	4.119E+000
EU-155	#	8.404E-001	8.404E-001	141.55	141.59	4.034E+000
TL-208		7.266E+000	7.266E+000	11.35	11.71	1.275E+000
BI-214		2.277E+001	2.277E+001	8.20	8.69	2.518E+000
RA-224	#	-6.332E+001	-6.332E+001	27.62	27.78	5.576E+001
AC-228	#	1.847E+001	1.847E+001	13.08	13.39	5.067E+000
TH-234	#	1.522E+001	1.522E+001	26.72	26.97	3.051E+001
PA-234M	#	2.935E+001	2.935E+001	215.74	215.75	2.263E+002
U-235	#	-3.601E-001	-3.601E-001	97.769.03	97.769.03	7.203E+000
PB-210	#	6.327E+000	6.327E+000	184.39	184.43	4.109E+001
PB-212		2.114E+001	2.114E+001	7.42	8.00	2.662E+000
PB-214		2.450E+001	2.450E+001	7.78	8.29	2.862E+000
BI-212	#	5.446E+000	5.447E+000	63.82	63.89	1.144E+001
Pa-234	#	-2.464E-002	-2.464E-002	5.398.67	5.398.67	4.618E+000
AM-241	#	8.691E-001	8.691E-001	114.24	114.31	3.361E+000

= All peaks for activity calculation had bad shape

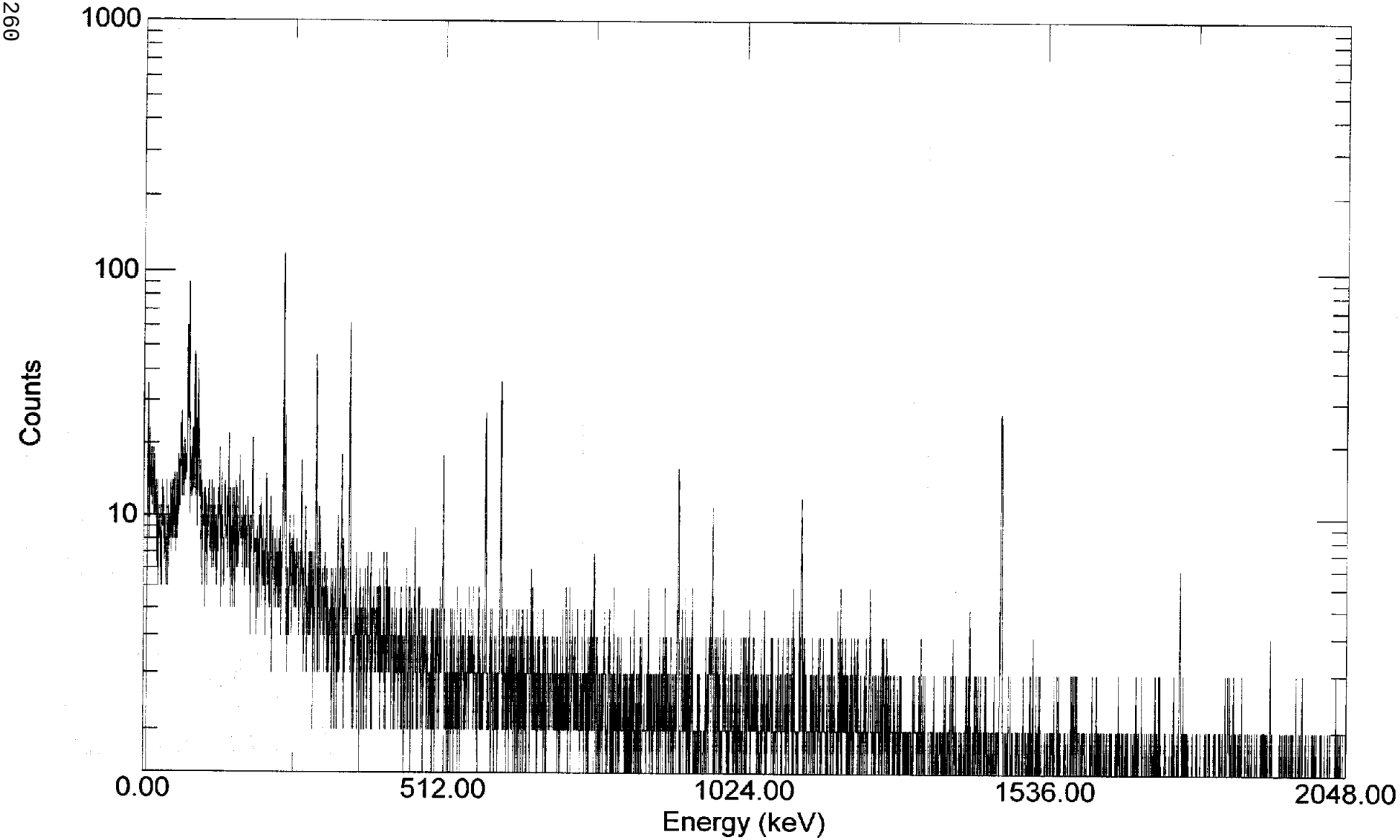
Total Activity (37.74 to 2,000.57 keV) 295.61 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKDC1AC

7360292_KEKDC1AC_F7L200260-003



Acquired: 26-Dec-2007 2:09:34 PM
File: C:\User\spectra\KEKDC1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1849.58 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,037

Sample Description: 7360292_KEKDE1AC_F7L200260-004

Spectrum Filename: KEKDE1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:10:01PM		
Live Time:	1800.00	Real Time:	1820.80
Dead Time:	1.14 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0728

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.11	74.74	268.33	202.67	0.113	16.34	0.762	PB-214	
307.29	77.04	291.83	291.17	0.162	12.90	0.709	PB-214	
347.84	87.17	136.83	147.17	0.082	13.94	1.321	BI-207	s
358.54	89.85	156.00	79.00	0.044	25.03	0.812	PB-214	
835.52	209.07	99.69	56.31	0.031	28.40	0.923	AC-228	s
1179.92	295.15	176.80	29.20	0.016	67.01	1.198		s
1406.83	351.87	271.42	51.58	0.029	47.27	1.433		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.59	46.62	176.96	12.57	0.007	50.45	0.832	
AM-241	1	239.34	60.05	264.24	7.05	0.004	328.31	0.846	s
TH-234	1	251.69	63.14	293.52	28.85	0.016	49.19	0.850	s
EU-155	1	345.32	86.54	355.76	4.97	0.003	539.11	0.874	s
TH-234	1	370.77	92.90	332.61	49.25	0.027	33.94	0.881	s
AC-228	1	372.56	93.35	245.97	75.98	0.042	2.28	0.882	s D
U-235	1	372.56	93.35	245.97	4.72	0.003	45.63	0.882	s D
EU-155	1	420.22	105.26	185.98	22.00	0.012	90.22	0.894	s
EU-152	1	487.23	122.01	194.27	-0.71	0.000	2779.00	0.912	
EU-154	1	488.91	122.43	184.26	-16.01	-0.009	122.45	0.913	
Pa-234	1	518.84	129.91	199.84	-24.29	-0.013	84.77	0.922	s
U-235	1	574.85	143.91	199.45	8.88	0.005	227.41	0.935	s
U-235	1	652.60	163.35	137.57	17.24	0.010	99.21	0.955	s
U-235	1	823.82	206.14	127.56	12.53	0.007	130.60	0.999	s
PB-212	1	954.39	238.78	158.88	671.13	0.373	5.93	1.131	
RA-224	1	959.98	240.18	686.33	-154.31	-0.086	25.32	1.036	s
PB-214	1	966.53	241.82	375.46	-0.53	0.000	5153.90	1.037	s
TL-208	1	1109.10	277.45	90.93	25.09	0.014	57.35	1.074	s
I-131	1	1136.69	284.35	101.89	-10.87	-0.006	134.83	1.081	s
PB-214	1	1180.21	295.23	53.47	148.30	0.082	10.77	1.092	s
PB-212	1	1198.21	299.72	31.17	73.83	0.041	18.83	1.027	s
AC-228	1	1352.53	338.30	64.49	100.77	0.056	15.04	1.136	s
EU-152	1	1375.58	344.06	54.03	-0.99	-0.001	1058.61	1.142	s
PB-214	1	1407.24	351.97	72.22	229.87	0.128	8.28	1.150	s
I-131	1	1457.07	364.43	58.39	-4.83	-0.003	228.43	1.163	s
BE-7	1	1913.27	478.46	32.97	14.19	0.008	63.10	1.277	
CS-134	1	2251.25	562.94	35.26	-0.44	0.000	1919.10	1.363	s
CS-134	1	2276.76	569.32	38.12	-0.04	0.000	-35.42	1.369	s D
Pa-234	1	2277.35	569.47	38.12	-3.58	-0.002	-130.43	1.369	s D
TL-208	1	2332.49	583.25	16.91	206.09	0.114	8.21	1.500	s
CS-134	1	2411.04	602.89	43.14	-0.26	0.000	3552.56	1.403	s
BI-214	1	2436.70	609.30	32.13	217.87	0.121	9.43	1.506	
I-131	1	2540.91	635.35	37.91	-5.36	-0.003	167.96	1.435	s
CS-137	1	2646.48	661.74	41.24	29.72	0.017	34.65	1.459	s
EU-154	1	2892.87	723.33	48.36	-3.38	-0.002	295.75	1.519	s
BI-212	1	2909.13	727.40	34.43	20.24	0.011	46.64	1.523	s
PA-234M	1	3066.74	766.80	44.98	-5.30	-0.003	184.20	1.561	s
EU-152	1	3112.95	778.35	36.29	-1.65	-0.001	522.47	1.573	s
BI-212	1	3141.11	785.39	28.94	8.85	0.005	92.29	1.579	s
CS-134	1	3180.47	795.23	25.70	5.00	0.003	150.28	1.589	s
CS-134	1	3213.24	803.42	26.06	-1.92	-0.001	382.86	1.595	s
TL-208	1	3443.43	860.96	22.99	11.97	0.007	63.59	1.650	s
EU-154	1	3492.18	873.15	18.55	5.47	0.003	119.33	1.662	s
Pa-234	1	3526.90	881.83	23.30	0.11	0.000	6152.98	1.669	s
Pa-234	1	3532.30	883.18	24.08	2.83	0.002	252.18	1.672	s
AC-228	1	3644.66	911.27	17.62	86.44	0.048	12.76	1.698	s

Pa-234	1	3783.68	946.02	35.18	0.00	0.000	838.77	1.731	s
EU-152	1	3857.82	964.55	50.46	20.71	0.012	53.25	1.748	s
AC-228	1	3876.96	969.34	46.86	45.29	0.025	26.03	1.752	s
EU-154	1	3975.64	994.01	16.66	0.08	0.000	6833.83	1.778	s
PA-234M	1	4005.70	1001.52	24.80	2.45	0.001	294.40	1.782	s
EU-154	1	4021.91	1005.57	28.51	-4.27	-0.002	183.28	1.785	s
EU-152	1	4466.76	1116.78	17.92	-0.35	0.000	1716.06	1.884	s
BI-214	1	4481.68	1120.51	0.00	86.00	0.048	10.78	0.617	s
CO-60	1	4692.13	1173.13	24.19	6.64	0.004	111.67	1.939	s
EU-154	1	5104.95	1276.33	21.79	1.26	0.001	530.45	2.030	s
CO-60	1	5329.63	1332.50	17.83	0.00	0.000	597.22	2.081	s
EU-152	1	5628.44	1407.21	16.32	5.50	0.003	112.36	2.147	s
K-40	1	5843.14	1460.88	0.00	325.00	0.181	5.55	2.016	
BI-214	1	7055.66	1764.04	4.76	16.98	0.009	30.32	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
CS-134	T F I	1	-9.971E-003	604.71	-9.971E-003	% (	1.269E+000G		7.5E+002	97.62
			-9.971E-003	795.87	2.756E-001	%	1.452E+000G		7.5E+002	85.53
			-9.971E-003	569.32	-9.971E-003	&	7.213E+000G		7.5E+002	15.38
			-9.971E-003	801.95	-1.049E+000	&	1.448E+001G		7.5E+002	8.69
			-9.971E-003	563.24	-1.835E-001	&	1.270E+001G		7.5E+002	8.35
U-235	N	1	9.472E-001	143.79	9.472E-001	% (	7.309E+000G		2.6E+011	10.96
			9.472E-001	205.33	3.568E+000	%	1.576E+001G		2.6E+011	5.01
			9.472E-001	163.38	4.190E+000	%	1.395E+001G		2.6E+011	5.08
			9.472E-001	93.35	9.472E-001	%	1.521E+001X	E	2.6E+011	5.81
TL-208	F N	1	8.778E+000	583.02	8.778E+000	@ (P	9.315E-001G		7.0E+002	84.50
			8.778E+000	277.28	7.268E+000	%	1.366E+001G		7.0E+002	6.31
			8.778E+000	860.56	4.862E+000	&	1.017E+001G		7.0E+002	12.42
TH-234	N	1	8.755E+000	63.29	8.755E+000	% (P	2.505E+001G		1.6E+012	4.82
			8.755E+000	92.59	1.031E+001	% P	1.836E+001G		1.6E+012	5.58
EU-152	T F	1	-8.288E-002	344.29	-8.288E-002	& (	3.106E+000G		4.9E+003	26.50
			-8.288E-002	121.78	-2.801E-002	%	2.670E+000G		4.9E+003	28.58
			-8.288E-002	778.92	-5.901E-001	%	1.102E+001G		4.9E+003	12.94
			-8.288E-002	964.11	7.881E+000	%	1.363E+001G		4.9E+003	14.61
			-8.288E-002	1112.07	-1.615E-001	%	1.034E+001G		4.9E+003	13.64
			-8.288E-002	1408.00	2.027E+000	%	7.944E+000G		4.9E+003	21.00
PB-210	N	1	7.506E+000	46.54	7.506E+000	% (P	3.863E+001G		8.1E+003	4.25
BI-212	N	1	7.475E+000	727.33	7.475E+000	% (	1.110E+001G		7.0E+002	11.82
			7.475E+000	785.51	3.753E+001	%	1.178E+002G		7.0E+002	1.10
RA-224	N	1	-6.094E+001	240.99	-6.094E+001	& (	4.929E+001G		7.0E+002	4.10
BE-7	N P C	1	4.058E+000	477.60	4.058E+000	% (	8.430E+000G		5.3E+001	10.52
AM-241	T	1	3.045E-001	59.54	3.045E-001	& (	3.390E+000G		1.6E+005	35.90
PB-212	N	1	2.489E+001	238.63	2.489E+001	(P	2.279E+000G		7.0E+002	43.30
			2.489E+001	300.03	4.418E+001	*	1.719E+001G		7.0E+002	3.28
K-40	N	1	2.441E+002	1460.83	2.441E+002	(	5.536E+000G		4.7E+011	10.67
			2.276E+000	123.10	-4.431E-001	&	1.825E+000G		3.1E+003	40.79
			2.276E+000	1274.54	2.541E-001	&	4.923E+000G		3.1E+003	35.19
			2.276E+000	723.36	-7.269E-001	&	7.546E+000G		3.1E+003	20.22

				2.276E+000	1004.77	-1.366E+000	%			8.821E+000G		3.1E+003	18.01
				2.276E+000	996.33	4.561E-002	%			1.172E+001G		3.1E+003	10.60
EU-154	T F I		1	2.276E+000	873.23	2.276E+000	%	(		9.482E+000G		3.1E+003	12.27
BI-214		N	1	1.769E+001	609.31	1.769E+001		(	P	2.365E+000G		5.8E+005	46.09
				1.769E+001	1120.29	3.602E+001	+			3.087E+000G		5.8E+005	15.10
				1.769E+001	1764.49	1.059E+001	-			8.031E+000G		5.8E+005	15.40
PA-234M		N	1	1.680E+001	1001.00	1.680E+001	%	(		1.777E+002G		1.6E+012	.84
				1.680E+001	766.41	-8.231E+001	%			5.276E+002G		1.6E+012	.29
AC-228		N	1	1.593E+001	911.16	1.579E+001		(		4.067E+000G		2.1E+003	29.00
				1.593E+001	968.97	1.448E+001		(		1.106E+001G		2.1E+003	17.46
				1.593E+001	338.32	1.838E+001	@	(		7.321E+000G		2.1E+003	12.01
				1.593E+001	93.35	1.593E+001	!		E	1.589E+001G	A	2.1E+003	5.56
Pa-234		N	1	-1.539E+000	131.29	-1.539E+000	&	(		4.345E+000G		1.6E+012	18.00
				-1.539E+000	569.47	-1.539E+000	&			1.353E+001G		1.6E+012	8.20
				-1.539E+000	946.02	0.000E+000	%			1.238E+001G		1.6E+012	13.40
				-1.539E+000	883.24	1.521E+000	%			1.374E+001G		1.6E+012	9.60
				-1.539E+000	880.53	9.522E-002	%			2.161E+001G		1.6E+012	6.00
PB-214		N	1	1.422E+001	351.93	1.389E+001	*	(	P	2.557E+000G		5.8E+005	37.60
				1.422E+001	295.09	1.486E+001	*	(		3.685E+000G		5.8E+005	19.30
				1.422E+001	242.00	-1.163E-001	%			2.034E+001G		5.8E+005	7.43
CS-137	T F I		1	1.403E+000	661.66	1.403E+000	*	(	P	1.540E+000G		1.1E+004	85.21
I-131	T F I		1	-1.387E-001	364.48	-1.387E-001	%	(		1.101E+000G		8.0E+000	81.70
				-1.387E-001	284.30	-3.309E+000	%			1.515E+001G		8.0E+000	6.14
				-1.387E-001	636.97	-2.911E+000	&			1.704E+001G		8.0E+000	7.17
EU-155	T F I		1	1.175E+000	105.31	1.175E+000	*	(		3.540E+000G		1.8E+003	21.20
				1.175E+000	86.54	1.941E-001	%			3.542E+000G	A	1.8E+003	30.70
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(		1.650E+000G		1.9E+003	99.98
				0.000E+000	1173.24	4.378E-001	%			1.689E+000G		1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	4.058E+000	4.063E+000	63.10	63.17	8.430E+000
K-40		2.441E+002	2.441E+002	5.55	6.27	5.536E+000
CO-60	#			597.22	597.23	1.650E+000
I-131	#	-1.387E-001	-1.398E-001	228.43	228.45	1.101E+000
CS-134	#	-9.971E-003	-9.972E-003	3,552.56	3,552.56	1.269E+000
CS-137	#	1.403E+000	1.403E+000	35.52	35.64	1.540E+000
EU-155	#	1.175E+000	1.175E+000	90.22	90.28	3.540E+000
TL-208	#	8.778E+000	8.779E+000	8.31	8.79	9.315E-001
PB-210	#	7.506E+000	7.506E+000	147.18	147.24	3.863E+001
PB-212		2.489E+001	2.490E+001	6.01	6.71	2.279E+000
PB-214	#	1.422E+001	1.422E+001	6.83	7.40	2.557E+000
RA-224	#	-6.094E+001	-6.095E+001	25.32	25.50	4.929E+001
AC-228	#	1.593E+001	1.593E+001	10.89	11.26	4.067E+000
Pa-234	#	-1.539E+000	-1.539E+000	84.77	84.82	4.345E+000
U-235	#	9.472E-001	9.472E-001	227.41	227.43	7.309E+000
AM-241	#	3.045E-001	3.045E-001	328.31	328.33	3.390E+000
EU-152	#	-8.288E-002	-8.288E-002	1,058.61	1,058.61	3.106E+000
EU-154	#	2.276E+000	2.276E+000	119.33	119.36	9.482E+000
BI-212	#	7.475E+000	7.475E+000	46.64	46.73	1.110E+001
BI-214		1.769E+001	1.769E+001	9.52	9.95	2.365E+000
TH-234	#	8.755E+000	8.755E+000	84.57	84.65	2.505E+001
PA-234M	#	1.680E+001	1.680E+001	294.40	294.42	1.777E+002

= All peaks for activity calculation had bad shape

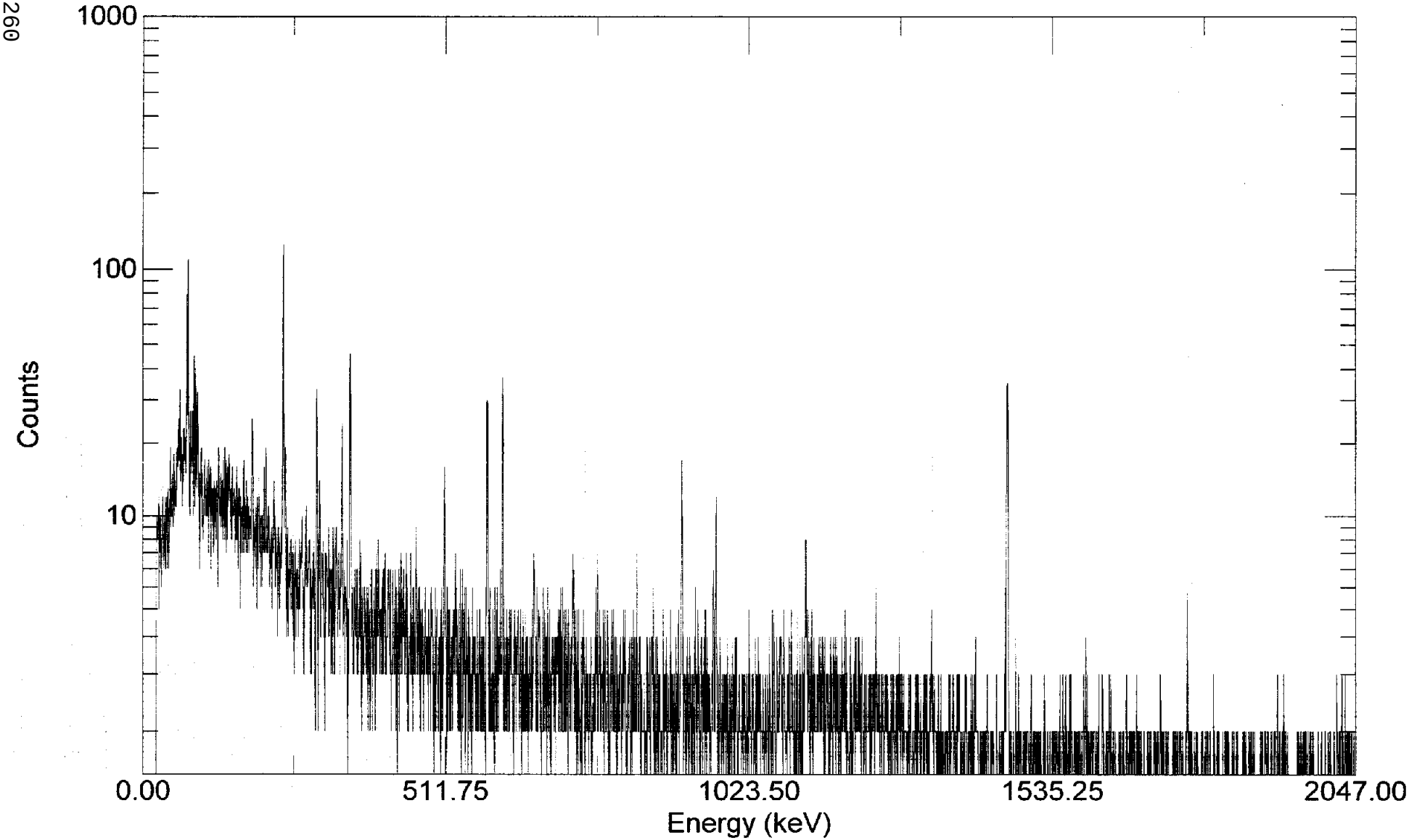
Total Activity (37.72 to 2,000.15 keV) 295.47 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKDE1AC

7360292_KEKDE1AC_F7L200260-004



Acquired: 26-Dec-2007 2:10:01 PM
File: C:\User\spectra\KEKDE1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.80 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,039

Sample Description: 7360292_KEKDK1AC_F7L200260-005

Spectrum Filename: KEKDK1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:46:25PM		
Live Time:	1800.00	Real Time:	1810.80
Dead Time:	0.60 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1020

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.71	74.89	426.00	242.00	0.134	18.23	0.944	PB-214	
307.64	77.13	376.83	368.17	0.205	11.96	0.794	PB-214	
347.85	87.18	199.33	159.67	0.089	14.80	0.971	PB-214	s
359.21	90.02	133.83	125.17	0.070	17.94	0.888	PB-214	sM
741.92	185.70	126.67	127.33	0.071	20.10	0.750	U-235	s
1179.56	295.11	228.87	6.13	0.003	351.24	1.026		
1309.72	327.65	50.67	49.33	0.027	32.71	0.736	AC-228	s
1352.76	338.41	219.72	48.28	0.027	45.74	1.061		s
1406.24	351.78	329.94	10.06	0.006	257.20	1.006		
1850.17	462.75	17.00	58.00	0.032	19.13	0.539	CS-138	s
2041.49	510.58	24.67	184.33	0.102	10.31	0.937	TL-208	s
3643.95	911.15	150.29	23.71	0.013	75.95	1.175		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.80	46.41	162.79	77.21	0.043	24.53	0.738	s
AM-241	1	237.26	59.53	272.70	10.34	0.006	227.98	0.824	s
TH-234	1	252.78	63.41	231.90	74.10	0.041	25.38	0.754	s
EU-155	1	345.31	86.54	395.76	-6.03	-0.003	468.71	0.849	s
TH-234	1	371.46	93.08	269.01	132.99	0.074	18.02	0.896	s
AC-228	1	372.54	93.35	243.56	100.45	0.056	1.94	0.855	s D
U-235	1	372.54	93.35	243.56	-6.55	-0.004	-531.42	0.855	s D
EU-155	1	420.06	105.23	214.85	31.51	0.018	68.16	0.866	s
EU-154	1	483.49	121.09	110.72	1.49	0.001	1003.52	0.882	s
EU-152	1	487.71	122.14	244.69	-33.40	-0.019	68.46	0.881	s
Pa-234	1	523.66	131.13	346.76	-24.28	-0.013	110.33	0.890	s
U-235	1	574.19	143.76	252.76	-12.10	-0.007	269.22	0.901	s
U-235	1	652.51	163.34	158.82	14.97	0.008	101.15	0.919	s
U-235	1	819.68	205.14	186.65	4.15	0.002	308.10	0.957	s
PB-212	1	952.98	238.46	162.25	671.75	0.373	5.14	1.075	
RA-224	1	958.66	239.88	837.44	-211.17	-0.117	20.57	0.989	s
PB-214	1	965.82	241.67	203.25	63.03	0.035	30.70	0.990	s
TL-208	1	1107.38	277.06	75.25	36.01	0.020	37.93	1.021	s
I-131	1	1137.16	284.51	92.24	-5.02	-0.003	274.15	1.028	s
PB-214	1	1179.56	295.11	103.96	164.67	0.091	10.96	1.037	
PB-212	1	1198.99	299.96	76.67	74.33	0.041	28.38	0.810	s
AC-228	1	1352.07	338.23	94.22	142.52	0.079	12.25	1.076	s
EU-152	1	1375.34	344.05	73.87	-10.07	-0.006	124.76	1.081	s
PB-214	1	1406.26	351.78	70.01	278.29	0.155	6.94	1.088	
I-131	1	1455.41	364.07	72.79	-6.69	-0.004	184.35	1.099	s
BE-7	1	1914.12	478.74	34.70	6.32	0.004	137.68	1.198	s
CS-134	1	2251.53	563.09	48.28	-2.21	-0.001	449.01	1.273	s
CS-134	1	2276.47	569.32	34.28	-2.55	-0.001	-45.39	1.278	s D
Pa-234	1	2277.07	569.47	34.55	-4.39	-0.002	-198.32	1.278	s D
TL-208	1	2331.25	583.02	29.58	262.42	0.146	7.36	1.229	
CS-134	1	2426.28	606.77	72.24	-15.53	-0.009	81.45	1.309	s
BI-214	1	2436.03	609.21	21.63	220.38	0.122	7.15	1.215	s
I-131	1	2543.26	636.01	32.56	-1.05	-0.001	776.70	1.337	s
CS-137	1	2644.92	661.42	37.62	18.82	0.010	51.54	1.358	s
EU-154	1	2891.93	723.17	64.97	-7.80	-0.004	150.48	1.411	s
BI-212	1	2908.02	727.19	48.83	38.85	0.022	30.08	1.414	s
PA-234M	1	3063.98	766.18	51.66	-0.24	0.000	4171.95	1.447	s
EU-152	1	3113.51	778.56	36.64	-4.75	-0.003	186.11	1.458	s
BI-212	1	3141.32	785.51	62.34	0.00	0.000	1116.60	1.463	s
CS-134	1	3179.12	794.96	30.65	14.84	0.008	58.79	1.472	s
CS-134	1	3201.76	800.62	32.47	-3.33	-0.002	248.19	1.477	s
TL-208	1	3440.69	860.34	5.83	73.17	0.041	14.53	0.720	s
EU-154	1	3496.03	874.17	28.63	-3.36	-0.002	231.61	1.537	s
Pa-234	1	3523.06	880.93	37.68	3.19	0.002	277.54	1.543	s
Pa-234	1	3532.34	883.25	33.95	2.62	0.001	320.56	1.546	s

AC-228	1	3643.75	911.10	31.82	142.12	0.079	9.65	1.569	s
Pa-234	1	3783.14	945.94	35.19	-3.66	-0.002	235.38	1.598	s
EU-152	1	3874.27	968.72	67.20	6.43	0.004	184.57	1.613	s
AC-228	1	3874.60	968.80	52.20	65.18	0.036	18.85	1.617	s
EU-154	1	3981.83	995.60	26.66	-0.20	0.000	3710.81	1.640	s
PA-234M	1	3997.35	999.48	32.17	-0.88	0.000	920.16	1.643	s
EU-154	1	4018.52	1004.77	26.97	0.00	0.000	734.50	1.647	s
EU-152	1	4449.06	1112.39	32.90	0.18	0.000	4431.23	1.735	s
BI-214	1	4479.44	1119.98	34.69	27.20	0.015	28.92	1.741	s
CO-60	1	4690.10	1172.64	42.08	-4.63	-0.003	203.62	1.784	s
EU-154	1	5091.05	1272.85	33.90	-1.57	-0.001	529.11	1.866	s
CO-60	1	5326.93	1331.80	17.45	-2.77	-0.002	221.56	1.912	s
EU-152	1	5631.55	1407.94	17.02	4.20	0.002	147.22	1.972	s
K-40	1	5842.48	1460.66	12.54	400.46	0.222	4.92	1.707	
BI-214	1	7055.43	1763.79	15.22	15.67	0.009	31.39	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Analysis Code		MDA Value Becquerels	Code	Comments	
RA-224	N	1	-9.273E+001	240.99	-9.273E+001	*	(	6.041E+001G		7.0E+002	4.10
EU-152	T F	1	-8.842E-001	344.29	-8.842E-001	%	(	3.755E+000G		4.9E+003	26.50
			-8.842E-001	121.78	-1.537E+000	&		3.480E+000G		4.9E+003	28.58
			-8.842E-001	778.92	-1.534E+000	%		9.991E+000G		4.9E+003	12.94
			-8.842E-001	964.11	2.137E+000	%		1.359E+001G		4.9E+003	14.61
			-8.842E-001	1112.07	7.217E-002	%		1.159E+001G		4.9E+003	13.64
			-8.842E-001	1408.00	1.280E+000	%		6.683E+000G		4.9E+003	21.00
CS-137	T F I	1	8.241E-001	661.66	8.241E-001	%	(	1.371E+000G		1.1E+004	85.21
CS-134	T F I	1	-5.573E-001	604.71	-5.573E-001	&	(	1.518E+000G		7.5E+002	97.62
			-5.573E-001	795.87	7.367E-001	%		1.415E+000G		7.5E+002	85.53
			-5.573E-001	569.32	-5.573E-001	%		6.545E+000G		7.5E+002	15.38
			-5.573E-001	801.95	-1.635E+000	%		1.437E+001G		7.5E+002	8.69
			-5.573E-001	563.24	-8.829E-001	%		1.400E+001G		7.5E+002	8.35
			-5.226E+000	766.41	-3.431E+000	%		5.092E+002G		1.6E+012	.29
PA-234	N	1	-5.226E+000	1001.00	-5.226E+000	%	(	1.735E+002G		1.6E+012	.84
AM-241	T	1	4.999E-001	59.54	4.999E-001	&	(	3.851E+000G		1.6E+005	35.90
PB-210	N	1	4.877E+001	46.54	4.877E+001	*	(P	3.927E+001G		8.1E+003	4.25
TH-234	N	1	2.880E+001	63.29	2.520E+001	*	(P	2.505E+001G		1.6E+012	4.82
			2.880E+001	92.59	3.190E+001	*	(P	1.899E+001G		1.6E+012	5.58
PB-212	N	1	2.774E+001	238.63	2.774E+001		(P	2.564E+000G		7.0E+002	43.30
			2.774E+001	300.03	4.767E+001	+		2.790E+001G		7.0E+002	3.28
K-40	N	1	2.471E+002	1460.83	2.471E+002		(P	1.186E+001G		4.7E+011	10.67
AC-228	N	1	2.415E+001	911.07	2.286E+001		(P	4.664E+000G		2.1E+003	29.00
			2.415E+001	968.97	1.818E+001	-	P	1.015E+001G		2.1E+003	17.46
			2.415E+001	338.32	2.726E+001	@	(P	9.170E+000G		2.1E+003	12.01
			2.415E+001	93.35	2.415E+001	!	E	1.813E+001X	A	2.1E+003	5.56
			-1.989E-001	284.30	-1.654E+000	%		1.564E+001G		8.0E+000	6.14
			-1.989E-001	636.97	-5.307E-001	&		1.485E+001G		8.0E+000	7.17
I-131	T F I	1	-1.989E-001	364.48	-1.989E-001	%	(	1.262E+000G		8.0E+000	81.70
			1.949E+000	86.54	-2.684E-001	%		4.250E+000G		1.8E+003	30.70
EU-155	T F I	1	1.949E+000	105.31	1.949E+000	*	(	4.392E+000G		1.8E+003	21.20
Pa-234	N	1	-1.798E+000	131.29	-1.798E+000	&	(	6.624E+000G		1.6E+012	18.00
			-1.798E+000	569.47	-1.798E+000	%		1.232E+001G		1.6E+012	8.20
			-1.798E+000	946.02	-1.306E+000	%		1.085E+001G		1.6E+012	13.40
			-1.798E+000	883.24	1.246E+000	%		1.420E+001G		1.6E+012	9.60
			-1.798E+000	880.53	2.424E+000	%		2.377E+001G		1.6E+012	6.00
BE-7	N P C	1	1.778E+000	477.60	1.778E+000	%	(	8.483E+000G		5.3E+001	10.52
PB-214	N	1	1.732E+001	351.93	1.750E+001		(P	2.623E+000G		5.8E+005	37.60
			1.732E+001	295.09	1.773E+001		(P	5.408E+000G		5.8E+005	19.30
			1.732E+001	242.00	1.532E+001	*	(P	1.680E+001G		5.8E+005	7.43
CO-60	T F	1	-1.700E-001	1332.50	-1.700E-001	%	(	1.361E+000G		1.9E+003	99.98
			-1.700E-001	1173.24	-2.587E-001	%		1.841E+000G		1.9E+003	99.90
			1.684E+001	1120.29	9.728E+000	-	P	1.078E+001G		5.8E+005	15.10
			1.684E+001	1764.49	7.815E+000	%	P	1.042E+001G		5.8E+005	15.40

BI-214		N	1	1.684E+001	609.31	1.684E+001	*	(	P	1.863E+000G	5.8E+005	46.09
U-235		N	1	-1.508E+000	143.79	-1.508E+000	%	(	P	9.568E+000G	2.6E+011	10.96
				-1.508E+000	205.33	1.343E+000	%		P	2.149E+001G	2.6E+011	5.01
				-1.508E+000	163.38	4.228E+000	%		P	1.735E+001G	2.6E+011	5.08
				-1.508E+000	93.35	-1.508E+000	!		E	1.736E+001X	2.6E+011	5.81
BI-212		N	1	1.310E+001	727.33	1.310E+001		(		1.190E+001G	7.0E+002	11.82
				1.310E+001	785.51	0.000E+000	&			1.511E+002G	7.0E+002	1.10
EU-154	T F I		1	-1.241E+000	873.23	-1.241E+000	&	(		1.020E+001G	3.1E+003	12.27
				-1.241E+000	123.10	4.805E-002	%			1.671E+000G	3.1E+003	40.79
				-1.241E+000	1274.54	-2.655E-001	%			5.033E+000G	3.1E+003	35.19
				-1.241E+000	723.36	-1.532E+000	%			7.910E+000G	3.1E+003	20.22
				-1.241E+000	1004.77	0.000E+000	&			7.467E+000G	3.1E+003	18.01
				-1.241E+000	996.33	-9.238E-002	&			1.255E+001G	3.1E+003	10.60
TL-208	F	N	1	1.065E+001	583.02	1.060E+001		(	P	1.133E+000G	7.0E+002	84.50
				1.065E+001	277.28	1.134E+001	?	(		1.358E+001G	7.0E+002	6.31
				1.065E+001	860.56	2.641E+001	+			5.040E+000G	7.0E+002	12.42

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	-5.573E-001	-5.573E-001	81.45	81.50	1.518E+000
BE-7	<	1.778E+000	1.780E+000	137.68	137.71	8.483E+000
K-40		2.471E+002	2.471E+002	5.07	5.86	1.186E+001
CO-60	<	-1.700E-001	-1.700E-001	221.56	221.58	1.361E+000
I-131	<	-1.989E-001	-2.008E-001	184.35	184.37	1.262E+000
CS-137	<	8.241E-001	8.241E-001	51.54	51.62	1.371E+000
EU-152	<	-8.842E-001	-8.842E-001	124.76	124.79	3.755E+000
TL-208		1.065E+001	1.065E+001	7.61	8.14	1.133E+000
RA-224	<	-9.273E+001	-9.274E+001	20.57	20.78	6.041E+001
PB-210	#	4.877E+001	4.877E+001	33.88	34.11	3.927E+001
PB-212		2.774E+001	2.775E+001	5.32	6.10	2.564E+000
AC-228	<	2.415E+001	2.415E+001	8.06	8.56	4.664E+000
Pa-234	<	-1.798E+000	-1.798E+000	110.33	110.37	6.624E+000
U-235	<	-1.508E+000	-1.508E+000	352.48	352.49	9.568E+000
AM-241	<	4.999E-001	4.999E-001	227.98	228.02	3.851E+000
EU-154	<	-1.241E+000	-1.241E+000	231.61	231.63	1.020E+001
EU-155	<	1.949E+000	1.949E+000	68.16	68.24	4.392E+000
PB-214	<	1.732E+001	1.732E+001	7.24	7.79	2.623E+000
BI-212	<	1.310E+001	1.310E+001	30.08	30.22	1.190E+001
BI-214	#	1.684E+001	1.684E+001	7.53	8.07	1.863E+000
TH-234	#	2.880E+001	2.880E+001	22.71	23.01	2.505E+001
PA-234M	<	-5.226E+000	-5.226E+000	920.16	920.16	1.735E+002

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 379.94 Bq/sample

Analyzed by: _____

403605

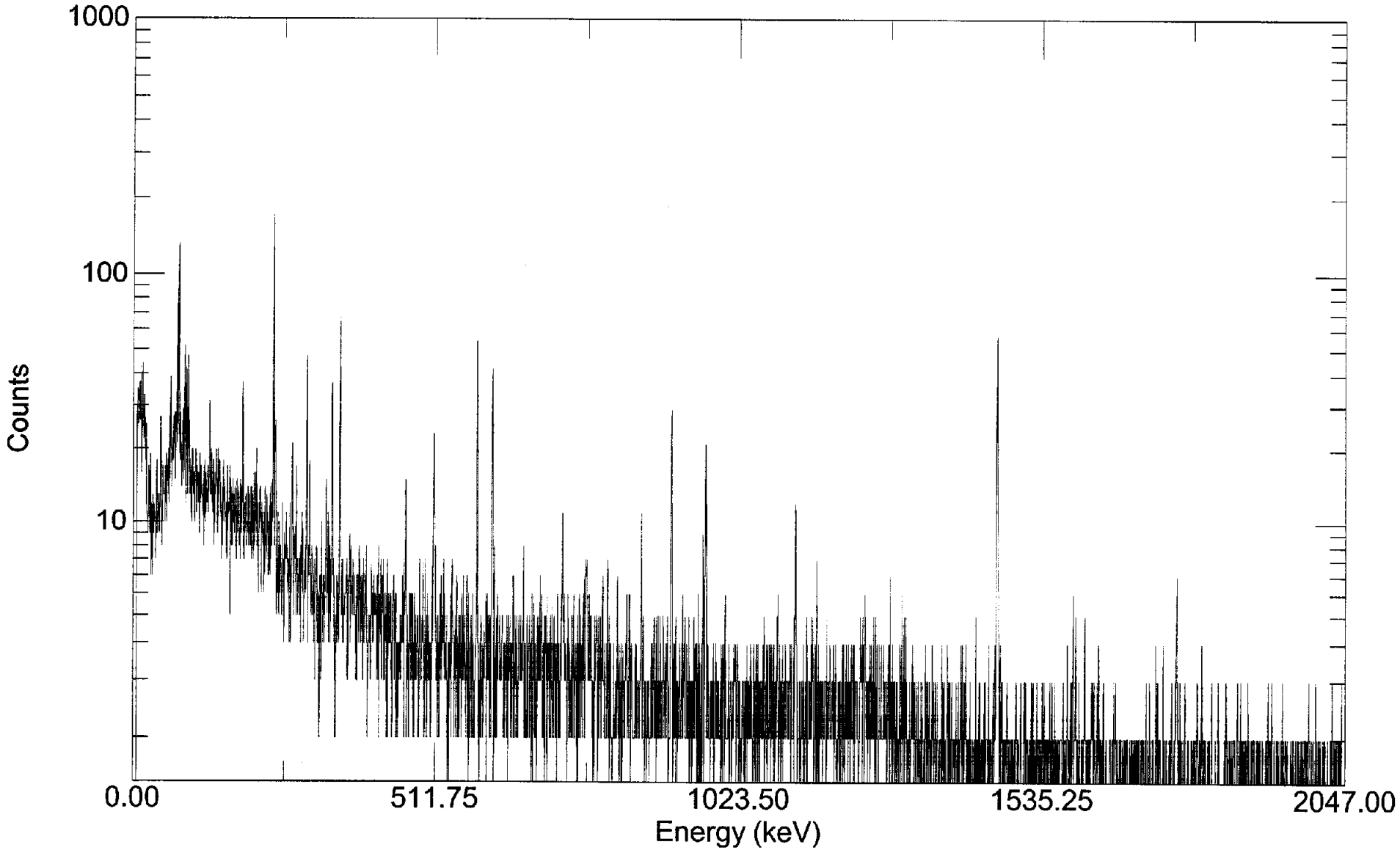
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKDK1AC

7360292_KEKDK1AC_F7L200260-005



Acquired: 26-Dec-2007 2:46:25 PM
File: C:\User\spectra\KEKDK1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.80 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,044

Sample Description: 7360292_KEKDR1AC_F7L200260-006

Spectrum Filename: KEKDR1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:46:45PM		
Live Time:	1800.00	Real Time:	1853.42
Dead Time:	2.88 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1526

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
347.25	87.01	401.00	0.00	0.000	2831.96	0.740		
358.52	89.83	210.17	119.83	0.067	19.39	0.682	PB-214	s
515.30	129.00	164.27	104.73	0.058	19.88	0.986	AC-228	
744.35	186.22	170.83	110.17	0.061	28.60	0.523	PA-234	s
836.54	209.25	161.45	113.55	0.063	18.40	0.694	AC-228	s
2044.36	511.06	17.50	124.50	0.069	10.95	0.508	TL-208	s
174.46	43.85	75.17	40.83	0.023	39.02	0.776	EU-155	sM
297.87	74.68	438.00	349.00	0.194	13.13	0.688	PB-214	
307.26	77.03	320.00	452.00	0.251	8.77	0.862	PB-214	

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.81	46.69	115.26	54.74	0.030	26.57	0.886	s
AM-241	1	236.08	59.25	301.59	-2.16	-0.001	2113.68	0.761	s
TH-234	1	252.01	63.22	355.30	14.39	0.008	93.38	0.764	s
EU-155	1	347.61	87.11	296.53	198.23	0.110	14.19	0.788	
TH-234	1	371.46	93.06	366.19	118.63	0.066	20.34	0.795	s
AC-228	1	372.61	93.35	250.00	187.06	0.104	1.82	1.176	s D
U-235	1	372.61	93.35	282.96	-4.15	-0.002	-648.25	0.795	s D
EU-155	1	421.75	105.63	237.78	31.55	0.018	71.37	0.808	s
EU-152	1	485.91	121.66	240.15	-8.67	-0.005	254.99	0.824	s
EU-154	1	491.36	123.02	203.79	12.01	0.007	170.60	0.826	s
Pa-234	1	520.05	130.18	247.74	-15.83	-0.009	142.81	0.834	s
U-235	1	574.00	143.66	262.46	-7.85	-0.004	426.77	0.847	s
U-235	1	653.60	163.55	225.65	-10.78	-0.006	243.22	0.867	s
U-235	1	819.58	205.02	169.10	22.92	0.013	82.90	0.909	s
PB-212	1	954.20	238.65	164.48	955.52	0.531	4.28	0.899	
RA-224	1	963.54	240.99	123.72	93.28	0.052	19.79	0.944	D
PB-214	1	967.59	242.00	173.64	71.36	0.040	28.67	0.945	D
TL-208	1	1109.02	277.33	65.00	109.00	0.061	19.58	0.921	s
I-131	1	1134.39	283.67	72.68	-0.29	0.000	4178.49	0.987	s
PB-214	1	1180.02	295.07	81.75	139.25	0.077	15.31	1.052	
PB-212	1	1200.65	300.23	36.67	63.33	0.035	20.42	1.434	s
AC-228	1	1353.70	338.47	65.00	236.00	0.131	10.23	1.160	
EU-152	1	1388.95	347.28	44.12	15.10	0.008	67.33	1.045	s
PB-214	1	1407.87	352.01	70.21	222.79	0.124	10.90	1.132	s
I-131	1	1457.36	364.37	56.31	9.32	0.005	118.51	1.065	s
BE-7	1	1918.97	479.73	43.43	-1.46	-0.001	645.65	1.173	s
CS-134	1	2252.72	563.14	51.75	3.32	0.002	311.73	1.252	s
CS-134	1	2277.45	569.32	39.25	-0.92	-0.001	-50.76	1.258	s D
Pa-234	1	2278.05	569.47	51.81	-2.38	-0.001	-198.04	1.258	s D
TL-208	1	2333.72	583.38	22.42	304.58	0.169	6.60	1.303	
CS-134	1	2420.54	605.09	45.56	-5.56	-0.003	176.90	1.290	s
BI-214	1	2438.26	609.51	21.90	123.10	0.068	10.27	1.425	
I-131	1	2546.53	636.58	39.32	7.74	0.004	120.06	1.319	
CS-137	1	2648.60	662.09	22.25	34.75	0.019	24.35	0.402	s
EU-154	1	2901.67	725.34	62.05	-14.05	-0.008	83.66	1.397	s
BI-212	1	2910.57	727.57	4.67	84.33	0.047	12.48	0.678	s
PA-234M	1	3066.18	766.47	46.88	-6.00	-0.003	166.55	1.434	s
EU-152	1	3116.98	779.17	40.39	-3.99	-0.002	230.55	1.445	s
BI-212	1	3131.86	782.89	24.74	4.60	0.003	160.00	1.451	
CS-134	1	3192.12	797.95	44.22	-6.55	-0.004	148.73	1.460	s
CS-134	1	3211.59	802.82	44.00	-8.12	-0.005	120.71	1.465	s
TL-208	1	3443.50	860.80	0.00	32.00	0.018	17.68	0.519	s
EU-154	1	3495.46	873.79	29.64	-2.09	-0.001	374.78	1.527	s
Pa-234	1	3523.44	880.78	35.58	-2.19	-0.001	391.43	1.533	s
Pa-234	1	3532.09	882.94	26.12	2.05	0.001	360.06	1.535	s
AC-228	1	3646.15	911.46	5.00	215.00	0.119	7.28	1.671	s

Pa-234	1	3779.03	944.68	24.73	0.10	0.000	7033.34	1.588	s
EU-152	1	3844.61	961.08	30.39	-0.32	0.000	2442.22	1.603	s
AC-228	1	3876.49	969.05	30.00	166.00	0.092	12.36	1.519	
EU-154	1	3988.40	997.03	22.56	3.96	0.002	177.05	1.630	s
PA-234M	1	4008.00	1001.93	27.87	0.43	0.000	1758.79	1.633	s
EU-154	1	4019.37	1004.77	77.53	0.00	0.000	1245.26	1.637	s
EU-152	1	4448.34	1112.04	23.04	1.30	0.001	529.81	1.723	s
BI-214	1	4482.16	1120.50	0.00	75.00	0.042	11.55	1.396	
CO-60	1	4691.23	1172.78	30.03	-2.04	-0.001	386.27	1.772	s
EU-154	1	5098.13	1274.54	82.93	0.00	0.000	1287.85	1.850	s
CO-60	1	5332.21	1333.09	19.65	0.60	0.000	1047.56	1.894	s
EU-152	1	5633.55	1408.46	10.73	5.87	0.003	89.02	1.950	s
K-40	1	5844.46	1461.22	0.00	252.00	0.140	6.30	1.677	
BI-214	1	7058.21	1764.89	10.03	9.41	0.005	46.69	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	MDA Value Becquerels	MDA Code	Comments	
CO-60	T F	1	5.827E-002	1332.50	5.827E-002	% (	2.258E+000G		1.9E+003	99.98
			5.827E-002	1173.24	-1.778E-001	%	2.461E+000G		1.9E+003	99.90
BE-7	N P C	1	-5.664E-001	477.60	-5.664E-001	% (	1.301E+001G		5.3E+001	10.52
AC-228	N	1	5.438E+001	911.16	5.258E+001	@ (	3.211E+000G		2.1E+003	29.00
			5.438E+001	968.97	7.088E+001	+	1.206E+001G		2.1E+003	17.46
			5.438E+001	338.32	5.872E+001	(	1.002E+001G		2.1E+003	12.01
			5.438E+001	93.35	5.438E+001	+ E	2.221E+001G	A	2.1E+003	5.56
RA-224	N	1	5.037E+001	240.99	5.037E+001	(	2.945E+001G		7.0E+002	4.10
PB-212	N	1	4.869E+001	238.63	4.846E+001	(P	3.168E+000G		7.0E+002	43.30
			4.869E+001	300.03	5.172E+001	(	2.526E+001G		7.0E+002	3.28
BI-212	N	1	4.204E+001	727.33	4.204E+001	(	6.370E+000G		7.0E+002	11.82
			4.204E+001	785.51	2.624E+001	%	1.478E+002G		7.0E+002	1.10
PB-210	N	1	4.019E+001	46.54	4.019E+001	* (P	3.873E+001G		8.1E+003	4.25
PA-234M	N	1	3.897E+000	1001.00	3.897E+000	% (	2.497E+002G		1.6E+012	.84
			3.897E+000	766.41	-1.255E+002	%	7.247E+002G		1.6E+012	.29
			3.649E-001	636.97	5.688E+000	%	2.346E+001G		8.0E+000	7.17
I-131	T F I	1	3.649E-001	364.48	3.649E-001	% (	1.476E+000G		8.0E+000	81.70
			3.649E-001	284.30	-1.201E-001	&	1.764E+001G		8.0E+000	6.14
CS-134	T F I	1	-2.869E-001	604.71	-2.869E-001	& (	1.764E+000G		7.5E+002	97.62
			-2.869E-001	795.87	-4.865E-001	%	2.502E+000G		7.5E+002	85.53
			-2.869E-001	569.32	-2.869E-001	%	9.920E+000G		7.5E+002	15.38
			-2.869E-001	801.95	-5.972E+000	%	2.472E+001G		7.5E+002	8.69
			-2.869E-001	563.24	1.881E+000	&	2.056E+001G		7.5E+002	8.35
K-40	N	1	2.463E+002	1460.83	2.463E+002	(	7.204E+000G		4.7E+011	10.67
EU-155	T F I	1	2.339E+000	105.31	2.339E+000	* (	5.528E+000G		1.8E+003	21.20
			2.339E+000	86.54	1.072E+001		4.487E+000G	A	1.8E+003	30.70
CS-137	T F I	1	2.219E+000	661.66	2.219E+000	(P	1.577E+000G		1.1E+004	85.21
TH-234	N	1	2.118E+001	63.29	5.828E+000	% (P	3.668E+001G		1.6E+012	4.82
			2.118E+001	92.59	3.443E+001	* (P	2.667E+001G		1.6E+012	5.58
			1.891E+001	295.09	1.904E+001	(P	6.131E+000G		5.8E+005	19.30
			1.891E+001	242.00	2.133E+001	(	1.917E+001G		5.8E+005	7.43
PB-214	N	1	1.891E+001	351.93	1.836E+001	@ (P	3.441E+000G		5.8E+005	37.60

TL-208	F	N	1	1.758E+001	583.02	1.760E+001		(	P	1.431E+000G	7.0E+002	84.50
				1.758E+001	277.28	4.313E+001	*			1.594E+001G	7.0E+002	6.31
				1.758E+001	860.56	1.744E+001		(		4.017E+000G	7.0E+002	12.42
EU-152	T F		1	1.730E+000	344.29	1.730E+000	%	(		3.857E+000G	4.9E+003	26.50
				1.730E+000	121.78	-4.738E-001	%			4.094E+000G	4.9E+003	28.58
				1.730E+000	778.92	-1.925E+000	%			1.558E+001G	4.9E+003	12.94
				1.730E+000	964.11	-1.627E-001	%			1.444E+001G	4.9E+003	14.61
				1.730E+000	1112.07	7.936E-001	%			1.532E+001G	4.9E+003	13.64
				1.730E+000	1408.00	2.827E+000	%			8.654E+000G	4.9E+003	21.00
Pa-234		N	1	-1.387E+000	131.29	-1.387E+000	%	(		6.661E+000G	1.6E+012	18.00
				-1.387E+000	569.47	-1.387E+000	%			2.115E+001G	1.6E+012	8.20
				-1.387E+000	946.02	5.462E-002	%			1.412E+001G	1.6E+012	13.40
				-1.387E+000	883.24	1.474E+000	&			1.911E+001G	1.6E+012	9.60
				-1.387E+000	880.53	-2.515E+000	%			3.507E+001G	1.6E+012	6.00
Bi-214		N	1	1.355E+001	609.31	1.355E+001		(	P	2.698E+000G	5.8E+005	46.09
				1.355E+001	1120.29	4.164E+001	+			4.092E+000G	5.8E+005	15.10
				1.355E+001	1764.49	7.503E+000	%		P	1.393E+001G	5.8E+005	15.40
AM-241	T		1	-1.227E-001	59.54	-1.227E-001	%	(	P	4.758E+000G	1.6E+005	35.90
				-1.167E+000	123.10	4.600E-001	%			2.653E+000G	3.1E+003	40.79
				-1.167E+000	1274.54	0.000E+000	%			1.195E+001G	3.1E+003	35.19
				-1.167E+000	723.36	-4.076E+000	%			1.143E+001G	3.1E+003	20.22
				-1.167E+000	1004.77	0.000E+000	%			1.865E+001G	3.1E+003	18.01
				-1.167E+000	996.33	2.846E+000	&			1.787E+001G	3.1E+003	10.60
EU-154	T F I		1	-1.167E+000	873.23	-1.167E+000	%	(		1.568E+001G	3.1E+003	12.27
U-235		N	1	-1.155E+000	143.79	-1.155E+000	&	(	P	1.151E+001G	2.6E+011	10.96
				-1.155E+000	205.33	8.942E+000	%			2.470E+001G	2.6E+011	5.01
				-1.155E+000	163.38	-3.604E+000	%		P	2.431E+001G	2.6E+011	5.08
				-1.155E+000	93.35	-1.155E+000	!		E	2.256E+001X	2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	#	-2.869E-001	-2.870E-001	176.90	176.92	1.764E+000
CS-137		2.219E+000	2.219E+000	28.73	28.88	1.577E+000
EU-155	#	2.339E+000	2.339E+000	71.37	71.45	5.528E+000
BI-212		4.204E+001	4.205E+001	12.48	12.81	6.370E+000
BI-214		1.355E+001	1.355E+001	10.83	11.21	2.698E+000
BE-7	#	-5.664E-001	-5.673E-001	645.65	645.65	1.301E+001
K-40		2.463E+002	2.463E+002	6.30	6.95	7.204E+000
CO-60	#	5.827E-002	5.827E-002	1,047.56	1,047.56	2.258E+000
I-131	#	3.649E-001	3.686E-001	118.51	118.55	1.476E+000
EU-152	#	1.730E+000	1.730E+000	67.33	67.39	3.857E+000
EU-154	#	-1.167E+000	-1.167E+000	374.78	374.79	1.568E+001
TL-208		1.758E+001	1.758E+001	6.68	7.28	1.431E+000
PB-210	#	4.019E+001	4.019E+001	34.95	35.17	3.873E+001
PB-212		4.869E+001	4.869E+001	4.31	5.25	3.168E+000
PB-214		1.891E+001	1.891E+001	11.16	11.52	3.441E+000
RA-224		5.037E+001	5.037E+001	19.79	20.01	2.945E+001
AC-228		5.438E+001	5.438E+001	6.28	6.91	3.211E+000
Pa-234	#	-1.387E+000	-1.387E+000	142.81	142.85	6.661E+000
U-235	#	-1.155E+000	-1.155E+000	561.43	561.43	1.151E+001
AM-241	#	-1.227E-001	-1.227E-001	5,361.39	5,361.39	4.758E+000
TH-234	#	2.118E+001	2.118E+001	24.26	24.54	3.668E+001
PA-234M	#	3.897E+000	3.897E+000	1,758.79	1,758.79	2.497E+002

= All peaks for activity calculation had bad shape

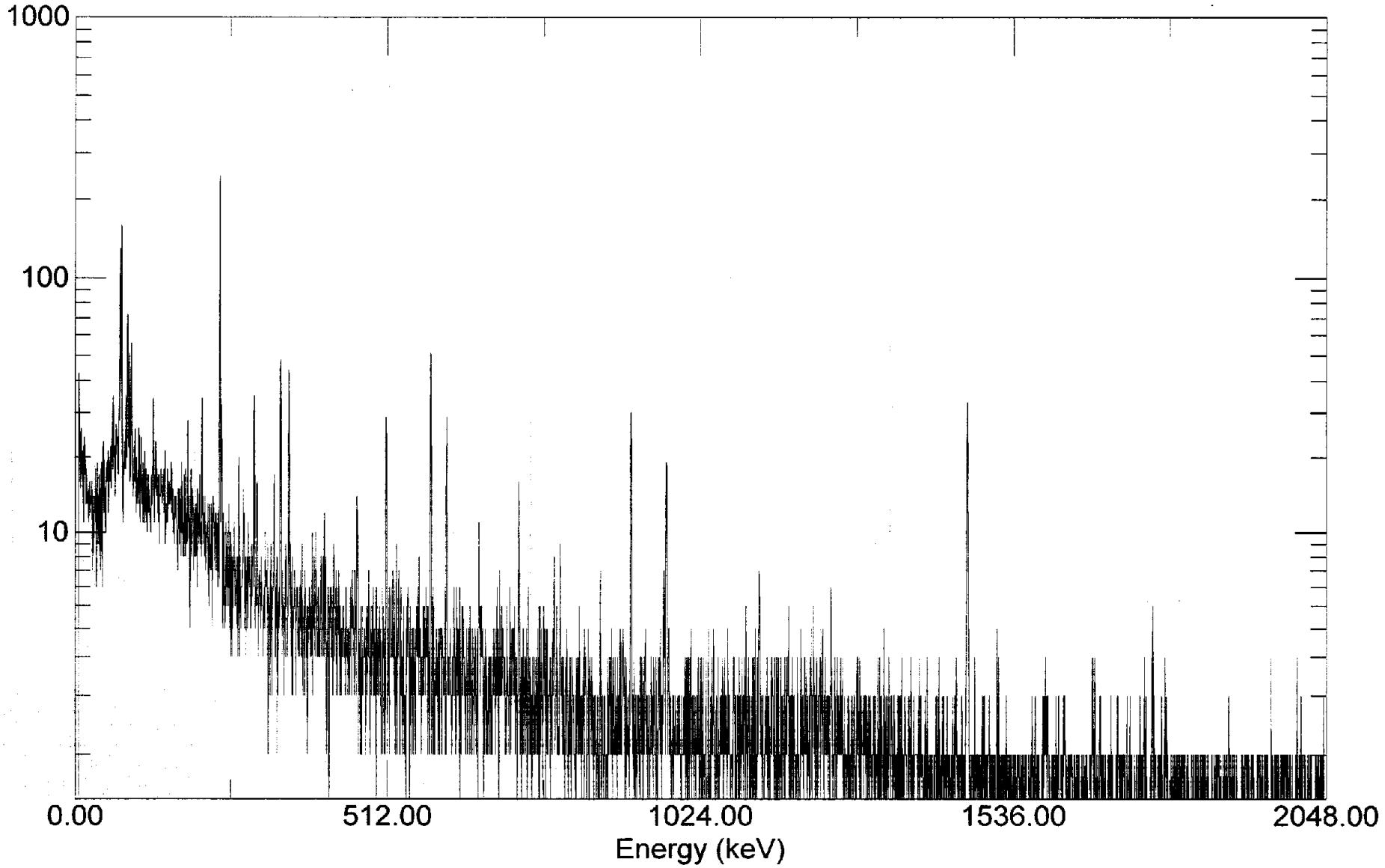
Total Activity (37.74 to 2,000.57 keV) 534.24 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKDR1AC

7360292_KEKDR1AC_F7L200260-006



Acquired: 26-Dec-2007 2:46:45 PM
File: C:\User\spectra\KEKDR1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1853.42 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,043

Sample Description: 7360292_KEKDX1AC_F7L200260-007

Spectrum Filename: KEKDX1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 2:47:37PM		
Live Time:	1800.00	Real Time:	1820.58
Dead Time:	1.13 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1043

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.73	74.90	383.17	204.83	0.114	20.72	0.815	PB-214	
307.81	77.17	332.50	383.50	0.213	10.97	1.078	PB-214	s
359.22	90.02	169.00	105.00	0.058	20.04	0.949	PB-214	sM
1180.50	295.30	218.16	31.84	0.018	67.95	1.291		
1407.08	351.93	310.92	26.08	0.014	97.62	1.352		sD

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.28	46.54	188.87	21.37	0.012	42.58	0.832	s
AM-241	1	235.81	59.17	222.45	0.66	0.000	3215.28	0.846	s
TH-234	1	251.81	63.17	301.09	29.58	0.016	49.11	0.850	s
EU-155	1	345.32	86.54	386.91	-1.24	-0.001	2242.83	0.874	s
TH-234	1	369.52	92.59	451.80	-29.21	-0.016	2330.22	0.881	s
U-235	1	372.56	93.35	250.65	7.98	0.004	27.13	0.882	s D
AC-228	1	372.56	93.35	142.33	131.36	0.073	1.74	0.978	s D
EU-155	1	420.43	105.32	210.42	14.56	0.008	143.29	0.894	s
EU-152	1	479.69	120.13	145.56	-9.40	-0.005	184.44	0.912	s
EU-154	1	491.53	123.09	224.55	-9.48	-0.005	225.78	0.913	s
Pa-234	1	524.64	131.36	259.75	-9.03	-0.005	254.66	0.922	s
U-235	1	573.81	143.65	198.59	15.02	0.008	135.21	0.935	
U-235	1	647.53	162.08	143.95	-0.44	0.000	3888.34	0.955	s
U-235	1	824.26	206.25	135.40	0.94	0.001	1759.66	0.999	
PB-212	1	954.27	238.75	178.71	874.29	0.486	5.11	1.216	s
RA-224	1	960.07	240.20	842.89	-188.01	-0.104	23.02	1.036	s
PB-214	1	968.07	242.20	270.77	21.76	0.012	109.05	1.037	s
TL-208	1	1107.96	277.17	77.50	78.50	0.044	30.05	0.896	
I-131	1	1131.07	282.94	49.96	5.31	0.003	193.16	1.081	s
PB-214	1	1180.49	295.29	91.54	145.32	0.081	12.47	1.092	
PB-212	1	1200.28	300.24	39.00	56.00	0.031	23.92	0.580	s
AC-228	1	1352.88	338.38	64.00	165.00	0.092	14.47	1.137	
EU-152	1	1376.97	344.41	80.30	-8.41	-0.005	154.65	1.142	s
PB-214	1	1407.08	351.93	64.91	266.90	0.148	7.36	1.150	s D
I-131	1	1456.39	364.26	57.94	10.17	0.006	110.35	1.163	s
BE-7	1	1908.48	477.26	33.26	4.24	0.002	198.31	1.277	s
CS-134	1	2252.42	563.24	59.42	0.00	0.000	1090.18	1.363	s
CS-134	1	2276.76	569.32	31.94	3.07	0.002	222.89	1.369	s D
Pa-234	1	2277.35	569.47	52.33	-1.33	-0.001	-145.62	1.369	s D
TL-208	1	2332.32	583.21	29.91	224.09	0.124	8.89	1.229	
CS-134	1	2403.91	601.11	1.21	18.49	0.010	24.72	1.403	s
BI-214	1	2435.64	609.04	24.13	193.87	0.108	9.39	1.317	s
I-131	1	2543.91	636.10	39.10	-6.42	-0.004	143.21	1.435	s
CS-137	1	2646.88	661.84	51.38	-0.86	0.000	9127.77	1.459	
EU-154	1	2896.58	724.26	51.25	-7.62	-0.004	137.79	1.519	s
BI-212	1	2912.40	728.21	13.00	73.00	0.041	17.89	0.744	s
PA-234M	1	3063.42	765.97	49.24	-1.06	-0.001	940.11	1.561	s
EU-152	1	3115.91	779.09	24.38	3.55	0.002	203.48	1.573	s
BI-212	1	3140.30	785.18	26.22	7.32	0.004	105.62	1.579	s
CS-134	1	3179.81	795.06	21.47	30.76	0.017	27.91	1.589	s
CS-134	1	3207.63	802.02	31.96	-2.68	-0.001	304.52	1.595	s
TL-208	1	3437.50	859.48	0.00	60.00	0.033	12.91	1.000	s
EU-154	1	3492.30	873.18	31.64	0.04	0.000	21012.65	1.662	s
Pa-234	1	3511.24	877.91	22.59	-0.02	0.000	33830.14	1.669	s
Pa-234	1	3536.23	884.16	22.89	7.97	0.004	91.95	1.672	s
AC-228	1	3644.60	911.25	0.00	145.00	0.081	8.30	0.643	s

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Pa-234	1	3787.84	947.06	33.45	-2.63	-0.001	317.36	1.731	s
EU-152	1	3866.94	966.83	111.93	-20.92	-0.012	74.80	1.748	s
AC-228	1	3872.11	968.13	7.33	133.67	0.074	10.44	0.736	s
EU-154	1	3978.99	994.85	21.21	0.42	0.000	1571.08	1.778	s
PA-234M	1	4003.83	1001.05	22.66	3.25	0.002	214.34	1.782	s
EU-154	1	4018.15	1004.63	32.64	-2.05	-0.001	400.87	1.785	s
EU-152	1	4448.98	1112.34	28.95	0.35	0.000	2167.77	1.884	s
BI-214	1	4480.70	1120.27	31.28	27.31	0.015	34.71	1.891	s
CO-60	1	4690.58	1172.74	26.62	4.90	0.003	155.63	1.939	s
EU-154	1	5102.03	1275.60	25.43	-3.29	-0.002	223.62	2.030	s
CO-60	1	5328.64	1332.26	22.57	1.30	0.001	523.90	2.081	s
EU-152	1	5632.26	1408.16	15.44	4.15	0.002	142.59	2.147	s
K-40	1	5843.60	1461.00	0.00	318.00	0.177	5.61	1.670	s
BI-214	1	7058.93	1764.86	7.31	22.41	0.012	27.15	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
			9.588E-002	1173.24	3.229E-001	%	1.763E+000G		1.9E+003	99.90
CO-60	T F	1	9.588E-002	1332.50	9.588E-002	% (	1.832E+000G		1.9E+003	99.98
TL-208	F N	1	9.545E+000	583.02	9.545E+000	(P	1.201E+000G		7.0E+002	84.50
			9.545E+000	277.28	2.274E+001	+	1.267E+001G		7.0E+002	6.31
			9.545E+000	860.56	2.436E+001	*	2.993E+000G		7.0E+002	12.42
			8.978E+000	92.59	-6.115E+000	% P	2.130E+001G		1.6E+012	5.58
TH-234	N	1	8.978E+000	63.29	8.978E+000	* (P	2.536E+001G		1.6E+012	4.82
EU-155	T F I	1	7.779E-001	105.31	7.779E-001	% (	3.756E+000G		1.8E+003	21.20
			7.779E-001	86.54	-4.853E-002	%	3.689E+000G	A	1.8E+003	30.70
RA-224	N	1	-7.425E+001	240.99	-7.425E+001	* (	5.450E+001G		7.0E+002	4.10
			-7.063E-001	1112.07	1.622E-001	%	1.280E+001G		4.9E+003	13.64
			-7.063E-001	1408.00	1.531E+000	%	7.754E+000G		4.9E+003	21.00
EU-152	T F	1	-7.063E-001	344.29	-7.063E-001	% (	3.736E+000G		4.9E+003	26.50
			-7.063E-001	121.78	-3.708E-001	&	2.325E+000G		4.9E+003	28.58
			-7.063E-001	778.92	1.272E+000	%	9.205E+000G		4.9E+003	12.94
			-7.063E-001	964.11	-7.959E+000	%	1.979E+001G		4.9E+003	14.61
CS-134	T F I	1	7.042E-001	604.71	7.042E-001	? (	2.982E-001G		7.5E+002	97.62
			7.042E-001	795.87	1.697E+000	+	1.340E+000G		7.5E+002	85.53
			7.042E-001	569.32	7.042E-001	&	6.655E+000G		7.5E+002	15.38
			7.042E-001	801.95	-1.464E+000	%	1.587E+001G		7.5E+002	8.69
			7.042E-001	563.24	0.000E+000	&	1.615E+001G		7.5E+002	8.35
Pa-234	N	1	-5.718E-001	131.29	-5.718E-001	% (	4.929E+000G		1.6E+012	18.00
			-5.718E-001	569.47	-5.718E-001	&	1.566E+001G		1.6E+012	8.20
			-5.718E-001	946.02	-1.072E+000	&	1.210E+001G		1.6E+012	13.40
			-5.718E-001	883.24	4.283E+000	&	1.343E+001G		1.6E+012	9.60
			-5.718E-001	880.53	-1.703E-002	%	2.131E+001G		1.6E+012	6.00
CS-137	T F I	1	-4.037E-002	661.66	-4.037E-002	% (P	1.705E+000G		1.1E+004	85.21
PB-212	N	1	3.251E+001	238.63	3.243E+001	@ (P	2.411E+000G		7.0E+002	43.30
			3.251E+001	300.03	3.351E+001	(	1.903E+001G		7.0E+002	3.28
I-131	T F I	1	2.923E-001	364.48	2.923E-001	& (	1.097E+000G		8.0E+000	81.70
			2.923E-001	284.30	1.617E+000	%	1.085E+001G		8.0E+000	6.14
			2.923E-001	636.97	-3.485E+000	%	1.728E+001G		8.0E+000	7.17

AM-241	T	1	2.836E-002	59.54	2.836E-002	&	(			3.120E+000G		1.6E+005	35.90
AC-228	N	1	2.754E+001	911.16	2.648E+001		(			1.346E+000G		2.1E+003	29.00
			2.754E+001	968.97	4.273E+001	+				4.901E+000G		2.1E+003	17.46
			2.754E+001	338.32	3.010E+001		(			7.295E+000G		2.1E+003	12.01
			2.754E+001	93.35	2.754E+001	+			E	1.222E+001G	A	2.1E+003	5.56
BI-212	N	1	2.696E+001	727.33	2.696E+001	@	(			7.207E+000G		7.0E+002	11.82
			2.696E+001	785.51	3.104E+001	%				1.127E+002G		7.0E+002	1.10
K-40	N	1	2.388E+002	1460.83	2.388E+002		(			5.536E+000G		4.7E+011	10.67
PA-234M	N	1	2.230E+001	1001.00	2.230E+001	%	(			1.707E+002G		1.6E+012	.84
			2.230E+001	766.41	-1.649E+001	&				5.501E+002G		1.6E+012	.29
U-235	N	1	1.602E+000	143.79	1.602E+000	%	(			7.294E+000G		2.6E+011	10.96
			1.602E+000	205.33	2.668E-001	%				1.621E+001G		2.6E+011	5.01
			1.602E+000	163.38	-1.062E-001	&				1.425E+001G		2.6E+011	5.08
			1.602E+000	93.35	1.602E+000	!			E	1.535E+001X		2.6E+011	5.81
EU-154	T F I	1	1.576E-002	873.23	1.576E-002	%	(			1.204E+001G		3.1E+003	12.27
			1.576E-002	123.10	-2.625E-001	&				2.007E+000G		3.1E+003	40.79
			1.576E-002	1274.54	-6.624E-001	%				5.276E+000G		3.1E+003	35.19
			1.576E-002	723.36	-1.637E+000	%				7.751E+000G		3.1E+003	20.22
			1.576E-002	1004.77	-6.545E-001	%				9.379E+000G		3.1E+003	18.01
			1.576E-002	996.33	2.247E-001	%				1.304E+001G		3.1E+003	10.60
PB-214	N	1	1.560E+001	351.93	1.613E+001		(	P	E	2.433E+000G		5.8E+005	37.60
			1.560E+001	295.09	1.456E+001		(			4.738E+000G		5.8E+005	19.30
			1.560E+001	242.00	4.760E+000	%				1.736E+001G		5.8E+005	7.43
BI-214	N	1	1.530E+001	609.31	1.574E+001	@	(	P		2.079E+000G		5.8E+005	46.09
			1.530E+001	1120.29	1.144E+001	-				1.205E+001G		5.8E+005	15.10
			1.530E+001	1764.49	1.398E+001	?	(			9.547E+000G		5.8E+005	15.40
PB-210	N	1	1.276E+001	46.54	1.276E+001	%	(	P		3.986E+001G		8.1E+003	4.25
BE-7	N P C	1	1.213E+000	477.60	1.213E+000	&	(			8.462E+000G		5.3E+001	10.52

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

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& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T	=	Thermal Neutron Activation	F	=	Fast Neutron Activation	I	=	Fission Product
P	=	Photon Reaction	N	=	Naturally Occurring Isotope	C	=	Charged Particle Reaction
M	=	No MDA Calculation						

Peak Codes:

G	=	Gamma Ray	X	=	X-Ray	P	=	Positron Decay
S	=	Single - Escape	D	=	Double - Escape	K	=	Key Line
A	=	Not in Average						

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	#	2.923E-001	2.952E-001	110.35	110.39	1.097E+000
CS-134	#	7.042E-001	7.043E-001	24.72	24.89	2.982E-001
EU-154	#	1.576E-002	1.576E-002	21.012.65	21.012.65	1.204E+001
PB-212		3.251E+001	3.251E+001	5.17	5.97	2.411E+000
PB-214	#	1.560E+001	1.560E+001	7.26	7.81	2.433E+000
BI-212	#	2.696E+001	2.697E+001	17.89	18.12	7.207E+000
CS-137	#	-4.037E-002	-4.037E-002	17.078.19	17.078.19	1.705E+000
EU-152	#	-7.063E-001	-7.063E-001	154.65	154.68	3.736E+000
EU-155	#	7.779E-001	7.779E-001	143.29	143.33	3.756E+000
TL-208		9.545E+000	9.546E+000	8.98	9.43	1.201E+000
PB-210	#	1.276E+001	1.276E+001	90.60	90.68	3.986E+001
BI-214	#	1.530E+001	1.530E+001	9.50	9.93	2.079E+000
RA-224	#	-7.425E+001	-7.426E+001	23.02	23.22	5.450E+001
AC-228		2.754E+001	2.754E+001	8.30	8.79	1.346E+000
PA-234M	#	2.230E+001	2.230E+001	214.34	214.36	1.707E+002
U-235	#	1.602E+000	1.602E+000	135.21	135.24	7.294E+000
Pa-234	#	-5.718E-001	-5.718E-001	254.66	254.68	4.929E+000
TH-234	#	8.978E+000	8.978E+000	83.57	83.65	2.536E+001
AM-241	#	2.836E-002	2.836E-002	3.215.28	3.215.28	3.120E+000
BE-7	#	1.213E+000	1.215E+000	198.31	198.33	8.462E+000
K-40		2.388E+002	2.388E+002	5.61	6.33	5.536E+000
CO-60	#	9.588E-002	9.589E-002	523.90	523.91	1.832E+000

= All peaks for activity calculation had bad shape

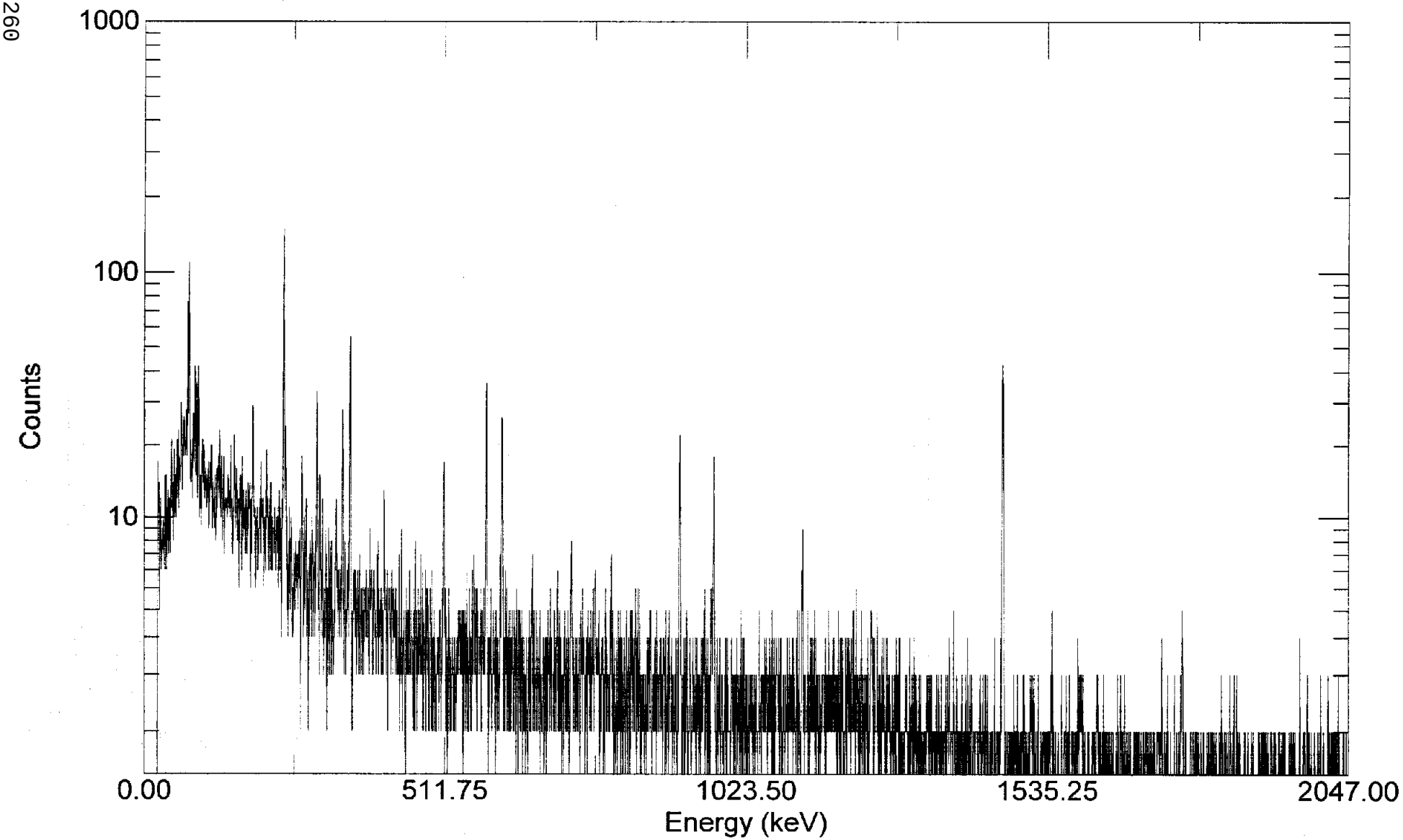
Total Activity (37.72 to 2,000.15 keV) 350.70 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKDX1AC

7360292_KEKDX1AC_F7L200260-007



Acquired: 26-Dec-2007 2:47:37 PM
File: C:\User\spectra\KEKDX1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.58 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,046

Sample Description: 7360292_KEKD41AC_F7L200260-008

Spectrum Filename: KEKD41AC.An1

Acquisition Information

Start Time:	26-Dec-2007 3:38:00PM		
Live Time:	1800.00	Real Time:	1811.06
Dead Time:	0.61 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1424

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.62	74.62	253.33	217.67	0.121	16.39	0.978	BI-207	
307.71	77.14	266.67	306.33	0.170	12.48	0.849	PB-214	
348.27	87.28	249.89	28.11	0.016	81.74	0.917		s
358.94	89.95	103.50	62.50	0.035	28.68	0.986	PB-214	M
634.07	158.74	33.83	33.17	0.018	31.11	0.704		
742.15	185.76	106.33	145.67	0.081	17.39	1.228	U-235	s
1351.44	338.07	127.80	56.20	0.031	31.42	0.738	AC-228	s
2436.04	609.21	224.68	34.32	0.019	64.07	1.073		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.56	46.35	196.63	-1.03	-0.001	67.00	0.813	s
AM-241	1	236.55	59.35	227.11	-1.33	-0.001	1606.51	0.824	s
TH-234	1	251.80	63.16	240.90	50.10	0.028	34.54	0.952	
EU-155	1	348.40	87.32	260.79	89.56	0.050	27.60	0.849	s
TH-234	1	371.38	93.06	242.51	169.49	0.094	15.61	0.963	s
AC-228	1	372.54	93.35	192.93	55.05	0.031	2.89	0.855	s D
U-235	1	372.54	93.35	192.93	4.34	0.002	53.88	0.855	s D
EU-155	1	421.26	105.53	181.80	26.44	0.015	74.70	0.866	s
EU-152	1	485.95	121.70	157.74	15.93	0.009	114.31	0.881	s
EU-154	1	494.73	123.90	182.15	-9.01	-0.005	214.40	0.882	s
Pa-234	1	523.36	131.06	207.51	-11.76	-0.007	175.62	0.890	s
U-235	1	573.96	143.71	174.17	8.02	0.004	159.66	0.901	s
U-235	1	651.72	163.15	131.88	-6.67	-0.004	438.33	0.919	s
U-235	1	820.33	205.30	152.87	-13.42	-0.007	156.80	0.957	s
PB-212	1	953.66	238.63	81.21	436.51	0.243	5.22	0.987	D
RA-224	1	963.07	240.99	107.75	48.25	0.027	33.66	0.989	D
PB-214	1	967.12	242.00	104.46	37.54	0.021	34.72	0.990	D
TL-208	1	1108.04	277.23	25.67	45.33	0.025	25.24	0.858	s
I-131	1	1147.12	287.00	43.49	3.00	0.002	316.26	1.028	s
PB-214	1	1180.09	295.24	75.71	128.29	0.071	14.81	0.922	
PB-212	1	1198.87	299.93	61.81	34.22	0.019	36.71	1.042	
AC-228	1	1351.64	338.13	67.59	76.39	0.042	17.68	1.076	s
EU-152	1	1375.89	344.19	56.35	3.47	0.002	310.72	1.081	s
PB-214	1	1405.75	351.65	37.65	259.35	0.144	7.29	1.112	s
I-131	1	1457.55	364.60	48.63	-1.01	-0.001	977.78	1.099	s
BE-7	1	1922.12	480.74	22.56	3.03	0.002	228.88	1.198	s
CS-134	1	2249.28	562.52	37.04	-0.22	0.000	3910.38	1.273	s
CS-134	1	2276.47	569.32	28.74	1.02	0.001	699.29	1.278	s D
Pa-234	1	2277.07	569.47	38.91	-2.13	-0.001	-152.92	1.278	s D
TL-208	1	2332.35	583.29	8.92	180.08	0.100	7.27	1.059	s
CS-134	1	2413.88	603.67	45.43	6.21	0.003	158.66	1.309	s
BI-214	1	2436.06	609.21	59.66	184.05	0.102	8.73	1.313	
I-131	1	2547.82	637.15	35.39	-1.00	-0.001	846.44	1.337	s
CS-137	1	2645.63	661.60	31.99	22.72	0.013	40.98	1.358	s
EU-154	1	2898.60	724.84	52.17	-10.60	-0.006	101.10	1.411	s
BI-212	1	2907.47	727.06	23.52	28.35	0.016	30.63	1.414	s
PA-234M	1	3055.04	763.94	32.74	0.41	0.000	1978.77	1.447	s
EU-152	1	3119.99	780.18	38.15	-0.47	0.000	1870.69	1.458	s
BI-212	1	3138.98	784.92	34.05	6.62	0.004	130.62	1.463	s
CS-134	1	3177.93	794.66	32.23	9.43	0.005	91.13	1.472	s
CS-134	1	3207.77	802.12	36.84	-5.57	-0.003	159.88	1.477	s
TL-208	1	3441.22	860.47	21.72	9.96	0.006	73.37	1.527	s
EU-154	1	3479.96	870.16	11.28	2.72	0.002	184.94	1.537	s
Pa-234	1	3521.18	880.46	30.64	1.27	0.001	622.67	1.543	s
Pa-234	1	3532.22	883.22	30.04	2.00	0.001	394.41	1.546	s

AC-228	1	3643.63	911.07	32.27	82.32	0.046	13.68	1.569	s
Pa-234	1	3786.40	946.75	31.29	-0.90	-0.001	880.80	1.598	s
EU-152	1	3857.51	964.53	53.20	15.78	0.009	70.03	1.613	s
AC-228	1	3875.23	968.96	50.61	44.01	0.024	25.21	1.617	s
EU-154	1	3983.01	995.90	29.95	-2.17	-0.001	363.52	1.640	s
PA-234M	1	4009.37	1002.49	23.52	0.41	0.000	1661.78	1.643	s
EU-154	1	4018.97	1004.89	25.34	-1.81	-0.001	400.72	1.647	s
EU-152	1	4447.61	1112.03	33.81	4.37	0.002	194.09	1.735	s
BI-214	1	4479.00	1119.87	34.86	28.23	0.016	28.26	1.741	s
CO-60	1	4692.56	1173.25	29.76	4.61	0.003	173.62	1.784	s
EU-154	1	5094.37	1273.68	25.92	5.64	0.003	134.42	1.866	s
CO-60	1	5331.60	1332.97	21.01	1.80	0.001	368.25	1.912	s
EU-152	1	5631.80	1408.00	13.60	3.98	0.002	140.25	1.972	s
K-40	1	5842.09	1460.56	12.54	430.46	0.239	4.75	1.579	
BI-214	1	7056.96	1764.18	15.27	15.44	0.009	31.69	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels	Peak Code	Peak Comments	
U-235	N	1	9.990E-001	143.79	9.990E-001	%	(	P	8.000E+000G		2.6E+011	10.96
			9.990E-001	205.33	-4.346E+000	%		P	1.953E+001G		2.6E+011	5.01
			9.990E-001	163.38	-1.883E+000	%		P	1.588E+001G		2.6E+011	5.08
			9.990E-001	93.35	9.990E-001	%			1.552E+001X	E	2.6E+011	5.81
CS-137	T F I	1	9.949E-001	661.66	9.949E-001	%	(		1.273E+000G		1.1E+004	85.21
BI-212	N	1	9.563E+000	727.33	9.563E+000	?	(		8.537E+000G		7.0E+002	11.82
			9.563E+000	785.51	2.531E+001	&			1.143E+002G		7.0E+002	1.10
			-8.707E-001	569.47	-8.707E-001	&			1.301E+001G		1.6E+012	8.20
			-8.707E-001	946.02	-3.233E-001	%			1.028E+001G		1.6E+012	13.40
			-8.707E-001	883.24	9.498E-001	&			1.343E+001G		1.6E+012	9.60
			-8.707E-001	880.53	9.642E-001	%			2.164E+001G		1.6E+012	6.00
Pa-234	N	1	-8.707E-001	131.29	-8.707E-001	&	(		5.170E+000G		1.6E+012	18.00
BE-7	N P C	1	8.528E-001	477.60	8.528E-001	%	(		6.988E+000G		5.3E+001	10.52
TL-208	F N	1	7.275E+000	583.02	7.275E+000	@	(	P	6.716E-001G		7.0E+002	84.50
			7.275E+000	277.28	1.427E+001	+			8.286E+000G		7.0E+002	6.31
			7.275E+000	860.56	3.595E+000	%			8.816E+000G		7.0E+002	12.42
PB-210	N	1	-6.505E-001	46.54	-6.505E-001	*	(	P	4.298E+001G		8.1E+003	4.25
AM-241	T	1	-6.422E-002	59.54	-6.422E-002	&	(		3.526E+000G		1.6E+005	35.90
EU-152	T F	1	3.046E-001	344.29	3.046E-001	&	(		3.310E+000G		4.9E+003	26.50
			3.046E-001	121.78	7.330E-001	%			2.819E+000G		4.9E+003	28.58
			3.046E-001	778.92	-1.514E-001	&			1.018E+001G		4.9E+003	12.94
			3.046E-001	964.11	5.245E+000	%			1.219E+001G		4.9E+003	14.61
			3.046E-001	1112.07	1.721E+000	%			1.173E+001G		4.9E+003	13.64
			3.046E-001	1408.00	1.213E+000	%			6.061E+000G		4.9E+003	21.00
EU-155	T F I	1	3.028E+000	105.31	1.635E+000	*	(		4.053E+000G		1.8E+003	21.20
			3.028E+000	86.54	3.989E+000	@	(		3.473E+000G		1.8E+003	30.70
			-3.012E-002	284.30	9.881E-001	&			1.102E+001G		8.0E+000	6.14
			-3.012E-002	636.97	-5.073E-001	%			1.542E+001G		8.0E+000	7.17
I-131	T F I	1	-3.012E-002	364.48	-3.012E-002	&	(		1.046E+000G		8.0E+000	81.70
TH-234	N	1	2.971E+001	63.29	1.704E+001	%	(	P	2.552E+001G		1.6E+012	4.82
			2.971E+001	92.59	4.066E+001	*	(	P	1.806E+001G		1.6E+012	5.58
K-40	N	1	2.657E+002	1460.83	2.657E+002		(	P	1.186E+001G		4.7E+011	10.67
PA-234	N	1	2.468E+000	1001.00	2.468E+000	&	(		1.507E+002G		1.6E+012	.84
			2.468E+000	766.41	5.770E+000	%			4.131E+002G		1.6E+012	.29
CS-134	T F I	1	2.228E-001	604.71	2.228E-001	%	(		1.224E+000G		7.5E+002	97.62
			2.228E-001	795.87	4.681E-001	%			1.447E+000G		7.5E+002	85.53
			2.228E-001	569.32	2.228E-001	&			6.043E+000G		7.5E+002	15.38
			2.228E-001	801.95	-2.734E+000	%			1.522E+001G		7.5E+002	8.69
			2.228E-001	563.24	-8.793E-002	%			1.239E+001G		7.5E+002	8.35
RA-224	N	1	2.119E+001	240.99	2.119E+001		(		2.243E+001G		7.0E+002	4.10
			1.803E+001	300.03	2.194E+001	+			2.523E+001G		7.0E+002	3.28
PB-212	N	1	1.803E+001	238.63	1.803E+001		(	P	1.846E+000G		7.0E+002	43.30
PB-214	N	1	1.631E+001	351.93	1.631E+001		(	P	1.969E+000G		5.8E+005	37.60
			1.631E+001	295.09	1.381E+001	-		P	4.658E+000G		5.8E+005	19.30

			1.631E+001	242.00	9.123E+000	%		P		1.223E+001G	5.8E+005	7.43
BI-214	N	1	1.406E+001	609.31	1.406E+001		(	P		2.957E+000G	5.8E+005	46.09
			1.406E+001	1120.29	1.009E+001	*		P		1.081E+001G	5.8E+005	15.10
			1.406E+001	1764.49	7.699E+000	%		P		1.043E+001G	5.8E+005	15.40
AC-228	N	1	1.323E+001	911.07	1.324E+001	@	(	P		4.693E+000G	2.1E+003	29.00
			1.323E+001	968.97	1.228E+001		(	P		1.000E+001G	2.1E+003	17.46
			1.323E+001	338.32	1.461E+001	*	(	P		7.846E+000G	2.1E+003	12.01
			1.323E+001	93.35	1.323E+001	+			E	1.621E+001X	A 2.1E+003	5.56
CO-60	T F	1	1.103E-001	1332.50	1.103E-001	%	(			1.477E+000G	1.9E+003	99.98
			1.103E-001	1173.24	2.578E-001	%				1.572E+000G	1.9E+003	99.90
EU-154	T F I	1	1.003E+000	873.23	1.003E+000	&	(			6.775E+000G	3.1E+003	12.27
			1.003E+000	123.10	-2.910E-001	%				2.119E+000G	3.1E+003	40.79
			1.003E+000	1274.54	9.512E-001	%				4.458E+000G	3.1E+003	35.19
			1.003E+000	723.36	-2.083E+000	%				7.144E+000G	3.1E+003	20.22
			1.003E+000	1004.77	-5.016E-001	%				7.260E+000G	3.1E+003	18.01
			1.003E+000	996.33	-1.015E+000	&				1.322E+001G	3.1E+003	10.60

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	2.228E-001	2.229E-001	158.66	158.68	1.224E+000
EU-154	<	1.003E+000	1.003E+000	184.94	184.97	6.775E+000
EU-155	<	3.028E+000	3.028E+000	27.60	27.81	4.053E+000
PB-214		1.631E+001	1.631E+001	7.63	8.15	1.969E+000
BI-212	<	9.563E+000	9.564E+000	30.63	30.76	8.537E+000
BI-214	<	1.406E+001	1.406E+001	9.28	9.72	2.957E+000
TH-234		2.971E+001	2.971E+001	20.27	20.60	2.552E+001
PA-234M	<	2.468E+000	2.468E+000	1,661.78	1,661.79	1.507E+002
CS-137	<	9.949E-001	9.949E-001	40.98	41.09	1.273E+000
EU-152	<	3.046E-001	3.046E-001	310.72	310.73	3.310E+000
TL-208	#	7.275E+000	7.276E+000	7.63	8.16	6.716E-001
RA-224		2.119E+001	2.119E+001	33.66	33.79	2.243E+001
PB-210	<	-6.505E-001	-6.505E-001	1,983.51	1,983.51	4.298E+001
PB-212		1.803E+001	1.803E+001	5.50	6.26	1.846E+000
AC-228	<	1.323E+001	1.324E+001	12.00	12.34	4.693E+000
Pa-234	<	-8.707E-001	-8.707E-001	175.62	175.65	5.170E+000
U-235	<	9.990E-001	9.990E-001	234.19	234.21	8.000E+000
AM-241	<	-6.422E-002	-6.422E-002	1,606.51	1,606.52	3.526E+000
BE-7	<	8.528E-001	8.545E-001	228.88	228.90	6.988E+000
K-40		2.657E+002	2.657E+002	4.89	5.70	1.186E+001
CO-60	<	1.103E-001	1.103E-001	368.25	368.26	1.477E+000
I-131	<	-3.012E-002	-3.051E-002	977.78	977.79	1.046E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 358.17 Bq/sample

Analyzed by: _____

403293

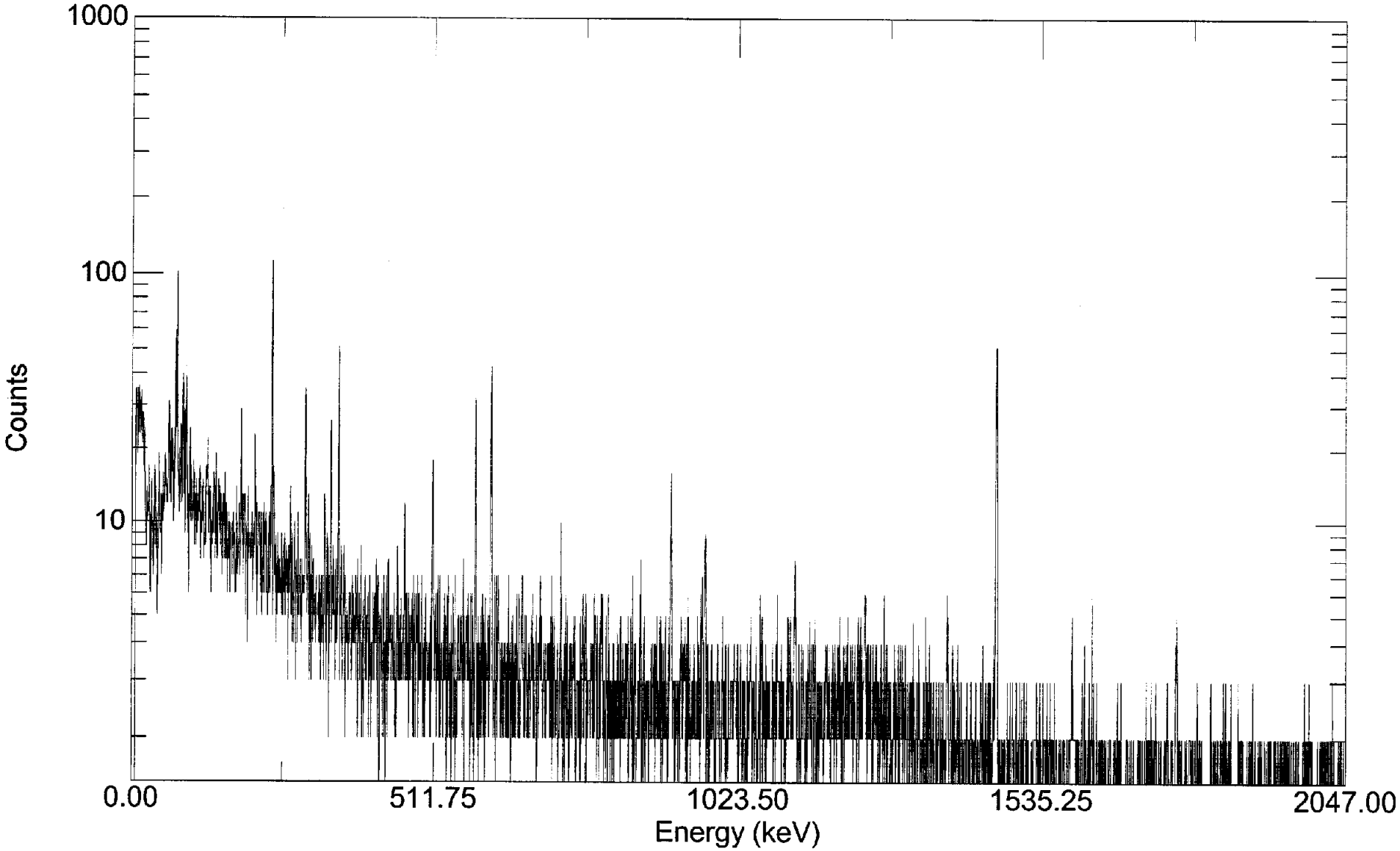
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKD41AC

7360292_KEKD41AC_F7L200260-008



Acquired: 26-Dec-2007 3:38:00 PM
File: C:\User\spectra\KEKD41AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.06 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,047

Sample Description: 7360292_KEKD81AC_F7L200260-009

Spectrum Filename: KEKD81AC.An1

Acquisition Information

Start Time:	26-Dec-2007 3:38:32PM		
Live Time:	1800.00	Real Time:	1814.98
Dead Time:	0.83 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.3177

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
370.99	93.06	514.00	0.00	0.000	3206.24	0.584		s
743.58	186.12	195.50	122.50	0.068	26.67	0.968	PA-234	s
836.45	209.31	161.47	151.53	0.084	14.37	0.873	AC-228	s
1079.98	270.15	108.33	113.67	0.063	22.83	0.715	AC-228	s
1352.21	338.15	252.56	7.44	0.004	304.14	1.201		
3644.28	910.94	189.17	41.83	0.023	49.01	1.968		
297.46	74.70	608.00	291.00	0.162	18.26	0.730	PB-214	
307.02	77.09	516.00	402.00	0.223	12.35	0.905	PB-214	
347.30	87.11	293.43	141.57	0.079	19.07	0.906	PB-214	D
358.12	89.85	216.67	76.33	0.042	29.58	0.855	PB-214	M

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.24	46.68	243.38	9.42	0.005	70.39	0.864	s
AM-241	1	236.69	59.52	384.73	-21.31	-0.012	131.94	0.878	s
TH-234	1	252.38	63.44	407.55	51.13	0.028	38.26	0.882	s
EU-155	1	344.88	86.54	501.71	158.13	0.088	21.55	0.906	D
TH-234	1	371.53	93.20	495.85	64.44	0.036	35.42	0.912	s
AC-228	1	372.14	93.35	426.23	132.80	0.074	1.51	0.913	s D
U-235	1	372.14	93.35	555.10	0.00	0.000	2734.96	0.913	s D
EU-155	1	421.39	105.65	280.37	47.56	0.026	51.86	0.925	
EU-152	1	484.80	121.49	239.10	-17.39	-0.010	128.02	0.942	s
EU-154	1	491.26	123.10	302.30	1.34	0.001	1837.01	0.943	s
Pa-234	1	520.09	130.30	289.10	-31.55	-0.018	78.27	0.952	s
U-235	1	573.35	143.60	230.25	20.74	0.012	95.64	0.964	s
U-235	1	651.58	163.14	234.39	9.35	0.005	233.82	0.984	s
U-235	1	822.09	205.73	223.50	25.44	0.014	85.43	1.027	
PB-212	1	953.82	238.63	188.82	828.18	0.460	4.06	1.060	D
RA-224	1	963.24	240.99	327.72	119.28	0.066	23.33	1.062	D
PB-214	1	967.29	242.00	202.20	77.80	0.043	28.23	1.063	D
TL-208	1	1108.81	277.35	106.33	96.67	0.054	27.70	0.602	s
I-131	1	1136.44	284.25	114.26	13.00	0.007	119.54	1.105	s
PB-214	1	1179.77	295.07	124.82	201.18	0.112	14.70	1.026	s
PB-212	1	1200.31	300.20	95.83	74.17	0.041	31.26	1.176	s
AC-228	1	1352.70	338.27	88.24	188.36	0.105	10.00	1.158	
EU-152	1	1377.57	344.49	105.61	-2.78	-0.002	526.15	1.164	s
PB-214	1	1407.16	351.88	91.37	310.63	0.173	8.84	0.945	s
I-131	1	1458.51	364.71	102.58	-10.50	-0.006	139.83	1.184	s
BE-7	1	1917.01	479.26	42.70	2.47	0.001	378.87	1.292	s
CS-134	1	2253.10	563.24	53.95	0.00	0.000	1038.75	1.372	s
CS-134	1	2277.45	569.32	87.30	-1.06	-0.001	-47.24	1.378	s D
Pa-234	1	2278.04	569.47	89.91	-5.49	-0.003	-169.75	1.378	s D
TL-208	1	2332.93	583.18	31.96	398.04	0.221	5.90	1.819	s
CS-134	1	2424.01	605.95	89.50	-6.41	-0.004	212.54	1.410	s
BI-214	1	2436.48	609.06	22.95	243.05	0.135	7.27	1.483	
I-131	1	2540.47	635.05	46.38	-7.67	-0.004	130.60	1.440	s
CS-137	1	2645.95	661.41	60.57	29.61	0.016	41.47	1.462	s
EU-154	1	2898.42	724.51	125.98	-20.12	-0.011	81.97	1.518	s
BI-212	1	2908.15	726.94	20.00	105.00	0.058	14.29	2.031	s
PA-234M	1	3069.09	767.16	38.91	13.57	0.008	70.47	1.556	s
EU-152	1	3114.78	778.58	43.77	-4.55	-0.003	210.68	1.567	s
BI-212	1	3142.71	785.56	41.12	12.52	0.007	77.78	1.572	
CS-134	1	3189.99	797.38	45.76	-5.83	-0.003	169.17	1.582	s
CS-134	1	3207.62	801.79	42.69	0.29	0.000	3227.71	1.587	s
TL-208	1	3441.12	860.15	6.17	74.83	0.042	14.58	0.890	s
EU-154	1	3495.63	873.78	28.59	0.67	0.000	1138.10	1.649	s
Pa-234	1	3516.30	878.95	21.47	4.70	0.003	146.85	1.655	s
Pa-234	1	3532.14	882.91	39.08	-4.59	-0.003	198.26	1.657	s

AC-228	1	3644.05	910.88	37.43	176.66	0.098	8.83	1.681	
Pa-234	1	3786.74	946.55	44.09	-4.93	-0.003	195.89	1.710	s
EU-152	1	3857.84	964.33	99.92	33.17	0.018	46.02	1.726	s
AC-228	1	3875.36	968.71	76.18	105.52	0.059	15.22	1.730	s
EU-154	1	3986.01	996.37	34.74	0.04	0.000	22343.67	1.753	s
PA-234M	1	4005.32	1001.20	36.53	0.36	0.000	2350.44	1.756	s
EU-154	1	4027.04	1006.63	31.52	-1.89	-0.001	426.80	1.760	s
EU-152	1	4443.70	1110.81	23.32	3.04	0.002	231.57	1.847	s
BI-214	1	4479.82	1119.84	7.94	64.06	0.036	15.75	0.446	s
CO-60	1	4691.41	1172.74	41.40	-5.09	-0.003	184.21	1.896	s
EU-154	1	5093.82	1273.38	21.71	5.01	0.003	138.91	1.975	s
CO-60	1	5330.21	1332.50	36.11	0.00	0.000	849.88	2.019	s
EU-152	1	5628.03	1406.99	17.50	4.90	0.003	129.03	2.076	s
K-40	1	5840.52	1460.14	11.21	456.79	0.254	4.62	1.805	s
BI-214	1	7053.44	1763.61	13.37	32.67	0.018	21.56	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
AM-241	T	1	-9.421E-001	59.54	-9.421E-001	% (	4.160E+000G		1.6E+005	35.90
BE-7	N P C	1	6.677E-001	477.60	6.677E-001	& (	8.949E+000G		5.3E+001	10.52
PB-210	N	1	5.459E+000	46.54	5.459E+000	% (P	4.369E+001G		8.1E+003	4.25
EU-155	T F I	1	4.956E+000	105.31	2.722E+000	% (	4.622E+000G		1.8E+003	21.20
			4.956E+000	86.54	6.498E+000	(	4.400E+000G		1.8E+003	30.70
RA-224	N	1	4.928E+001	240.99	4.928E+001	(	3.597E+001G		7.0E+002	4.10
BI-212	N	1	3.446E+001	727.33	3.446E+001	(	7.728E+000G		7.0E+002	11.82
			3.446E+001	785.51	4.669E+001	%	1.216E+002G		7.0E+002	1.10
PB-212	N	1	3.217E+001	238.63	3.217E+001	(P	2.593E+000G		7.0E+002	43.30
			3.217E+001	300.03	4.501E+001	+	2.933E+001G		7.0E+002	3.28
I-131	T F I	1	-2.969E-001	364.48	-2.969E-001	% (	1.411E+000G		8.0E+000	81.70
			-2.969E-001	284.30	4.047E+000	%	1.635E+001G		8.0E+000	6.14
			-2.969E-001	636.97	-3.766E+000	%	1.691E+001G		8.0E+000	7.17
			2.949E+001	968.97	2.894E+001	(	1.190E+001G		2.1E+003	17.46
			2.949E+001	338.32	3.421E+001	(P	8.443E+000G		2.1E+003	12.01
			2.949E+001	93.35	2.949E+001	- E	2.197E+001X	A	2.1E+003	5.56
AC-228	N	1	2.949E+001	911.07	2.787E+001	(P	4.925E+000G		2.1E+003	29.00
K-40	N	1	2.822E+002	1460.83	2.822E+002	@ (P	1.131E+001G		4.7E+011	10.67
			2.415E-001	723.36	-3.845E+000	&	1.051E+001G		3.1E+003	20.22
			2.415E-001	1004.77	-5.157E-001	%	7.887E+000G		3.1E+003	18.01
			2.415E-001	996.33	1.721E-002	&	1.392E+001G		3.1E+003	10.60
EU-154	T F I	1	2.415E-001	873.23	2.415E-001	% (	9.984E+000G		3.1E+003	12.27
			2.415E-001	123.10	4.015E-002	&	2.509E+000G		3.1E+003	40.79
			2.415E-001	1274.54	8.402E-001	&	4.096E+000G		3.1E+003	35.19
U-235	N	1	2.404E+000	143.79	2.404E+000	% (P	8.508E+000G		2.6E+011	10.96
			2.404E+000	205.33	7.720E+000	%	2.196E+001G		2.6E+011	5.01
			2.404E+000	163.38	2.463E+000	&	1.950E+001G		2.6E+011	5.08
			2.404E+000	93.35	0.000E+000	% } E	2.103E+001X		2.6E+011	5.81
EU-152	T F	1	-2.320E-001	344.29	-2.320E-001	% (	4.222E+000G		4.9E+003	26.50
			-2.320E-001	121.78	-7.425E-001	%	3.192E+000G		4.9E+003	28.58
			-2.320E-001	778.92	-1.435E+000	%	1.057E+001G		4.9E+003	12.94
			-2.320E-001	964.11	1.084E+001	%	1.610E+001G		4.9E+003	14.61
			-2.320E-001	1112.07	1.185E+000	%	9.813E+000G		4.9E+003	13.64
			-2.320E-001	1408.00	1.490E+000	%	6.760E+000G		4.9E+003	21.00
CS-134	T F I	1	-2.223E-001	604.71	-2.223E-001	% (	1.623E+000G		7.5E+002	97.62
			-2.223E-001	795.87	-2.825E-001	%	1.658E+000G		7.5E+002	85.53
			-2.223E-001	569.32	-2.223E-001	&	9.739E+000G		7.5E+002	15.38
			-2.223E-001	801.95	1.375E-001	&	1.590E+001G		7.5E+002	8.69
			-2.223E-001	563.24	0.000E+000	%	1.421E+001G		7.5E+002	8.35
Pa-234	N	1	-2.169E+000	131.29	-2.169E+000	% (	5.633E+000G		1.6E+012	18.00
			-2.169E+000	569.47	-2.169E+000	%	1.853E+001G		1.6E+012	8.20
			-2.169E+000	946.02	-1.729E+000	%	1.181E+001G		1.6E+012	13.40
			-2.169E+000	883.24	-2.137E+000	%	1.483E+001G		1.6E+012	9.60
			-2.169E+000	880.53	3.495E+000	&	1.807E+001G		1.6E+012	6.00

PA-234		N	1	2.137E+000	1001.00	2.137E+000	&	(		1.810E+002G	1.6E+012	.84
				2.137E+000	766.41	1.860E+002	%			4.356E+002G	1.6E+012	.29
PB-214		N	1	1.906E+001	351.93	1.858E+001	*	(	P	2.826E+000G	5.8E+005	37.60
				1.906E+001	295.09	2.049E+001	@	(	P	5.578E+000G	5.8E+005	19.30
				1.906E+001	242.00	1.779E+001		(		1.577E+001G	5.8E+005	7.43
BI-214		N	1	1.759E+001	609.31	1.796E+001		(	P	1.850E+000G	5.8E+005	46.09
				1.759E+001	1120.29	2.266E+001	+		P	5.602E+000G	5.8E+005	15.10
				1.759E+001	1764.49	1.647E+001	?	(	P	9.961E+000G	5.8E+005	15.40
TH-234		N	1	1.592E+001	63.29	1.592E+001	%	(	P	3.014E+001G	1.6E+012	4.82
				1.592E+001	92.59	1.428E+001	%		P	2.359E+001G	1.6E+012	5.58
TL-208	F	N	1	1.553E+001	583.02	1.553E+001		(	P	1.133E+000G	7.0E+002	84.50
				1.553E+001	277.28	2.874E+001	+			1.509E+001G	7.0E+002	6.31
				1.553E+001	860.56	2.643E+001	*			5.045E+000G	7.0E+002	12.42
CS-137	T F I		1	1.257E+000	661.66	1.257E+000	%	(		1.655E+000G	1.1E+004	85.21
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(		1.879E+000G	1.9E+003	99.98
				0.000E+000	1173.24	-2.818E-001	%			1.811E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
K-40	#	2.822E+002	2.822E+002	4.74	5.57	1.131E+001
CO-60	<			849.88	849.88	1.879E+000
I-131	<	-2.969E-001	-3.008E-001	139.83	139.86	1.411E+000
CS-134	<	-2.223E-001	-2.223E-001	212.54	212.56	1.623E+000
BE-7	<	6.677E-001	6.691E-001	378.87	378.88	8.949E+000
CS-137	<	1.257E+000	1.257E+000	41.47	41.57	1.655E+000
EU-152	<	-2.320E-001	-2.320E-001	526.15	526.16	4.222E+000
EU-155		4.956E+000	4.956E+000	21.55	21.81	4.622E+000
TL-208		1.553E+001	1.553E+001	6.02	6.67	1.133E+000
EU-154	<	2.415E-001	2.415E-001	1,138.10	1,138.10	9.984E+000
RA-224		4.928E+001	4.928E+001	23.33	23.52	3.597E+001
PB-210	<	5.459E+000	5.459E+000	231.22	231.25	4.369E+001
PB-212		3.217E+001	3.218E+001	4.16	5.12	2.593E+000
PB-214		1.906E+001	1.906E+001	9.10	9.54	2.826E+000
Pa-234	<	-2.169E+000	-2.169E+000	78.27	78.32	5.633E+000
TH-234	<	1.592E+001	1.592E+001	56.74	56.86	3.014E+001
PA-234M	<	2.137E+000	2.137E+000	2,350.44	2,350.44	1.810E+002
U-235	<	2.404E+000	2.404E+000	105.53	105.57	8.508E+000
BI-212		3.446E+001	3.446E+001	14.29	14.58	7.728E+000
BI-214		1.759E+001	1.759E+001	7.47	8.01	1.850E+000
AC-228	<	2.949E+001	2.949E+001	6.78	7.37	4.925E+000
AM-241	<	-9.421E-001	-9.421E-001	131.94	131.99	4.160E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 455.23 Bq/sample

Analyzed by: _____

403293

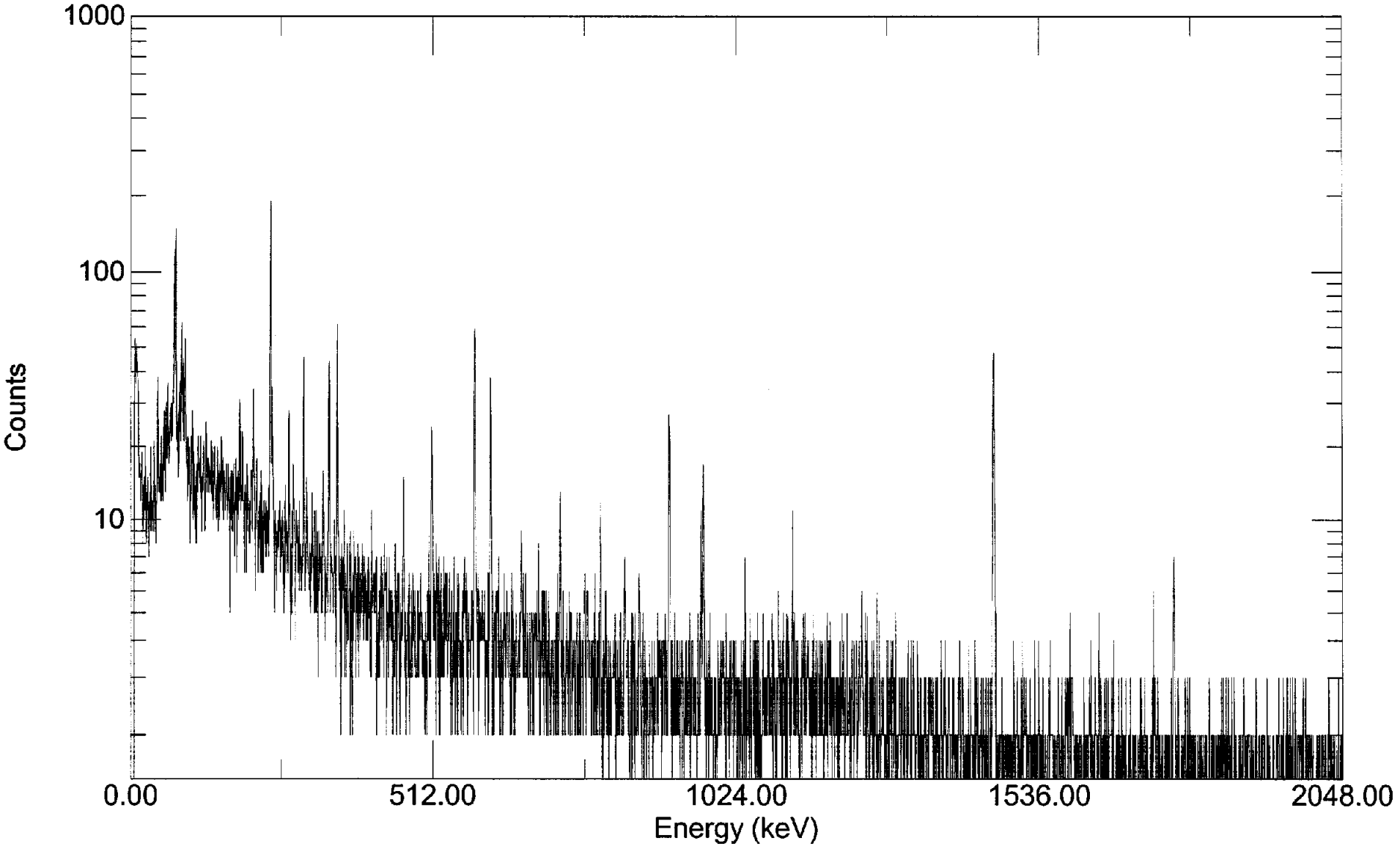
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKD81AC

7360292_KEKD81AC_F7L200260-009



Acquired: 26-Dec-2007 3:38:32 PM
File: C:\User\spectra\KEKD81AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1814.98 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,048

Sample Description: 7360292_KEKEC1AC_F7L200260-010

Spectrum Filename: KEKEC1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 3:39:06PM		
Live Time:	1800.00	Real Time:	1804.46
Dead Time:	0.25 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2408

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.00	74.80	126.67	115.33	0.064	18.46	0.788	PB-214	
308.25	77.11	230.00	241.00	0.134	14.60	0.789	PB-214	
348.42	87.16	206.25	10.75	0.006	191.46	0.802		s
836.63	209.25	105.01	90.99	0.051	19.07	0.570	AC-228	s
1179.10	294.88	110.11	37.89	0.021	42.40	0.956		
1353.49	338.48	92.52	36.48	0.020	40.80	1.065		s
1406.19	351.66	186.88	8.12	0.005	240.65	0.939		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.40	46.39	80.81	27.19	0.015	33.46	0.453	s
AM-241	1	235.98	59.04	137.97	0.27	0.000	6158.82	0.830	s
TH-234	1	252.10	63.07	208.76	24.10	0.013	51.42	0.834	s
EU-155	1	348.88	87.27	118.70	131.09	0.073	14.64	0.854	s
U-235	1	373.18	93.35	139.78	8.48	0.005	27.23	0.860	s D
AC-228	1	373.18	93.35	39.94	156.27	0.087	9.31	0.860	s D
TH-234	1	379.03	94.81	178.11	-49.92	-0.028	70.68	0.859	s
EU-155	1	421.49	105.43	112.69	10.67	0.006	144.01	0.871	
EU-152	1	485.63	121.47	123.31	-11.17	-0.006	143.72	0.885	
EU-154	1	493.53	123.45	126.39	-2.30	-0.001	695.13	0.886	
Pa-234	1	523.33	130.90	158.76	-18.43	-0.010	99.45	0.894	s
U-235	1	570.37	142.66	107.15	16.01	0.009	94.77	0.904	s
U-235	1	654.28	163.65	109.46	14.53	0.008	105.15	0.922	s
U-235	1	820.74	205.27	75.01	-6.39	-0.004	195.59	0.958	s
PB-212	1	953.37	238.44	69.46	331.54	0.184	7.14	1.012	
RA-224	1	958.97	239.84	436.48	-121.71	-0.068	25.91	0.988	s
PB-214	1	965.44	241.46	109.63	46.32	0.026	35.18	0.989	s
TL-208	1	1109.25	277.41	28.33	31.67	0.018	37.40	0.464	s
I-131	1	1140.17	285.14	60.19	-9.05	-0.005	125.69	1.025	s
PB-214	1	1179.76	295.04	37.17	77.23	0.043	15.06	1.034	
PB-212	1	1198.51	299.73	16.00	42.00	0.023	23.89	1.178	
AC-228	1	1351.69	338.03	31.31	68.36	0.038	16.74	1.071	s
EU-152	1	1376.72	344.29	75.00	0.00	0.000	1224.74	1.076	s
PB-214	1	1406.18	351.65	36.16	161.80	0.090	9.06	1.082	
I-131	1	1457.16	364.40	42.60	-3.47	-0.002	271.34	1.092	s
BE-7	1	1915.37	478.94	38.31	-7.63	-0.004	120.26	1.185	s
CS-134	1	2262.70	565.76	16.77	0.24	0.000	2439.03	1.254	s
CS-134	1	2276.94	569.32	23.79	-2.36	-0.001	-62.06	1.259	s D
Pa-234	1	2277.54	569.47	31.75	-2.74	-0.002	-165.80	1.259	s D
TL-208	1	2330.14	582.62	9.18	124.82	0.069	10.65	1.205	
CS-134	1	2424.95	606.31	59.52	-14.20	-0.008	81.31	1.286	s
BI-214	1	2434.87	608.79	5.25	174.75	0.097	7.45	0.947	s
I-131	1	2550.45	637.68	15.36	5.76	0.003	104.94	1.312	s
CS-137	1	2645.75	661.50	28.83	17.69	0.010	49.07	1.331	s
EU-154	1	2898.34	724.62	55.73	-11.73	-0.007	94.65	1.378	s
BI-212	1	2906.43	726.64	16.90	22.01	0.012	33.95	1.381	s
PA-234M	1	3065.59	766.41	33.00	0.00	0.000	812.40	1.411	s
EU-152	1	3116.28	779.08	29.40	-5.61	-0.003	143.13	1.420	s
BI-212	1	3142.02	785.51	34.00	0.00	0.000	824.62	1.425	s
CS-134	1	3179.22	794.81	18.52	6.70	0.004	98.69	1.433	s
CS-134	1	3208.80	802.20	15.15	-1.04	-0.001	535.83	1.437	s
TL-208	1	3442.89	860.69	17.05	9.62	0.005	68.75	1.481	s
EU-154	1	3490.95	872.70	20.84	-0.01	0.000	14636.32	1.490	s
Pa-234	1	3524.17	880.99	12.14	-0.37	0.000	1349.18	1.495	s
Pa-234	1	3532.91	883.18	13.40	2.50	0.001	216.24	1.497	s

AC-228	1	3643.26	910.75	10.12	66.08	0.037	14.06	1.518	
Pa-234	1	3784.51	946.04	19.75	-2.02	-0.001	318.46	1.543	s
EU-152	1	3856.86	964.11	194.69	0.00	0.000	1973.25	1.556	s
AC-228	1	3875.44	968.75	27.60	36.85	0.020	26.04	1.559	s
EU-154	1	3985.80	996.32	15.27	-2.09	-0.001	273.61	1.579	s
PA-234M	1	4004.52	1001.00	23.32	0.00	0.000	682.99	1.582	s
EU-154	1	4020.65	1005.03	22.94	-0.79	0.000	867.45	1.585	s
EU-152	1	4454.25	1113.34	14.69	1.49	0.001	371.97	1.659	s
BI-214	1	4479.31	1119.59	21.23	12.63	0.007	41.12	1.665	s
CO-60	1	4699.47	1174.58	14.82	-1.84	-0.001	304.69	1.701	s
EU-154	1	5099.74	1274.54	47.16	0.00	0.000	971.19	1.768	s
CO-60	1	5333.86	1333.01	7.45	2.61	0.001	160.34	1.806	s
EU-152	1	5634.45	1408.06	8.06	2.91	0.002	149.96	1.854	s
K-40	1	5843.76	1460.32	2.83	214.17	0.119	6.79	1.601	
BI-214	1	7057.86	1763.38	1.16	13.68	0.008	29.24	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code			Peak MDA Value Becquerels	Code	Comments	
CS-134	T F I	1	-7.632E-001	604.71	-7.632E-001	%	(		2.079E+000G		7.5E+002	97.62
			-7.632E-001	795.87	5.194E-001	&			1.764E+000G		7.5E+002	85.53
			-7.632E-001	569.32	-7.632E-001	&			8.237E+000G		7.5E+002	15.38
			-7.632E-001	801.95	-8.022E-001	%			1.601E+001G		7.5E+002	8.69
			-7.632E-001	563.24	1.408E-001	%			1.287E+001G		7.5E+002	8.35
TL-208	F N	1	7.510E+000	583.02	7.510E+000		(	P	1.013E+000G		7.0E+002	84.50
			7.510E+000	277.28	1.304E+001	+			1.133E+001G		7.0E+002	6.31
			7.510E+000	860.56	5.479E+000	%			1.251E+001G		7.0E+002	12.42
RA-224	N	1	-6.836E+001	240.99	-6.836E+001	*	(		5.620E+001G		7.0E+002	4.10
EU-155	T F I	1	4.675E+000	105.31	8.155E-001	%	(		3.988E+000G		1.8E+003	21.20
			4.675E+000	86.54	7.341E+000	*	(		2.995E+000G		1.8E+003	30.70
EU-154	T F I	1	-3.287E-003	873.23	-3.287E-003	&	(		1.400E+001G		3.1E+003	12.27
			-3.287E-003	123.10	-9.085E-002	&			2.179E+000G		3.1E+003	40.79
			-3.287E-003	1274.54	0.000E+000	%			9.690E+000G		3.1E+003	35.19
			-3.287E-003	723.36	-3.548E+000	%			1.134E+001G		3.1E+003	20.22
			-3.287E-003	1004.77	-3.519E-001	%			1.118E+001G		3.1E+003	18.01
			-3.287E-003	996.33	-1.573E+000	%			1.577E+001G		3.1E+003	10.60
BE-7	N P C	1	-3.091E+000	477.60	-3.091E+000	%	(		1.278E+001G		5.3E+001	10.52
CO-60	T F	1	2.664E-001	1332.50	2.664E-001	%	(		1.575E+000G		1.9E+003	99.98
			2.664E-001	1173.24	-1.688E-001	%			1.893E+000G		1.9E+003	99.90
U-235	N	1	2.437E+000	143.79	2.437E+000	&	(		7.754E+000G		2.6E+011	10.96
			2.437E+000	205.33	-2.592E+000	%			1.746E+001G		2.6E+011	5.01
			2.437E+000	163.38	5.035E+000	%			1.783E+001G		2.6E+011	5.08
			2.437E+000	93.35	2.437E+000	!		E	1.661E+001X		2.6E+011	5.81
PB-210	N	1	2.253E+001	46.54	2.253E+001	%	(	P	3.696E+001G		8.1E+003	4.25
K-40	N	1	2.219E+002	1460.83	2.219E+002		(	P	1.093E+001G		4.7E+011	10.67
BI-214	N	1	2.003E+001	609.31	2.003E+001		(	P	1.534E+000G		5.8E+005	46.09
			2.003E+001	1120.29	7.368E+000	%		P	1.411E+001G		5.8E+005	15.10
			2.003E+001	1764.49	1.166E+001	-			6.581E+000G		5.8E+005	15.40
PB-212	N	1	1.749E+001	238.63	1.749E+001		(	P	2.192E+000G		7.0E+002	43.30
			1.749E+001	300.03	3.570E+001	+			1.815E+001G		7.0E+002	3.28
AC-228	N	1	1.694E+001	911.07	1.690E+001		(		4.485E+000G		2.1E+003	29.00
			1.694E+001	968.97	1.648E+001		(		1.216E+001G		2.1E+003	17.46
			1.694E+001	338.32	1.770E+001	@	(		7.454E+000G		2.1E+003	12.01
			1.694E+001	93.35	4.692E+001	+	}	E	1.735E+001X	A	2.1E+003	5.56
Pa-234	N	1	-1.667E+000	131.29	-1.667E+000	%	(		5.556E+000G		1.6E+012	18.00
			-1.667E+000	569.47	-1.667E+000	%			1.760E+001G		1.6E+012	8.20
			-1.667E+000	946.02	-1.156E+000	%			1.338E+001G		1.6E+012	13.40
			-1.667E+000	883.24	1.885E+000	%			1.489E+001G		1.6E+012	9.60
			-1.667E+000	880.53	-4.422E-001	%			2.277E+001G		1.6E+012	6.00
AM-241	T	1	1.657E-002	59.54	1.657E-002	%	(		3.527E+000G		1.6E+005	35.90
I-131	T F I	1	-1.415E-001	364.48	-1.415E-001	&	(		1.350E+000G		8.0E+000	81.70
			-1.415E-001	284.30	-3.916E+000	%			1.681E+001G		8.0E+000	6.14
			-1.415E-001	636.97	4.407E+000	%			1.606E+001G		8.0E+000	7.17

PB-214	N	1	1.396E+001	351.93	1.388E+001		(	P	2.635E+000G	5.8E+005	37.60
			1.396E+001	295.09	1.099E+001	-		P	4.428E+000G	5.8E+005	19.30
			1.396E+001	242.00	1.441E+001	*	(		1.602E+001G	5.8E+005	7.43
CS-137 T F I		1	1.177E+000	661.66	1.177E+000	%	(		1.846E+000G	1.1E+004	85.21
BI-212	N	1	1.144E+001	727.33	1.144E+001		(		1.137E+001G	7.0E+002	11.82
			1.144E+001	785.51	0.000E+000	%			1.781E+002G	7.0E+002	1.10
TH-234	N	1	1.042E+001	63.29	1.042E+001	*	(	P	3.030E+001G	1.6E+012	4.82
			1.042E+001	92.59	-1.497E+001	%		P	1.946E+001G	1.6E+012	5.58
EU-152 T F		1	0.000E+000	344.29	0.000E+000	%	(		5.136E+000G	4.9E+003	26.50
			0.000E+000	121.78	-6.299E-001	%			3.070E+000G	4.9E+003	28.58
			0.000E+000	778.92	-2.821E+000	%			1.408E+001G	4.9E+003	12.94
			0.000E+000	964.11	0.000E+000	&			3.606E+001G	4.9E+003	14.61
			0.000E+000	1112.07	9.587E-001	%			1.320E+001G	4.9E+003	13.64
			0.000E+000	1408.00	1.483E+000	&			8.124E+000G	4.9E+003	21.00
PA-234	N	1	0.000E+000	1001.00	0.000E+000	%	(		2.417E+002G	1.6E+012	.84
			0.000E+000	766.41	0.000E+000	%			6.440E+002G	1.6E+012	.29

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	<	-1.415E-001	-1.433E-001	271.34	271.36	1.350E+000
CS-134	<	-7.632E-001	-7.633E-001	81.31	81.36	2.079E+000
CS-137	<	1.177E+000	1.177E+000	49.07	49.15	1.846E+000
EU-152	<			1,224.74	1,224.75	5.136E+000
BE-7	<	-3.091E+000	-3.097E+000	120.26	120.29	1.278E+001
K-40		2.219E+002	2.219E+002	6.88	7.48	1.093E+001
CO-60	<	2.664E-001	2.664E-001	160.34	160.37	1.575E+000
EU-154	<	-3.287E-003	-3.287E-003	114,636.32	114,636.32	1.400E+001
PB-212		1.749E+001	1.749E+001	7.34	7.92	2.192E+000
PB-214	<	1.396E+001	1.396E+001	9.35	9.78	2.635E+000
BI-212	<	1.144E+001	1.144E+001	33.95	34.07	1.137E+001
Pa-234	<	-1.667E+000	-1.667E+000	99.45	99.49	5.556E+000
TH-234	<	1.042E+001	1.042E+001	85.62	85.70	3.030E+001
EU-155	<	4.675E+000	4.676E+000	14.64	15.02	3.988E+000
TL-208		7.510E+000	7.511E+000	10.84	11.22	1.013E+000
RA-224	<	-6.836E+001	-6.837E+001	25.91	26.08	5.620E+001
PB-210	#	2.253E+001	2.253E+001	59.08	59.21	3.696E+001
BI-214	#	2.003E+001	2.003E+001	7.68	8.20	1.534E+000
AC-228	<	1.694E+001	1.694E+001	11.33	11.69	4.485E+000
PA-234M	<			682.99	683.00	2.417E+002
U-235	<	2.437E+000	2.437E+000	94.77	94.81	7.754E+000
AM-241	<	1.657E-002	1.657E-002	6,158.82	6,158.82	3.527E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 266.91 Bq/sample

Analyzed by: _____

403293

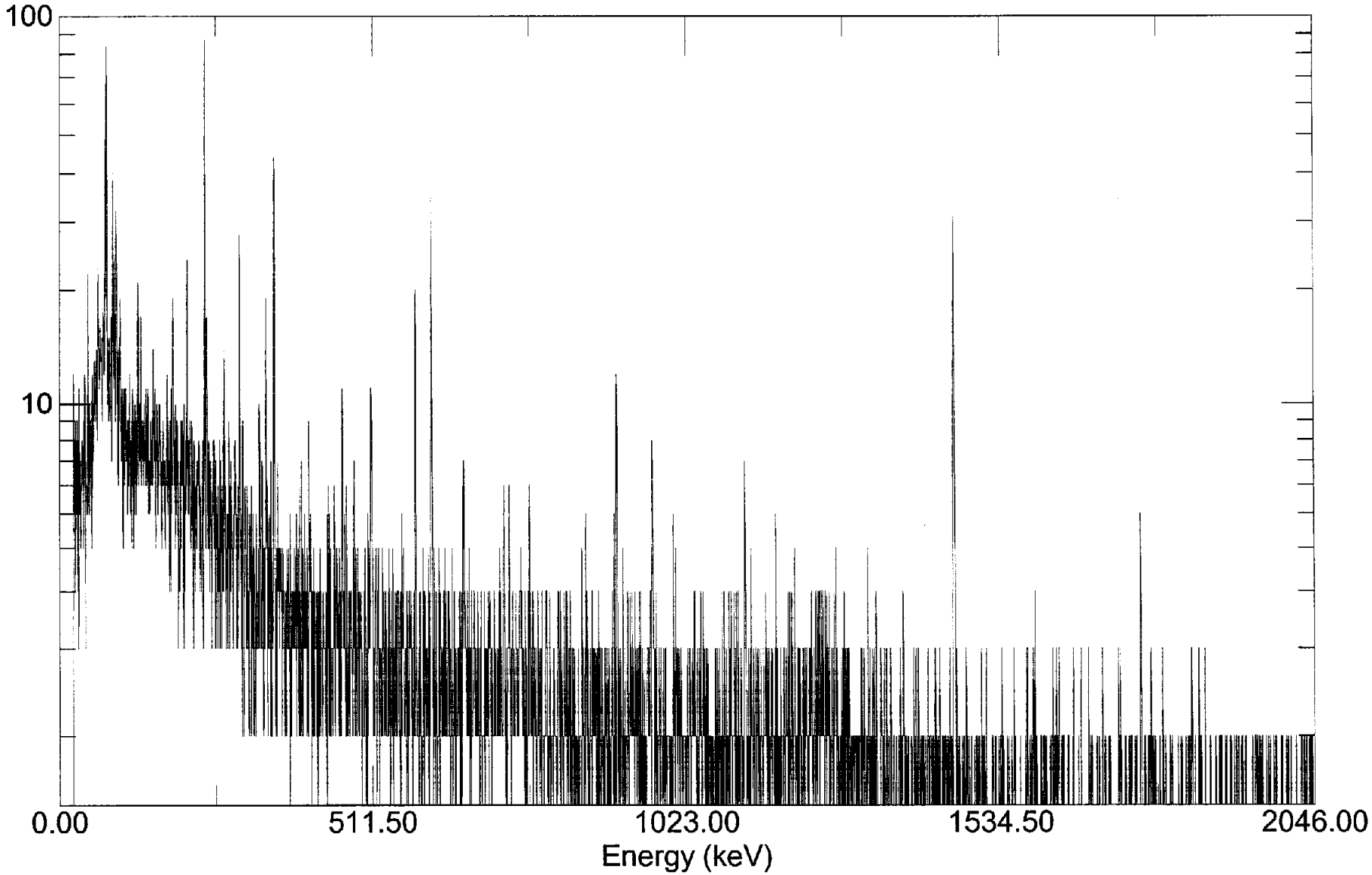
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKEC1AC

7360292_KEKEC1AC_F7L200260-010



Acquired: 26-Dec-2007 3:39:06 PM
File: C:\User\spectra\KEKEC1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.46 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,050

Sample Description: 7360292_KEKEG1AC_F7L200260-011

Spectrum Filename: KEKEG1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 3:39:40PM		
Live Time:	1800.00	Real Time:	1850.06
Dead Time:	2.71 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2198

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
252.40	63.32	157.09	60.91	0.034	31.80	0.560	PA-234	s
297.11	74.49	168.00	154.00	0.086	18.02	0.758	PB-214	s
307.20	77.01	106.00	239.00	0.133	9.87	0.801	PB-214	
316.71	79.39	44.00	31.00	0.017	37.29	0.620	TH-227	
744.31	186.21	65.33	110.67	0.061	19.82	0.741	PA-234	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.08	46.50	115.26	42.74	0.024	37.31	0.469	s
AM-241	1	237.21	59.53	133.83	0.33	0.000	446.98	0.761	s
TH-234	1	251.95	63.21	146.44	28.93	0.016	40.70	0.764	s
EU-155	1	347.47	87.07	185.47	54.37	0.030	37.93	0.788	s
TH-234	1	370.29	92.77	204.14	33.62	0.019	36.24	0.795	s
U-235	1	372.61	93.35	130.60	7.42	0.004	28.49	0.795	s D
AC-228	1	372.61	93.35	197.84	0.00	0.000	1843.91	0.795	s D
EU-155	1	419.99	105.19	82.03	12.92	0.007	102.98	0.808	s
EU-152	1	488.98	122.42	71.75	14.74	0.008	85.33	0.824	s
EU-154	1	493.40	123.53	119.38	-15.03	-0.008	105.97	0.826	s
Pa-234	1	524.23	131.23	111.96	4.16	0.002	363.36	0.834	s
U-235	1	574.18	143.71	97.51	14.04	0.008	87.04	0.847	s
U-235	1	652.56	163.29	82.12	4.85	0.003	188.88	0.867	s
U-235	1	818.25	204.69	58.73	19.86	0.011	59.01	0.909	s
PB-212	1	954.40	238.70	68.15	242.85	0.135	8.73	0.761	
RA-224	1	959.72	240.03	366.10	-101.88	-0.057	28.35	0.944	
PB-214	1	966.75	241.79	48.00	94.00	0.052	17.48	1.016	s
TL-208	1	1108.24	277.14	38.03	6.09	0.003	148.83	0.980	s
I-131	1	1137.19	284.37	46.97	3.36	0.002	293.46	0.987	s
PB-214	1	1181.28	295.39	34.08	137.92	0.077	12.61	0.899	
PB-212	1	1201.98	300.56	29.33	49.67	0.028	27.50	0.411	s
AC-228	1	1352.61	338.20	42.96	41.12	0.023	27.41	1.040	s
EU-152	1	1389.65	347.46	29.82	1.88	0.001	417.94	1.045	s
PB-214	1	1407.55	351.93	25.21	187.79	0.104	8.87	1.211	s
I-131	1	1452.04	363.04	35.60	-0.32	0.000	2679.66	1.065	s
BE-7	1	1910.09	477.51	28.68	-0.06	0.000	13385.39	1.173	s
CS-134	1	2253.11	563.24	57.97	0.00	0.000	1076.75	1.252	s
CS-134	1	2277.45	569.32	16.65	-0.01	0.000	-38.80	1.258	s D
Pa-234	1	2278.05	569.47	29.10	0.62	0.000	132.27	1.258	s D
TL-208	1	2332.78	583.15	11.42	89.58	0.050	12.23	1.455	s
CS-134	1	2416.89	604.17	28.21	-0.08	0.000	9465.46	1.290	s
BI-214	1	2438.55	609.58	14.40	118.60	0.066	10.17	0.869	s
I-131	1	2548.55	637.08	20.37	1.88	0.001	348.17	1.319	s
CS-137	1	2647.23	661.74	39.96	20.20	0.011	36.63	1.342	s
EU-154	1	2892.45	723.04	26.30	-0.13	0.000	5717.96	1.397	s
BI-212	1	2910.72	727.61	22.95	16.82	0.009	47.10	1.400	s
PA-234M	1	3065.96	766.41	50.46	0.00	0.000	1004.62	1.434	s
EU-152	1	3124.18	780.97	19.45	-4.68	-0.003	141.07	1.445	s
BI-212	1	3141.44	785.28	22.19	-0.19	0.000	3464.62	1.451	s
CS-134	1	3179.88	794.89	17.30	12.33	0.007	55.56	1.460	s
CS-134	1	3211.72	802.85	17.51	-2.24	-0.001	272.48	1.465	s
TL-208	1	3445.30	861.25	14.50	13.35	0.007	48.73	1.516	s
EU-154	1	3493.75	873.36	18.89	-1.44	-0.001	435.90	1.527	s
Pa-234	1	3521.35	880.26	15.30	-0.07	0.000	8502.20	1.533	s
Pa-234	1	3532.11	882.95	18.27	-2.93	-0.002	214.24	1.535	s
AC-228	1	3646.22	911.48	20.40	58.73	0.033	16.99	1.559	

Pa-234	1	3790.80	947.63	17.01	0.32	0.000	1856.89	1.588	s
EU-152	1	3860.92	965.16	41.72	-0.77	0.000	1196.76	1.603	s
AC-228	1	3877.03	969.18	26.24	28.44	0.016	31.63	1.607	s
EU-154	1	3983.94	995.92	18.11	-2.93	-0.002	213.35	1.630	s
PA-234M	1	4004.50	1001.06	20.30	0.06	0.000	10779.21	1.633	s
EU-154	1	4011.46	1002.80	12.02	4.33	0.002	123.04	1.637	s
EU-152	1	4447.14	1111.74	16.54	8.20	0.005	78.32	1.723	s
BI-214	1	4482.94	1120.69	0.00	46.00	0.026	14.74	1.625	
CO-60	1	4693.06	1173.24	44.66	0.00	0.000	945.05	1.772	s
EU-154	1	5104.99	1276.26	26.87	-7.07	-0.004	110.30	1.850	s
CO-60	1	5307.75	1326.97	7.66	0.51	0.000	781.16	1.894	s
EU-152	1	5623.51	1405.95	17.06	-4.07	-0.002	151.80	1.950	s
K-40	1	5843.96	1461.10	0.00	292.00	0.162	5.85	1.735	
BI-214	1	7057.30	1764.66	10.11	7.89	0.004	52.63	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	MDA Value Becquerels	Code	Comments	
EU-155	T F I	1	9.576E-001	105.31	9.576E-001	& (	3.329E+000G		1.8E+003	21.20
			9.576E-001	86.54	2.941E+000		3.579E+000G	A	1.8E+003	30.70
BI-212	N	1	8.384E+000	727.33	8.384E+000	% (	1.248E+001G		7.0E+002	11.82
			8.384E+000	785.51	-1.100E+000	%	1.408E+002G		7.0E+002	1.10
EU-154	T F I	1	-8.021E-001	873.23	-8.021E-001	% (	1.282E+001G		3.1E+003	12.27
			-8.021E-001	123.10	-5.760E-001	%	2.055E+000G		3.1E+003	40.79
			-8.021E-001	1274.54	-1.871E+000	%	7.111E+000G		3.1E+003	35.19
			-8.021E-001	723.36	-3.684E-002	%	7.719E+000G		3.1E+003	20.22
			-8.021E-001	1004.77	1.845E+000	%	8.042E+000G		3.1E+003	18.01
			-8.021E-001	996.33	-2.110E+000	%	1.622E+001G		3.1E+003	10.60
RA-224	N	1	-5.501E+001	240.99	-5.501E+001	(	4.961E+001G		7.0E+002	4.10
PA-234M	N	1	5.409E-001	1001.00	5.409E-001	& (	2.168E+002G		1.6E+012	.84
			5.409E-001	766.41	0.000E+000	&	7.497E+002G		1.6E+012	.29
TL-208	F N	1	5.176E+000	583.02	5.176E+000	* (P	1.066E+000G		7.0E+002	84.50
			5.176E+000	277.28	2.409E+000	%	1.244E+001G		7.0E+002	6.31
			5.176E+000	860.56	7.278E+000	%	1.115E+001G		7.0E+002	12.42
CO-60	T F	1	4.921E-002	1332.50	4.921E-002	% (	1.508E+000G		1.9E+003	99.98
			4.921E-002	1173.24	0.000E+000	%	2.949E+000G		1.9E+003	99.90
CS-134	T F I	1	-4.099E-003	604.71	-4.099E-003	& (	1.417E+000G		7.5E+002	97.62
			-4.099E-003	795.87	9.154E-001	&	1.640E+000G		7.5E+002	85.53
			-4.099E-003	569.32	-4.099E-003	%	6.755E+000G		7.5E+002	15.38
			-4.099E-003	801.95	-1.647E+000	%	1.633E+001G		7.5E+002	8.69
			-4.099E-003	563.24	0.000E+000	%	2.167E+001G		7.5E+002	8.35
Pa-234	N	1	3.640E-001	131.29	3.640E-001	& (	4.556E+000G		1.6E+012	18.00
			3.640E-001	569.47	3.640E-001	%	1.624E+001G		1.6E+012	8.20
			3.640E-001	946.02	1.722E-001	%	1.197E+001G		1.6E+012	13.40
			3.640E-001	883.24	-2.112E+000	%	1.630E+001G		1.6E+012	9.60
			3.640E-001	880.53	-7.487E-002	%	2.407E+001G		1.6E+012	6.00
PB-210	N	1	3.138E+001	46.54	3.138E+001	* (P	3.873E+001G		8.1E+003	4.25
K-40	N	1	2.854E+002	1460.83	2.854E+002	(	7.204E+000G		4.7E+011	10.67
BE-7	N P C	1	-2.203E-002	477.60	-2.203E-002	% (	1.077E+001G		5.3E+001	10.52
			2.150E-001	1112.07	5.011E+000	%	1.323E+001G		4.9E+003	13.64

				2.150E-001	1408.00	-1.960E+000	%			1.057E+001G		4.9E+003	21.00
EU-152	T F		1	2.150E-001	344.29	2.150E-001	&	(		3.226E+000G		4.9E+003	26.50
				2.150E-001	121.78	8.055E-001	%			2.305E+000G		4.9E+003	28.58
				2.150E-001	778.92	-2.256E+000	%			1.121E+001G		4.9E+003	12.94
				2.150E-001	964.11	-3.898E-001	%			1.668E+001G		4.9E+003	14.61
U-235		N	1	2.066E+000	143.79	2.066E+000	*	(	P	7.170E+000G		2.6E+011	10.96
				2.066E+000	205.33	7.747E+000	&			1.499E+001G		2.6E+011	5.01
				2.066E+000	163.38	1.621E+000	%		P	1.503E+001G		2.6E+011	5.08
				2.066E+000	93.35	2.066E+000	!			E 1.557E+001X		2.6E+011	5.81
AM-241	T		1	1.861E-002	59.54	1.861E-002	%	(	P	3.221E+000G		1.6E+005	35.90
PB-214		N	1	1.662E+001	351.93	1.547E+001		(	P	2.151E+000G		5.8E+005	37.60
				1.662E+001	295.09	1.886E+001		(	P	4.090E+000G		5.8E+005	19.30
				1.662E+001	242.00	2.810E+001	*			1.046E+001G		5.8E+005	7.43
BI-214		N	1	1.305E+001	609.31	1.305E+001		(	P	2.244E+000G		5.8E+005	46.09
				1.305E+001	1120.29	2.554E+001	+			4.092E+000G		5.8E+005	15.10
				1.305E+001	1764.49	6.293E+000	%		P	1.398E+001G		5.8E+005	15.40
CS-137	T F I		1	1.290E+000	661.66	1.290E+000	%	(	P	2.054E+000G		1.1E+004	85.21
AC-228		N	1	1.285E+001	911.16	1.436E+001		(		5.810E+000G		2.1E+003	29.00
				1.285E+001	968.97	1.214E+001	*	(		1.135E+001G		2.1E+003	17.46
				1.285E+001	338.32	1.023E+001	*	(		8.274E+000G		2.1E+003	12.01
				1.285E+001	93.35	0.000E+000	%		} E	1.627E+001G	A	2.1E+003	5.56
I-131	T F I		1	-1.236E-002	364.48	-1.236E-002	%	(		1.195E+000G		8.0E+000	81.70
				-1.236E-002	284.30	1.397E+000	%			1.440E+001G		8.0E+000	6.14
				-1.236E-002	636.97	1.378E+000	%			1.745E+001G		8.0E+000	7.17
PB-212		N	1	1.232E+001	238.63	1.232E+001		(	P	2.088E+000G		7.0E+002	43.30
				1.232E+001	300.03	4.056E+001	+			2.282E+001G		7.0E+002	3.28
				1.172E+001	92.59	9.759E+000	%		P	2.011E+001G		1.6E+012	5.58
TH-234		N	1	1.172E+001	63.29	1.172E+001	*	(	P	2.394E+001G		1.6E+012	4.82

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-2.203E-002	-2.207E-002	13,385.39	13,385.39	1.077E+001
K-40		2.854E+002	2.854E+002	5.85	6.54	7.204E+000
CO-60	#	4.921E-002	4.921E-002	781.16	781.16	1.508E+000
I-131	#	-1.236E-002	-1.252E-002	2,679.66	2,679.66	1.195E+000
CS-134	#	-4.099E-003	-4.100E-003	9,465.46	9,465.46	1.417E+000
EU-154	#	-8.021E-001	-8.021E-001	435.90	435.91	1.282E+001
PB-212		1.232E+001	1.232E+001	8.97	9.45	2.088E+000
PB-214		1.662E+001	1.662E+001	7.87	8.38	2.151E+000
BI-212	#	8.384E+000	8.385E+000	47.10	47.19	1.248E+001
CS-137	#	1.290E+000	1.290E+000	47.96	48.05	2.054E+000
EU-152	#	2.150E-001	2.150E-001	417.94	417.95	3.226E+000
EU-155	#	9.576E-001	9.576E-001	102.98	103.03	3.329E+000
TL-208	#	5.176E+000	5.177E+000	12.75	13.07	1.066E+000
PB-210	#	3.138E+001	3.138E+001	52.38	52.52	3.873E+001
BI-214		1.305E+001	1.305E+001	10.74	11.13	2.244E+000
RA-224	#	-5.501E+001	-5.502E+001	28.35	28.51	4.961E+001
AC-228	#	1.285E+001	1.285E+001	15.06	15.33	5.810E+000
PA-234M	#	5.409E-001	5.409E-001	10,779.21	10,779.21	2.168E+002
U-235	#	2.066E+000	2.066E+000	102.39	102.44	7.170E+000
AM-241	#	1.861E-002	1.861E-002	4,972.96	4,972.96	3.221E+000
Pa-234	#	3.640E-001	3.640E-001	363.36	363.37	4.556E+000
TH-234	#	1.172E+001	1.172E+001	60.64	60.75	2.394E+001

= All peaks for activity calculation had bad shape

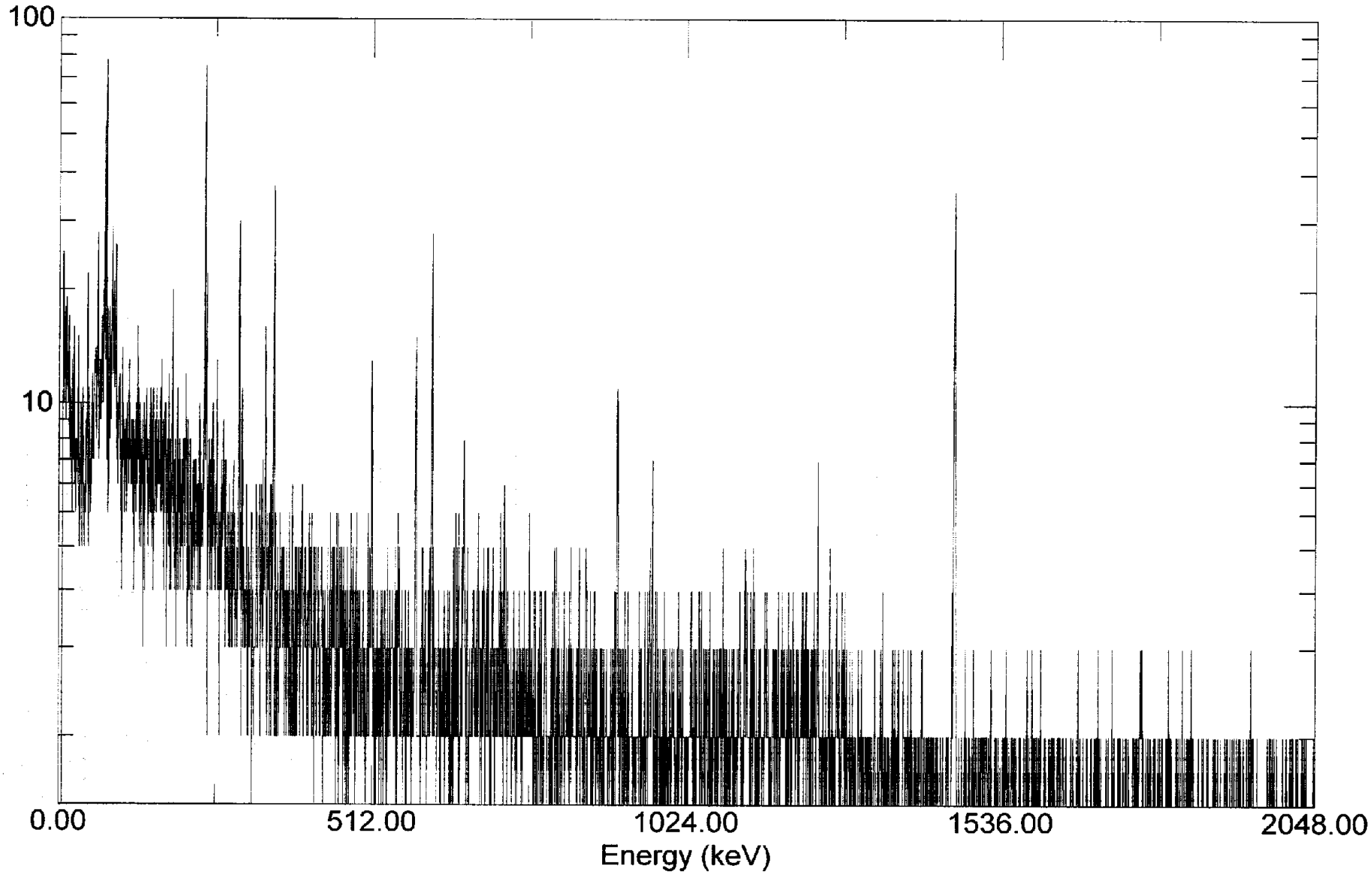
Total Activity (37.74 to 2,000.57 keV) 332.59 Bq/sample

Analyzed by: 403293

Laboratory: STL- St Louis

KEKEG1AC

7360292_KEKEG1AC_F7L200260-011



Acquired: 26-Dec-2007 3:39:40 PM
File: C:\User\spectra\KEKEG1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1850.06 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,049

Sample Description: 7360292_KEKEM1AC_F7L200260-012

Spectrum Filename: KEKEM1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 3:40:09PM		
Live Time:	1800.00	Real Time:	1820.50
Dead Time:	1.13 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1892

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.62	74.87	247.33	174.67	0.097	18.10	0.981	PB-214	
308.02	77.22	255.00	237.00	0.132	14.70	0.708	PB-214	
370.14	92.75	315.00	0.00	0.000	2509.98	0.519		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.90	46.69	163.21	16.03	0.009	44.45	0.832	
AM-241	1	237.81	59.67	219.42	-0.08	0.000	26965.29	0.846	s
TH-234	1	252.21	63.27	241.38	20.46	0.011	53.30	0.850	
EU-155	1	347.44	87.07	214.80	69.08	0.038	32.33	0.874	s
TH-234	1	369.92	92.69	246.12	64.83	0.036	24.79	0.881	s
U-235	1	372.56	93.35	175.07	9.65	0.005	17.69	0.882	s D
AC-228	1	372.56	93.35	304.74	0.00	0.000	2144.76	0.882	s D
EU-155	1	418.71	104.89	126.00	22.06	0.012	75.05	0.894	s
EU-152	1	486.96	121.94	124.19	2.01	0.001	787.85	0.912	
EU-154	1	500.73	125.39	88.38	-0.78	0.000	1703.79	0.913	s
Pa-234	1	520.60	130.35	144.74	4.47	0.002	383.48	0.922	s
U-235	1	573.49	143.57	118.94	18.15	0.010	88.16	0.935	s
U-235	1	652.73	163.38	140.60	0.00	0.000	1676.88	0.955	s
U-235	1	820.37	205.28	124.60	-0.83	0.000	1908.93	0.999	s
PB-212	1	954.06	238.70	162.54	469.46	0.261	7.59	1.069	
RA-224	1	959.75	240.12	547.40	-119.71	-0.067	29.11	1.036	
PB-214	1	965.93	241.66	130.33	74.67	0.041	35.55	0.555	s
TL-208	1	1106.45	276.79	28.50	56.50	0.031	23.43	0.404	s
I-131	1	1138.95	284.91	61.99	9.59	0.005	120.55	1.081	s
PB-214	1	1179.03	294.93	35.00	174.00	0.097	10.46	1.251	s
PB-212	1	1199.83	300.13	33.33	49.67	0.028	28.05	1.426	s
AC-228	1	1352.62	338.32	66.37	77.58	0.043	18.69	1.136	s
EU-152	1	1373.13	343.45	46.14	-4.96	-0.003	198.61	1.142	s
PB-214	1	1406.90	351.89	59.55	271.45	0.151	9.31	1.130	s
I-131	1	1457.46	364.52	46.41	9.59	0.005	105.56	1.163	s
BE-7	1	1907.60	477.04	35.60	-1.08	-0.001	784.90	1.277	s
CS-134	1	2251.38	562.98	29.65	1.61	0.001	486.20	1.363	s
CS-134	1	2276.76	569.32	28.91	0.00	0.000	632.46	1.369	s D
Pa-234	1	2277.35	569.47	23.29	0.66	0.000	108.60	1.369	s D
TL-208	1	2332.01	583.13	2.41	183.59	0.102	7.33	1.108	s
CS-134	1	2403.23	600.93	20.21	0.96	0.001	672.19	1.403	s
BI-214	1	2436.85	609.34	18.80	151.20	0.084	9.79	1.630	
I-131	1	2552.00	638.12	19.14	3.66	0.002	177.01	1.435	s
CS-137	1	2633.84	658.58	27.46	-2.08	-0.001	556.02	1.459	s
EU-154	1	2900.94	725.35	56.47	-8.11	-0.005	135.59	1.519	s
BI-212	1	2908.10	727.14	27.89	20.30	0.011	42.97	1.523	s
PA-234M	1	3065.20	766.41	38.00	0.00	0.000	871.78	1.561	s
EU-152	1	3115.24	778.92	9.92	0.00	0.000	445.52	1.573	s
BI-212	1	3141.60	785.51	27.45	0.00	0.000	740.96	1.579	
CS-134	1	3179.98	795.10	23.08	12.13	0.007	62.96	1.589	s
CS-134	1	3190.05	797.62	16.62	-0.76	0.000	771.43	1.595	s
TL-208	1	3445.70	861.53	5.67	25.33	0.014	27.08	1.333	
EU-154	1	3490.59	872.75	21.98	2.03	0.001	333.70	1.662	s
Pa-234	1	3515.24	878.91	16.99	0.21	0.000	2797.77	1.669	s
Pa-234	1	3532.82	883.31	23.14	-3.07	-0.002	228.90	1.672	s
AC-228	1	3643.78	911.05	20.12	72.36	0.040	14.66	1.698	s

Pa-234	1	3786.31	946.68	30.75	-0.06	0.000	12396.84	1.731	s
EU-152	1	3852.08	963.12	45.12	-4.29	-0.002	226.61	1.748	s
AC-228	1	3876.39	969.19	34.15	37.42	0.021	27.48	1.752	
EU-154	1	3984.72	996.28	25.24	-2.37	-0.001	306.66	1.778	s
PA-234M	1	4003.11	1000.87	18.41	4.26	0.002	150.47	1.782	s
EU-154	1	4019.37	1004.94	24.28	1.83	0.001	387.13	1.785	s
EU-152	1	4447.41	1111.95	35.08	-4.63	-0.003	186.81	1.884	s
BI-214	1	4481.53	1120.48	0.00	74.00	0.041	11.62	0.500	s
CO-60	1	4693.96	1173.58	28.37	10.37	0.006	78.99	1.939	s
EU-154	1	5102.51	1275.72	21.14	2.25	0.001	296.03	2.030	s
CO-60	1	5329.63	1332.50	17.83	0.00	0.000	597.22	2.081	s
EU-152	1	5628.48	1407.22	16.16	0.71	0.000	805.07	2.147	s
K-40	1	5844.08	1461.12	17.31	303.29	0.168	6.06	2.192	
BI-214	1	7057.33	1764.45	9.91	12.14	0.007	46.58	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
CS-137	T F I	1	-9.798E-002	661.66	-9.798E-002	%	(P	1.281E+000G		1.1E+004	85.21
PB-210	N	1	9.574E+000	46.54	9.574E+000	%	(P	3.716E+001G		8.1E+003	4.25
			8.458E-001	1274.54	4.538E-001	%		4.859E+000G		3.1E+003	35.19
			8.458E-001	723.36	-1.744E+000	%		8.107E+000G		3.1E+003	20.22
			8.458E-001	1004.77	5.863E-001	%		8.207E+000G		3.1E+003	18.01
			8.458E-001	996.33	-1.279E+000	%		1.409E+001G		3.1E+003	10.60
EU-154	T F I	1	8.458E-001	873.23	8.458E-001	%	(	1.022E+001G		3.1E+003	12.27
			8.458E-001	123.10	-2.164E-002	%		1.287E+000G		3.1E+003	40.79
TL-208	F N	1	7.820E+000	583.02	7.820E+000	*	(P	4.234E-001G		7.0E+002	84.50
			7.820E+000	277.28	1.637E+001	*		7.993E+000G		7.0E+002	6.31
			7.820E+000	860.56	1.029E+001	+		5.605E+000G		7.0E+002	12.42
BI-212	N	1	7.496E+000	727.33	7.496E+000	%	(	1.009E+001G		7.0E+002	11.82
			7.496E+000	785.51	0.000E+000	%		1.150E+002G		7.0E+002	1.10
RA-224	N	1	-4.728E+001	240.99	-4.728E+001		(	4.413E+001G		7.0E+002	4.10
EU-152	T F	1	-4.172E-001	344.29	-4.172E-001	%	(	2.887E+000G		4.9E+003	26.50
			-4.172E-001	121.78	7.924E-002	%		2.156E+000G		4.9E+003	28.58
			-4.172E-001	778.92	0.000E+000	%		6.223E+000G		4.9E+003	12.94
			-4.172E-001	964.11	-1.633E+000	&		1.294E+001G		4.9E+003	14.61
			-4.172E-001	1112.07	-2.132E+000	%		1.396E+001G		4.9E+003	13.64
			-4.172E-001	1408.00	2.634E-001	%		7.910E+000G		4.9E+003	21.00
CS-134	T F I	1	3.644E-002	604.71	3.644E-002	%	(	9.009E-001G		7.5E+002	97.62
			3.644E-002	795.87	6.688E-001	%		1.384E+000G		7.5E+002	85.53
			3.644E-002	569.32	0.000E+000	%		6.362E+000G		7.5E+002	15.38
			3.644E-002	801.95	-4.129E-001	%		1.186E+001G		7.5E+002	8.69
			3.644E-002	563.24	6.710E-001	&		1.174E+001G		7.5E+002	8.35
AM-241	T	1	-3.357E-003	59.54	-3.357E-003	%	(	3.099E+000G		1.6E+005	35.90
BE-7	N P C	1	-3.098E-001	477.60	-3.098E-001	%	(	8.729E+000G		5.3E+001	10.52
PA-234M	N	1	2.921E+001	1001.00	2.921E+001	&	(	1.557E+002G		1.6E+012	.84
			2.921E+001	766.41	0.000E+000	&		4.883E+002G		1.6E+012	.29
Pa-234	N	1	2.832E-001	131.29	2.832E-001	%	(	3.723E+000G		1.6E+012	18.00
			2.832E-001	569.47	2.832E-001	%		1.083E+001G		1.6E+012	8.20
			2.832E-001	946.02	-2.583E-002	%		1.165E+001G		1.6E+012	13.40

			2.832E-001	883.24	-1.649E+000	%			1.350E+001G		1.6E+012	9.60
			2.832E-001	880.53	1.791E-001	%			1.879E+001G		1.6E+012	6.00
I-131	T F I	1	2.754E-001	364.48	2.754E-001	&	(		9.898E-001G		8.0E+000	81.70
			2.754E-001	284.30	2.919E+000	%			1.200E+001G		8.0E+000	6.14
			2.754E-001	636.97	1.985E+000	&			1.253E+001G		8.0E+000	7.17
K-40	N	1	2.278E+002	1460.83	2.278E+002		(		1.660E+001G		4.7E+011	10.67
			1.936E+000	205.33	-2.359E-001	%			1.559E+001G		2.6E+011	5.01
			1.936E+000	163.38	0.000E+000	&			1.409E+001G		2.6E+011	5.08
			1.936E+000	93.35	1.936E+000	!		E	1.292E+001X		2.6E+011	5.81
U-235	N	1	1.936E+000	143.79	1.936E+000	%	(		5.710E+000G		2.6E+011	10.96
PB-212	N	1	1.741E+001	238.63	1.741E+001		(	P	2.304E+000G		7.0E+002	43.30
			1.741E+001	300.03	2.972E+001	+			1.772E+001G		7.0E+002	3.28
PB-214	N	1	1.670E+001	351.93	1.640E+001	*	(	P	2.337E+000G		5.8E+005	37.60
			1.670E+001	295.09	1.743E+001	@	(		3.033E+000G		5.8E+005	19.30
			1.670E+001	242.00	1.633E+001	*	(		1.223E+001G		5.8E+005	7.43
AC-228	N	1	1.303E+001	911.16	1.321E+001		(		4.312E+000G		2.1E+003	29.00
			1.303E+001	968.97	1.196E+001		(		9.572E+000G		2.1E+003	17.46
			1.303E+001	338.32	1.415E+001	*	(		7.420E+000G		2.1E+003	12.01
			1.303E+001	93.35	0.000E+000	%	}	E	1.349E+001G	A	2.1E+003	5.56
BI-214	N	1	1.228E+001	609.31	1.228E+001		(	P	1.860E+000G		5.8E+005	46.09
			1.228E+001	1120.29	3.100E+001	+			3.087E+000G		5.8E+005	15.10
			1.228E+001	1764.49	7.568E+000	%			1.084E+001G		5.8E+005	15.40
EU-155	T F I	1	1.178E+000	105.31	1.178E+000	%	(		2.939E+000G		1.8E+003	21.20
			1.178E+000	86.54	2.701E+000	*			2.776E+000G	A	1.8E+003	30.70
TH-234	N	1	1.016E+001	63.29	6.211E+000	%	(	P	2.280E+001G		1.6E+012	4.82
			1.016E+001	92.59	1.357E+001		(	P	1.587E+001G		1.6E+012	5.58
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		1.650E+000G		1.9E+003	99.98
			0.000E+000	1173.24	6.835E-001	&			1.814E+000G		1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-3.098E-001	-3.105E-001	784.90	784.91	8.729E+000
K-40	#	2.278E+002	2.278E+002	6.06	6.73	1.660E+001
CO-60	#			597.22	597.23	1.650E+000
I-131	#	2.754E-001	2.791E-001	105.56	105.60	9.898E-001
CS-134	#	3.644E-002	3.644E-002	672.19	672.19	9.009E-001
CS-137	#	-9.798E-002	-9.798E-002	755.54	755.55	1.281E+000
EU-152	#	-4.172E-001	-4.172E-001	198.61	198.63	2.887E+000
EU-155	#	1.178E+000	1.178E+000	75.05	75.12	2.939E+000
TL-208		7.820E+000	7.821E+000	7.43	7.97	4.234E-001
EU-154	#	8.458E-001	8.459E-001	333.70	333.71	1.022E+001
PB-210	#	9.574E+000	9.574E+000	111.28	111.34	3.716E+001
PB-212		1.741E+001	1.742E+001	7.74	8.30	2.304E+000
PB-214	#	1.670E+001	1.670E+001	9.41	9.84	2.337E+000
AC-228	#	1.303E+001	1.303E+001	12.11	12.45	4.312E+000
Pa-234	#	2.832E-001	2.832E-001	383.48	383.49	3.723E+000
AM-241	#	-3.357E-003	-3.357E-003	26,965.29	26,965.29	3.099E+000
BI-212	#	7.496E+000	7.497E+000	42.97	43.07	1.009E+001
BI-214		1.228E+001	1.228E+001	9.93	10.35	1.860E+000
RA-224	#	-4.728E+001	-4.729E+001	29.11	29.27	4.413E+001
TH-234	#	1.016E+001	1.016E+001	35.48	35.67	2.280E+001
PA-234M	#	2.921E+001	2.921E+001	150.47	150.50	1.557E+002
U-235	#	1.936E+000	1.936E+000	88.16	88.21	5.710E+000

= All peaks for activity calculation had bad shape

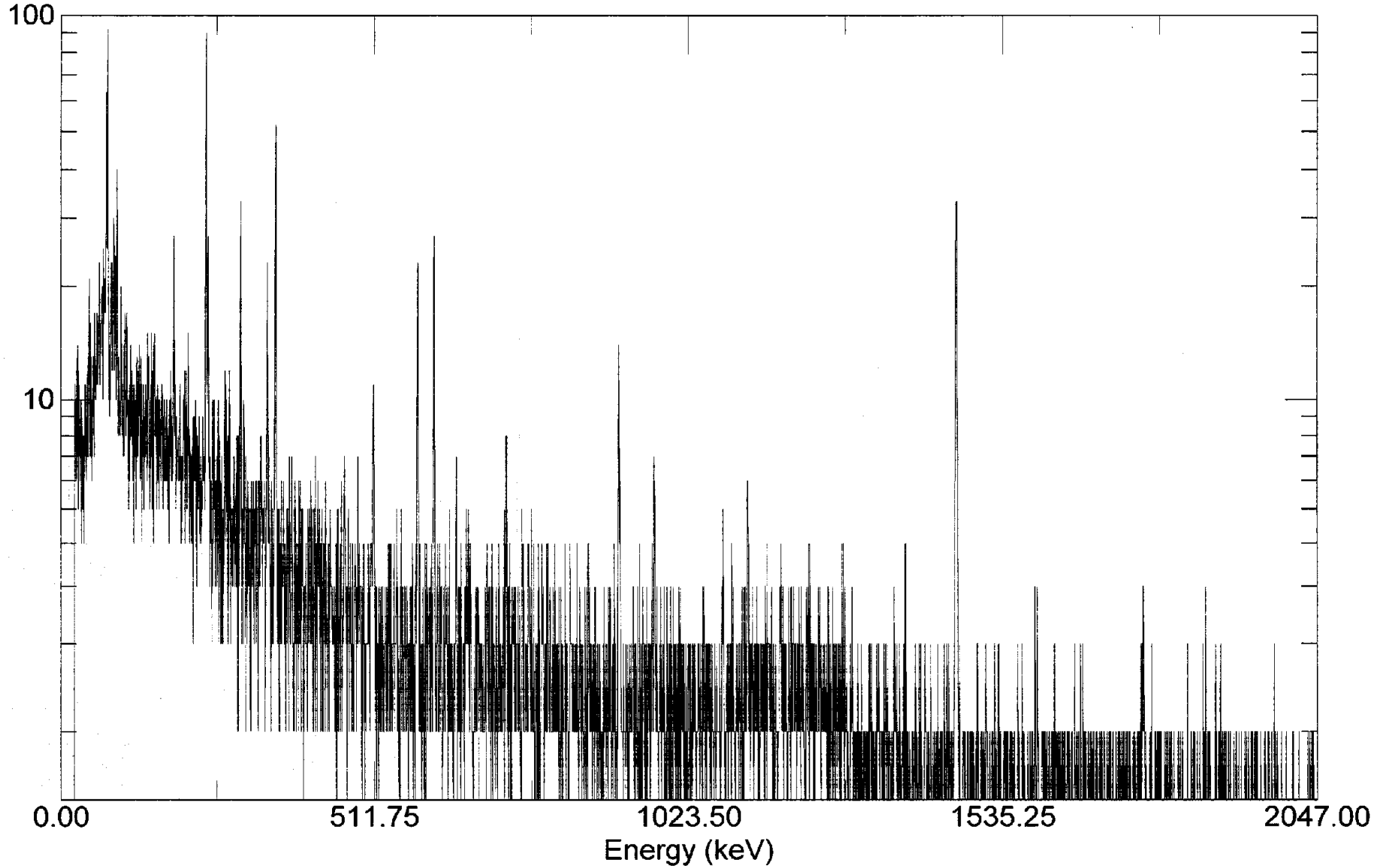
Total Activity (37.72 to 2,000.15 keV) 54.21 Bq/sample

Analyzed by: 403293

Laboratory: Test America

KEKEM1AC

7360292_KEKEM1AC_F7L200260-012



Acquired: 26-Dec-2007 3:40:09 PM
File: C:\User\spectra\KEKEM1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.50 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,051

Sample Description: 7360292_KEKEW1AC_F7L200260-013

Spectrum Filename: KEKEW1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 4:17:41PM		
Live Time:	1800.00	Real Time:	1811.78
Dead Time:	0.65 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1766

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.42	74.57	592.17	449.83	0.250	12.01	0.762	PB-214	s
307.65	77.13	313.50	612.50	0.340	6.32	0.754	PB-214	
348.05	87.23	272.53	263.47	0.146	10.79	0.801	PB-214	
358.60	89.86	225.50	179.50	0.100	15.94	1.382	PB-212	sM
741.76	185.66	234.50	113.50	0.063	30.12	1.002	U-235	
837.43	209.58	183.67	152.33	0.085	14.96	0.603	NP-239	s
2231.54	558.09	10.83	32.17	0.018	25.35	0.288	Y-91M	s
2435.99	609.20	289.81	23.19	0.013	105.88	1.166		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.41	46.32	172.46	38.54	0.021	33.56	0.607	
AM-241	1	235.58	59.11	385.74	12.91	0.007	216.97	0.824	s
TH-234	1	250.23	62.77	379.73	100.27	0.056	27.77	0.436	s
EU-155	1	345.31	86.54	537.03	-4.82	-0.003	681.44	0.849	
TH-234	1	369.50	92.59	404.54	31.46	0.017	34.29	0.855	D
AC-228	1	372.54	93.35	291.07	223.68	0.124	1.05	0.855	D
U-235	1	372.54	93.35	389.68	-1.35	-0.001	-1485.66	0.855	s D
EU-155	1	419.91	105.19	291.30	59.96	0.033	42.28	0.866	s
EU-152	1	486.29	121.79	382.42	-12.84	-0.007	217.12	0.881	s
EU-154	1	491.31	123.04	332.50	10.23	0.006	254.09	0.882	s
Pa-234	1	523.78	131.16	434.84	-2.68	-0.001	1101.48	0.890	s
U-235	1	580.67	145.39	287.54	-2.50	-0.001	1911.73	0.901	s
U-235	1	649.97	162.71	282.32	7.73	0.004	222.76	0.919	s
U-235	1	821.59	205.61	253.79	17.86	0.010	114.38	0.957	s
PB-212	1	953.66	238.63	117.71	1422.90	0.790	2.80	0.987	D
RA-224	1	963.07	240.99	207.47	152.53	0.085	15.62	0.989	D
PB-214	1	967.12	242.00	218.56	87.44	0.049	24.08	0.990	D
TL-208	1	1108.70	277.39	100.00	94.00	0.052	24.43	0.672	s
I-131	1	1137.90	284.69	137.01	0.55	0.000	2986.88	1.028	s
PB-214	1	1179.17	295.01	99.21	208.79	0.116	11.31	1.107	s
PB-212	1	1199.14	300.00	65.00	111.00	0.062	16.58	1.260	s
AC-228	1	1351.95	338.20	56.24	252.76	0.140	8.04	1.235	
EU-152	1	1379.50	345.09	103.53	-0.28	0.000	5201.27	1.081	s
PB-214	1	1406.31	351.79	130.99	323.01	0.179	10.03	1.146	
I-131	1	1452.47	363.33	78.17	-7.28	-0.004	175.81	1.099	s
BE-7	1	1910.62	477.86	72.48	-3.73	-0.002	326.51	1.198	s
CS-134	1	2246.52	561.83	37.28	3.61	0.002	244.91	1.273	s
CS-134	1	2276.47	569.32	62.09	5.49	0.003	182.74	1.278	s D
Pa-234	1	2277.07	569.47	36.93	-0.48	0.000	-218.63	1.278	s D
TL-208	1	2331.36	583.04	55.58	492.42	0.274	5.52	1.325	
CS-134	1	2414.85	603.91	46.31	9.82	0.005	103.04	1.309	s
BI-214	1	2436.09	609.22	63.17	236.51	0.131	7.55	1.313	
I-131	1	2544.70	636.37	63.00	-3.54	-0.002	321.59	1.337	s
CS-137	1	2644.46	661.31	47.00	107.00	0.059	21.36	0.367	s
EU-154	1	2897.38	724.53	122.84	-24.93	-0.014	65.98	1.411	s
BI-212	1	2906.71	726.87	40.98	89.11	0.050	14.68	1.414	
PA-234M	1	3065.45	766.55	66.62	-2.04	-0.001	570.87	1.447	s
EU-152	1	3113.02	778.44	41.03	-0.55	0.000	1666.27	1.458	s
BI-212	1	3137.52	784.56	44.18	11.25	0.006	88.72	1.463	s
CS-134	1	3179.03	794.94	40.02	54.26	0.030	21.36	1.472	s
CS-134	1	3207.09	801.95	81.81	0.00	0.000	1279.12	1.477	s
TL-208	1	3440.94	860.40	9.50	68.50	0.038	15.18	0.347	s
EU-154	1	3490.11	872.69	31.26	4.63	0.003	176.81	1.537	s
Pa-234	1	3518.18	879.71	41.38	-1.28	-0.001	717.53	1.543	s
Pa-234	1	3520.97	880.41	29.38	1.94	0.001	401.74	1.546	s

AC-228	1	3643.53	911.04	20.81	322.19	0.179	6.33	1.503	
Pa-234	1	3781.73	945.59	29.41	1.47	0.001	527.18	1.598	s
EU-152	1	3857.73	964.58	66.75	46.47	0.026	28.87	1.613	s
AC-228	1	3875.20	968.95	14.25	217.75	0.121	7.74	1.466	
EU-154	1	3991.44	998.01	41.31	0.05	0.000	19172.00	1.640	s
PA-234M	1	4000.99	1000.39	41.53	3.40	0.002	273.77	1.643	s
EU-154	1	4011.25	1002.96	37.94	-3.59	-0.002	248.18	1.647	s
EU-152	1	4447.96	1112.11	26.78	2.30	0.001	324.59	1.735	s
BI-214	1	4480.87	1120.34	47.52	46.58	0.026	22.27	1.741	s
CO-60	1	4693.96	1173.60	43.97	-7.80	-0.004	125.51	1.784	s
EU-154	1	5104.27	1276.15	23.57	0.04	0.000	15590.02	1.866	s
CO-60	1	5331.99	1333.07	29.26	4.63	0.003	171.54	1.912	s
EU-152	1	5631.28	1407.87	24.88	10.21	0.006	75.84	1.972	s
K-40	1	5842.23	1460.59	12.54	416.46	0.231	4.83	1.621	
BI-214	1	7057.69	1764.36	15.01	20.10	0.011	27.02	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
RA-224	N	1	6.698E+001	240.99	6.698E+001	(	3.066E+001G		7.0E+002	4.10
AM-241	T	1	6.240E-001	59.54	6.240E-001	& (	4.555E+000G		1.6E+005	35.90
PB-212	N	1	5.877E+001	238.63	5.877E+001	(P	2.200E+000G		7.0E+002	43.30
			5.877E+001	300.03	7.118E+001	+	2.583E+001G		7.0E+002	3.28
EU-152	T F	1	5.471E+000	344.29	-2.431E-002	% (	4.402E+000G		4.9E+003	26.50
			5.471E+000	121.78	-5.912E-001	&	4.319E+000G		4.9E+003	28.58
			5.471E+000	778.92	-1.763E-001	%	1.052E+001G		4.9E+003	12.94
			5.471E+000	964.11	1.544E+001	(	1.355E+001G		4.9E+003	14.61
			5.471E+000	1112.07	9.066E-001	%	1.056E+001G		4.9E+003	13.64
			5.471E+000	1408.00	3.111E+000	%	7.907E+000G		4.9E+003	21.00
AC-228	N	1	5.377E+001	911.07	5.182E+001	(P	3.855E+000G		2.1E+003	29.00
			5.377E+001	968.97	6.074E+001	(P	5.663E+000G		2.1E+003	17.46
			5.377E+001	338.32	4.835E+001	(P	7.203E+000G		2.1E+003	12.01
			5.377E+001	93.35	5.377E+001	- E	1.976E+001X	A	2.1E+003	5.56
CS-137	T F I	1	4.686E+000	661.66	4.686E+000	(	1.518E+000G		1.1E+004	85.21
EU-155	T F I	1	3.708E+000	105.31	3.708E+000	* (	5.086E+000G		1.8E+003	21.20
			3.708E+000	86.54	-2.147E-001	%	4.931E+000G		1.8E+003	30.70
TH-234	N	1	3.410E+001	63.29	3.410E+001	* (P	3.180E+001G		1.6E+012	4.82
			3.410E+001	92.59	7.548E+000	% P	2.313E+001G		1.6E+012	5.58
U-235	N	1	-3.109E-001	143.79	-3.109E-001	% (P	1.018E+001G		2.6E+011	10.96
			-3.109E-001	205.33	5.783E+000	% P	2.492E+001G		2.6E+011	5.01
			-3.109E-001	163.38	2.184E+000	% P	2.288E+001G		2.6E+011	5.08
			-3.109E-001	93.35	-3.109E-001	! E	2.179E+001X		2.6E+011	5.81
BI-212	N	1	3.006E+001	727.33	3.006E+001	(	1.098E+001G		7.0E+002	11.82
			3.006E+001	785.51	4.301E+001	%	1.288E+002G		7.0E+002	1.10
CO-60	T F	1	2.843E-001	1332.50	2.843E-001	& (	1.713E+000G		1.9E+003	99.98
			2.843E-001	1173.24	-4.357E-001	%	1.879E+000G		1.9E+003	99.90
K-40	N	1	2.570E+002	1460.83	2.570E+002	(P	1.186E+001G		4.7E+011	10.67
PB-210	N	1	2.434E+001	46.54	2.434E+001	% (P	4.037E+001G		8.1E+003	4.25
I-131	T F I	1	-2.161E-001	364.48	-2.161E-001	% (	1.304E+000G		8.0E+000	81.70
			-2.161E-001	284.30	1.828E-001	%	1.886E+001G		8.0E+000	6.14
			-2.161E-001	636.97	-1.793E+000	%	2.012E+001G		8.0E+000	7.17
PB-214	N	1	2.107E+001	351.93	2.032E+001	(P	3.525E+000G		5.8E+005	37.60
			2.107E+001	295.09	2.248E+001	* (P	5.289E+000G		5.8E+005	19.30
			2.107E+001	242.00	2.125E+001	(P	1.740E+001G		5.8E+005	7.43
PA-234	N	1	2.022E+001	1001.00	2.022E+001	& (	1.949E+002G		1.6E+012	.84
			2.022E+001	766.41	-2.866E+001	%	5.731E+002G		1.6E+012	.29
TL-208	F N	1	1.989E+001	583.02	1.989E+001	(P	1.513E+000G		7.0E+002	84.50
			1.989E+001	277.28	2.959E+001	+	1.552E+001G		7.0E+002	6.31
			1.989E+001	860.56	2.472E+001	+	6.162E+000G		7.0E+002	12.42
			-1.985E-001	946.02	5.264E-001	&	1.000E+001G		1.6E+012	13.40
			-1.985E-001	883.24	9.220E-001	%	1.330E+001G		1.6E+012	9.60
			-1.985E-001	880.53	-9.699E-001	%	2.481E+001G		1.6E+012	6.00
Pa-234	N	1	-1.985E-001	131.29	-1.985E-001	% (	7.394E+000G		1.6E+012	18.00

			-1.985E-001	569.47	-1.985E-001	&			1.270E+001G	1.6E+012	8.20
BI-214	N	1	1.772E+001	609.31	1.807E+001		(	P	3.037E+000G	5.8E+005	46.09
			1.772E+001	1120.29	1.666E+001	*	(	P	1.246E+001G	5.8E+005	15.10
			1.772E+001	1764.49	1.003E+001	-		P	1.035E+001G	5.8E+005	15.40
			1.710E+000	123.10	3.303E-001	%			2.832E+000G	3.1E+003	40.79
			1.710E+000	1274.54	7.430E-003	%			4.272E+000G	3.1E+003	35.19
			1.710E+000	723.36	-4.898E+000	%			1.068E+001G	3.1E+003	20.22
			1.710E+000	1004.77	-9.965E-001	%			8.715E+000G	3.1E+003	18.01
			1.710E+000	996.33	2.222E-002	%			1.530E+001G	3.1E+003	10.60
EU-154	T F I	1	1.710E+000	873.23	1.710E+000	%	(		1.062E+001G	3.1E+003	12.27
CS-134	T F I	1	1.445E+000	604.71	3.525E-001	&	(		1.235E+000G	7.5E+002	97.62
			1.445E+000	795.87	2.693E+000	?	(		1.598E+000G	7.5E+002	85.53
			1.445E+000	569.32	1.197E+000	&			8.604E+000G	7.5E+002	15.38
			1.445E+000	801.95	0.000E+000	%			2.203E+001G	7.5E+002	8.69
			1.445E+000	563.24	1.440E+000	%			1.243E+001G	7.5E+002	8.35
BE-7	N P C	1	-1.050E+000	477.60	-1.050E+000	%	(		1.192E+001G	5.3E+001	10.52

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.050E+000	-1.053E+000	326.51	326.52	1.192E+001
K-40		2.570E+002	2.570E+002	4.97	5.77	1.186E+001
CO-60	<	2.843E-001	2.843E-001	171.54	171.56	1.713E+000
I-131	<	-2.161E-001	-2.195E-001	175.81	175.83	1.304E+000
CS-134	<	1.445E+000	1.446E+000	21.36	21.55	1.235E+000
CS-137		4.686E+000	4.686E+000	21.36	21.55	1.518E+000
EU-155	<	3.708E+000	3.708E+000	42.28	42.41	5.086E+000
PB-214		2.107E+001	2.107E+001	10.14	10.53	3.525E+000
BI-212	<	3.006E+001	3.006E+001	14.68	14.96	1.098E+001
BI-214	<	1.772E+001	1.772E+001	7.92	8.43	3.037E+000
TH-234	#	3.410E+001	3.410E+001	37.99	38.17	3.180E+001
PA-234M	<	2.022E+001	2.022E+001	273.77	273.78	1.949E+002
EU-152	<	5.471E+000	5.472E+000	28.87	29.01	4.402E+000
EU-154	<	1.710E+000	1.711E+000	176.81	176.83	1.062E+001
TL-208		1.989E+001	1.990E+001	5.62	6.32	1.513E+000
RA-224		6.698E+001	6.699E+001	15.62	15.90	3.066E+001
PB-210		2.434E+001	2.434E+001	59.21	59.34	4.037E+001
PB-212		5.877E+001	5.878E+001	2.84	4.12	2.200E+000
AC-228		5.377E+001	5.377E+001	4.35	5.21	3.855E+000
Pa-234	<	-1.985E-001	-1.985E-001	1,101.48	1,101.49	7.394E+000
U-235	<	-3.109E-001	-3.109E-001	4,779.33	4,779.33	1.018E+001
AM-241	<	6.240E-001	6.240E-001	216.97	217.01	4.555E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 516.28 Bq/sample

Analyzed by: _____

403605

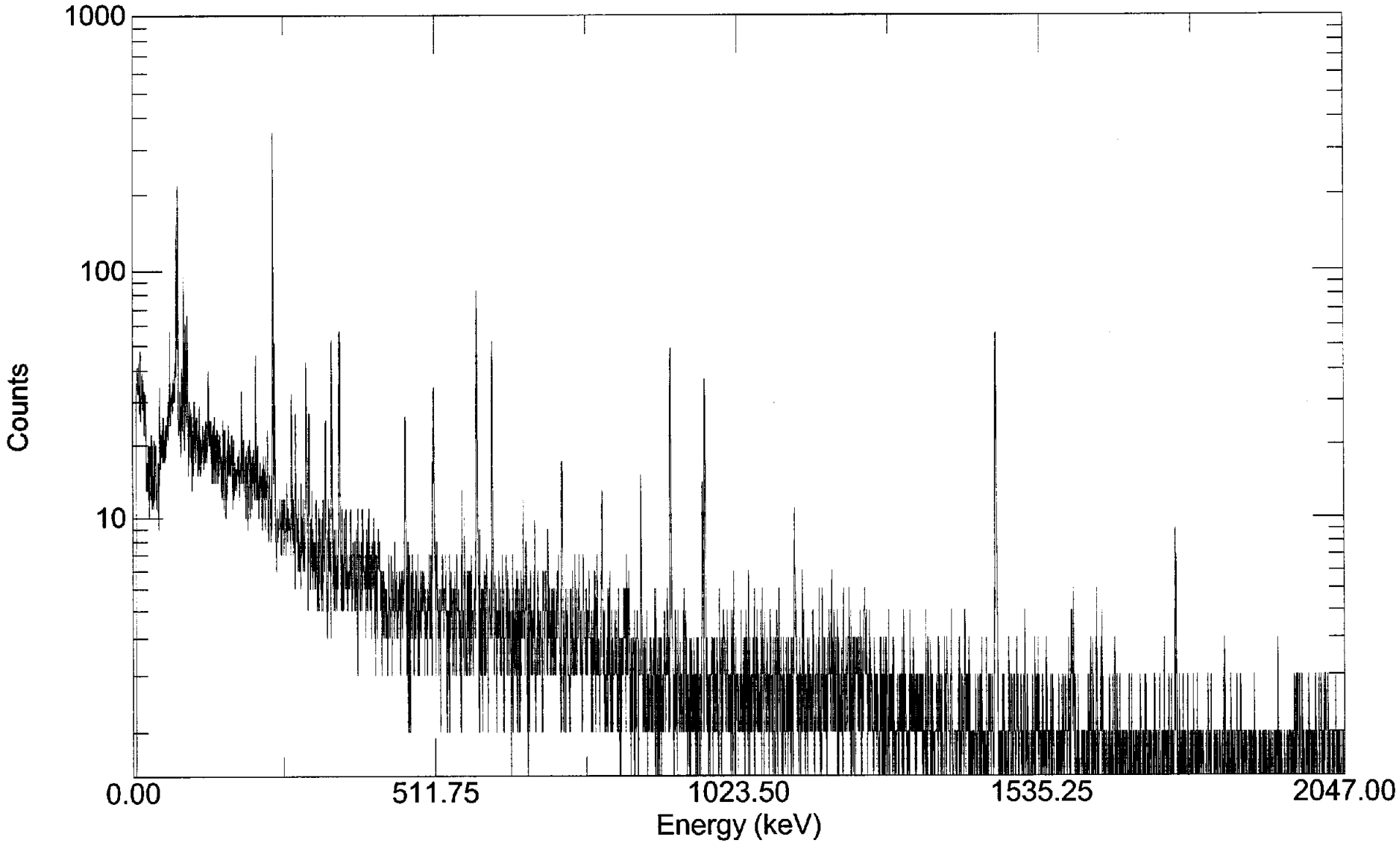
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKEW1AC

7360292_KEKEW1AC_F7L200260-013



Acquired: 26-Dec-2007 4:17:41 PM
File: C:\User\spectra\KEKEW1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.78 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,052

Sample Description: 7360292_KEKE11AC_F7L200260-014

Spectrum Filename: KEKE11AC.An1

Acquisition Information

Start Time:	26-Dec-2007 4:18:27PM		
Live Time:	1800.00	Real Time:	1815.88
Dead Time:	0.87 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2000

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.87	74.75	525.03	451.50	0.251	8.58	0.894	PB-214	D
307.03	77.09	657.00	692.00	0.384	8.33	0.934	PB-214	
346.77	87.01	604.31	61.69	0.034	57.77	0.627		s
358.28	89.89	259.50	121.50	0.068	22.84	0.779	PB-214	M
513.98	128.77	329.36	212.64	0.118	13.88	0.824	AC-228	s
1080.37	270.24	222.00	192.00	0.107	21.76	0.595	AC-228	s
2040.96	510.23	62.33	267.67	0.149	9.77	1.396	J-133	s
2436.49	609.06	253.99	34.01	0.019	68.45	1.400		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.20	46.67	309.57	23.90	0.013	54.87	0.864	s
AM-241	1	236.16	59.39	555.00	-1.90	-0.001	1751.11	0.878	s
TH-234	1	251.76	63.29	336.35	81.65	0.045	25.40	0.882	D
EU-155	1	347.43	87.18	748.93	156.31	0.087	26.02	0.906	s
TH-234	1	369.10	92.59	467.07	93.93	0.052	26.36	0.912	D
AC-228	1	372.14	93.35	559.27	89.64	0.050	35.74	0.913	D
U-235	1	372.14	93.35	540.10	18.38	0.010	17.85	0.913	s D
EU-155	1	420.05	105.32	326.09	84.43	0.047	32.15	0.925	s
EU-154	1	489.32	122.62	392.27	-12.74	-0.007	221.67	0.943	s
EU-152	1	489.67	122.70	403.50	-19.20	-0.011	149.71	0.942	s
Pa-234	1	520.64	130.44	433.76	-26.34	-0.015	113.51	0.952	s
U-235	1	574.92	143.99	384.82	33.71	0.019	78.95	0.964	
U-235	1	653.11	163.52	363.08	-20.01	-0.011	136.54	0.984	s
U-235	1	825.05	206.47	292.63	-21.42	-0.012	115.01	1.027	s
PB-212	1	953.82	238.63	253.74	1521.26	0.845	2.91	1.060	D
RA-224	1	963.24	240.99	417.62	153.38	0.085	20.50	1.062	D
PB-214	1	967.29	242.00	20.53	19.26	0.011	40.33	1.063	D
TL-208	1	1109.57	277.54	151.67	127.33	0.071	24.03	1.395	s
I-131	1	1134.61	283.79	151.57	4.06	0.002	432.22	1.105	s
PB-214	1	1179.23	294.94	157.98	219.02	0.122	14.84	1.277	
PB-212	1	1201.85	300.59	108.50	202.50	0.113	14.58	1.283	s
AC-228	1	1352.35	338.19	172.65	363.35	0.202	10.30	1.410	s
EU-152	1	1374.11	343.62	174.81	-18.83	-0.010	101.92	1.164	s
PB-214	1	1407.08	351.86	108.20	334.80	0.186	8.67	1.284	s
I-131	1	1461.07	365.35	117.33	-7.43	-0.004	209.42	1.184	s
BE-7	1	1910.30	477.58	65.85	11.18	0.006	106.94	1.292	s
CS-134	1	2263.69	565.88	72.74	-5.17	-0.003	237.39	1.372	s
CS-134	1	2277.45	569.32	66.72	5.85	0.003	184.23	1.378	s D
Pa-234	1	2278.04	569.47	88.17	-4.58	-0.003	-205.53	1.378	s D
TL-208	1	2332.33	583.04	83.96	575.04	0.319	5.79	1.221	s
CS-134	1	2419.07	604.71	783.95	4.00	0.002	989.97	1.410	s
BI-214	1	2437.02	609.20	64.08	214.47	0.119	8.27	1.415	s
I-131	1	2546.27	636.50	58.60	1.29	0.001	844.16	1.440	s
CS-137	1	2645.44	661.28	61.36	37.87	0.021	33.46	1.462	s
EU-154	1	2896.33	723.98	181.74	-32.90	-0.018	60.51	1.518	s
BI-212	1	2908.92	727.13	52.82	124.43	0.069	12.19	1.521	s
PA-234M	1	3066.04	766.40	61.86	-4.69	-0.003	241.38	1.556	s
EU-152	1	3118.20	779.44	60.91	-8.96	-0.005	127.64	1.567	s
BI-212	1	3150.29	787.46	48.95	-4.85	-0.003	209.10	1.572	s
CS-134	1	3179.48	794.75	48.80	51.19	0.028	23.83	1.582	s
CS-134	1	3221.29	805.21	32.37	0.73	0.000	1114.58	1.587	s
TL-208	1	3440.00	859.87	4.50	110.50	0.061	10.52	0.583	s
EU-154	1	3489.91	872.35	41.00	-5.80	-0.003	161.69	1.649	s
Pa-234	1	3520.91	880.10	38.37	4.27	0.002	210.54	1.655	s
Pa-234	1	3534.17	883.41	40.22	-3.39	-0.002	269.77	1.657	s

AC-228	1	3643.88	910.84	20.85	379.15	0.211	5.79	1.621	s
Pa-234	1	3785.36	946.21	39.20	-2.15	-0.001	417.76	1.710	s
EU-152	1	3859.09	964.64	146.98	32.84	0.018	55.04	1.726	s
AC-228	1	3874.03	968.37	36.67	313.33	0.174	7.94	1.267	s
EU-154	1	3988.01	996.87	35.08	3.54	0.002	242.71	1.753	s
PA-234M	1	4004.49	1000.99	41.34	-0.34	0.000	2665.94	1.756	s
EU-154	1	4021.47	1005.24	42.22	-4.54	-0.003	207.78	1.760	s
EU-152	1	4445.49	1111.25	48.44	-1.39	-0.001	714.57	1.847	s
BI-214	1	4480.54	1120.02	42.44	36.22	0.020	28.61	1.854	s
CO-60	1	4697.74	1174.33	31.44	-4.26	-0.002	192.20	1.896	s
EU-154	1	5098.54	1274.56	48.70	-3.10	-0.002	323.08	1.975	s
CO-60	1	5322.95	1330.68	21.68	-3.18	-0.002	214.47	2.019	s
EU-152	1	5627.18	1406.78	16.24	6.55	0.004	95.39	2.076	s
K-40	1	5840.71	1460.19	11.21	391.79	0.218	4.98	2.556	s
BI-214	1	7083.36	1771.09	23.90	-9.93	-0.006	94.04	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments
AM-241	T	1	-8.417E-002	59.54	-8.417E-002	%	(		4.972E+000G			1.6E+005 35.90
RA-224	N	1	6.336E+001	240.99	6.336E+001		(		4.046E+001G			7.0E+002 4.10
AC-228	N	1	6.163E+001	911.07	5.981E+001	@	(	P	3.784E+000G			2.1E+003 29.00
			6.163E+001	968.97	8.593E+001	+			8.482E+000G			2.1E+003 17.46
			6.163E+001	338.32	6.600E+001		(	P	1.161E+001G			2.1E+003 12.01
			6.163E+001	93.35	1.991E+001	-		}	E 2.055E+001X		A	2.1E+003 5.56
PB-212	N	1	5.909E+001	238.63	5.909E+001		(	P	2.989E+000G			7.0E+002 43.30
			5.909E+001	300.03	1.229E+002	*			3.110E+001G			7.0E+002 3.28
EU-155	T F I	1	5.773E+000	105.31	4.833E+000	*	(		4.972E+000G			1.8E+003 21.20
			5.773E+000	86.54	6.423E+000	*	(		5.352E+000G			1.8E+003 30.70
BI-212	N	1	4.083E+001	727.33	4.083E+001	*	(		1.200E+001G			7.0E+002 11.82
			4.083E+001	785.51	-1.808E+001	&			1.317E+002G			7.0E+002 1.10
U-235	N	1	3.906E+000	143.79	3.906E+000	%	(	P	1.091E+001G			2.6E+011 10.96
			3.906E+000	205.33	-6.498E+000	%			2.501E+001G			2.6E+011 5.01
			3.906E+000	163.38	-5.268E+000	%			2.410E+001G			2.6E+011 5.08
			3.906E+000	93.35	3.906E+000	!			E 2.360E+001X			2.6E+011 5.81
BE-7	N P C	1	3.017E+000	477.60	3.017E+000	%	(		1.094E+001G			5.3E+001 10.52
K-40	N	1	2.420E+002	1460.83	2.420E+002	@	(	P	1.131E+001G			4.7E+011 10.67
TH-234	N	1	2.295E+001	63.29	2.542E+001		(	P	2.746E+001G			1.6E+012 4.82
			2.295E+001	92.59	2.081E+001		(	P	2.292E+001G			1.6E+012 5.58
TL-208	F N	1	2.243E+001	583.02	2.243E+001	@	(	P	1.771E+000G			7.0E+002 84.50
			2.243E+001	277.28	3.786E+001	*			1.787E+001G			7.0E+002 6.31
			2.243E+001	860.56	3.903E+001	*			4.449E+000G			7.0E+002 12.42
I-131	T F I	1	-2.101E-001	364.48	-2.101E-001	%	(		1.504E+000G			8.0E+000 81.70
			-2.101E-001	284.30	1.262E+000	%			1.870E+001G			8.0E+000 6.14
			-2.101E-001	636.97	6.329E-001	%			1.884E+001G			8.0E+000 7.17
EU-154	T F I	1	-2.094E+000	873.23	-2.094E+000	%	(		1.176E+001G			3.1E+003 12.27
			-2.094E+000	123.10	-3.817E-001	&			2.847E+000G			3.1E+003 40.79
			-2.094E+000	1274.54	-5.204E-001	%			5.909E+000G			3.1E+003 35.19
			-2.094E+000	723.36	-6.286E+000	%			1.252E+001G			3.1E+003 20.22
			-2.094E+000	1004.77	-1.240E+000	%			9.011E+000G			3.1E+003 18.01
			-2.094E+000	996.33	1.631E+000	%			1.398E+001G			3.1E+003 10.60
PB-214	N	1	2.080E+001	351.93	2.002E+001	*	(	P	3.061E+000G			5.8E+005 37.60
			2.080E+001	295.09	2.231E+001		(	P	6.242E+000G			5.8E+005 19.30
			2.080E+001	242.00	4.403E+000	%			5.447E+000G			5.8E+005 7.43
PA-234	N	1	-2.003E+000	1001.00	-2.003E+000	%	(		1.915E+002G			1.6E+012 .84
			-2.003E+000	766.41	-6.435E+001	%			5.396E+002G			1.6E+012 .29
CO-60	T F	1	-1.945E-001	1332.50	-1.945E-001	%	(		1.493E+000G			1.9E+003 99.98
			-1.945E-001	1173.24	-2.361E-001	%			1.597E+000G			1.9E+003 99.90
Pa-234	N	1	-1.811E+000	131.29	-1.811E+000	&	(		6.858E+000G			1.6E+012 18.00
			-1.811E+000	569.47	-1.811E+000	%			1.836E+001G			1.6E+012 8.20
			-1.811E+000	946.02	-7.542E-001	%			1.119E+001G			1.6E+012 13.40
			-1.811E+000	883.24	-1.581E+000	%			1.503E+001G			1.6E+012 9.60
			-1.811E+000	880.53	3.179E+000	&			2.348E+001G			1.6E+012 6.00

CS-137	T F I		1	1.609E+000	661.66	1.609E+000		(		1.665E+000G	1.1E+004	85.21
BI-214		N	1	1.585E+001	609.31	1.585E+001	@	(	P	2.957E+000G	5.8E+005	46.09
				1.585E+001	1120.29	1.281E+001	-		P	1.170E+001G	5.8E+005	15.10
				1.585E+001	1764.49	-5.007E+000	%		P	1.285E+001G	5.8E+005	15.40
				-1.571E+000	964.11	1.073E+001	%			1.934E+001G	4.9E+003	14.61
				-1.571E+000	1112.07	-5.399E-001	%			1.368E+001G	4.9E+003	13.64
				-1.571E+000	1408.00	1.994E+000	&			6.541E+000G	4.9E+003	21.00
EU-152	T F		1	-1.571E+000	344.29	-1.571E+000	*	(		5.367E+000G	4.9E+003	26.50
				-1.571E+000	121.78	-8.198E-001	%			4.113E+000G	4.9E+003	28.58
				-1.571E+000	778.92	-2.824E+000	%			1.232E+001G	4.9E+003	12.94
PB-210		N	1	1.385E+001	46.54	1.385E+001	*	(	P	4.907E+001G	8.1E+003	4.25
CS-134	T F I		1	1.232E+000	604.71	1.389E-001	%	(		4.621E+000G	7.5E+002	97.62
				1.232E+000	795.87	2.479E+000	&	(		1.708E+000G	7.5E+002	85.53
				1.232E+000	569.32	1.232E+000	%			8.586E+000G	7.5E+002	15.38
				1.232E+000	801.95	3.480E-001	&			1.401E+001G	7.5E+002	8.69
				1.232E+000	563.24	-1.990E+000	%			1.634E+001G	7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CO-60	<	-1.945E-001	-1.946E-001	214.47	214.49	1.493E+000
I-131	<	-2.101E-001	-2.133E-001	209.42	209.44	1.504E+000
CS-134	<	1.232E+000	1.232E+000	23.83	24.01	4.621E+000
EU-154	<	-2.094E+000	-2.094E+000	161.69	161.71	1.176E+001
RA-224		6.336E+001	6.337E+001	20.50	20.72	4.046E+001
PB-210	<	1.385E+001	1.385E+001	104.29	104.37	4.907E+001
PB-212		5.909E+001	5.911E+001	2.95	4.20	2.989E+000
PB-214		2.080E+001	2.080E+001	8.77	9.23	3.061E+000
BE-7	<	3.017E+000	3.024E+000	106.94	106.98	1.094E+001
K-40	#	2.420E+002	2.420E+002	5.12	5.90	1.131E+001
CS-137	<	1.609E+000	1.609E+000	33.46	33.58	1.665E+000
EU-152	<	-1.571E+000	-1.571E+000	101.92	101.96	5.367E+000
EU-155	<	5.773E+000	5.774E+000	20.68	20.95	4.972E+000
TL-208	#	2.243E+001	2.244E+001	5.87	6.54	1.771E+000
BI-212	<	4.083E+001	4.084E+001	12.19	12.53	1.200E+001
BI-214	<	1.585E+001	1.585E+001	8.54	9.02	2.957E+000
AC-228		6.163E+001	6.163E+001	5.82	6.49	3.784E+000
TH-234		2.295E+001	2.295E+001	23.61	23.90	2.746E+001
PA-234M	<	-2.003E+000	-2.003E+000	2,665.94	2,665.94	1.915E+002
U-235	<	3.906E+000	3.906E+000	83.97	84.02	1.091E+001
Pa-234	<	-1.811E+000	-1.811E+000	113.51	113.55	6.858E+000
AM-241	<	-8.417E-002	-8.417E-002	1,751.11	1,751.11	4.972E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 492.30 Bq/sample

Analyzed by: _____

403605

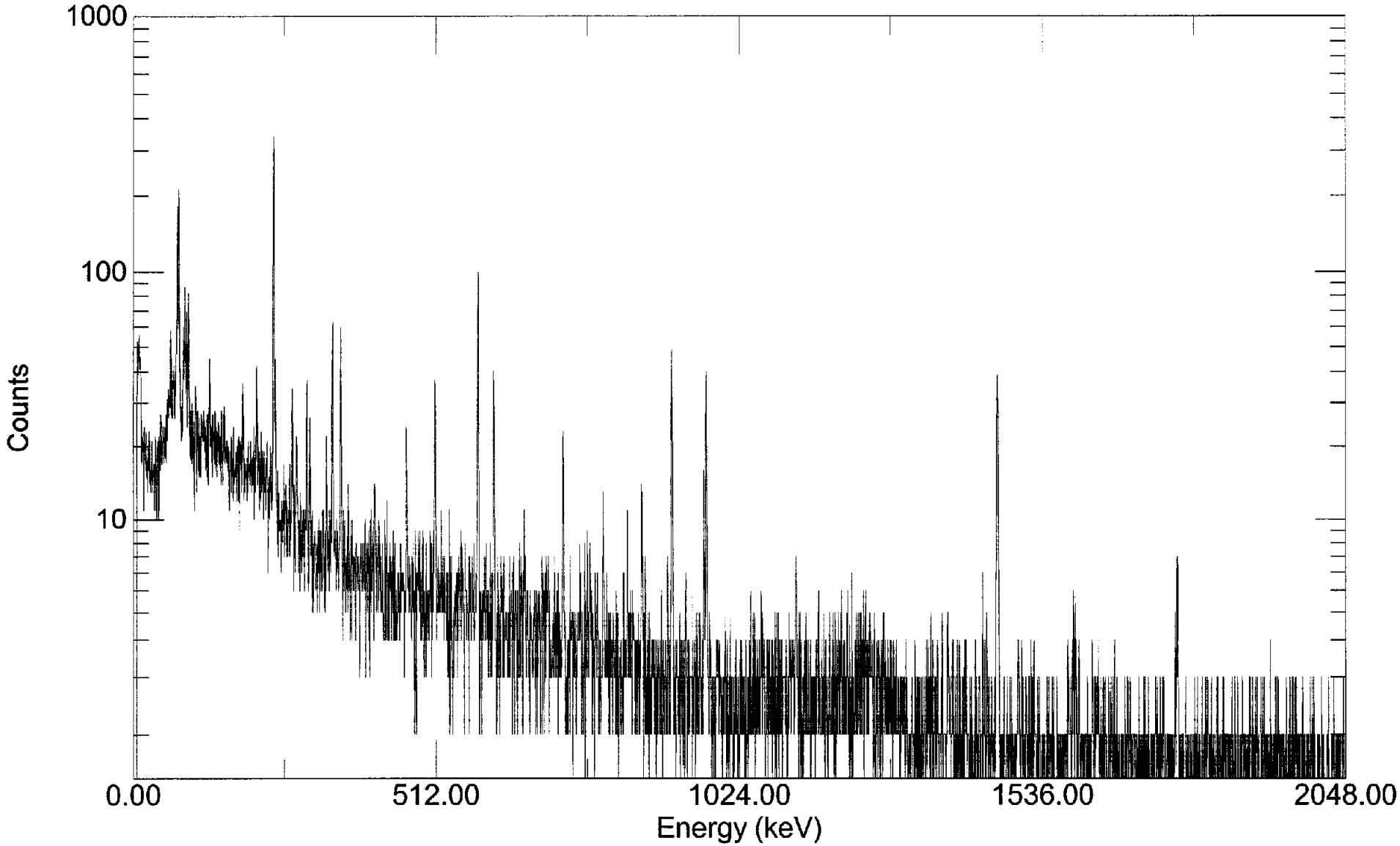
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKE11AC

7360292_KEKE11AC_F7L200260-014



Acquired: 26-Dec-2007 4:18:28 PM
File: C:\User\spectra\KEKE11AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1815.88 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,057

Sample Description: 7360292_KEKE21AC_F7L200260-015

Spectrum Filename: KEKE21AC.An1

Acquisition Information

Start Time:	26-Dec-2007 4:19:17PM		
Live Time:	1800.00	Real Time:	1804.22
Dead Time:	0.23 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_I		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1977

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.81	74.75	234.00	165.00	0.092	20.11	0.679	PB-214	
308.34	77.13	141.17	259.83	0.144	9.89	0.814	PB-214	
348.15	87.09	126.44	126.56	0.070	15.39	1.016	PB-214	s
742.82	185.79	125.67	157.33	0.087	18.97	1.378	U-235	s
1351.64	338.02	77.59	11.41	0.006	113.09	0.936		
3643.41	910.79	36.06	22.94	0.013	42.51	0.667		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.82	46.74	84.98	26.02	0.014	32.29	0.998	s
AM-241	1	240.83	60.25	182.35	0.84	0.000	2266.77	0.830	s
TH-234	1	252.65	63.21	143.86	51.14	0.028	32.34	0.795	
EU-155	1	345.96	86.54	230.28	-6.06	-0.003	356.51	0.854	s
TH-234	1	372.71	93.23	122.23	153.77	0.085	13.62	1.053	s
AC-228	1	373.18	93.35	483.50	0.00	0.000	2024.85	0.860	s D
U-235	1	373.18	93.35	175.95	8.89	0.005	30.40	0.860	s D
EU-155	1	421.73	105.49	125.67	13.82	0.008	117.81	0.871	s
EU-152	1	483.49	120.94	130.07	-0.69	0.000	2336.33	0.885	s
EU-154	1	489.38	122.41	130.04	10.82	0.006	152.09	0.886	s
Pa-234	1	522.42	130.67	139.08	0.76	0.000	2210.59	0.894	s
U-235	1	575.66	143.99	149.35	16.79	0.009	105.78	0.904	s
U-235	1	663.35	165.92	64.96	-5.71	-0.003	203.81	0.922	s
U-235	1	825.40	206.44	99.82	-7.79	-0.004	184.98	0.958	s
PB-212	1	953.16	238.38	109.29	243.71	0.135	10.85	1.019	
RA-224	1	959.51	239.97	352.31	-78.51	-0.044	35.64	0.988	
PB-214	1	966.78	241.79	112.00	103.00	0.057	25.00	1.143	
TL-208	1	1111.78	278.05	49.30	10.08	0.006	103.43	1.019	
I-131	1	1138.68	284.77	59.69	-0.25	0.000	4409.36	1.025	s
PB-214	1	1179.45	294.97	30.54	244.46	0.136	8.03	0.853	
PB-212	1	1198.46	299.72	42.65	12.76	0.007	77.62	1.039	s
AC-228	1	1351.54	337.99	38.33	49.25	0.027	22.78	1.071	
EU-152	1	1376.80	344.31	38.27	8.70	0.005	106.18	1.076	s
PB-214	1	1405.96	351.60	30.74	314.26	0.175	6.39	0.993	
I-131	1	1461.29	365.43	41.90	-5.20	-0.003	181.35	1.092	s
BE-7	1	1909.97	477.60	44.29	0.00	0.000	941.15	1.185	s
CS-134	1	2252.60	563.24	25.86	8.09	0.004	95.61	1.254	s
CS-134	1	2276.94	569.32	13.58	-1.73	-0.001	-57.85	1.259	s D
Pa-234	1	2277.54	569.47	17.03	0.11	0.000	151.07	1.259	s D
TL-208	1	2331.61	582.98	14.18	84.82	0.047	13.94	0.881	s
CS-134	1	2425.16	606.37	52.67	-10.44	-0.006	103.10	1.286	s
BI-214	1	2435.17	608.87	13.92	258.08	0.143	6.68	1.321	
I-131	1	2546.38	636.66	32.97	0.22	0.000	3737.86	1.312	s
CS-137	1	2644.45	661.17	23.53	47.79	0.027	20.38	1.331	
EU-154	1	2892.81	723.24	37.59	-4.09	-0.002	217.87	1.378	s
BI-212	1	2908.78	727.23	20.17	12.83	0.007	56.85	1.381	s
PA-234M	1	3061.00	765.27	28.84	0.01	0.000	84485.78	1.411	s
EU-152	1	3119.54	779.89	19.64	-1.98	-0.001	323.91	1.420	s
BI-212	1	3142.02	785.51	15.32	0.00	0.000	553.49	1.425	s
CS-134	1	3182.03	795.51	25.15	2.92	0.002	249.70	1.433	s
CS-134	1	3213.73	803.43	20.93	-5.08	-0.003	134.79	1.437	s
TL-208	1	3442.38	860.56	16.61	7.37	0.004	86.49	1.481	s
EU-154	1	3491.53	872.84	19.39	-0.89	0.000	708.94	1.490	s
Pa-234	1	3522.71	880.63	28.51	-3.65	-0.002	213.13	1.495	s
Pa-234	1	3537.10	884.23	20.44	1.83	0.001	357.99	1.497	s

AC-228	1	3642.93	910.67	12.67	31.56	0.018	23.90	1.518	s
Pa-234	1	3783.73	945.84	19.63	1.33	0.001	478.59	1.543	s
EU-152	1	3851.82	962.85	31.64	-5.74	-0.003	144.85	1.556	s
AC-228	1	3874.70	968.57	24.37	24.93	0.014	34.43	1.559	s
EU-154	1	3991.37	997.71	24.68	-1.43	-0.001	499.08	1.579	s
PA-234M	1	4003.00	1000.62	22.34	1.99	0.001	343.61	1.582	s
EU-154	1	4018.70	1004.54	22.27	-1.41	-0.001	481.94	1.585	s
EU-152	1	4444.38	1110.87	15.91	4.08	0.002	146.95	1.659	s
BI-214	1	4481.11	1120.05	4.65	66.35	0.037	11.87	1.099	s
CO-60	1	4692.36	1172.81	23.67	-3.89	-0.002	183.82	1.701	s
EU-154	1	5098.99	1274.36	14.58	1.68	0.001	330.11	1.768	s
CO-60	1	5334.66	1333.21	11.42	2.37	0.001	211.92	1.806	s
EU-152	1	5634.11	1407.98	7.53	8.56	0.005	56.76	1.854	s
K-40	1	5843.71	1460.31	2.83	199.17	0.111	7.04	0.993	s
BI-214	1	7060.17	1763.95	1.71	33.44	0.019	18.16	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
AC-228	N	1	9.953E+000	911.07	8.074E+000	(	4.936E+000G		2.1E+003	29.00
			9.953E+000	968.97	1.115E+001	(	1.150E+001G		2.1E+003	17.46
			9.953E+000	338.32	1.275E+001	(	8.172E+000G		2.1E+003	12.01
			9.953E+000	93.35	0.000E+000 +	} E	1.937E+001X	A	2.1E+003	5.56
Pa-234	N	1	6.834E-002	131.29	6.834E-002 &	(	5.216E+000G		1.6E+012	18.00
			6.834E-002	569.47	6.834E-002 %		1.333E+001G		1.6E+012	8.20
			6.834E-002	946.02	7.605E-001 %		1.334E+001G		1.6E+012	13.40
			6.834E-002	883.24	1.375E+000 %		1.791E+001G		1.6E+012	9.60
			6.834E-002	880.53	-4.393E+000 %		3.316E+001G		1.6E+012	6.00
BI-212	N	1	6.668E+000	727.33	6.668E+000 %	(	1.229E+001G		7.0E+002	11.82
			6.668E+000	785.51	0.000E+000 %		1.249E+002G		7.0E+002	1.10
CS-134	T F I	1	-5.611E-001	604.71	-5.611E-001 %	(	1.964E+000G		7.5E+002	97.62
			-5.611E-001	795.87	2.264E-001 %		2.021E+000G		7.5E+002	85.53
			-5.611E-001	569.32	-5.611E-001 %		6.437E+000G		7.5E+002	15.38
			-5.611E-001	801.95	-3.902E+000 %		1.845E+001G		7.5E+002	8.69
			-5.611E-001	563.24	4.779E+000 &		1.560E+001G		7.5E+002	8.35
EU-154	T F I	1	-5.185E-001	873.23	-5.185E-001 &	(	1.356E+001G		3.1E+003	12.27
			-5.185E-001	123.10	4.279E-001 &		2.208E+000G		3.1E+003	40.79
			-5.185E-001	1274.54	4.695E-001 &		5.723E+000G		3.1E+003	35.19
			-5.185E-001	723.36	-1.236E+000 %		9.464E+000G		3.1E+003	20.22
			-5.185E-001	1004.77	-6.284E-001 &		1.104E+001G		3.1E+003	18.01
			-5.185E-001	996.33	-1.077E+000 %		1.950E+001G		3.1E+003	10.60
AM-241	T	1	5.178E-002	59.54	5.178E-002 %	(	4.030E+000G		1.6E+005	35.90
TL-208	F N	1	5.103E+000	583.02	5.103E+000	(P	1.219E+000G		7.0E+002	84.50
			5.103E+000	277.28	4.150E+000 %		1.459E+001G		7.0E+002	6.31
			5.103E+000	860.56	4.196E+000 %		1.236E+001G		7.0E+002	12.42
RA-224	N	1	-4.409E+001	240.99	-4.409E+001	(	5.065E+001G		7.0E+002	4.10
			3.499E+001	92.59	4.610E+001 *	(P	1.626E+001G		1.6E+012	5.58
TH-234	N	1	3.499E+001	63.29	2.212E+001 %	(P	2.535E+001G		1.6E+012	4.82
CS-137	T F I	1	3.181E+000	661.66	3.181E+000	(	1.685E+000G		1.1E+004	85.21
BI-214	N	1	2.931E+001	609.31	2.958E+001	(P	2.303E+000G		5.8E+005	46.09
			2.931E+001	1120.29	3.871E+001 +	P	7.441E+000G		5.8E+005	15.10
			2.931E+001	1764.49	2.850E+001 ?	(	7.505E+000G		5.8E+005	15.40
PB-214	N	1	2.779E+001	351.93	2.695E+001	(P	2.448E+000G		5.8E+005	37.60
			2.779E+001	295.09	3.479E+001 +	P	4.050E+000G		5.8E+005	19.30
			2.779E+001	242.00	3.203E+001	(	1.618E+001G		5.8E+005	7.43
U-235	N	1	2.556E+000	143.79	2.556E+000 &	(	9.080E+000G		2.6E+011	10.96
			2.556E+000	205.33	-3.156E+000 &		1.997E+001G		2.6E+011	5.01
			2.556E+000	163.38	-1.980E+000 &		1.395E+001G		2.6E+011	5.08
			2.556E+000	93.35	2.556E+000 !	E	1.854E+001X		2.6E+011	5.81
CO-60	T F	1	2.418E-001	1332.50	2.418E-001 %	(	1.884E+000G		1.9E+003	99.98
			2.418E-001	1173.24	-3.570E-001 %		2.327E+000G		1.9E+003	99.90
PB-210	N	1	2.156E+001	46.54	2.156E+001 *	(P	3.784E+001G		8.1E+003	4.25
I-131	T F I	1	-2.120E-001	364.48	-2.120E-001 &	(	1.340E+000G		8.0E+000	81.70

			-2.120E-001	284.30	-1.073E-001	%			1.675E+001G	8.0E+000	6.14
			-2.120E-001	636.97	1.666E-001	&			2.256E+001G	8.0E+000	7.17
K-40	N	1	2.063E+002	1460.83	2.063E+002		(	P	1.093E+001G	4.7E+011	10.67
PA-234	N	1	1.905E+001	1001.00	1.905E+001	%	(		2.371E+002G	1.6E+012	.84
			1.905E+001	766.41	1.964E-001	%			6.059E+002G	1.6E+012	.29
PB-212	N	1	1.286E+001	238.63	1.286E+001		(	P	2.713E+000G	7.0E+002	43.30
			1.286E+001	300.03	1.084E+001	%			2.817E+001G	7.0E+002	3.28
EU-155	T F I	1	1.057E+000	105.31	1.057E+000	%	(		4.200E+000G	1.8E+003	21.20
			1.057E+000	86.54	-3.393E-001	%			4.112E+000G	1.8E+003	30.70
			1.037E+000	1112.07	2.616E+000	&			1.367E+001G	4.9E+003	13.64
			1.037E+000	1408.00	4.363E+000	%			7.897E+000G	4.9E+003	21.00
EU-152	T F	1	1.037E+000	344.29	1.037E+000	&	(		3.761E+000G	4.9E+003	26.50
			1.037E+000	121.78	-3.897E-002	&			3.149E+000G	4.9E+003	28.58
			1.037E+000	778.92	-9.978E-001	%			1.175E+001G	4.9E+003	12.94
			1.037E+000	964.11	-3.053E+000	%			1.540E+001G	4.9E+003	14.61
BE-7	N P C	1	0.000E+000	477.60	0.000E+000	%	(		1.366E+001G	5.3E+001	10.52

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<			941.15	941.16	1.366E+001
K-40		2.063E+002	2.063E+002	7.14	7.71	1.093E+001
CO-60	<	2.418E-001	2.418E-001	211.92	211.94	1.884E+000
I-131	<	-2.120E-001	-2.154E-001	181.35	181.37	1.340E+000
CS-134	<	-5.611E-001	-5.612E-001	103.10	103.14	1.964E+000
EU-154	<	-5.185E-001	-5.185E-001	708.94	708.94	1.356E+001
PB-210	#	2.156E+001	2.156E+001	58.11	58.24	3.784E+001
PB-212		1.286E+001	1.286E+001	11.26	11.65	2.713E+000
PB-214		2.779E+001	2.779E+001	6.50	7.11	2.448E+000
BI-212	<	6.668E+000	6.670E+000	56.85	56.93	1.229E+001
CS-137	<	3.181E+000	3.181E+000	20.38	20.58	1.685E+000
EU-152	<	1.037E+000	1.037E+000	106.18	106.22	3.761E+000
EU-155	<	1.057E+000	1.057E+000	117.81	117.86	4.200E+000
TL-208		5.103E+000	5.104E+000	14.30	14.58	1.219E+000
RA-224	<	-4.409E+001	-4.410E+001	35.64	35.77	5.065E+001
BI-214		2.931E+001	2.931E+001	6.82	7.40	2.303E+000
AC-228	<	9.953E+000	9.954E+000	15.90	16.16	4.936E+000
PA-234M	<	1.905E+001	1.905E+001	343.61	343.62	2.371E+002
U-235	<	2.556E+000	2.556E+000	105.78	105.82	9.080E+000
AM-241	<	5.178E-002	5.179E-002	2.266.77	2.266.78	4.030E+000
Pa-234	<	6.834E-002	6.834E-002	2.210.59	2.210.59	5.216E+000
TH-234		3.499E+001	3.499E+001	15.75	16.18	2.535E+001

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 316.39 Bq/sample

Analyzed by: _____

403605

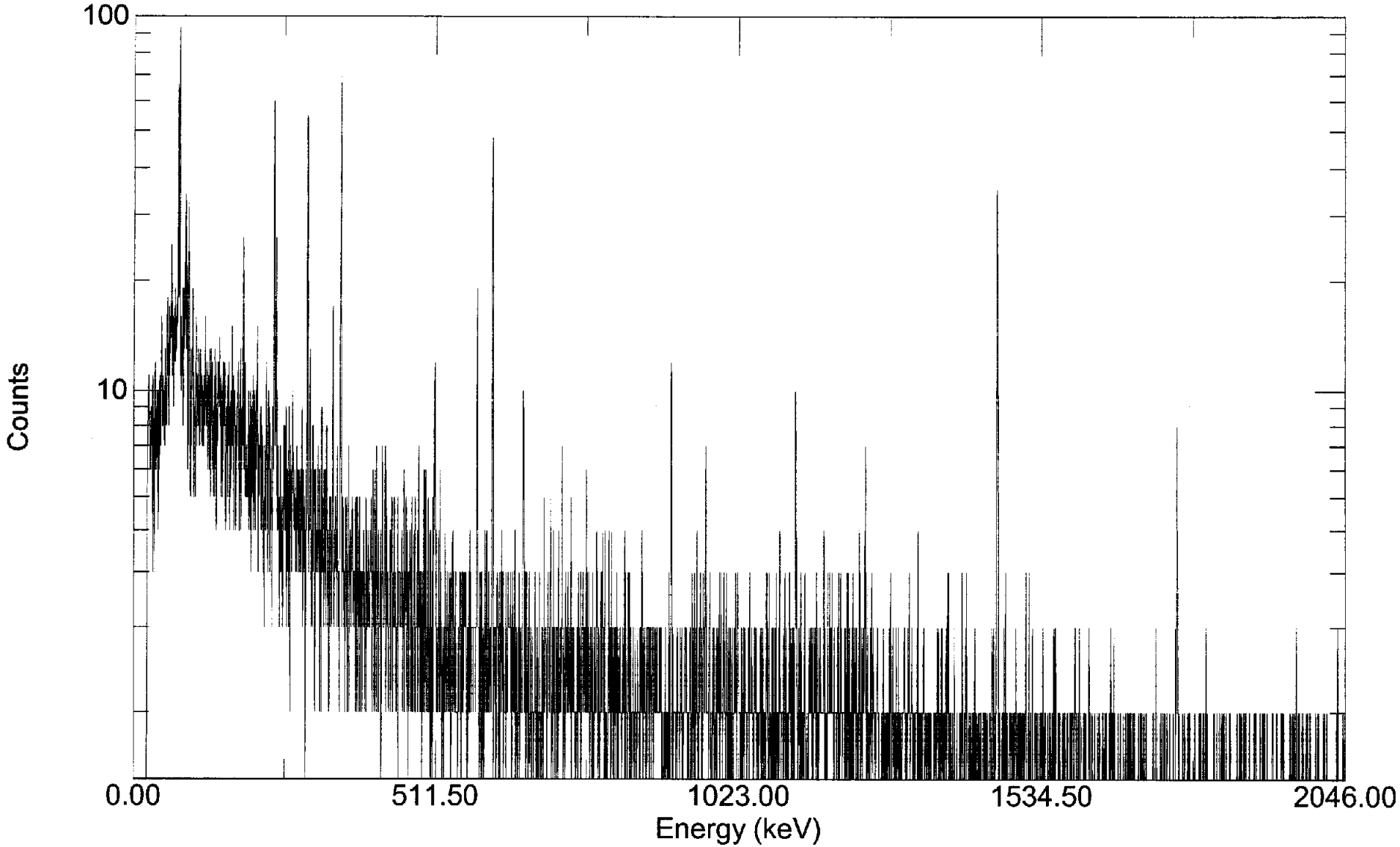
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKE21AC

7360292_KEKE21AC_F7L200260-015



Acquired: 26-Dec-2007 4:19:17 PM
File: C:\User\spectra\KEKE21AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.22 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,053

Sample Description: 7360292_KEKE41AC_F7L200260-016

Spectrum Filename: KEKE41AC.An1

Acquisition Information

Start Time:	26-Dec-2007 4:18:03PM		
Live Time:	1800.00	Real Time:	1851.76
Dead Time:	2.80 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1334

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.20	74.76	190.67	254.33	0.141	11.08	0.825	PB-214	
307.24	77.02	161.67	376.33	0.209	7.55	0.781	PB-214	
347.37	87.05	318.31	16.69	0.009	153.16	0.711		s
358.68	89.87	124.00	90.00	0.050	20.43	0.364	PB-214	sM
837.44	209.48	82.17	72.83	0.040	27.04	0.753	AC-228	
1352.80	338.25	168.08	36.92	0.021	52.32	0.860		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.06	46.75	124.60	66.40	0.037	25.11	0.805	s
AM-241	1	236.86	59.44	204.94	-7.53	-0.004	478.95	0.761	s
TH-234	1	253.02	63.48	172.83	78.17	0.043	26.99	0.800	s
EU-155	1	347.58	87.10	240.38	138.65	0.077	17.95	0.788	s
TH-234	1	369.56	92.59	319.47	-20.60	-0.011	1081.15	0.795	s
U-235	1	372.61	93.35	199.47	7.74	0.004	26.37	0.795	s D
AC-228	1	372.61	93.35	199.47	96.06	0.053	2.21	0.795	s D
EU-155	1	419.19	104.99	174.56	23.73	0.013	81.37	0.808	s
EU-154	1	487.15	121.97	146.24	-22.44	-0.012	79.09	0.826	s
EU-152	1	487.23	121.99	169.33	-15.94	-0.009	118.10	0.824	s
Pa-234	1	523.16	130.96	188.01	-17.87	-0.010	111.04	0.834	s
U-235	1	567.79	142.11	90.17	14.64	0.008	81.05	0.847	s
U-235	1	656.05	164.16	148.09	-18.92	-0.011	103.89	0.867	s
U-235	1	818.19	204.67	99.16	-0.62	0.000	2260.59	0.909	s
PB-212	1	954.06	238.62	108.15	606.85	0.337	5.24	1.019	
RA-224	1	963.54	240.99	89.93	66.07	0.037	23.74	0.944	D
PB-214	1	967.59	242.00	131.93	49.07	0.027	36.05	0.945	D
TL-208	1	1109.02	277.33	40.33	64.67	0.036	24.59	0.707	s
I-131	1	1142.68	285.74	60.69	3.00	0.002	371.19	0.987	s
PB-214	1	1179.71	295.00	46.58	157.42	0.087	12.18	0.991	s
PB-212	1	1200.77	300.26	53.33	88.67	0.049	23.29	1.199	
AC-228	1	1353.36	338.39	50.01	129.58	0.072	11.69	1.040	
EU-152	1	1377.86	344.51	59.51	5.22	0.003	213.59	1.045	s
PB-214	1	1407.75	351.98	37.21	153.79	0.085	10.04	0.942	
I-131	1	1458.46	364.65	42.68	2.16	0.001	432.90	1.065	s
BE-7	1	1911.09	477.76	34.99	2.20	0.001	385.42	1.173	s
CS-134	1	2252.34	563.04	29.52	9.22	0.005	89.61	1.252	
CS-134	1	2277.45	569.32	23.34	-0.84	0.000	-51.49	1.258	s D
Pa-234	1	2278.05	569.47	22.00	-2.68	-0.001	-173.82	1.258	s D
TL-208	1	2333.42	583.31	13.08	210.92	0.117	7.62	1.150	
CS-134	1	2418.20	604.50	47.22	-5.07	-0.003	196.85	1.290	s
BI-214	1	2437.17	609.24	16.73	163.27	0.091	8.92	1.112	s
I-131	1	2547.08	636.71	29.90	0.42	0.000	1844.42	1.319	s
CS-137	1	2648.19	661.98	38.58	13.96	0.008	45.58	1.342	s
EU-154	1	2878.75	719.61	0.56	-8.73	-0.005	35.95	1.397	s
BI-212	1	2910.19	727.47	20.36	40.75	0.023	22.15	1.400	s
PA-234M	1	3074.75	768.61	25.19	5.75	0.003	130.25	1.434	s
EU-152	1	3116.92	779.15	30.05	2.19	0.001	359.68	1.445	s
BI-212	1	3142.35	785.51	30.63	0.00	0.000	782.75	1.451	s
CS-134	1	3183.78	795.87	35.00	0.00	0.000	836.66	1.460	s
CS-134	1	3210.14	802.46	33.44	-0.35	0.000	2361.54	1.465	s
TL-208	1	3442.03	860.43	0.00	43.00	0.024	15.25	0.615	s
EU-154	1	3493.71	873.35	18.07	2.46	0.001	252.41	1.527	s
Pa-234	1	3522.44	880.53	42.22	0.00	0.000	918.95	1.533	s
Pa-234	1	3529.98	882.42	25.20	0.24	0.000	2920.95	1.535	s
AC-228	1	3645.92	911.40	21.05	103.25	0.057	11.68	1.559	

Pa-234	1	3786.66	946.59	23.86	2.66	0.001	266.61	1.588	s
EU-152	1	3861.89	965.40	54.38	0.50	0.000	2086.22	1.603	s
AC-228	1	3876.73	969.11	24.55	68.86	0.038	15.77	1.607	s
EU-154	1	3991.30	997.76	24.90	0.35	0.000	1995.19	1.630	s
PA-234M	1	4004.26	1001.00	15.06	0.00	0.000	548.86	1.633	s
EU-154	1	4019.37	1004.77	12.51	0.00	0.000	500.22	1.637	s
EU-152	1	4450.04	1112.46	18.90	-2.24	-0.001	282.33	1.723	s
BI-214	1	4483.52	1120.84	0.00	44.00	0.024	15.08	2.063	s
CO-60	1	4691.44	1172.83	18.42	2.20	0.001	283.67	1.772	s
EU-154	1	5097.56	1274.40	22.89	-1.49	-0.001	462.80	1.850	s
CO-60	1	5331.35	1332.87	26.30	2.43	0.001	305.66	1.894	s
EU-152	1	5633.33	1408.41	9.81	8.74	0.005	60.93	1.950	s
K-40	1	5844.44	1461.22	0.00	283.00	0.157	5.94	1.951	
BI-214	1	7059.35	1765.17	9.48	16.00	0.009	32.24	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code			Peak MDA Value Becquerels	Code	Comments	
CS-137	T F I	1	8.917E-001	661.66	8.917E-001	*	(	P	2.022E+000G		1.1E+004	85.21
BE-7	N P C	1	8.578E-001	477.60	8.578E-001	&	(		1.178E+001G		5.3E+001	10.52
I-131	T F I	1	8.464E-002	364.48	8.464E-002	%	(		1.299E+000G		8.0E+000	81.70
			8.464E-002	284.30	1.249E+000	&			1.622E+001G		8.0E+000	6.14
			8.464E-002	636.97	3.092E-001	&			2.072E+001G		8.0E+000	7.17
EU-152	T F	1	5.979E-001	344.29	5.979E-001	*	(		4.430E+000G		4.9E+003	26.50
			5.979E-001	121.78	-8.712E-001	%			3.461E+000G		4.9E+003	28.58
			5.979E-001	778.92	1.058E+000	&			1.362E+001G		4.9E+003	12.94
			5.979E-001	964.11	2.547E-001	%			1.885E+001G		4.9E+003	14.61
			5.979E-001	1112.07	-1.369E+000	%			1.403E+001G		4.9E+003	13.64
			5.979E-001	1408.00	4.207E+000	%			8.331E+000G		4.9E+003	21.00
PB-210	N	1	4.876E+001	46.54	4.876E+001	*	(	P	4.018E+001G		8.1E+003	4.25
AM-241	T	1	-4.282E-001	59.54	-4.282E-001	&	(	P	3.950E+000G		1.6E+005	35.90
RA-224	N	1	3.567E+001	240.99	3.567E+001		(		2.532E+001G		7.0E+002	4.10
TH-234	N	1	3.167E+001	63.29	3.167E+001	*	(	P	2.592E+001G		1.6E+012	4.82
			3.167E+001	92.59	-5.980E+000	&		P	2.496E+001G		1.6E+012	5.58
PB-212	N	1	3.078E+001	238.63	3.078E+001		(	P	2.595E+000G		7.0E+002	43.30
			3.078E+001	300.03	7.241E+001	+			3.001E+001G		7.0E+002	3.28
AC-228	N	1	2.793E+001	911.16	2.525E+001		(		5.891E+000G		2.1E+003	29.00
			2.793E+001	968.97	2.940E+001		(		1.102E+001G		2.1E+003	17.46
			2.793E+001	338.32	3.224E+001		(		8.874E+000G		2.1E+003	12.01
			2.793E+001	93.35	2.793E+001	!		E	1.992E+001G	A	2.1E+003	5.56
K-40	N	1	2.766E+002	1460.83	2.766E+002		(		7.204E+000G		4.7E+011	10.67
CS-134	T F I	1	-2.616E-001	604.71	-2.616E-001	%	(		1.793E+000G		7.5E+002	97.62
			-2.616E-001	795.87	0.000E+000	%			2.248E+000G		7.5E+002	85.53
			-2.616E-001	569.32	-2.616E-001	%			7.843E+000G		7.5E+002	15.38
			-2.616E-001	801.95	-2.553E-001	&			2.181E+001G		7.5E+002	8.69
			-2.616E-001	563.24	5.232E+000	%			1.590E+001G		7.5E+002	8.35
CO-60	T F	1	2.345E-001	1332.50	2.345E-001	%	(		2.571E+000G		1.9E+003	99.98
			2.345E-001	1173.24	1.919E-001	%			1.979E+000G		1.9E+003	99.90
U-235	N	1	2.155E+000	143.79	2.155E+000	%	(	P	6.911E+000G		2.6E+011	10.96
			2.155E+000	205.33	-2.434E-001	&			1.916E+001G		2.6E+011	5.01

			2.155E+000	163.38	-6.327E+000	%		P	1.987E+001G		2.6E+011	5.08
			2.155E+000	93.35	2.155E+000	!		E	1.907E+001X		2.6E+011	5.81
BI-212		N	1	2.031E+001	727.33	2.031E+001	?	(	1.183E+001G		7.0E+002	11.82
				2.031E+001	785.51	0.000E+000	&		1.628E+002G		7.0E+002	1.10
BI-214		N	1	1.797E+001	609.31	1.797E+001	@	(P	2.396E+000G		5.8E+005	46.09
				1.797E+001	1120.29	2.443E+001	+		4.092E+000G		5.8E+005	15.10
				1.797E+001	1764.49	1.276E+001	-	P	1.360E+001G		5.8E+005	15.40
EU-155	T F I		1	1.759E+000	105.31	1.759E+000	%	(	4.765E+000G		1.8E+003	21.20
				1.759E+000	86.54	7.499E+000	*		4.054E+000G	A	1.8E+003	30.70
				-1.565E+000	569.47	-1.565E+000	%		1.433E+001G		1.6E+012	8.20
				-1.565E+000	946.02	1.453E+000	%		1.390E+001G		1.6E+012	13.40
				-1.565E+000	883.24	1.755E-001	%		1.880E+001G		1.6E+012	9.60
				-1.565E+000	880.53	0.000E+000	%		3.793E+001G		1.6E+012	6.00
Pa-234		N	1	-1.565E+000	131.29	-1.565E+000	%	(	5.833E+000G		1.6E+012	18.00
EU-154	T F I		1	1.374E+000	873.23	1.374E+000	%	(	1.257E+001G		3.1E+003	12.27
				1.374E+000	123.10	-8.597E-001	&		2.263E+000G		3.1E+003	40.79
				1.374E+000	1274.54	-3.931E-001	%		6.618E+000G		3.1E+003	35.19
				1.374E+000	723.36	-2.534E+000	&		2.138E+000G		3.1E+003	20.22
				1.374E+000	1004.77	0.000E+000	%		8.182E+000G		3.1E+003	18.01
				1.374E+000	996.33	2.553E-001	%		1.868E+001G		3.1E+003	10.60
PB-214		N	1	1.300E+001	351.93	1.267E+001		(P	2.566E+000G		5.8E+005	37.60
				1.300E+001	295.09	2.152E+001	*	P	4.719E+000G		5.8E+005	19.30
				1.300E+001	242.00	1.467E+001		(	1.681E+001G		5.8E+005	7.43
TL-208	F	N	1	1.219E+001	583.02	1.219E+001		(P	1.130E+000G		7.0E+002	84.50
				1.219E+001	277.28	2.559E+001	+		1.278E+001G		7.0E+002	6.31
				1.219E+001	860.56	2.344E+001	+		4.017E+000G		7.0E+002	12.42
PA-234M		N	1	0.000E+000	1001.00	0.000E+000	%	(	1.902E+002G		1.6E+012	.84
				0.000E+000	766.41	1.204E+002	&		5.464E+002G		1.6E+012	.29

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	8.578E-001	8.598E-001	385.42	385.43	1.178E+001
K-40		2.766E+002	2.766E+002	5.94	6.63	7.204E+000
CO-60	#	2.345E-001	2.345E-001	305.66	305.68	2.571E+000
I-131	#	8.464E-002	8.596E-002	432.90	432.91	1.299E+000
CS-134	#	-2.616E-001	-2.616E-001	196.85	196.87	1.793E+000
EU-154	#	1.374E+000	1.374E+000	252.41	252.43	1.257E+001
EU-155	#	1.759E+000	1.759E+000	81.37	81.44	4.765E+000
PB-214		1.300E+001	1.300E+001	10.38	10.77	2.566E+000
BI-212	#	2.031E+001	2.032E+001	22.15	22.34	1.183E+001
BI-214	#	1.797E+001	1.797E+001	9.29	9.73	2.396E+000
TH-234	#	3.167E+001	3.167E+001	31.89	32.10	2.592E+001
PA-234M	#			548.86	548.87	1.902E+002
CS-137	#	8.917E-001	8.917E-001	65.98	66.04	2.022E+000
EU-152	#	5.979E-001	5.980E-001	213.59	213.61	4.430E+000
TL-208		1.219E+001	1.219E+001	7.76	8.27	1.130E+000
PB-210	#	4.876E+001	4.876E+001	31.64	31.88	4.018E+001
PB-212		3.078E+001	3.078E+001	5.30	6.09	2.595E+000
RA-224		3.567E+001	3.568E+001	23.74	23.92	2.532E+001
AC-228	#	2.793E+001	2.793E+001	7.61	8.14	5.891E+000
Pa-234	#	-1.565E+000	-1.565E+000	111.04	111.08	5.833E+000
U-235	#	2.155E+000	2.155E+000	94.76	94.80	6.911E+000
AM-241	#	-4.282E-001	-4.282E-001	689.72	689.73	3.950E+000

= All peaks for activity calculation had bad shape

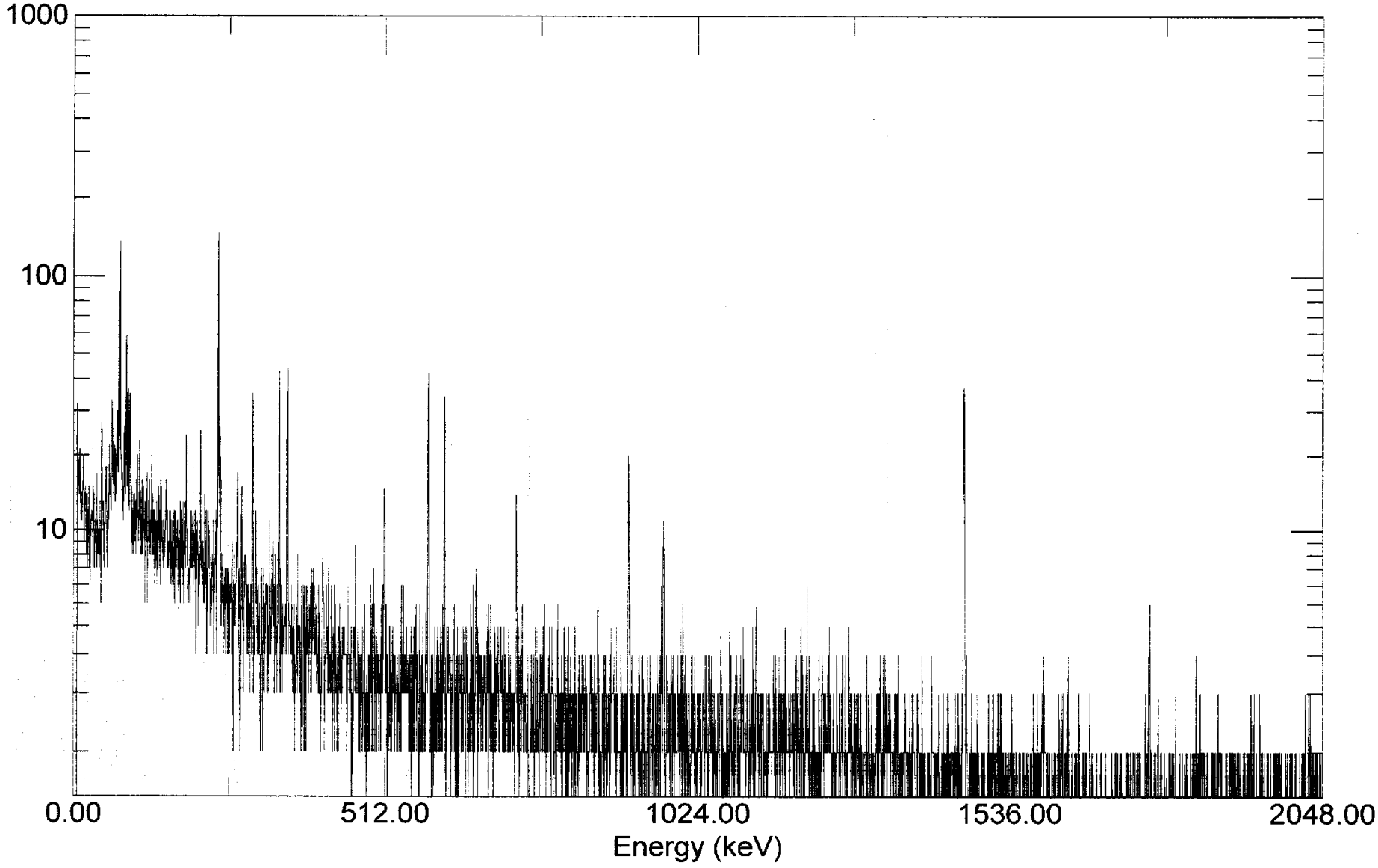
Total Activity (37.74 to 2,000.57 keV) 486.97 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKE41AC

7360292_KEKE41AC_F7L200260-016



Acquired: 26-Dec-2007 4:18:04 PM
File: C:\User\spectra\KEKE41AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1851.76 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,056

Sample Description: 7360292_KEKE51AC_F7L200260-017

Spectrum Filename: KEKE51AC.An1

Acquisition Information

Start Time:	26-Dec-2007 4:18:55PM		
Live Time:	1800.00	Real Time:	1820.66
Dead Time:	1.13 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1073

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.21	74.77	642.83	436.17	0.242	12.80	0.765	PB-214	
307.63	77.12	394.17	688.83	0.383	6.17	1.067	PB-214	s
334.45	83.83	338.27	138.73	0.077	20.58	0.919	TA-182	s
348.03	87.22	333.36	268.64	0.149	11.38	0.834	PB-214	s
742.15	185.73	320.83	402.17	0.223	11.29	1.381	U-235	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.23	46.78	211.10	158.90	0.088	16.39	1.468	s
AM-241	1	235.23	59.03	429.45	-17.30	-0.010	171.09	0.846	s
TH-234	1	252.76	63.41	382.42	185.58	0.103	18.21	0.853	s
EU-155	1	345.32	86.54	628.64	-2.48	-0.001	1429.69	0.874	s
TH-234	1	369.52	92.59	353.91	233.09	0.129	11.57	0.881	D
AC-228	1	372.56	93.35	508.59	93.06	0.052	3.09	0.882	D
U-235	1	372.56	93.35	464.97	19.02	0.011	15.62	0.882	s D
EU-155	1	418.97	104.95	333.60	15.89	0.009	164.45	0.894	s
EU-152	1	486.11	121.73	393.89	-8.98	-0.005	314.43	0.912	s
EU-154	1	491.42	123.06	346.11	17.05	0.009	156.19	0.913	s
Pa-234	1	522.47	130.82	383.08	-17.25	-0.010	162.24	0.922	s
U-235	1	575.46	144.06	369.98	35.77	0.020	77.86	0.935	s
U-235	1	653.93	163.68	296.98	35.22	0.020	71.22	0.955	s
U-235	1	822.41	205.79	326.50	-4.46	-0.002	574.95	0.999	s
PB-212	1	953.90	238.66	156.54	418.46	0.232	7.08	0.970	
RA-224	1	963.98	241.18	700.18	-4.03	-0.002	929.86	1.036	
PB-214	1	966.96	241.92	126.00	369.00	0.205	7.61	1.222	s
TL-208	1	1107.93	277.16	234.89	-9.84	-0.005	222.52	1.074	
I-131	1	1135.94	284.16	191.86	21.45	0.012	93.86	1.081	s
PB-214	1	1180.50	295.30	135.33	795.67	0.442	4.97	1.290	s
PB-212	1	1199.53	300.05	183.00	29.64	0.016	67.12	1.097	
AC-228	1	1351.22	337.97	110.00	160.00	0.089	17.90	0.687	s
EU-152	1	1377.17	344.46	136.49	6.08	0.003	274.64	1.142	s
PB-214	1	1407.25	351.97	126.22	1272.78	0.707	3.64	1.191	
I-131	1	1460.41	365.26	109.77	-6.21	-0.003	241.85	1.163	s
BE-7	1	1911.26	477.96	97.33	-0.31	0.000	4468.37	1.277	s
CS-134	1	2254.53	563.76	70.63	-6.47	-0.004	187.82	1.363	s
CS-134	1	2276.76	569.32	65.06	13.60	0.008	68.32	1.369	s D
Pa-234	1	2277.35	569.47	77.05	-2.54	-0.001	-177.30	1.369	s D
TL-208	1	2332.38	583.23	40.41	192.59	0.107	11.16	1.503	s
CS-134	1	2418.33	604.71	1543.67	3.98	0.002	1395.48	1.403	s
BI-214	1	2436.81	609.33	40.63	821.37	0.456	3.98	1.333	
I-131	1	2537.60	634.52	39.53	0.93	0.001	958.83	1.435	s
CS-137	1	2645.04	661.38	18.08	103.92	0.058	13.41	1.479	
EU-154	1	2899.41	724.97	88.62	-15.91	-0.009	87.35	1.519	s
BI-212	1	2908.42	727.22	45.52	42.81	0.024	27.03	1.523	s
PA-234M	1	3065.48	766.48	74.25	4.57	0.003	271.00	1.561	s
EU-152	1	3120.98	780.36	53.76	-6.19	-0.003	172.18	1.573	s
BI-212	1	3143.51	785.99	46.97	23.86	0.013	45.49	1.579	s
CS-134	1	3177.70	794.53	28.27	10.90	0.006	75.37	1.589	s
CS-134	1	3213.81	803.56	39.75	-4.17	-0.002	219.54	1.595	s
TL-208	1	3440.79	860.30	7.50	27.50	0.015	26.66	0.844	s
EU-154	1	3492.26	873.17	45.76	0.24	0.000	3958.58	1.662	s
Pa-234	1	3521.73	880.54	43.76	3.36	0.002	284.13	1.669	s
Pa-234	1	3535.21	883.90	39.89	0.56	0.000	1613.81	1.672	s
AC-228	1	3644.16	911.14	24.17	106.83	0.059	14.74	1.333	

Pa-234	1	3780.35	945.19	39.87	-0.98	-0.001	913.38	1.731	s
EU-152	1	3839.57	959.99	33.06	0.75	0.000	1083.32	1.748	s
AC-228	1	3872.84	968.31	28.67	107.33	0.060	17.22	1.084	s
EU-154	1	3982.85	995.81	35.75	-0.16	0.000	5396.61	1.778	s
PA-234M	1	4007.22	1001.90	25.69	7.45	0.004	102.91	1.782	s
EU-154	1	4018.71	1004.77	53.35	0.00	0.000	1032.98	1.785	s
EU-152	1	4447.92	1112.07	30.76	0.00	0.000	784.29	1.884	s
BI-214	1	4481.68	1120.51	15.00	175.00	0.097	9.94	1.002	s
CO-60	1	4696.42	1174.20	36.06	6.39	0.004	138.56	1.939	s
EU-154	1	5097.80	1274.54	127.37	0.00	0.000	1596.06	2.030	s
CO-60	1	5334.25	1333.66	35.56	-7.70	-0.004	115.30	2.081	s
EU-152	1	5642.39	1410.69	23.47	1.21	0.001	575.49	2.147	s
K-40	1	5843.25	1460.91	0.00	291.00	0.162	5.86	1.739	
BI-214	1	7059.25	1764.94	14.87	104.46	0.058	11.09	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PB-210	N	1	9.487E+001	46.54	9.487E+001	* (P	4.204E+001G		8.1E+003	4.25
BE-7	N P C	1	-8.939E-002	477.60	-8.939E-002	& (	1.393E+001G		5.3E+001	10.52
EU-155	T F I	1	8.490E-001	105.31	8.490E-001	* (	4.692E+000G		1.8E+003	21.20
			8.490E-001	86.54	-9.706E-002	&	4.674E+000G	A	1.8E+003	30.70
TL-208	F N	1	8.203E+000	583.02	8.203E+000	* (P	1.377E+000G		7.0E+002	84.50
			8.203E+000	277.28	-2.852E+000	%	2.148E+001G		7.0E+002	6.31
			8.203E+000	860.56	1.117E+001	+	6.283E+000G		7.0E+002	12.42
			7.819E+001	242.00	8.070E+001	* (	1.203E+001G		5.8E+005	7.43
PB-214	N	1	7.819E+001	351.93	7.692E+001	(P	3.328E+000G		5.8E+005	37.60
			7.819E+001	295.09	7.970E+001	* (	5.702E+000G		5.8E+005	19.30
AM-241	T	1	-7.474E-001	59.54	-7.474E-001	& (	4.289E+000G		1.6E+005	35.90
BI-214	N	1	6.768E+001	609.31	6.668E+001	(P	2.632E+000G		5.8E+005	46.09
			6.768E+001	1120.29	7.330E+001	(	8.695E+000G		5.8E+005	15.10
			6.768E+001	1764.49	6.514E+001	? (	1.289E+001G		5.8E+005	15.40
CO-60	T F	1	-5.677E-001	1332.50	-5.677E-001	% (	2.248E+000G		1.9E+003	99.98
			-5.677E-001	1173.24	4.215E-001	%	2.023E+000G		1.9E+003	99.90
TH-234	N	1	5.229E+001	63.29	5.633E+001	(P	2.848E+001G		1.6E+012	4.82
			5.229E+001	92.59	4.880E+001	(P	1.892E+001G		1.6E+012	5.58
EU-152	T F	1	5.111E-001	344.29	5.111E-001	& (	4.802E+000G		4.9E+003	26.50
			5.111E-001	121.78	-3.542E-001	&	3.756E+000G		4.9E+003	28.58
			5.111E-001	778.92	-2.216E+000	%	1.320E+001G		4.9E+003	12.94
			5.111E-001	964.11	2.873E-001	%	1.123E+001G		4.9E+003	14.61
			5.111E-001	1112.07	0.000E+000	&	1.315E+001G		4.9E+003	13.64
			5.111E-001	1408.00	4.447E-001	%	9.326E+000G		4.9E+003	21.00
PA-234M	N	1	5.111E+001	1001.00	5.111E+001	& (	1.806E+002G		1.6E+012	.84
			5.111E+001	766.41	7.091E+001	%	6.658E+002G		1.6E+012	.29
CS-137	T F I	1	4.905E+000	661.66	4.905E+000	(P	1.063E+000G		1.1E+004	85.21
			3.816E+000	205.33	-1.270E+000	&	2.475E+001G		2.6E+011	5.01
			3.816E+000	163.38	8.562E+000	%	2.018E+001G		2.6E+011	5.08
			3.816E+000	93.35	3.816E+000	!	2.071E+001X	E	2.6E+011	5.81
U-235	N	1	3.816E+000	143.79	3.816E+000	* (	9.850E+000G		2.6E+011	10.96
K-40	N	1	2.186E+002	1460.83	2.186E+002	(	5.536E+000G		4.7E+011	10.67

AC-228		N	1	1.951E+001	911.16	1.951E+001		(		4.678E+000G	2.1E+003	29.00
				1.951E+001	968.97	3.431E+001	+			8.843E+000G	2.1E+003	17.46
				1.951E+001	338.32	2.919E+001	+			9.410E+000G	2.1E+003	12.01
				1.951E+001	93.35	1.951E+001			E	2.260E+001G	A 2.1E+003	5.56
I-131	T F I		1	-1.785E-001	364.48	-1.785E-001	%	(		1.480E+000G	8.0E+000	81.70
				-1.785E-001	284.30	6.530E+000	%			2.048E+001G	8.0E+000	6.14
				-1.785E-001	636.97	5.062E-001	%			1.737E+001G	8.0E+000	7.17
RA-224		N	1	-1.592E+000	240.99	-1.592E+000	%	(		4.977E+001G	7.0E+002	4.10
BI-212		N	1	1.581E+001	727.33	1.581E+001		(		1.261E+001G	7.0E+002	11.82
				1.581E+001	785.51	1.012E+002	%			1.469E+002G	7.0E+002	1.10
PB-212		N	1	1.552E+001	238.63	1.552E+001		(	P	2.263E+000G	7.0E+002	43.30
				1.552E+001	300.03	1.773E+001	%			3.934E+001G	7.0E+002	3.28
CS-134	T F I		1	1.517E-001	604.71	1.517E-001	%	(		7.075E+000G	7.5E+002	97.62
				1.517E-001	795.87	6.009E-001	%			1.516E+000G	7.5E+002	85.53
				1.517E-001	569.32	3.117E+000	%		}	1.005E+001G	7.5E+002	15.38
				1.517E-001	801.95	-2.276E+000	%			1.753E+001G	7.5E+002	8.69
				1.517E-001	563.24	-2.705E+000	%			1.750E+001G	7.5E+002	8.35
Pa-234		N	1	-1.093E+000	131.29	-1.093E+000	&	(		5.949E+000G	1.6E+012	18.00
				-1.093E+000	569.47	-1.093E+000	%			1.875E+001G	1.6E+012	8.20
				-1.093E+000	946.02	-4.014E-001	%			1.311E+001G	1.6E+012	13.40
				-1.093E+000	883.24	2.983E-001	%			1.727E+001G	1.6E+012	9.60
				-1.093E+000	880.53	2.876E+000	&			2.875E+001G	1.6E+012	6.00
				1.007E-001	1274.54	0.000E+000	%			1.113E+001G	3.1E+003	35.19
				1.007E-001	723.36	-3.419E+000	%			1.001E+001G	3.1E+003	20.22
				1.007E-001	1004.77	0.000E+000	%			1.175E+001G	3.1E+003	18.01
				1.007E-001	996.33	-8.460E-002	%			1.649E+001G	3.1E+003	10.60
EU-154	T F I		1	1.007E-001	873.23	1.007E-001	%	(		1.425E+001G	3.1E+003	12.27
				1.007E-001	123.10	4.719E-001	&			2.474E+000G	3.1E+003	40.79

Analysis Codes:

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- = Peak activity lower than counting uncertainty range

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* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-8.939E-002	-8.960E-002	4,468.37	4,468.37	1.393E+001
K-40		2.186E+002	2.186E+002	5.86	6.55	5.536E+000
CO-60	#	-5.677E-001	-5.677E-001	115.30	115.33	2.248E+000
I-131	#	-1.785E-001	-1.813E-001	241.85	241.86	1.480E+000
CS-134	#	1.517E-001	1.517E-001	1,395.48	1,395.49	7.075E+000
CS-137		4.905E+000	4.905E+000	13.51	13.82	1.063E+000
EU-152	#	5.111E-001	5.111E-001	274.64	274.66	4.802E+000
EU-155	#	8.490E-001	8.491E-001	164.45	164.48	4.692E+000
TL-208		8.203E+000	8.204E+000	11.30	11.66	1.377E+000
BI-212	#	1.581E+001	1.581E+001	27.03	27.18	1.261E+001
BI-214		6.768E+001	6.768E+001	3.99	4.93	2.632E+000
RA-224	#	-1.592E+000	-1.592E+000	929.86	929.86	4.977E+001
EU-154	#	1.007E-001	1.007E-001	3,958.58	3,958.58	1.425E+001
PB-210	#	9.487E+001	9.487E+001	18.88	19.28	4.204E+001
PB-212		1.552E+001	1.552E+001	7.24	7.83	2.263E+000
PB-214		7.819E+001	7.819E+001	3.27	4.35	3.328E+000
AC-228		1.951E+001	1.951E+001	14.74	15.01	4.678E+000
Pa-234	#	-1.093E+000	-1.093E+000	162.24	162.27	5.949E+000
AM-241	#	-7.474E-001	-7.474E-001	171.09	171.14	4.289E+000
TH-234		5.229E+001	5.229E+001	12.02	12.57	2.848E+001
PA-234M	#	5.111E+001	5.111E+001	102.91	102.95	1.806E+002
U-235	#	3.816E+000	3.816E+000	77.86	77.92	9.850E+000

= All peaks for activity calculation had bad shape

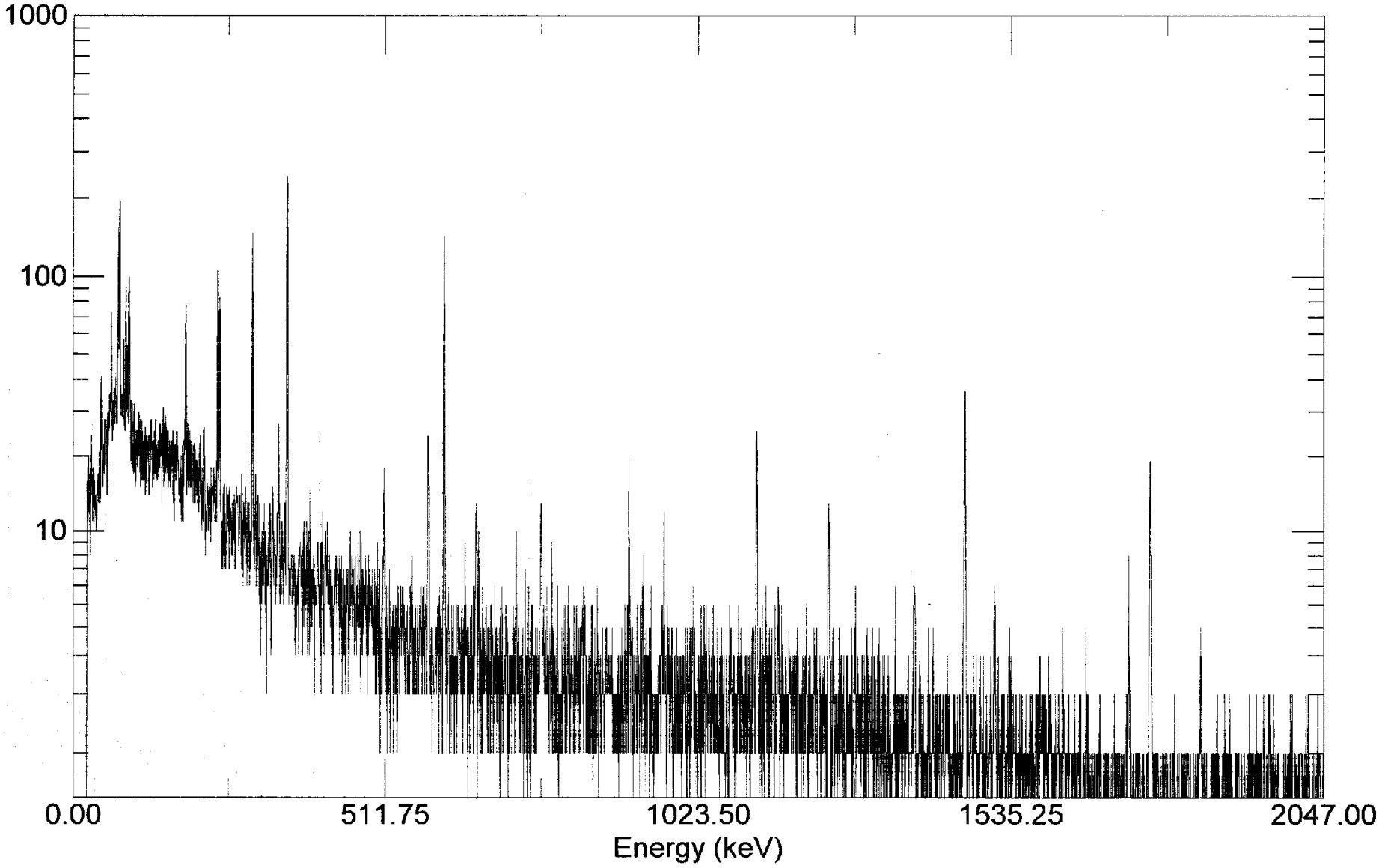
Total Activity (37.72 to 2,000.15 keV) 559.73 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKE51AC

7360292_KEKE51AC_F7L200260-017



Acquired: 26-Dec-2007 4:18:55 PM
File: C:\User\spectra\KEKE51AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.66 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,058

Sample Description: 7360292_KER4G1AA_F7L260000-292B

Spectrum Filename: KER4G1AA.An1

Acquisition Information

Start Time:	26-Dec-2007 5:00:15PM		
Live Time:	1800.00	Real Time:	1810.06
Dead Time:	0.56 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.0990

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty Sigma%	FWHM keV	Suspected Nuclide	Code

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.15	46.50	55.62	-10.56	-0.006	44.66	0.813	
AM-241	1	237.29	59.54	46.67	-1.17	-0.001	830.86	0.824	s
TH-234	1	252.10	63.24	63.90	6.10	0.003	28.58	0.372	s
EU-155	1	345.31	86.54	58.62	0.00	0.000	1082.81	0.849	s
TH-234	1	370.16	92.75	98.91	-5.51	-0.003	26.46	0.855	s
AC-228	1	372.54	93.35	31.35	-3.36	-0.002	-3072.06	0.855	s D
U-235	1	372.54	93.35	31.35	3.90	0.002	26.29	0.855	s D
EU-155	1	419.28	105.04	22.00	6.33	0.004	111.99	0.866	s
EU-152	1	487.59	122.11	50.64	-3.96	-0.002	259.11	0.881	s
EU-154	1	491.68	123.14	34.05	0.04	0.000	19014.54	0.882	s
Pa-234	1	522.29	130.79	28.72	5.69	0.003	139.66	0.890	s
U-235	1	575.95	144.20	32.19	7.21	0.004	75.21	0.901	s
U-235	1	652.32	163.30	40.08	-6.92	-0.004	224.57	0.919	s
U-235	1	814.77	203.91	26.51	-2.63	-0.001	1447.11	0.957	s
PB-212	1	954.21	238.77	35.58	16.42	0.009	24.40	0.529	s
PB-214	1	968.35	242.31	42.74	-12.03	-0.007	174.56	0.990	s
RA-224	1	972.41	243.32	13.83	2.65	0.001	207.50	0.989	s
TL-208	1	1109.27	277.53	19.13	-0.03	0.000	18225.48	1.021	s
I-131	1	1132.06	283.23	20.18	0.16	0.000	3996.74	1.028	s
PB-214	1	1177.51	294.59	35.36	1.97	0.001	71.30	1.037	s
PB-212	1	1198.03	299.72	31.08	-3.62	-0.002	224.35	1.042	
AC-228	1	1352.87	338.43	24.00	-6.25	-0.003	470.97	1.076	s
EU-152	1	1375.51	344.09	21.48	-0.10	0.000	6791.34	1.081	s
PB-214	1	1404.26	351.28	32.15	-6.53	-0.004	124.10	1.088	s
I-131	1	1458.10	364.74	22.23	2.76	0.002	248.77	1.099	s
BE-7	1	1909.54	477.60	15.47	0.00	0.000	556.32	1.198	s
CS-134	1	2248.60	562.35	16.77	-0.86	0.000	685.86	1.273	s
CS-134	1	2276.47	569.32	11.40	-0.09	0.000	-22.65	1.278	s D
Pa-234	1	2277.07	569.47	11.72	1.03	0.001	57.18	1.278	s D
TL-208	1	2330.09	582.72	26.21	-3.39	-0.002	114.59	1.290	s
CS-134	1	2414.73	603.88	19.67	-0.52	0.000	1213.24	1.309	s
BI-214	1	2436.32	609.28	36.51	-5.26	-0.003	117.80	1.313	s
I-131	1	2547.11	636.97	24.18	0.00	0.000	695.43	1.337	s
CS-137	1	2641.86	660.66	15.10	-3.36	-0.002	172.54	1.358	s
EU-154	1	2884.58	721.33	13.68	1.23	0.001	436.00	1.411	s
BI-212	1	2912.87	728.41	17.84	6.01	0.003	107.39	1.414	s
PA-234M	1	3064.92	766.41	0.00	0.00	0.000	100.00	1.447	s
EU-152	1	3129.43	782.54	1.57	0.77	0.000	257.91	1.458	s
BI-212	1	3141.32	785.51	0.00	0.00	0.000	100.00	1.463	s
CS-134	1	3180.16	795.22	14.22	-2.24	-0.001	247.17	1.472	s
CS-134	1	3209.95	802.66	18.67	4.33	0.002	149.01	1.477	s
TL-208	1	3438.21	859.72	17.99	-1.46	-0.001	417.75	1.527	s
EU-154	1	3492.25	873.23	0.00	0.00	0.000	100.00	1.537	s
Pa-234	1	3521.46	880.53	10.87	0.00	0.000	466.32	1.543	s
Pa-234	1	3531.58	883.06	9.26	2.68	0.001	171.60	1.546	s

AC-228	1	3649.61	912.56	12.99	-5.02	-0.003	1944.78	1.569	s
Pa-234	1	3782.51	945.78	16.80	-2.62	-0.001	229.54	1.598	s
EU-152	1	3858.13	964.69	6.81	4.00	0.002	104.89	1.613	s
AC-228	1	3873.86	968.62	21.87	-5.16	-0.003	328.55	1.617	s
EU-154	1	3978.06	994.66	15.81	-2.81	-0.002	208.94	1.640	s
PA-234M	1	4003.65	1001.06	11.30	4.59	0.003	113.59	1.643	s
EU-154	1	4026.58	1006.79	15.44	-3.91	-0.002	150.94	1.647	s
EU-152	1	4447.80	1112.07	40.78	0.00	0.000	903.10	1.735	s
BI-214	1	4487.21	1121.92	12.23	-1.31	-0.001	93.98	1.741	s
CO-60	1	4692.88	1173.33	14.04	-1.55	-0.001	351.48	1.784	s
EU-154	1	5103.50	1275.96	11.15	-2.18	-0.001	226.91	1.866	s
CO-60	1	5329.72	1332.50	17.18	0.00	0.000	586.26	1.912	s
EU-152	1	5630.04	1407.56	4.73	0.14	0.000	2257.29	1.972	s
K-40	1	5843.18	1460.83	32.59	-12.54	-0.007	633.26	2.013	s
BI-214	1	7058.22	1764.49	4.81	-4.81	-0.003	100.00	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code		MDA Value Becquerels	Code	Comments	
U-235	N	1	8.981E-001	143.79	8.981E-001	%	(	P	3.631E+000G		2.6E+011	10.96
			8.981E-001	205.33	-8.505E-001	%		P	8.647E+000G		2.6E+011	5.01
			8.981E-001	163.38	-1.953E+000	%		P	9.098E+000G		2.6E+011	5.08
			8.981E-001	93.35	8.981E-001	!		E	6.627E+000X		2.6E+011	5.81
EU-152	T F	1	-8.485E-003	344.29	-8.485E-003	&	(		2.135E+000G		4.9E+003	26.50
			-8.485E-003	121.78	-1.822E-001	%			1.651E+000G		4.9E+003	28.58
			-8.485E-003	778.92	2.476E-001	%			2.762E+000G		4.9E+003	12.94
			-8.485E-003	964.11	1.330E+000	%			4.942E+000G		4.9E+003	14.61
			-8.485E-003	1112.07	0.000E+000	%			1.278E+001G		4.9E+003	13.64
			-8.485E-003	1408.00	4.180E-002	%			3.912E+000G		4.9E+003	21.00
I-131	T F I	1	8.205E-002	364.48	8.205E-002	%	(		7.332E-001G		8.0E+000	81.70
			8.205E-002	284.30	5.246E-002	%			7.788E+000G		8.0E+000	6.14
			8.205E-002	636.97	0.000E+000	%			1.299E+001G		8.0E+000	7.17
AC-228	N	1	-8.067E-001	911.07	-8.067E-001	%	(	P	3.137E+000G		2.1E+003	29.00
			-8.067E-001	968.97	-1.438E+000	%		P	6.834E+000G		2.1E+003	17.46
			-8.067E-001	338.32	-1.195E+000	%		P	4.885E+000G		2.1E+003	12.01
			-8.067E-001	93.35	-8.067E-001	!		E	6.924E+000X	A	2.1E+003	5.56
K-40	N	1	-7.740E+000	1460.83	-7.740E+000	%	(	P	1.809E+001G		4.7E+011	10.67
PB-212	N	1	6.780E-001	238.63	6.780E-001	%	(	P	1.260E+000G		7.0E+002	43.30
			6.780E-001	300.03	-2.318E+000	%			1.840E+001G		7.0E+002	3.28
PB-210	N	1	-6.670E+000	46.54	-6.670E+000	%	(	P	2.366E+001G		8.1E+003	4.25
AM-241	T	1	-5.656E-002	59.54	-5.656E-002	&	(		1.670E+000G		1.6E+005	35.90
Pa-234	N	1	4.211E-001	131.29	4.211E-001	&	(		2.049E+000G		1.6E+012	18.00
			4.211E-001	569.47	4.211E-001	%			7.641E+000G		1.6E+012	8.20
			4.211E-001	946.02	-9.369E-001	%			7.794E+000G		1.6E+012	13.40
			4.211E-001	883.24	1.276E+000	%			8.030E+000G		1.6E+012	9.60
			4.211E-001	880.53	0.000E+000	%			1.372E+001G		1.6E+012	6.00
PB-214	N	1	-4.110E-001	351.93	-4.110E-001	%	(	P	1.832E+000G		5.8E+005	37.60
			-4.110E-001	295.09	2.118E-001	%		P	3.275E+000G		5.8E+005	19.30
			-4.110E-001	242.00	-2.923E+000	%		P	8.062E+000G		5.8E+005	7.43
			-4.023E-001	1764.49	-2.397E+000	%		P	6.446E+000G		5.8E+005	15.40
BI-214	N	1	-4.023E-001	609.31	-4.023E-001	%	(	P	2.359E+000G		5.8E+005	46.09
			-4.023E-001	1120.29	-4.687E-001	%		P	6.798E+000G		5.8E+005	15.10
EU-155	T F I	1	3.917E-001	105.31	3.917E-001	&	(		1.519E+000G		1.8E+003	21.20
			3.917E-001	86.54	0.000E+000	%			1.710E+000G		1.8E+003	30.70
PA-234	N	1	2.733E+001	1001.00	2.733E+001	%	(		1.094E+002G		1.6E+012	.84
			2.733E+001	766.41	0.000E+000	%			1.037E+002G		1.6E+012	.29
TH-234	N	1	2.076E+000	63.29	2.076E+000	%	(	P	1.359E+001G		1.6E+012	4.82
			2.076E+000	92.59	-1.322E+000	&		P	1.177E+001G		1.6E+012	5.58
BI-212	N	1	2.028E+000	727.33	2.028E+000	%	(		7.553E+000G		7.0E+002	11.82
			2.028E+000	785.51	0.000E+000	%			2.818E+001G		7.0E+002	1.10
CS-134	T F I	1	-1.867E-002	604.71	-1.867E-002	&	(		8.389E-001G		7.5E+002	97.62
			-1.867E-002	795.87	-1.112E-001	%			1.007E+000G		7.5E+002	85.53
			-1.867E-002	569.32	-1.867E-002	%			4.025E+000G		7.5E+002	15.38

				-1.867E-002	801.95	2.127E+000	%		1.122E+001G	7.5E+002	8.69
				-1.867E-002	563.24	-3.411E-001	%		8.694E+000G	7.5E+002	8.35
CS-137	T F I		1	-1.470E-001	661.66	-1.470E-001	%	(	9.118E-001G	1.1E+004	85.21
TL-208	F	N	1	-1.369E-001	583.02	-1.369E-001	%	(P	1.073E+000G	7.0E+002	84.50
				-1.369E-001	277.28	-1.069E-002	%		7.270E+000G	7.0E+002	6.31
				-1.369E-001	860.56	-5.287E-001	%		8.112E+000G	7.0E+002	12.42
RA-224		N	1	1.165E+000	240.99	1.165E+000	%	(	8.801E+000G	7.0E+002	4.10
BE-7		N P C	1	0.000E+000	477.60	0.000E+000	&	(	5.918E+000G	5.3E+001	10.52
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(	1.352E+000G	1.9E+003	99.98
				0.000E+000	1173.24	-8.654E-002	%		1.127E+000G	1.9E+003	99.90
EU-154	T F I		1	0.000E+000	873.23	0.000E+000	%	(	2.720E+000G	3.1E+003	12.27
				0.000E+000	123.10	1.402E-003	%		9.658E-001G	3.1E+003	40.79
				0.000E+000	1274.54	-3.677E-001	%		3.081E+000G	3.1E+003	35.19
				0.000E+000	723.36	2.409E-001	&		3.918E+000G	3.1E+003	20.22
				0.000E+000	1004.77	-1.084E+000	%		5.832E+000G	3.1E+003	18.01
				0.000E+000	996.33	-1.316E+000	%		9.953E+000G	3.1E+003	10.60

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<			556.32	556.32	5.918E+000
K-40	<	-7.740E+000	-7.740E+000	1,266.52	1,266.53	1.809E+001
CO-60	<			586.26	586.26	1.352E+000
I-131	<	8.205E-002	8.355E-002	248.77	248.79	7.332E-001
CS-134	<	-1.867E-002	-1.868E-002	1,213.24	1,213.24	8.389E-001
CS-137	<	-1.470E-001	-1.470E-001	172.54	172.57	9.118E-001
EU-152	<	-8.485E-003	-8.485E-003	6,791.34	6,791.34	2.135E+000
EU-154	<			100.00	100.04	2.720E+000
TL-208	<	-1.369E-001	-1.369E-001	416.04	416.05	1.073E+000
RA-224	<	1.165E+000	1.165E+000	207.50	207.52	8.801E+000
PB-210	<	-6.670E+000	-6.671E+000	169.24	169.28	2.366E+001
PB-212		6.780E-001	6.782E-001	58.46	58.54	1.260E+000
AC-228	<	-8.067E-001	-8.067E-001	3,808.37	3,808.37	3.137E+000
Pa-234	<	4.211E-001	4.211E-001	139.66	139.70	2.049E+000
U-235	<	8.981E-001	8.981E-001	114.25	114.29	3.631E+000
AM-241	<	-5.656E-002	-5.656E-002	830.86	830.87	1.670E+000
EU-155	<	3.917E-001	3.918E-001	111.99	112.05	1.519E+000
PB-214	<	-4.110E-001	-4.110E-001	351.74	351.75	1.832E+000
BI-212	<	2.028E+000	2.028E+000	107.39	107.42	7.553E+000
BI-214	<	-4.023E-001	-4.023E-001	377.91	377.93	2.359E+000
TH-234	<	2.076E+000	2.076E+000	201.31	201.34	1.359E+001
PA-234M	<	2.733E+001	2.733E+001	113.59	113.63	1.094E+002

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 0.00 Bq/sample

Analyzed by: _____

403605

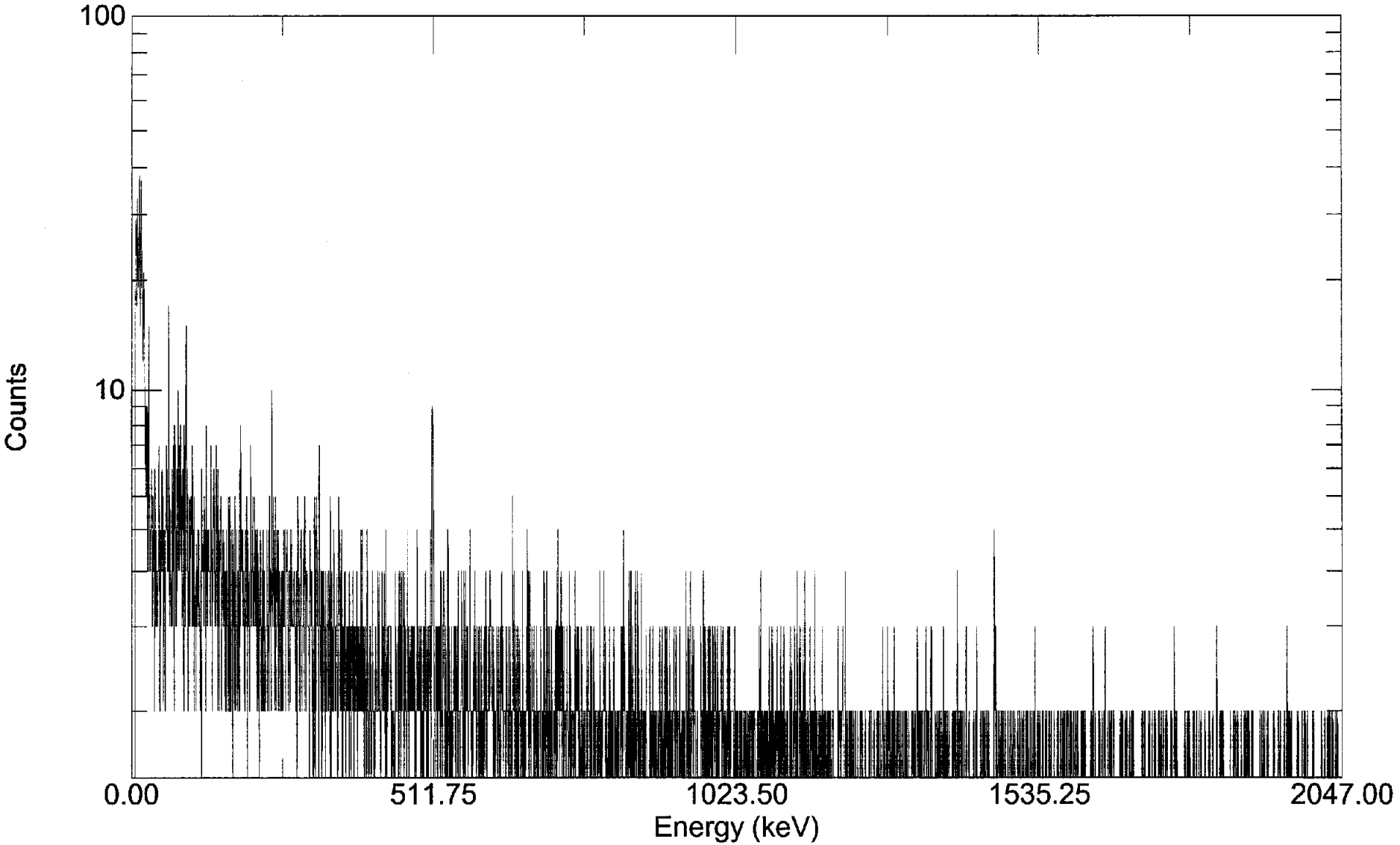
Reviewed by: _____

Supervisor

Laboratory: Test America

KER4G1AA

7360292_KER4G1AA_F7L260000-292B



Acquired: 26-Dec-2007 5:00:15 PM
File: C:\User\spectra\KER4G1AA.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.06 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,059

Sample Description: 7360292_KER4G1AC_F7L260000-292C

Spectrum Filename: KER4G1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:00:58PM		
Live Time:	1800.00	Real Time:	1826.94
Dead Time:	1.47 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2004 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2320

Testamerica St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
145.06	36.64	1792.00	344.00	0.191	23.11	1.104	CE-144	s
350.43	87.93	2735.22	7273.78	4.041	1.55	0.979	PB-214	s
486.39	121.88	2306.45	206.55	0.115	33.61	1.122	EU-152	s
1344.65	336.26	826.45	146.55	0.081	28.95	0.348		s
1406.51	351.72	461.39	53.61	0.030	58.29	0.799		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.60	46.51	9741.53	26758.47	14.866	1.03	0.968	s
AM-241	1	236.52	59.48	7416.00	31261.00	17.367	0.86	0.900	s
TH-234	1	245.14	61.63	2914.26	-626.39	-0.348	13.28	0.882	s
EU-155	1	352.24	88.38	4261.18	-90.00	-0.050	103.11	0.906	s
TH-234	1	371.20	93.12	1902.38	6.56	0.004	187.98	0.912	s
U-235	1	372.14	93.35	1975.92	5.03	0.003	129.12	0.913	s D
AC-228	1	372.14	93.35	1989.05	13.59	0.008	324.88	0.913	s D
EU-155	1	421.10	105.58	1765.14	-11.36	-0.006	523.85	0.925	s
EU-152	1	486.53	121.92	1686.96	846.45	0.470	7.67	0.942	s
EU-154	1	491.26	123.10	1796.80	4.02	0.002	1492.05	0.943	s
Pa-234	1	524.32	131.36	1511.51	7.05	0.004	781.18	0.952	s
U-235	1	575.51	144.14	1569.98	9.23	0.005	493.02	0.964	s
U-235	1	650.45	162.86	1249.51	-0.97	-0.001	5146.77	0.984	s
U-235	1	821.41	205.56	1496.18	-56.25	-0.031	98.16	1.027	s
PB-212	1	954.21	238.73	1488.81	99.97	0.056	45.80	1.060	s
RA-224	1	963.14	240.96	1559.18	-9.30	-0.005	601.63	1.062	s
PB-214	1	969.07	242.44	1446.99	-22.37	-0.012	241.46	1.063	s
TL-208	1	1102.17	275.69	906.23	10.26	0.006	416.15	1.098	s
I-131	1	1138.77	284.83	1147.20	-12.72	-0.007	377.50	1.105	s
PB-214	1	1177.57	294.52	986.04	30.99	0.017	127.83	1.116	s
PB-212	1	1195.78	299.07	901.83	-13.98	-0.008	304.93	1.121	
AC-228	1	1351.96	338.09	1001.50	61.61	0.034	71.23	1.158	s
EU-152	1	1373.03	343.35	891.32	-33.67	-0.019	126.58	1.164	s
PB-214	1	1406.54	351.72	1029.26	40.82	0.023	91.39	1.171	s
I-131	1	1458.13	364.61	1069.99	-24.30	-0.014	191.43	1.184	s
BE-7	1	1912.73	478.19	1141.52	-54.11	-0.030	89.34	1.292	s
CS-134	1	2253.09	563.23	608.41	34.58	0.019	102.29	1.372	s
CS-134	1	2277.45	569.32	684.65	0.00	0.000	2657.07	1.378	s D
Pa-234	1	2278.04	569.47	629.20	1.23	0.001	308.60	1.378	s D
TL-208	1	2332.91	583.18	643.49	56.90	0.032	56.35	1.390	s
CS-134	1	2419.07	604.71	838.67	2.00	0.001	2046.48	1.410	s
BI-214	1	2435.04	608.70	618.79	37.96	0.021	79.31	1.415	s
I-131	1	2553.61	638.33	539.72	22.24	0.012	149.23	1.440	s
CS-137	1	2646.12	661.45	588.00	12162.00	6.757	1.07	1.555	
EU-154	1	2903.76	725.84	440.20	0.09	0.000	34320.55	1.518	s
BI-212	1	2923.40	730.75	381.74	3.12	0.002	888.24	1.521	s
PA-234M	1	3067.58	766.78	595.58	8.14	0.005	425.52	1.556	s
EU-152	1	3114.89	778.61	563.19	31.64	0.018	107.56	1.567	s
BI-212	1	3142.06	785.40	644.37	-19.90	-0.011	181.80	1.572	s
CS-134	1	3187.51	796.76	589.01	-32.13	-0.018	108.27	1.582	s
CS-134	1	3200.48	800.00	495.43	8.42	0.005	375.51	1.587	s
TL-208	1	3436.91	859.10	679.45	-10.19	-0.006	362.98	1.638	s
EU-154	1	3494.72	873.55	793.65	-24.15	-0.013	166.21	1.649	s
Pa-234	1	3533.85	883.33	808.77	25.07	0.014	161.70	1.657	s
Pa-234	1	3540.79	885.07	558.48	-4.28	-0.002	782.67	1.655	s

TestAmerica St. Louis

AC-228	1	3644.93	911.10	893.18	37.60	0.021	107.30	1.681	s
Pa-234	1	3785.95	946.36	1037.73	16.18	0.009	282.65	1.710	s
EU-152	1	3855.02	963.62	923.34	22.74	0.013	190.16	1.726	s
AC-228	1	3873.68	968.29	846.44	-10.89	-0.006	379.10	1.730	s
EU-154	1	3995.81	998.82	613.19	-1.64	-0.001	2141.18	1.753	s
PA-234M	1	4014.60	1003.52	551.53	55.46	0.031	61.37	1.756	s
EU-154	1	4019.63	1004.77	766.65	0.00	0.000	3915.72	1.760	s
EU-152	1	4447.58	1111.78	680.59	18.68	0.010	198.89	1.847	s
BI-214	1	4481.62	1120.29	591.16	-4.57	-0.003	1306.40	1.854	s
CO-60	1	4691.35	1172.73	328.00	9318.00	5.177	1.19	1.856	
EU-154	1	5096.56	1274.06	85.60	4.28	0.002	309.30	1.975	s
CO-60	1	5327.90	1331.92	91.50	8622.50	4.790	1.14	2.113	
EU-152	1	5622.44	1405.59	32.89	1.64	0.001	500.75	2.076	s
K-40	1	5841.86	1460.48	53.83	8.32	0.005	52.41	2.115	s
BI-214	1	7054.18	1763.79	32.59	6.20	0.003	97.05	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
EU-154	T F I	1	-8.729E+000	873.23	-8.729E+000	%	(	4.842E+001G		3.1E+003	12.27
			-8.729E+000	123.10	1.205E-001	%		6.000E+000G		3.1E+003	40.79
			-8.729E+000	1274.54	7.183E-001	&		7.686E+000G		3.1E+003	35.19
			-8.729E+000	723.36	1.652E-002	&		1.920E+001G		3.1E+003	20.22
			-8.729E+000	1004.77	0.000E+000	%		3.598E+001G		3.1E+003	18.01
			-8.729E+000	996.33	-7.548E-001	&		5.447E+001G		3.1E+003	10.60
CS-134	T F I	1	6.947E-002	604.71	6.947E-002	%	(	4.776E+000G		7.5E+002	97.62
			6.947E-002	795.87	-1.556E+000	&		5.609E+000G		7.5E+002	85.53
			6.947E-002	569.32	0.000E+000	&	}	2.492E+001G		7.5E+002	15.38
			6.947E-002	801.95	4.036E+000	&		5.102E+001G		7.5E+002	8.69
			6.947E-002	563.24	1.331E+001	%		4.527E+001G		7.5E+002	8.35
I-131	T F I	1	-6.871E-001	364.48	-6.871E-001	&	(	4.386E+000G		8.0E+000	81.70
			-6.871E-001	284.30	-3.961E+000	%		4.998E+001G		8.0E+000	6.14
			-6.871E-001	636.97	1.092E+001	%		5.447E+001G		8.0E+000	7.17
EU-155	T F I	1	-6.503E-001	105.31	-6.503E-001	&	(	1.136E+001G		1.8E+003	21.20
			-6.503E-001	86.54	-3.698E+000	%		1.261E+001G		1.8E+003	30.70
			5.932E+000	338.32	1.119E+001	%	P	2.728E+001G		2.1E+003	12.01
			5.932E+000	93.35	3.017E+000	%	} E	4.660E+001X	A	2.1E+003	5.56
AC-228	N	1	5.932E+000	911.07	5.932E+000	%	(P	2.240E+001G		2.1E+003	29.00
			5.932E+000	968.97	-2.986E+000	&		3.793E+001G		2.1E+003	17.46
CO-60	T F	1	5.217E+002	1332.50	5.274E+002		(	2.892E+000G		1.9E+003	99.98
			5.217E+002	1173.24	5.161E+002		(	4.824E+000G		1.9E+003	99.90
CS-137	T F I	1	5.165E+002	661.66	5.165E+002		(	4.914E+000G		1.1E+004	85.21
K-40	N	1	5.141E+000	1460.83	5.141E+000	*	(P	2.279E+001G		4.7E+011	10.67
Pa-234	N	1	4.844E-001	131.29	4.844E-001	%	(	1.264E+001G		1.6E+012	18.00
			4.844E-001	569.47	4.844E-001	&		4.725E+001G		1.6E+012	8.20
			4.844E-001	946.02	5.680E+000	&		5.365E+001G		1.6E+012	13.40
			4.844E-001	883.24	1.168E+001	%		6.299E+001G		1.6E+012	9.60
			4.844E-001	880.53	-3.181E+000	&		8.390E+001G		1.6E+012	6.00
PB-212	N	1	3.884E+000	238.63	3.884E+000	*	(P	7.090E+000G		7.0E+002	43.30
			3.884E+000	300.03	-8.485E+000	%		8.657E+001G		7.0E+002	3.28
RA-224	N	1	-3.840E+000	240.99	-3.840E+000	*	(	7.713E+001G		7.0E+002	4.10
PA-234	N	1	3.250E+002	1001.00	3.250E+002	&	(	6.573E+002G		1.6E+012	.84
			3.250E+002	766.41	1.116E+002	&		1.596E+003G		1.6E+012	.29
BI-214	N	1	2.805E+000	609.31	2.805E+000	%	(P	8.766E+000G		5.8E+005	46.09
			2.805E+000	1120.29	-1.617E+000	%	P	4.103E+001G		5.8E+005	15.10
			2.805E+000	1764.49	3.126E+000	&	P	1.478E+001G		5.8E+005	15.40
PB-214	N	1	2.441E+000	351.93	2.441E+000	%	(P	9.103E+000G		5.8E+005	37.60
			2.441E+000	295.09	3.157E+000	%	P	1.518E+001G		5.8E+005	19.30
			2.441E+000	242.00	-5.114E+000	%		4.115E+001G		5.8E+005	7.43
TL-208	F N	1	2.220E+000	583.02	2.220E+000	*	(P	4.717E+000G		7.0E+002	84.50
			2.220E+000	277.28	3.050E+000	%		4.251E+001G		7.0E+002	6.31
			2.220E+000	860.56	-3.601E+000	%		4.386E+001G		7.0E+002	12.42
TH-234	N	1	-1.950E+002	63.29	-1.950E+002	?	(P	7.918E+001G		1.6E+012	4.82

				-1.950E+002	92.59	1.454E+000	%		P	4.564E+001G	1.6E+012	5.58
EU-152	T F		1	1.740E+001	344.29	-2.809E+000	%	(		1.183E+001G	4.9E+003	26.50
				1.740E+001	121.78	3.614E+001	*	(		8.288E+000G	4.9E+003	28.58
				1.740E+001	778.92	9.971E+000	%			3.571E+001G	4.9E+003	12.94
				1.740E+001	964.11	7.427E+000	&			4.714E+001G	4.9E+003	14.61
				1.740E+001	1112.07	7.269E+000	%			4.837E+001G	4.9E+003	13.64
				1.740E+001	1408.00	4.991E-001	&			8.960E+000G	4.9E+003	21.00
PB-210		N	1	1.550E+004	46.54	1.550E+004	*	(	P	2.680E+002G	8.1E+003	4.25
BE-7		N P C	1	-1.460E+001	477.60	-1.460E+001	%	(		4.322E+001G	5.3E+001	10.52
AM-241	T		1	1.382E+003	59.54	1.382E+003	*	(		1.786E+001G	1.6E+005	35.90
				1.070E+000	93.35	1.070E+000	%		E	4.461E+001X	2.6E+011	5.81
U-235		N	1	1.070E+000	143.79	1.070E+000	&	(	P	2.171E+001G	2.6E+011	10.96
				1.070E+000	205.33	-1.707E+001	%			5.551E+001G	2.6E+011	5.01
				1.070E+000	163.38	-2.558E-001	&			4.409E+001G	2.6E+011	5.08
BI-212		N	1	1.023E+000	727.33	1.023E+000	&	(		3.077E+001G	7.0E+002	11.82
				1.023E+000	785.51	-7.423E+001	%			4.514E+002G	7.0E+002	1.10

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.460E+001		89.34	89.38	4.322E+001
K-40	<	5.141E+000	5.141E+000	122.99	123.03	2.279E+001
CO-60		5.217E+002	8.526E+002	0.82	2.96	2.892E+000
I-131	<	-6.871E-001		191.43	191.45	4.386E+000
CS-134	<	6.947E-002	2.434E-001	2,046.48	2,046.48	4.776E+000
CS-137		5.165E+002	5.631E+002	1.07	3.09	4.914E+000
EU-152	<	1.740E+001	2.107E+001	7.67	8.20	1.183E+001
EU-154	<	-8.729E+000	-1.180E+001	166.21	166.23	4.842E+001
RA-224	<	-3.840E+000	-1.489E+001	601.63	601.64	7.713E+001
PB-210	#	1.550E+004	1.741E+004	1.03	4.03	2.680E+002
PB-212	#	3.884E+000	1.506E+001	55.30	55.38	7.090E+000
PB-214	<	2.441E+000	2.445E+000	112.00	112.03	9.103E+000
Pa-234	<	4.844E-001	4.844E-001	781.18	781.19	1.264E+001
AM-241	#	1.382E+003	1.390E+003	0.86	3.96	1.786E+001
EU-155	<	-6.503E-001	-1.096E+000	523.85	523.86	1.136E+001
TL-208	<	2.220E+000	8.610E+000	64.23	64.30	4.717E+000
BI-212	<	1.023E+000	3.967E+000	888.24	888.25	3.077E+001
BI-214	<	2.805E+000	2.810E+000	93.82	93.86	8.766E+000
AC-228	<	5.932E+000	9.305E+000	113.51	113.55	2.240E+001
TH-234	<	-1.950E+002	-1.950E+002	13.80	14.28	7.918E+001
PA-234M	<	3.250E+002	3.250E+002	61.37	61.44	6.573E+002
U-235	<	1.070E+000	1.070E+000	607.48	607.49	2.171E+001

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 17,922.50 Bq/sample

Analyzed by: _____

403605

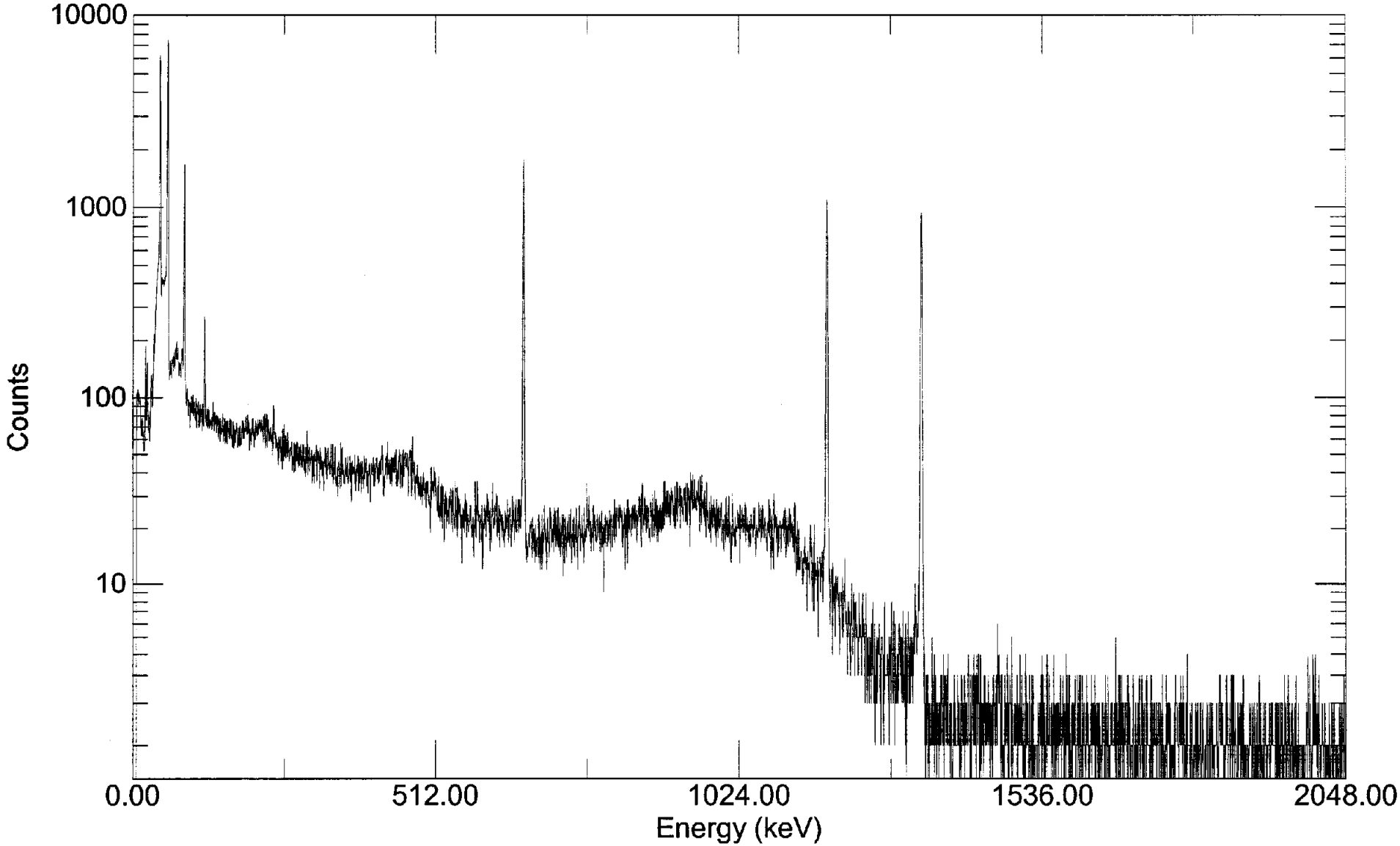
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KER4G1AC

7360292_KER4G1AC_F7L260000-292C



Acquired: 26-Dec-2007 5:00:58 PM
File: C:\User\spectra\KER4G1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1826.94 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

PROJECT NO. 03-3040.30/TA

Great Lakes NS Remediation

Lot #: F7L200262

John Eberline
Cabrera Services Inc
633 Stablestone Dr
Chesterfield, MO 63017

TESTAMERICA LABORATORIES, INC.

Ivan Vania
Project Manager

December 27, 2007

13715 Rider Trail North Earth City, MO 63045 tel 314.298.8566 fax 314.298.8757 www.testamericainc.com

Case Narrative
LOT NUMBER: F7L200262

This report contains the analytical results for the 15 samples received under chain of custody by TestAmerica St. Louis on December 20, 2007. These samples are associated with your Great Lakes NS Remediation project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Gamma Spectroscopy - Cesium-137 & Hits (EML GA-01-R MOD)
The reporting limit for Actinium-228 was not met. There is activity in the samples above the MDA.
Affected Samples:
F7L200262 (1): SU13-B28-1
F7L200262 (2): SU14-348-1
F7L200262 (3): SU15-357-1
F7L200262 (5): SU16-B56-S
F7L200262 (7): SU16-B58-N
F7L200262 (8): SU17-07-1
F7L200262 (9): SU17-10-1
F7L200262 (10): SU17-12-1
F7L200262 (11): SU17-B30-1
F7L200262 (12): SU18-04-1
F7L200262 (13): SU18-06-1
F7L200262 (14): SU18-B32-1
F7L200262 (15): SU18-B33-1

There were no other nonconformances or observations noted with any analysis on this lot.

F7L200262 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20
Analytical Due Date: 2008-01-04
Report Due Date: 2008-01-07
Report Type: W
EDD Code: 00

Project Manager: IV
Quote #: 77996
SDG:
Project: 03-3040.30/TA
Great Lakes NS Remediation
PO#:
Report to:
Client: 1352406 Cabrera Services, Inc.
#SMPS in LOT: 15

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	SU13-B28-1			2007-08-23 / 1450	KEKFE	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	SU14-348-1			2007-07-23 / 1350	KEKFF	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	SU15-357-1			2007-08-01 / 1220	KEKFG	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	SU16-B55-W			2007-12-04 / 1207	KEKFP	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	SU16-B56-S			2007-12-04 / 1205	KEKFT	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	SU16-B57-E			2007-12-04 / 1208	KEKFV	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	SU16-B58-N			2007-12-04 / 1206	KEKF0	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

F7L200262 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 15

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	SU17-07-1			2007-08-29 / 1125	KEKF1	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	SU17-10-1			2007-08-29 / 1050	KEKF5	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	SU17-12-1			2007-08-29 / 1010	KEKF7	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	SU17-B30-1			2007-08-29 / 1000	KEKF8	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	SU18-04-1			2007-09-04 / 1445	KEKF9	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	SU18-06-1			2007-09-04 / 1435	KEKGD	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	SU18-B32-1			2007-09-06 / 1250	KEKGF	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F7L200262

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996 SDG:

Project: 03-3040.30/TA Great Lakes NS Remediation

PO#: Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 15

15 SU18-B33-1 2007-09-07 / 1225 KEKGG SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 4
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 1 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ____W____			
(314) 703-6784 Phone	TAT if different from Below __15days_____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU13-B28-1	8/23/07	1450	Grab	Soil	1		X	
SU14-348-1	7/23/07	1350	Grab	Soil	1		X	
SU15-357-1	8/1/07	1220	Grab	Soil	1		X	
SU16-B55-W	12/4/07	1207	Grab	Soil	1		X	
SU16-B56-S	12/4/07	1205	Grab	Soil	1		X	
SU16-B57-E	12/4/07	1208	Grab	Soil	1		X	
SU16-B58-N	12/4/07	1206	Grab	Soil	1		X	
SU17-07-1	8/29/07	1125	Grab	Soil	1		X	
SU17-10-1	8/29/07	1050	Grab	Soil	1		X	
SU17-12-1	8/29/07	1010	Grab	Soil	1		X	
SU17-B30-1	8/29/07	1000	Grab	Soil	1		X	
SU18-04-1	9/4/07	1445	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABRERA	12/12/07 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 4
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 2 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ____W_____			
(314) 703-6784 Phone	TAT if different from Below ____15days_____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Station	☐ 1 week			
Site: Training Center	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU18-06-1	9/4/07	1435	Grab	Soil	1		X	
SU18-B32-1	9/6/07	1250	Grab	Soil	1		X	
SU18-B33-1	9/7/07	1225	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	CABRERA	12/13/07 1830		TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Lot #(s): F7L200251
260
262
271

- 1412 -

Condition Upon Receipt Form

Client: Cabrera
Quote No: 77996
COC/RFA No: 2,3,4,1
Initiated By:
Date: 12-20-07
Time: 0830

Shipping Information

Shipper Name: Client
Shipping # (s):*

1. N/A
2. ↓
3. ↓
4. ↓
5.
6.
7.
8.
9.
10.

Multiple Packages (Y) N
Sample Temperature (s):**

1. Ambient
2. ↓
3. ↓
4. ↓
5.
6.
7.
8.
9.
10.

*Numbered shipping lines correspond to Numbered Sample Temp lines

**Sample must be received at 4°C ± 2°C- If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid or Rad tests- Liquid or Solids

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y (N)	Are there custody seals present on the cooler?	8.	Y (N)	Are there custody seals present on bottles?
2.	Y N (N/A)	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	Do custody seals on bottles appear to be tampered with?
3.	(Y) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N (N/A)	Was sample received with proper pH[1]? (If not, make note below)
4.	(Y) N	Sample received with Chain of Custody?	11.	Y N	If N/A- Was pH taken by original TestAmerica lab?
5.	(Y) N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	(Y) N	Sample received in proper containers?
6.	Y (N)	Was sample received broken?	13.	Y N (N/A)	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	(Y) N	Is sample volume sufficient for analysis?	14.	Y N	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX and soils.

Notes:

Corrective Action:

- ☐ Client Contact Name: Informed by:
- ☐ Sample(s) processed "as is"
- ☐ Sample(s) on hold until: If released, notify:

Project Management Review: Sheryl A Adam Date: 12-21-07 1412

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

Revision 2

OP-001-02 Radiological Survey Sheet

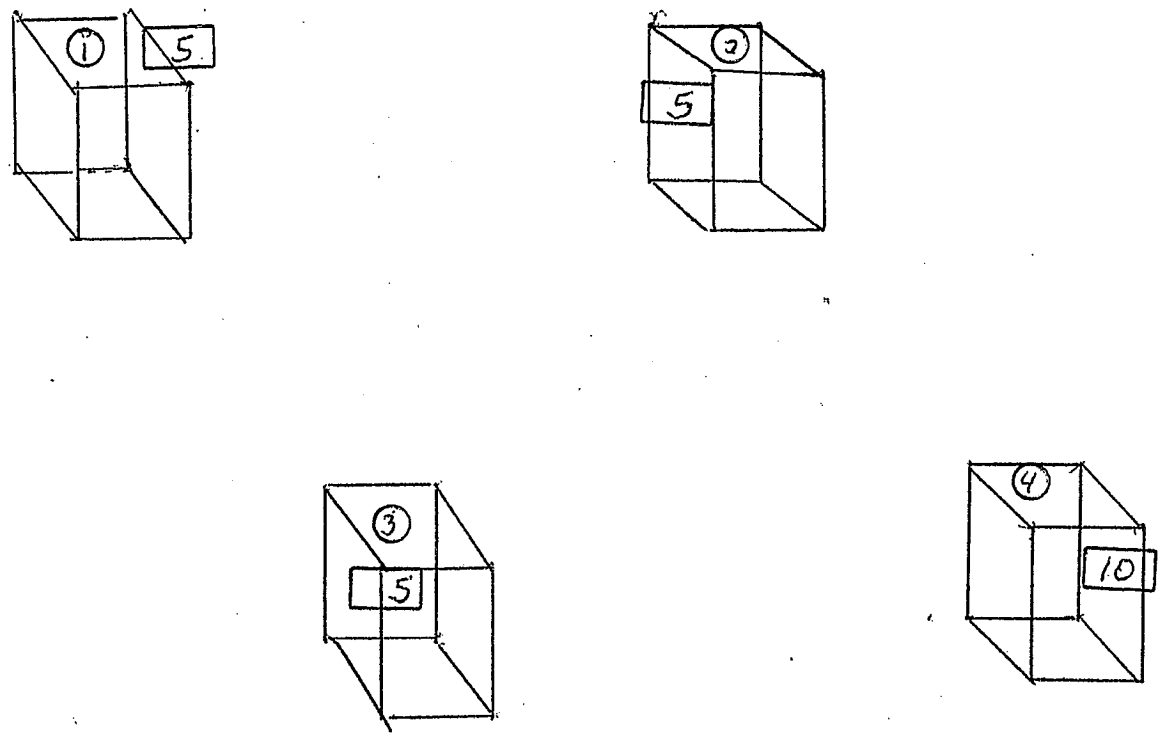
Radiological Surveys

Location: Sample Containers Site: GLNTC PPV Areas	RWP# 003	Survey # 03-3040, 30-272	Survey Type:	pg. 1 of 1

(Smear) (CPM/100 cm²) — circle one

Direct Count (CPM/Direct Frisk)

No.	α	β	No.	α	β
1	0	62	26		
2	0	65	27		
3	1	49	28		
4	1	53	29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35	N	
11			36		
12	N		37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19		NA	44		
20			45		
21			46		
22			47		NA
23			48		
24			49		
25			50		



Comments	Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	γ Bkg	Cal. Due
	K. Gordon	12/13/07	Bicron	C8541F	N/A	N/A	N/A	N/A	5	6/17/08
			2929	163827	.3649	.2385	.15	44.2	N/A	9/7/08

Reviewed By: [signature] Date: 12/13/07

Key

■	A/S Location
-	Boundary
○	Smear
□	Dose Rate μR /hr
*	Direct Reading CPM/direct frisk
△	Grab Sample

METHODS SUMMARY

F7L200262

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Cesium-137 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F7L200262

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
KEKFE	001	SU13-B28-1	08/23/07	14:50
KEKFF	002	SU14-348-1	07/23/07	13:50
KEKFG	003	SU15-357-1	08/01/07	12:20
KEKFP	004	SU16-B55-W	12/04/07	12:07
KEKFT	005	SU16-B56-S	12/04/07	12:05
KEKFV	006	SU16-B57-E	12/04/07	12:08
KEKF0	007	SU16-B58-N	12/04/07	12:06
KEKF1	008	SU17-07-1	08/29/07	11:25
KEKF5	009	SU17-10-1	08/29/07	10:50
KEKF7	010	SU17-12-1	08/29/07	10:10
KEKF8	011	SU17-B30-1	08/29/07	10:00
KEKF9	012	SU18-04-1	09/04/07	14:45
KEKGD	013	SU18-06-1	09/04/07	14:35
KEKGF	014	SU18-B32-1	09/06/07	12:50
KEKGG	015	SU18-B33-1	09/07/07	12:25

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Cabrera Services, Inc.

Client Sample ID: SU13-B28-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-001
Work Order: KEKFE
Matrix: SOLID

Date Collected: 08/23/07 1450
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.71**		**0.50**	0.25	**0.60**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU13-B28-1 DUP

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-001X
Work Order: KEKFE
Matrix: SOLID

Date Collected: 08/23/07 1450
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.70**		**0.39**	0.25	**0.47**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU14-348-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-002
Work Order: KEKFF
Matrix: SOLID

Date Collected: 07/23/07 1350
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.27**		**0.45**	0.25	**0.59**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU15-357-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-003
Work Order: KEKFG
Matrix: SOLID

Date Collected: 08/01/07 1220
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**1.11**		**0.28**	0.25	**0.45**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU16-B55-W

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-004
Work Order: KEKFP
Matrix: SOLID

Date Collected: 12/04/07 1207
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**4.60**		**0.59**	0.25	**0.24**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU16-B56-S

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-005
Work Order: KEKFT
Matrix: SOLID

Date Collected: 12/04/07 1205
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.14**		**0.59**	0.25	**0.59**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU16-B57-E

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-006
Work Order: KEKFV
Matrix: SOLID

Date Collected: 12/04/07 1208
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**5.27**		**0.61**	0.25	**0.16**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU16-B58-N

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-007
Work Order: KEKF0
Matrix: SOLID

Date Collected: 12/04/07 1206
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**1.08**		**0.33**	0.25	**0.58**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU17-07-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-008
Work Order: KEKF1
Matrix: SOLID

Date Collected: 08/29/07 1125
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**1.41**		**0.28**	0.25	**0.40**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU17-10-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-009
Work Order: KEKF5
Matrix: SOLID

Date Collected: 08/29/07 1050
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**1.47**		**0.34**	0.25	**0.40**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU17-12-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-010
Work Order: KEKF7
Matrix: SOLID

Date Collected: 08/29/07 1010
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**1.68**		**0.38**	0.25	**0.40**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU17-B30-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-011
Work Order: KEKF8
Matrix: SOLID

Date Collected: 08/29/07 1000
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**4.16**		**0.64**	0.25	**0.36**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU18-04-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-012
Work Order: KEKF9
Matrix: SOLID

Date Collected: 09/04/07 1445
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**			**Batch # 7356122**	**Yld %**
Actinium 228	**1.08**		**0.30**	0.25	**0.55**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU18-06-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-013
Work Order: KEKGD
Matrix: SOLID

Date Collected: 09/04/07 1435
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.62**		**0.39**	0.25	**0.38**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU18-B32-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-014
Work Order: KEKGF
Matrix: SOLID

Date Collected: 09/06/07 1250
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**40.1**		**2.9**	0.2	**0.6**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU18-B33-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200262-015
Work Order: KEKGG
Matrix: SOLID

Date Collected: 09/07/07 1225
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7356122**	**Yld %**
Actinium 228	**2.05**		**0.48**	0.25	**0.57**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

METHOD BLANK REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200262
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Lab Sample ID Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**Batch # 7356122**	**Yld %**		**F7L220000-122B**
Actinium 228	0.0	U	0.035	0.250	0.13	12/22/07	12/23/07
Cesium 137	**0.0**	**J**	**0.0**	0.2	**0.0**	**12/22/07**	**12/23/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC

J Result is greater than sample detection limit but less than stated reporting limit.
U Result is less than the sample detection limit.

Laboratory Control Sample Report

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200262
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID QC Control Limits
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**		**F7L220000-122C**	
Americium 241	103	102	8.0	1.2		99	(85 - 118)
Cesium 137	40.0	43.0	2.7	0.5		108	(91 - 120)
Cobalt 60	62.7	64.4	3.8	0.2		103	(91 - 112)
	Batch #:	7356122		**Analysis Date:**	12/23/07		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200262
Matrix: SOLID

Date Sampled: 08/23/07
Date Received: 12/20/07

Parameter	SAMPLE Result	Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result	Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Cs-137 & Hits by DOE GA-01-R MOD.		**pCi/g**		**GA-01-R MOD**			**F7L200262-001**	
Actinium 228	**2.71**	**0.50**		**2.70**	**0.39**		0.2	%RPD
	Batch #:	7356122	(Sample)	7356122	(Duplicate)			

NOTE(S)

Data are incomplete without the case narrative.
Calculations are performed before rounding to avoid round-off error in calculated results

GAMMA SPECTROSCOPY

Gamma Spectroscopy

Cesium-137

TestAmerica
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Analysis Report for Gamma Spectroscopy

Batch: 7356122 **Operator:** 60040

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-001	KEKFE1AC	251.40g	2.00	GammaVision	GV04	12 / 23 / 07 15:05	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.709E+000 pCi/g	5.019E-001	4.771E-001	6.012E-001	2.633E-001	4.51

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-001X	KEKFE1AD	251.40g	2.00	GammaVision	GV01	12 / 23 / 07 15:44	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.702E+000 pCi/g	3.940E-001	3.620E-001	4.663E-001	2.097E-001	5.79

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-002	KEKFF1AC	283.40g	2.00	GammaVision	GV05	12 / 23 / 07 15:05	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.274E+000 pCi/g	4.460E-001	4.264E-001	5.870E-001	0.000E+000	3.87

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-003	KEKFG1AC	293.90g	2.00	GammaVision	GV07	12 / 23 / 07 15:06	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.106E+000 pCi/g	2.766E-001	2.692E-001	4.503E-001	0.000E+000	2.46

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-004	KEKFP1AC	279.70g	2.00	GammaVision	GV03	12 / 23 / 07 15:45	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.598E+000 pCi/g	5.877E-001	5.248E-001	2.382E-001	9.843E-002	19.30

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-005	KEKFT1AC	255.10g	2.00	GammaVision	GV04	12 / 23 / 07 15:47	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.141E+000 pCi/g	5.886E-001	5.756E-001	5.924E-001	2.595E-001	3.61

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-006	KEKFV1AC	305.00g	2.00	GammaVision	GV05	12 / 23 / 07 15:45	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	5.269E+000 pCi/g	6.057E-001	5.244E-001	1.597E-001	0.000E+000	32.99

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-007	KEKF01AC	231.10g	2.00	GammaVision	GV07	12 / 23 / 07 15:45	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.077E+000 pCi/g	3.298E-001	3.239E-001	5.835E-001	0.000E+000	1.85

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-008	KEKF11AC	315.20g	2.00	GammaVision	GV01	12 / 23 / 07 16:26	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.414E+000 pCi/g	2.788E-001	2.667E-001	3.962E-001	1.794E-001	3.57

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-009	KEKF51AC	264.60g	2.00	GammaVision	GV03	12 / 23 / 07 16:27	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.467E+000 pCi/g	3.357E-001	3.249E-001	4.027E-001	1.795E-001	3.64

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-010	KEKF71AC	269.30g	2.00	GammaVision	GV04	12 / 23 / 07 16:28	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.679E+000 pCi/g	3.751E-001	3.625E-001	4.023E-001	1.663E-001	4.17

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-011	KEKF81AC	255.90g	2.00	GammaVision	GV05	12 / 23 / 07 16:26	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.163E+000 pCi/g	6.421E-001	5.958E-001	3.565E-001	0.000E+000	11.68

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-012	KEKF91AC	291.60g	2.00	GammaVision	GV07	12 / 23 / 07 16:27	30

Analyte	Cmpnd#	Activity	TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.084E+000 pCi/g	2.991E-001	2.926E-001	5.461E-001	0.000E+000	1.99

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-013	KEKGD1AC	258.00g	2.00	GammaVision	GV01	12 / 23 / 07 17:03	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.625E+000	pCi/g	3.851E-001	3.543E-001	3.841E-001	1.692E-001	6.83

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-014	KEKGF1AC	275.70g	2.00	GammaVision	GV03	12 / 23 / 07 17:04	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.015E+001	pCi/g	2.860E+000	1.687E+000	5.600E-001	2.591E-001	71.68

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200262-015	KEKGG1AC	237.70g	2.00	GammaVision	GV04	12 / 23 / 07 17:05	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	2.054E+000	pCi/g	4.830E-001	4.683E-001	5.746E-001	2.479E-001	3.58

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L220000-122B	KEQKC1AA	372.80g	2.00	GammaVision	GV05	12 / 23 / 07 17:03	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	0.000E+000	pCi/g	3.548E-002	3.546E-002	1.307E-001	0.000E+000	0.00

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L220000-122C	KEQKC1AC	351.20g	2.00	GammaVision	GV07	12 / 23 / 07 17:04	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AM-241	1493	1.016E+002	pCi/g	8.026E+000	1.624E+000	1.229E+000	0.000E+000	82.68
CO-60	1515	6.438E+001	pCi/g	3.848E+000	1.181E+000	2.030E-001	0.000E+000	317.10
CS-137	1518	4.304E+001	pCi/g	2.698E+000	1.021E+000	4.954E-001	0.000E+000	86.89

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery
F7L220000-122C	KEQKC1AC	CS-137	4.304E+001	pCi/g	4.002E+001	107.56%
		CO-60	6.438E+001	pCi/g	6.272E+001	102.65%
		AM-241	1.016E+002	pCi/g	1.031E+002	98.54%

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity		Dup Activity	RPD	RER	DER	Flag
F7L200262-001	F7L200262-001X	AC-228	2.709E+000	pCi/g	2.702E+000	0.26%	7.839E-003	2.201E-002	

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Instrument Checks

TestAmerica **STL**

Gamma Spectroscopy Daily Check Summary

Detector: 1

Measurement Date/Time: 12/23/2007 12:45:25

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	3.250	3.500	3.638	4.250	4.500	ok
Total Activity (Bq)	1841.0	1880.0	1921.6	1996.0	2035.0	ok
Peak Shift (keV)	-0.3000	-0.2000	-0.1684	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	1.0027	1.0500	1.1000	ok
Avg FWTM Ratio	0.9000	0.9500	1.0093	1.1000	1.1500	ok

Detector: 3

Measurement Date/Time: 12/23/2007 12:48:08

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.500	2.750	3.206	3.250	3.500	ok
Total Activity (Bq)	1835.0	1874.0	1948.4	1990.0	2029.0	ok
Peak Shift (keV)	-0.3000	-0.2500	-0.2107	0.2500	0.3000	ok
Avg FWHM Ratio	0.8500	0.9000	1.0342	1.1500	1.2500	ok
Avg FWTM Ratio	0.9000	0.9500	1.1792	1.1500	1.2500	High

Detector: 4

Measurement Date/Time: 12/23/2007 12:10:00

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.150	1.200	1.344	1.450	1.500	ok
Total Activity (Bq)	1833.7	1872.3	1923.3	1988.2	2026.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1888	0.2500	0.5000	ok
Avg FWHM Ratio	0.7000	0.8000	0.9651	1.1000	1.2500	ok
Avg FWTM Ratio	0.7000	0.8000	0.9754	1.1000	1.2500	ok

Detector: 5

Measurement Date/Time: 12/23/2007 12:11:12

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.915	2.000	2.250	ok
Total Activity (Bq)	1837.9	1876.6	1912.4	1992.7	2031.4	ok
Peak Shift (keV)	-0.2500	-0.1750	0.0031	0.1750	0.2500	ok
Avg FWHM Ratio	0.8500	0.9000	0.9973	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0164	1.1500	1.2000	ok

Gamma Spectroscopy Daily Check Summary

Detector: 6

Measurement Date/Time: 12/23/2007 12:10:21

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.350	2.600	2.901	3.150	3.400	ok
Total Activity (Bq)	1829.3	1867.8	1899.2	1983.3	2021.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1349	0.2500	0.5000	ok
Avg FWHM Ratio	0.7500	0.9000	1.0167	1.1500	1.3000	ok
Avg FWTM Ratio	0.7500	0.9000	1.0641	1.1500	1.3000	ok

Detector: 7

Measurement Date/Time: 12/23/2007 12:10:31

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	0.750	1.000	1.348	1.750	2.000	ok
Total Activity (Bq)	1850.0	1875.0	1910.3	1975.0	2000.0	ok
Peak Shift (keV)	-0.5000	-0.2500	0.0885	0.2500	0.5000	ok
Avg FWHM Ratio	0.8000	0.8500	0.9807	1.1500	1.2000	ok
Avg FWTM Ratio	0.8000	0.8500	1.0029	1.2000	1.2500	ok

Detector: 8

Measurement Date/Time: 12/23/2007 12:45:08

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.527	2.000	2.250	ok
Total Activity (Bq)	1875.0	1900.0	1864.2	1995.0	2020.0	< MIN !!
Peak Shift (keV)	-0.2500	-0.2000	0.1958	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	1.0383	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0462	1.1000	1.1550	ok

Notes: Low and High are 2 sigma warning limits. Minimum (<MIN) and Maximum (>MAX) are 3 sigma control limits (Fail).

Analyst _____

Date _____

GammaVision V6.01 QA Background Report 12/23/2007 11:33:39 AM

Detector: 1 Ge 1 SN/242
Measurement Number: 1279
Data Acquired On: 12/23/2007 11:13:30 AM
Real Time: 1206.96 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	3.25	3.50	3.64	4.25	4.50

GammaVision V6.01 QA Background Report 12/23/2007 12:16:40 PM

Detector: 3 Ge 3 SN/155
Measurement Number: 1209
Data Acquired On: 12/23/2007 11:56:30 AM
Real Time: 1208.10 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.50	2.75	3.21	3.25	3.50

GammaVision V6.01 QA Background Report 12/23/2007 11:33:52 AM

Detector: 4 Ge 4 SN/181
Measurement Number: 101
Data Acquired On: 12/23/2007 11:13:47 AM
Real Time: 1202.22 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.15	1.20	1.34	1.45	1.50

GammaVision V6.01 QA Background Report 12/23/2007 11:33:58 AM

Detector: 5 Ge 5 SN/157
Measurement Number: 247
Data Acquired On: 12/23/2007 11:13:56 AM
Real Time: 1200.00 Sec.
Live Time: 1128.16 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.91	2.00	2.25

GammaVision V6.01 QA Background Report 12/23/2007 11:34:14 AM

Detector: 7 Ge 7 SN/154
Measurement Number: 341
Data Acquired On: 12/23/2007 11:14:03 AM
Real Time: 1210.08 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	0.75	1.00	1.35	1.75	2.00

GammaVision V6.01 QA Background Report 12/23/2007 11:35:00 AM

Detector: 8 Ge 8 SN/174
Measurement Number: 1227
Data Acquired On: 12/23/2007 11:14:14 AM
Real Time: 1244.44 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.53	2.00	2.25

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:45:23PM Page 1

DB Analysis ID: 32,957

Sample Description: 03-0366

Spectrum Filename: QA101259.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:14:38PM		
Live Time:	1800.00	Real Time:	1822.24
Dead Time:	1.22 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 air filter 74140-334 1_05_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\GE1 AF interp_165_quad 01_05_07.Clb		
Energy Created:	05-Jan-2007 1:55:09PM	Efficiency Created:	05-Jan-2007 1:58:17PM
Zero Offset:	0.112 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.11 keV
Stop Channel:	8,000 for an energy of 1999.43 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2789

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.307E+002	6.159E+002	1.74	5.96	1.151E+000
CS-137	3.464E+002	3.862E+002	2.02	6.39	2.418E+000
AM-241	9.125E+002	9.195E+002	1.03	9.34	4.805E+000

= All peaks for activity calculation had bad shape

Total Activity (25.11 to 1,999.43 keV) 1,589.70 Bq/SA

Analyzed by: _____

403605

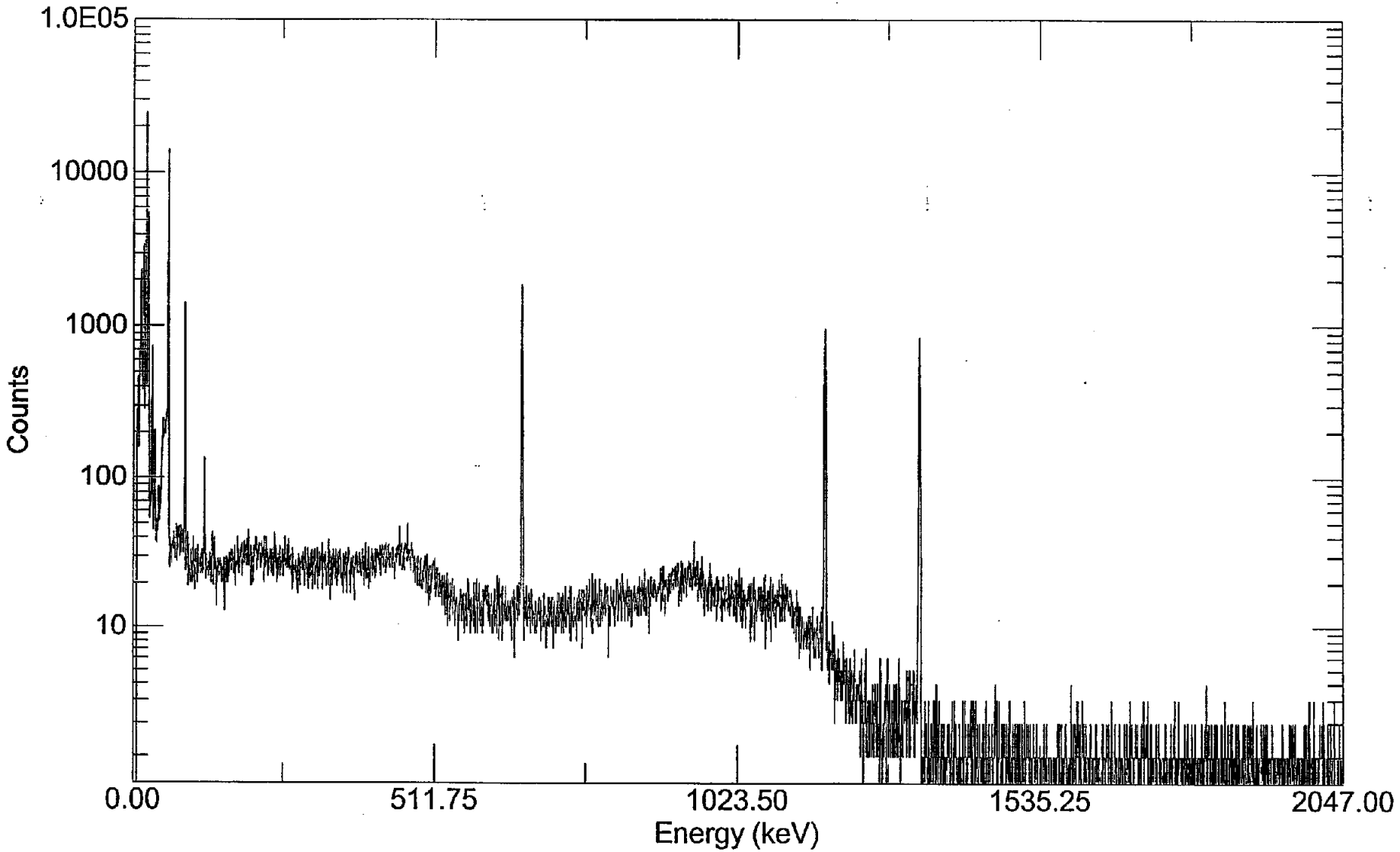
Reviewed by: _____

Supervisor

Laboratory: Test America

QA101259

03-0366



Acquired: 23-Dec-2007 12:14:38 PM
File: C:\User\spectra\QA101259.spc
Detector: #0 Ge 1 SN/242

Real Time: 1822.24 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:48:06PM Page 1

DB Analysis ID: 32,958

Sample Description: 03-0368

Spectrum Filename: QA301294.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:17:15PM		
Live Time:	1800.00	Real Time:	1825.74
Dead Time:	1.41 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 Air filter 74140_334 interp_122_quad 01_09_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Air filter interp_122_quad 01_09_07.Clb		
Energy Created:	09-Jan-2007 10:31:35AM	Efficiency Created:	09-Jan-2007 10:36:46AM
Zero Offset:	0.372 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.35 keV
Stop Channel:	8,000 for an energy of 2000.41 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2754

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60		3.446E+002	6.417E+002	1.74	5.96	1.767E+000
CS-137		3.524E+002	3.929E+002	2.05	6.21	2.864E+000
AM-241	#	9.069E+002	9.138E+002	1.01	9.33	4.917E+000

= All peaks for activity calculation had bad shape

Total Activity (25.35 to 2,000.41 keV) 1,603.89 Bq/SA

Analyzed by: _____

403605

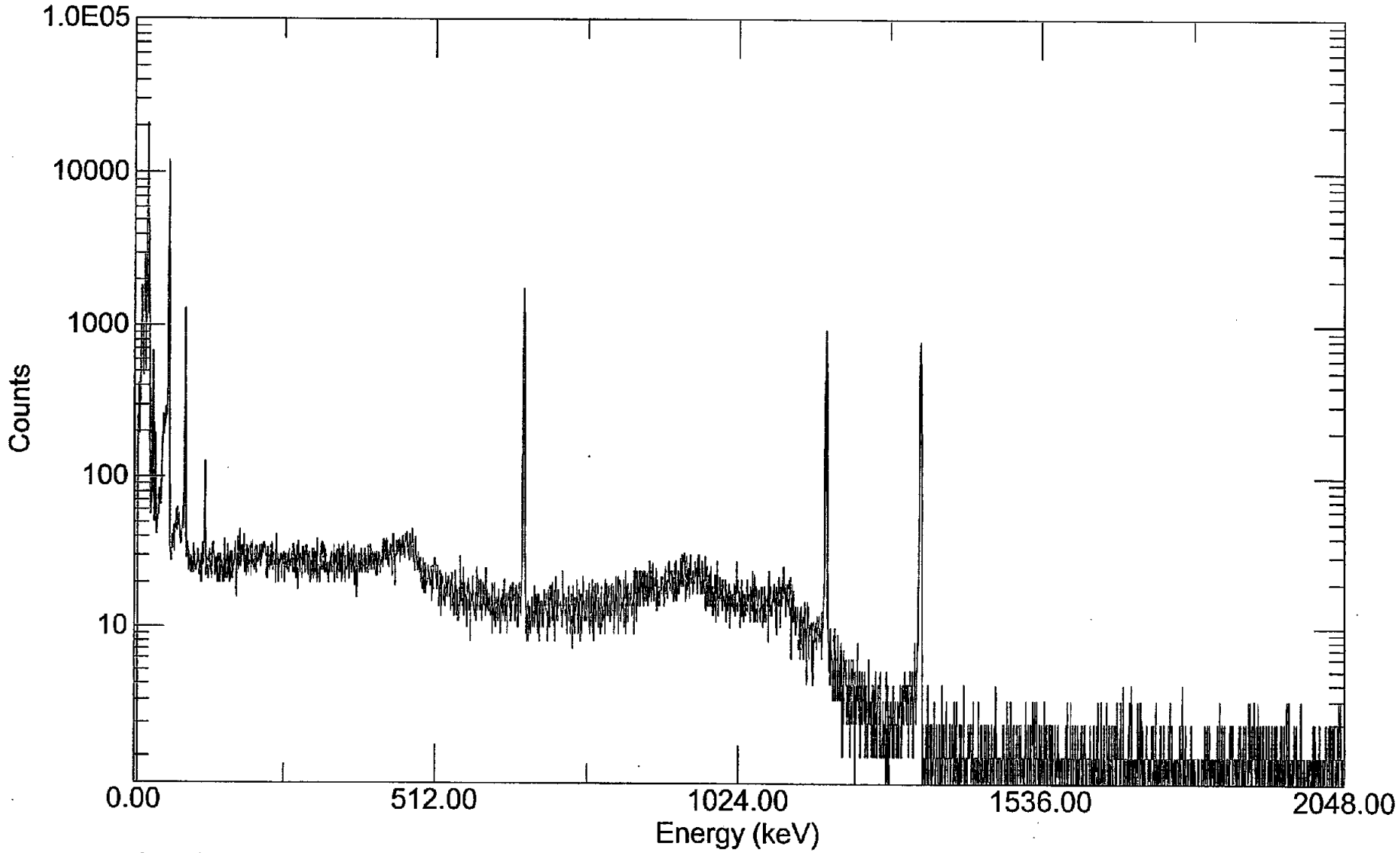
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA301294

03-0368



Acquired: 23-Dec-2007 12:17:15 PM
File: C:\User\spectra\QA301294.spc
Detector: #0 Ge 3 SN/155

Real Time: 1825.74 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:09:59PM Page 1

DB Analysis ID: 32,951

Sample Description: 03-0371

Spectrum Filename: QA400104.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:38:52AM		
Live Time:	1800.00	Real Time:	1810.88
Dead Time:	0.60 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4 AirFilterCal_74140_334_05_08_07(EE)		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4 AirFilterCal_74140_334_05_08_07		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	08-May-2007 1:39:26PM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.03 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1888

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.230E+002	6.015E+002	2.23	6.11	1.381E+000
CS-137	3.587E+002	3.998E+002	2.62	6.50	4.056E+000
AM-241	9.150E+002	9.220E+002	1.12	9.28	4.985E+000

= All peaks for activity calculation had bad shape

Total Activity (25.03 to 1,998.47 keV) 1,596.71 Bq/SA

Analyzed by: _____

403605

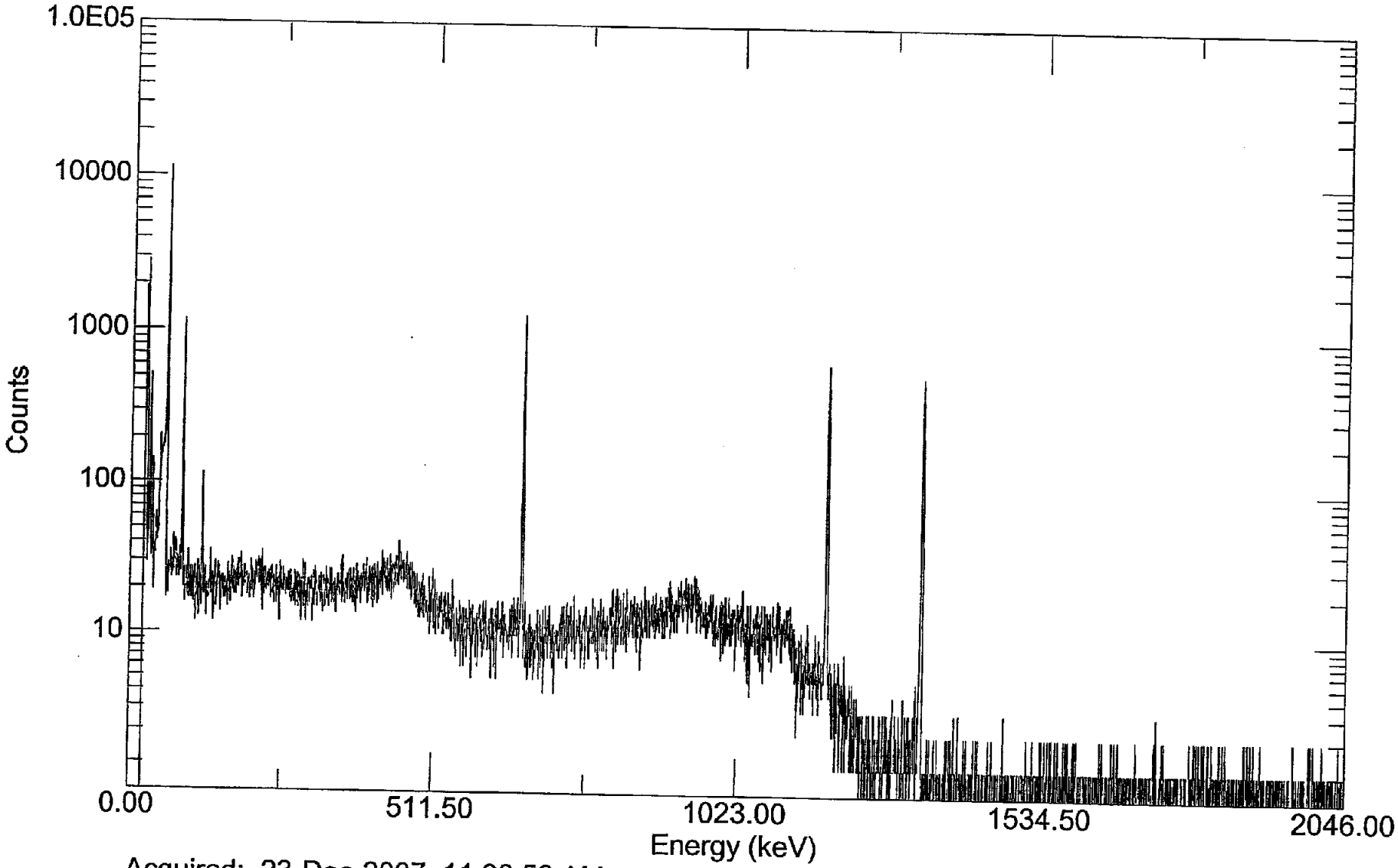
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA400104

03-0371



Acquired: 23-Dec-2007 11:38:52 AM
File: C:\User\spectra\QA400104.spc
Detector: #0 Ge 4 SN/181

Real Time: 1810.88 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:11:10PM Page 1

DB Analysis ID: 32,954

Sample Description: 03-0370

Spectrum Filename: QA500094.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:39:00AM		
Live Time:	1800.00	Real Time:	1897.84
Dead Time:	5.16 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 airfilter 74140-334_032707 interp_165_quad		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 airfilter_032707_interp165quad.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	28-Mar-2007 6:10:41PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.25 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0268

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.326E+002	6.194E+002	2.16	6.10	1.535E+000
CS-137	3.435E+002	3.829E+002	2.47	6.55	3.202E+000
AM-241	9.032E+002	9.101E+002	1.07	9.34	4.639E+000

= All peaks for activity calculation had bad shape

Total Activity (25.25 to 2,000.57 keV) 1,579.32 Bq/SA

Analyzed by: _____

403605

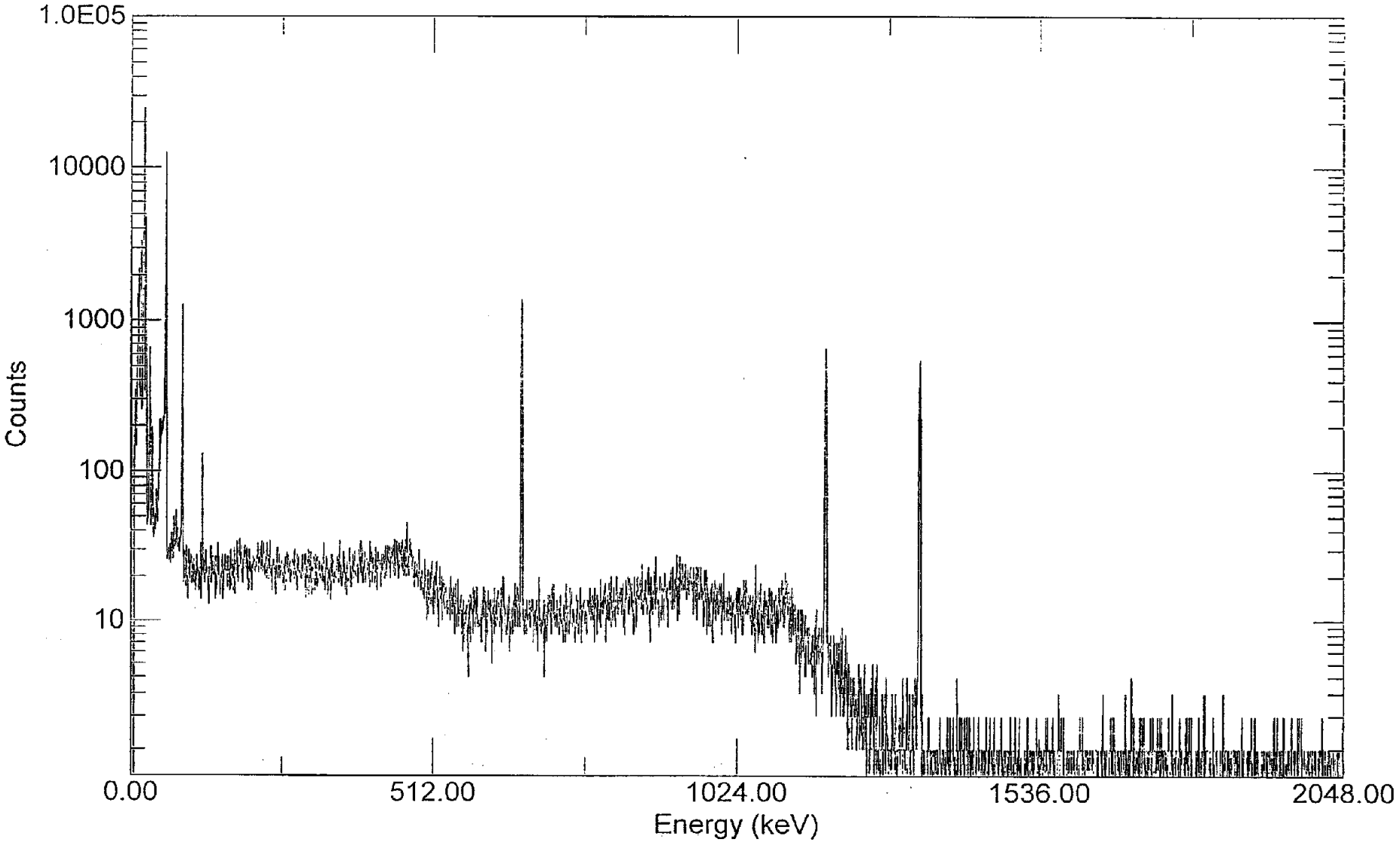
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA500094

03-0370



Acquired: 23-Dec-2007 11:39:00 AM
File: C:\User\spectra\QA500094.spc
Detector: #0 Ge 5 SN/157

Real Time: 1897.84 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:10:29PM Page 1

DB Analysis ID: 32,953

Sample Description: 03-0372

Spectrum Filename: QA700211.Spc

Acquisition Information

Start Time:	23-Dec-2007 11:39:08AM		
Live Time:	1800.00	Real Time:	1828.52
Dead Time:	1.56 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 air filter 74140-334 01_04_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 air filter 01_04_07.Clb		
Energy Created:	04-Jan-2007 9:44:57AM	Efficiency Created:	04-Jan-2007 9:55:23AM
Zero Offset:	0.082 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.08 keV
Stop Channel:	8,000 for an energy of 2000.16 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1194

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.277E+002	6.102E+002	1.93	6.01	1.731E+000
CS-137	3.489E+002	3.890E+002	2.14	6.24	2.913E+000
AM-241	9.042E+002	9.111E+002	0.95	8.44	4.204E+000

= All peaks for activity calculation had bad shape

Total Activity (25.08 to 2,000.16 keV) 1,580.84 Bq/SA

Analyzed by: _____

403605

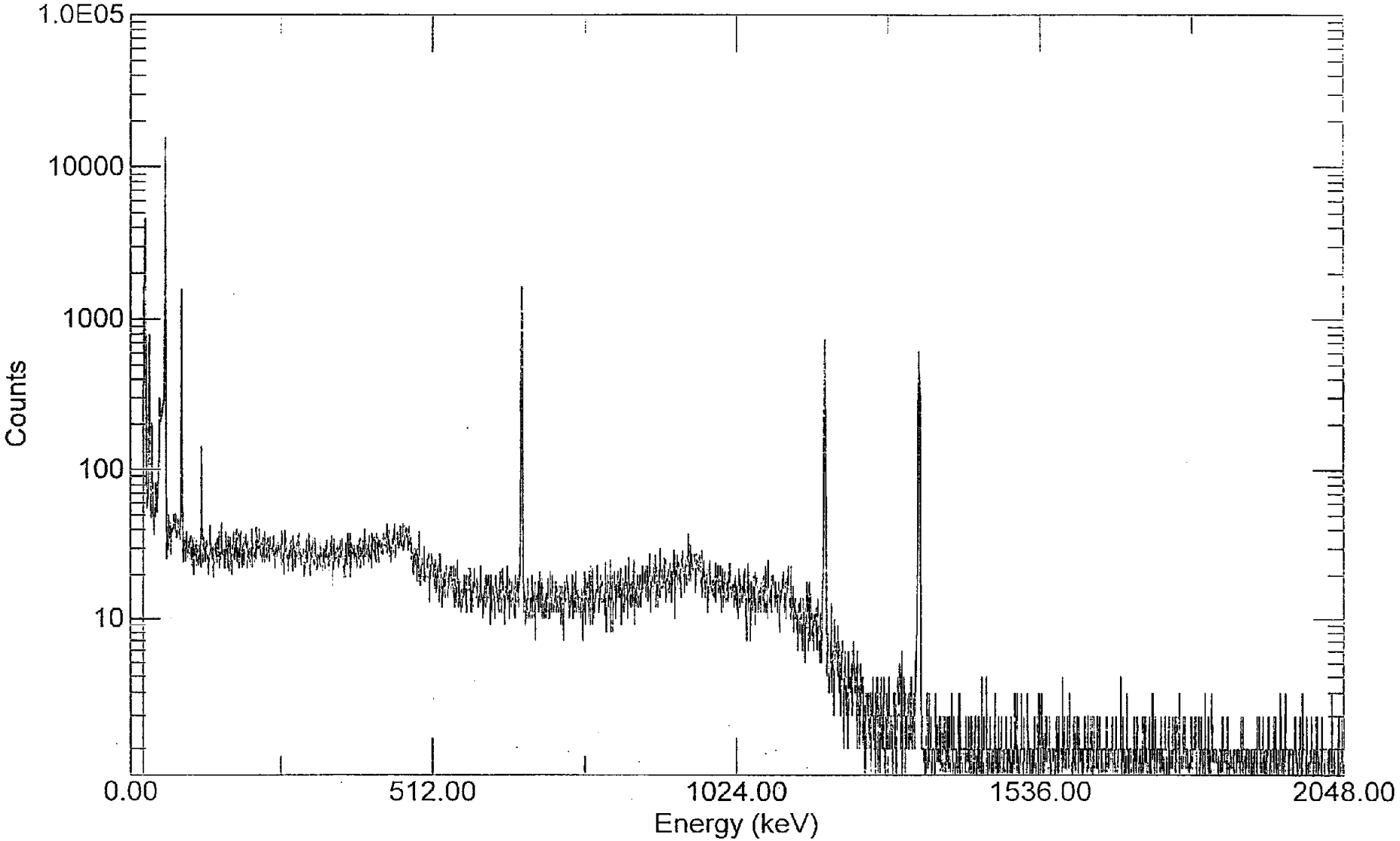
Reviewed by: _____

Supervisor

Laboratory: Test America

QA700211

03-0372



Acquired: 23-Dec-2007 11:39:08 AM
File: C:\User\spectra\QA700211.spc
Detector: #0 Ge 7 SN/154

Real Time: 1828.52 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 23-Dec-2007 12:45:06PM Page 1

DB Analysis ID: 32,956

Sample Description: 03-0373

Spectrum Filename: QA801157.Spc

Acquisition Information

Start Time:	23-Dec-2007 12:13:16PM		
Live Time:	1800.00	Real Time:	1879.12
Dead Time:	4.21 %		
Detector ID:	8		

Detector System: Ge 8 SN/174

Calibration

Description:	Ge8 air filter_interp>122<quad		
Filename:	C:\User\Calibrations\Ge8 post 11_03_06\Ge8 air filter interp_122_quad.Clb		
Energy Created:	06-Nov-2006 3:12:36PM	Efficiency Created:	06-Nov-2006 3:14:26PM
Zero Offset:	0.014 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.02 keV
Stop Channel:	8,000 for an energy of 2000.35 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2791

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.209E+002	5.976E+002	2.04	6.01	4.997E-001
CS-137	3.391E+002	3.780E+002	2.43	6.54	3.236E+000
AM-241	8.820E+002	8.887E+002	1.08	9.35	4.870E+000

= All peaks for activity calculation had bad shape

Total Activity (25.02 to 2,000.35 keV) 1,541.93 Bq/SA

Analyzed by: _____

403605

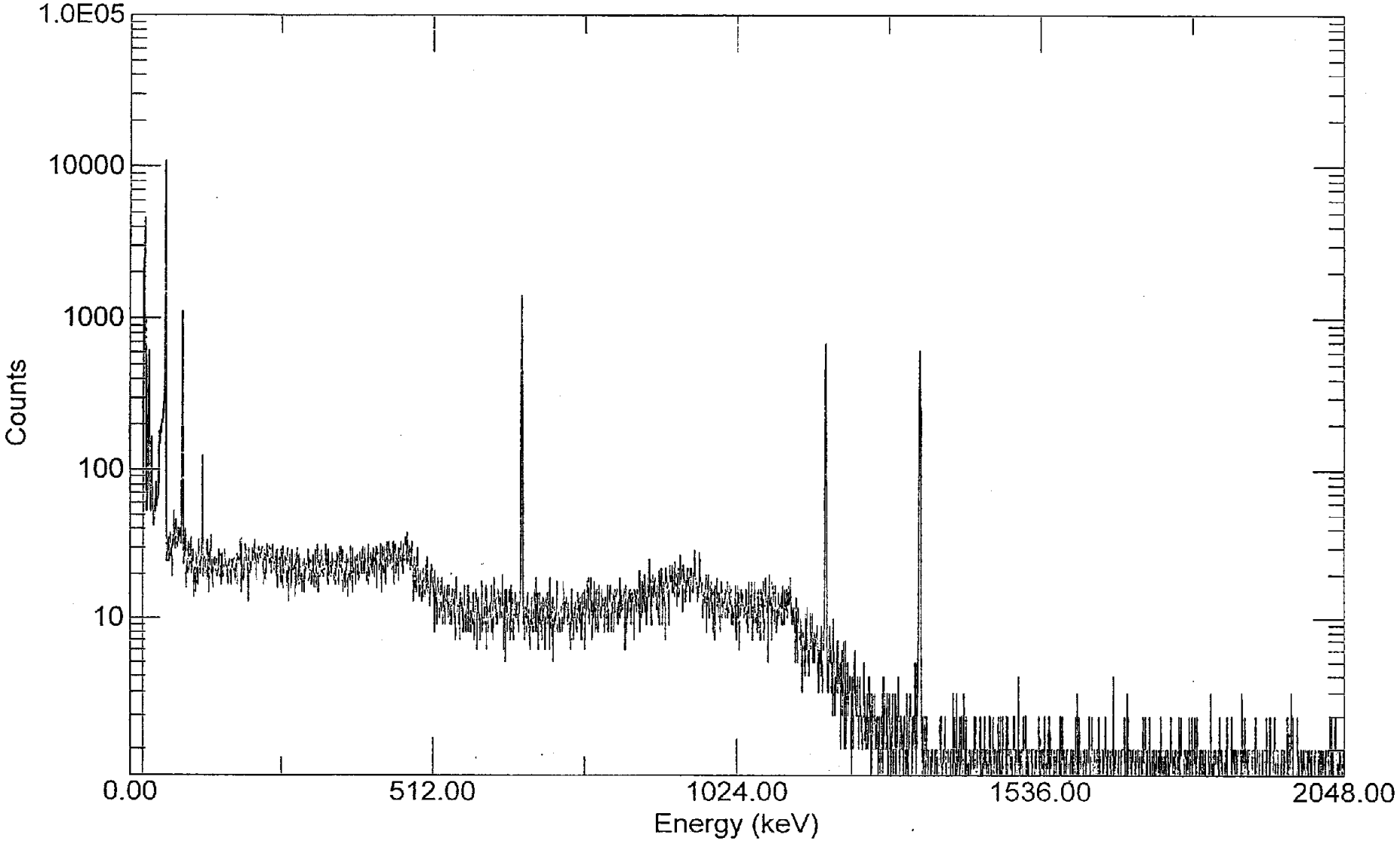
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA801157

03-0373



Acquired: 23-Dec-2007 12:13:16 PM
File: C:\User\spectra\QA801157.spc
Detector: #0 Ge 8 SN/174

Real Time: 1879.12 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica STL

Gamma Vision Long Backgrounds

November 2007

Ge1 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    1
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1

Sample description
     Ge1 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge1 bkgd\Ge1 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 20:12:47
       Live time:              43200
       Real time:              43454
       Dead time:                  0.59 %
       Detector ID:                    1

Detector system
     Ge 1 SN/242


Calibration
       Filename:                   GE1 AF interp_165_quad 01_05_07.Clb
     Ge1 air filter 74140-334 1_05_07


       Energy Calibration
            Created:               05-Jan-2007 13:55:09
            Zero offset:           0.112 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.471E-09 keV/channel^2

       Efficiency Calibration
            Created:               05-Jan-2007 13:58:17
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.63 %
            Log(Eff):             -5.325680E-02 + (-3.688631E-01*Log(E) ) +
                                   ( -3.389960E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.61keV )
       Stop channel:            8000 (  1999.43keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method

       Random error:              0.0000000E+00
       Systematic error:          0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    2
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1
                                       Page 1
```

Ge1 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 26 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1584

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.48	1145.	8.01	0.82	7.917E-02	29.46	20.350	1.645E+00	I129
					29.78	37.840	8.846E-01	I129
33.55	364.	19.14	1.08	7.930E-02	33.61	10.230	1.039E+00	I129
39.64	367.	17.70	0.72	7.948E-02	39.57	7.500	1.425E+00	I129
43.95	83.	36.93	0.77	7.961E-02				
46.49	615.	6.96	0.78	7.969E-02	46.54	4.250	4.202E+00	PB210
63.22	886.	6.96	0.78	7.996E-02	63.29	4.820	5.319E+00	TH234
74.91	250.	16.22	0.81	7.953E-02				
77.12	227.	16.57	0.81	7.945E-02				
84.26	190.	20.36	0.82	7.919E-02	83.79	25.180	2.206E-01	RA223
92.53	1212.	5.11	1.09	7.822E-02	92.59	5.570	6.442E+00	TH234
143.45	191.	27.71	1.47	6.596E-02	143.76	10.960	6.125E-01	U235
185.73	526.	9.46	0.72	5.472E-02	185.71	57.200	3.892E-01	U235
205.37	116.	29.90	0.76	5.087E-02	205.31	5.010	1.050E+00	U235
216.58	124.	37.90	0.67	4.893E-02				
238.22	550.	10.88	0.92	4.561E-02	238.63	43.300	6.455E-01	PB212
241.65	168.	26.87	0.76	4.508E-02	242.00	7.430	1.164E+00	PB214
294.87	221.	20.40	1.06	3.889E-02	295.22	19.300	6.822E-01	PB214
321.82	106.	28.71	0.51	3.640E-02				
338.11	118.	0.12	1.08	3.504E-02	338.28	2.790	1.406E+00	RA223
351.65	288.	15.45	1.27	3.402E-02	351.93	37.600	5.210E-01	PB214
510.67	1595.	4.49	2.58	2.544E-02				
558.30	154.	21.25	1.00	2.370E-02				
582.63	214.	22.14	1.61	2.290E-02	583.19	84.500	2.562E-01	TL208
609.26	279.	18.64	1.59	2.209E-02	609.31	46.090	6.342E-01	BI214
678.61	106.	27.09	0.86	2.025E-02				
910.54	225.	19.20	0.94	1.591E-02				
968.65	78.	33.31	1.64	1.511E-02	968.97	15.800	PBC<MDA	AC228
1119.75	138.	28.36	0.92	1.337E-02	1120.29	15.100	1.582E+00	BI214
1460.80	301.	11.17	1.75	1.066E-02	1460.83	10.670	6.124E+00	K40
1764.41	115.	18.86	0.40	9.048E-03	1764.49	15.400	1.916E+00	BI214

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STL- St Louis Spectrum name: Ge1 background 11_21_07.An1
Page 2

Ge1 background 11_21_07.Rpt

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
175.36	43.91	424.	83.	0.002	73.85	0.772	EU-155	lD
299.08	74.87	807.	207.	0.005	48.16	0.699	PB-214	
307.91	77.08	673.	174.	0.004	52.38	0.864	PB-214	
573.39	143.45	712.	191.	0.004	55.42	1.469	TC-99M	l
742.53	185.73	586.	526.	0.012	18.92	0.716	U-235	l
821.10	205.37	381.	116.	0.003	59.80	0.757	U-235	l
865.96	216.58	565.	124.	0.003	75.80	0.669	TB-160	s
2042.53	510.67	504.	1595.	0.037	8.97	2.583	TL-208	s
2233.07	558.30	218.	154.	0.004	42.50	0.999	Y-91M	s
2714.42	678.61	154.	106.	0.002	54.18	0.859	AG-110M	sM
3642.42	910.54	329.	109.	0.003	50.65	0.937	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.69	29.78	1412.	1845.	0.043	0.03	0.757D
I-129	133.99	33.61	705.	256.	0.006	31.86	0.761D
I-129	158.11	39.64	963.	367.	0.008	35.40	0.717s
PB-210	184.97	46.35	1060.	707.	0.016	20.60	0.662s
TH-234	252.44	63.22	832.	886.	0.020	13.92	0.776
RA-223	336.52	84.24	1308.	175.	0.004	60.22	0.815s
TH-234	369.70	92.53	789.	1212.	0.028	10.22	1.090s
RA-223	576.53	144.23	937.	32.	0.001	0.79	0.880D
Ra-226	744.47	186.21	938.	426.	0.010	22.51	0.924D
PB-212	952.51	238.22	700.	550.	0.013	21.77	0.919s
RA-224	959.36	239.93	1373.	-223.	-0.005	48.86	0.980
PB-214	966.24	241.65	538.	168.	0.004	53.74	0.758s
PB-214	1179.17	294.87	453.	221.	0.005	40.80	1.059
AC-228	1352.99	338.32	729.	118.	0.003	0.23	1.078D
PB-214	1406.31	351.65	405.	288.	0.007	30.91	1.275
TL-208	2330.44	582.63	348.	214.	0.005	44.27	1.612s
BI-214	2436.97	609.26	441.	279.	0.006	37.28	1.586s
AC-228	3644.09	910.96	250.	115.	0.003	43.01	1.596s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 4
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	3874.95	968.65	299.	78.	0.002	66.62	1.642s
BI-214	4479.56	1119.75	190.	138.	0.003	56.71	0.922s
K-40	5844.32	1460.80	94.	301.	0.007	22.35	1.747
BI-214	7059.40	1764.41	47.	115.	0.003	37.72	0.398s

s - Peak fails shape tests.

Ge1 background 11_21_07.Rpt

D - Peak area deconvoluted.
A Derived peak area.

```
*****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak -------------
Name   Code  Activity     Energy   Activity Code MDA Value
             Bq/sample     keV     Bq/sample     Bq/sample      COMMENTS
-----------------------------------------------------------------------------

Be-7     C  -2.5924E-02
                          477.61-2.592E-02 %(  8.962E-01 1.02E+03 G
                             1 of   1 peaks found

K-40     N   6.1244E+00
                         1460.83 6.124E+00  (  9.744E-01 1.12E+01 G
                             1 of   1 peaks found

CO-60    F   8.3359E-03
                         1332.50 8.336E-03 &(  1.027E-01 3.57E+02 G
                         1173.24 7.132E-02 %   1.179E-01 5.06E+01 G
                             2 of   2 peaks found

I-129    I   1.4251E+00
                           29.78 1.425E+00 }   1.374E-01 1.37E-02 X
                           33.61 7.311E-01 -   3.607E-01 1.59E+01 X
                           39.57 1.425E+00 *(  5.721E-01 1.77E+01 G
                           34.61-4.163E-01 %   1.957E+00 1.41E+02 X
                             4 of   5 peaks found

CS-137   I  -6.5179E-03
                          661.66-6.518E-03 &(  1.302E-01 5.91E+02 G
                             1 of   1 peaks found

TL-208   N   2.5616E-01
                          583.19 2.562E-01 @(  1.073E-01 2.21E+01 G
                          860.56 4.219E-01 %   9.305E-01 6.68E+01 G
                             2 of   2 peaks found

PB-210   N   4.8319E+00
                           46.54 4.832E+00 *(  1.055E+00 1.03E+01 G
                             1 of   1 peaks found

PB-212   N   6.4547E-01
                          238.63 6.455E-01 @(  1.479E-01 1.09E+01 G
                          300.10 1.825E-01 %   2.408E+00 3.93E+02 G
                             2 of   2 peaks found

PB-214   N   5.7564E-01
                          351.93 5.210E-01  (  1.748E-01 1.55E+01 G
                          295.22 6.822E-01  (  3.145E-01 2.04E+01 G
                          242.00 1.164E+00 +   7.653E-01 2.69E+01 G
                             3 of   3 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    5
STL- St Louis                   Spectrum name: Ge1 background 11_21_07.An1

Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

BI-214   N   6.3420E-01
                          609.31 6.342E-01 *(  2.286E-01 1.86E+01 G
                         1764.49 1.916E+00 +   5.739E-01 1.89E+01 G
```

Page 4

```
                                Ge1 background 11_21_07.Rpt
                              1120.29 1.582E+00 +   7.673E-01 2.84E+01 G
                               768.36 5.845E-01 %   2.258E+00 1.16E+02 G
                                  4 of   4 peaks found

RA-223    N   3.4520E-01
                                 83.79 2.037E-01 *   1.987E-01 3.01E+01 X
                              269.46 1.066E-01 &(  5.409E-01 1.52E+02 G
                              154.21 4.946E-01 %   9.325E-01 5.73E+01 G
                              144.23 3.452E-01 }   1.590E+00 3.93E-01 G
                              323.87-5.721E-01 %   2.109E+00 1.11E+02 G
                                  5 of   6 peaks found

RA-224    N  -2.7848E+00
                              240.99-2.785E+00  (  2.190E+00 2.44E+01 G
                                  1 of   1 peaks found

AC-228    N   6.9099E-01
                              911.20 6.508E-01  (  4.310E-01 2.15E+01 G
                              968.97 7.567E-01 *(  8.074E-01 3.33E+01 G
                              338.32 6.910E-01 }   7.535E-01 1.16E-01 G
                                  3 of   3 peaks found

TH-234    N   5.3187E+00
                                 63.29 5.319E+00  (  8.239E-01 6.96E+00 G
                                 92.59 6.442E+00 +   7.098E-01 5.11E+00 G
                                  2 of   2 peaks found

U-235     N   1.3269E-01
                              185.71 3.695E-02 }(  1.143E-01 9.33E+01 G
                              143.76 2.880E-01 }(  4.162E-01 4.42E+01 G
                              163.36 5.461E-01 }(  1.152E+00 6.40E+01 G
                              205.31 4.668E-01 }(  1.258E+00 8.14E+01 G
                                  4 of   4 peaks found

Ra-226    N   5.0340E+00
                              186.21 5.034E+00 }(  1.717E+00 1.13E+01 G
                                  1 of   1 peaks found

AM-241    T   1.7879E-02
                                 59.54 1.788E-02 %(  1.230E-01 2.06E+02 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
```



```
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
```

to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	84.24	1308.	175.	0.004	60.22	2.037E-01
RA-223	144.23	937.	32.	0.001	0.79	3.452E-01
RA-224	239.93	1373.	-223.	-0.005	48.86	-2.785E+00
AC-228	910.96	250.	115.	0.003	43.01	6.508E-01
AC-228	968.65	299.	78.	0.002	66.62	7.567E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.5924E-02	2.0493E+03%	8.962E-01
K-40		6.1244E+00	2.2349E+01%	9.744E-01
CO-60	#A	8.3359E-03	7.1489E+02%	1.027E-01
I-129		1.4251E+00	3.5397E+01%	5.721E-01
CS-137	#A	-6.5179E-03	1.1826E+03%	1.302E-01
TL-208	#	2.5616E-01	4.4272E+01%	1.073E-01
PB-210	#	4.8319E+00	2.0595E+01%	1.055E+00
PB-212	#	6.4547E-01	2.1768E+01%	1.479E-01
PB-214		5.7564E-01	2.5595E+01%	1.748E-01
BI-214		6.3420E-01	3.7279E+01%	2.286E-01
RA-223	#A	3.4520E-01	7.1896E+01%	5.409E-01
RA-224	#A	-2.7848E+00	4.8862E+01%	2.190E+00
AC-228	#	6.9099E-01	3.9651E+01%	4.310E-01
TH-234		5.3187E+00	1.3922E+01%	8.239E-01

U-235	A	1.3269E-01	8.8419E+01%	1.258E+00
Ra-226		5.0340E+00	2.5148E+01%	1.717E+00
AM-241	#A	1.7879E-02	4.1232E+02%	1.230E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.

Ge1 background 11_21_07.Rpt

F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (39.4 to 1999.4 keV) 1.981E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge2 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    1
STL- St Louis                    Spectrum name: Ge2 background 11_21_07.An1

Sample description
     Ge2 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge2 bkgd\Ge2 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:39:03
       Live time:             43200
       Real time:             43328
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     Ge 2 SN/182


Calibration
       Filename:                   Ge2 AF w_spacer 72002 poly. 121206 no Hg
                                   .Clb
     Ge2 72002-334 Air Filter Poly no Hg 121206


       Energy Calibration
            Created:               13-Dec-2006 07:56:27
            Zero offset:           0.102 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.874E-09 keV/channel^2

       Efficiency Calibration
            Created:               13-Dec-2006 07:58:09
            Type:                  Polynomial
            Uncertainty:           1.400 %
            Coefficients:         -0.388770  -4.607021   0.563706
                                  -0.059383   0.002602  -0.000047

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.60keV )
       Stop channel:            8000 (  1999.97keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
       Fraction Limit:             0.000%
       Background width:           average of three points.

       Half lives decay limit:    12.000
                                      Page 1
```

Ge2 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 2
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 3 cutoff 20.00000 %
Energy Calibration
Normalized diff: 1.0000

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
36.01	548.	9.94	2.31	1.554E-04	34.61	2.419	0.000E+00	I129
54.77	448.	20.63	0.48	2.979E-02				
70.79	795.	10.76	0.57	4.706E-02				
82.34	140.	38.03	1.07	5.505E-02				
104.48	141.	28.68	0.56	6.052E-02				
142.56	15.	0.90	1.13	5.781E-02	144.23	3.220	PBC<MDA	RA223
151.40	922.	7.90	0.80	5.654E-02				
172.73	246.	28.01	0.59	5.240E-02				
180.30	97.	34.82	0.46	5.091E-02				
270.17	94.	30.57	0.82	3.630E-02	269.46	13.700	4.365E-01	RA223
432.95	145.	13.12	1.10	2.330E-02				
774.09	107.	14.98	1.25	1.393E-02				

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
143.68	36.01	765.	548.	0.013	16.63	2.308	CS-137	sM
218.74	54.77	1948.	448.	0.010	41.27	0.482	LU-177	sM
282.83	70.79	1564.	795.	0.018	21.52	0.570	AU-198	sM
417.63	104.48	526.	141.	0.003	57.36	0.563	U-235	sM
605.36	151.40	549.	1148.	0.027	8.26	0.797	KR-85M	sM
690.68	172.73	768.	246.	0.006	56.02	0.592	-	sM
1080.54	270.17	183.	94.	0.002	61.15	0.819	AC-228	l
1731.80	432.95	50.	145.	0.003	26.23	1.105	J-134	sM
3096.58	774.09	25.	107.	0.002	23.42	1.245	W-187	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

Ge2 background 11_21_07.Rpt
This section based on library: long bkgd_pbc.lib
D

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 3
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
RA-223	329.04	82.34	1346.	140.	0.003	76.05	1.072s
RA-223	576.67	144.23	742.	15.	0.000	1.79	1.128D
RA-223	610.25	152.62	1317.	-226.	-0.005	47.36	1.137s
AC-228	1353.21	338.32	271.	-3.	0.000	-12.93	1.306D

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-4.6117E-02					
			477.61	-4.612E-02	%(	5.044E-01 3.17E+02	G
			1 of 1 peaks found				
K-40	N	-1.7222E-01					
			1460.83	-1.722E-01	%(	8.611E-01 1.44E+02	G
			1 of 1 peaks found				
CO-60	F	-8.3377E-03					
			1332.50	-8.338E-03	%(	7.747E-02 2.62E+02	G
			1173.24	6.175E-04	%	7.327E-02 3.29E+03	G
			2 of 2 peaks found				
I-129	I	-1.9497E-01					
			39.57	-1.950E-01	%(	1.419E+01 2.19E+03	G
			1 of 5 peaks found				
CS-137	I	-9.4394E-04					
			661.66	-9.439E-04	&(	6.847E-02 2.06E+03	G
			1 of 1 peaks found				
TL-208	N	-4.4122E-03					
			583.19	-4.412E-03	&(	6.480E-02 4.21E+02	G
			860.56	7.613E-04	&	4.117E-01 1.48E+04	G
			2 of 2 peaks found				
PB-210	N	-4.5169E-01					
			46.54	-4.517E-01	&(	8.363E+00 5.56E+02	G
			1 of 1 peaks found				
PB-212	N	-1.7207E-02					
			238.63	-1.721E-02	&(	1.488E-01 2.58E+02	G
			300.10	-4.113E-01	&	2.107E+00 1.53E+02	G
			2 of 2 peaks found				

```
PB-214    N   7.0784E-02
                          351.93 7.078E-02 %(  1.628E-01 6.95E+01 G
                          295.22-7.852E-02 &   3.395E-01 1.29E+02 G
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                          242.00 1.721E-01 &   7.907E-01 1.37E+02 G
                             3 of   3 peaks found

BI-214    N  -3.4801E-03
                          609.31-3.480E-03 &(  1.312E-01 1.08E+03 G
                         1764.49-1.363E-02 %   5.148E-01 1.02E+03 G
                         1120.29-1.887E-02 %   4.717E-01 6.99E+02 G
                          768.36 1.538E-01 &   1.164E+00 2.17E+02 G
                             4 of   4 peaks found

RA-223    N   1.8540E-01
                           83.79 2.337E-01 *   2.900E-01 3.80E+01 X
                          269.46 1.854E-01 %(  4.423E-01 7.21E+01 G
                          154.21-1.660E+00 +   1.263E+00 2.37E+01 G
                          144.23 1.854E-01 }   1.612E+00 8.96E-01 G
                          323.87-2.960E-01 &   1.561E+00 1.57E+02 G
                          338.28 2.760E-01 }   2.283E+00 1.90E+02 G
                             6 of   6 peaks found

RA-224    N   2.7670E-01
                          240.99 2.767E-01 &(  1.525E+00 1.65E+02 G
                             1 of   1 peaks found

AC-228    N  -2.2436E-02
                          911.20-2.244E-02 %(  2.287E-01 2.88E+02 G
                          338.32-2.244E-02 }   5.553E-01 ******** G
                             2 of   3 peaks found

TH-234    N   2.5408E-01
                           63.29 2.541E-01 %(  2.384E+00 2.82E+02 G
                           92.59-6.697E-02 %   1.236E+00 5.52E+02 G
                             2 of   2 peaks found

U-235     N   6.1680E-02
                          185.71 2.368E-03 }(  1.010E-01 1.27E+03 G
                          143.76 1.920E-02 }(  5.448E-01 8.46E+02 G
                          163.36 5.295E-01 }(  1.179E+00 6.74E+01 G
                          205.31 3.574E-01 }(  1.228E+00 1.03E+02 G
                             4 of   4 peaks found

Ra-226    N   0.0000E+00
                             0 of   1 peaks found

AM-241    T   0.0000E+00
                             0 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
```

Ge2 background 11_21_07.Rpt

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.

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STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	82.34	1346.	140.	0.003	76.05	2.337E-01
RA-223	152.62	1317.	-226.	-0.005	47.36	-1.660E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-4.6117E-02	6.3413E+02%	5.044E-01
K-40	#A	-1.7222E-01	2.8889E+02%	8.611E-01
CO-60	#A	-8.3377E-03	5.2415E+02%	7.747E-02
I-129	#A	-1.9497E-01	4.3718E+03%	1.419E+01
CS-137	#A	-9.4394E-04	4.1142E+03%	6.847E-02
TL-208	#A	-4.4122E-03	8.4236E+02%	6.480E-02
PB-210	#A	-4.5169E-01	1.1128E+03%	8.363E+00
PB-212	#A	-1.7207E-02	5.1525E+02%	1.488E-01
PB-214	#A	7.0784E-02	1.3902E+02%	1.628E-01
BI-214	#A	-3.4801E-03	2.1577E+03%	1.312E-01
RA-223	#A	1.8540E-01	1.4419E+02%	4.423E-01
RA-224	#A	2.7670E-01	3.2921E+02%	1.525E+00
AC-228	#A	-2.2436E-02	5.7610E+02%	2.287E-01
TH-234	#A	2.5408E-01	5.6341E+02%	2.384E+00
U-235	#A	6.1680E-02	1.3487E+02%	1.228E+00
Ra-226	#A	0.0000E+00	7.4987E+03%	1.636E+00
AM-241	#A	0.0000E+00	1.4307E+04%	4.288E-01

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Page 5

Ge2 background 11_21_07.Rpt

STL- St Louis

Spectrum name: Ge2 background 11_21_07.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.0 keV) 0.000E+00 Bq/sample

Analyzed by: _____
402630

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge3 background 11_21_07.Rpt

```
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STL- St Louis                    Spectrum name: Ge3 background 11_21_07.An1

Sample description
     Ge3 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge3 Bkd post 5_8_06\Ge3 background
                     11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 20:14:21
       Live time:              43200
       Real time:              44044
       Dead time:                  1.92 %
       Detector ID:                    3

Detector system
     Ge 3 SN/155


Calibration
       Filename:                   Ge3 Air filter interp_122_quad 01_09_07.
                                   Clb
     Ge3 Air filter 74140_334 interp_122_quad 01_09_07


       Energy Calibration
            Created:               09-Jan-2007 10:31:35
            Zero offset:           0.372 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.457E-08 keV/channel^2

       Efficiency Calibration
            Created:               09-Jan-2007 10:36:46
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.114144E-01 + (-2.846233E-01*Log(E) ) +
                                   ( -4.247676E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (   22.85keV )
       Stop channel:            8000 (  2000.41keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    2
```

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Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.0700

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
46.63	517.	11.73	0.85	8.618E-02	46.54	4.250	3.266E+00	PB210
63.31	592.	12.93	0.85	8.723E-02	63.29	4.820	3.262E+00	TH234
72.12	210.	21.86	0.87	8.589E-02				
74.95	648.	7.63	0.87	8.546E-02				
84.56	371.	11.37	0.88	8.406E-02	83.79	25.180	4.057E-01	RA223
87.41	211.	18.65	0.88	8.364E-02				
92.67	628.	10.80	1.19	8.268E-02	92.59	5.570	3.156E+00	TH234
143.71	8.	1.77	0.94	6.882E-02	143.76	10.960	PBC<MDA	U235
185.84	362.	17.45	1.25	5.738E-02	185.71	57.200	2.556E-01	U235
					186.21	3.590	4.080E+00	Ra226
238.33	498.	13.20	1.16	4.774E-02	238.63	43.300	5.582E-01	PB212
294.85	179.	32.86	0.88	4.062E-02				
338.11	52.	0.25	1.13	3.652E-02	338.28	2.790	1.113E+00	RA223
351.95	221.	17.02	1.15	3.541E-02	351.93	37.600	3.840E-01	PB214
569.39	140.	24.12	0.46	2.406E-02				
583.08	191.	16.67	0.43	2.359E-02	583.19	84.500	2.218E-01	TL208
609.47	167.	20.68	1.40	2.275E-02	609.31	46.090	3.679E-01	BI214
675.97	198.	19.41	0.25	2.087E-02				
1460.77	269.	12.60	0.77	1.067E-02	1460.83	10.670	5.472E+00	K40
1763.99	57.	24.52	2.37	8.978E-03	1764.49	15.400	9.488E-01	BI214

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
287.30	72.26	948.	210.	0.005	43.72	0.865	W-187	]D
299.20	75.10	1479.	687.	0.016	24.09	0.945	PB-214	
347.97	87.28	676.	184.	0.004	51.12	0.891	PB-214	
1178.99	294.85	656.	179.	0.004	65.71	0.885	PB-214	]

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Page 2

Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
2277.83	569.39	207.	140.	0.003	48.24	0.461	PA-234	s
2704.31	675.97	179.	198.	0.005	38.82	0.248	AU-198	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	116.48	29.46	1393.	-40.	-0.001	-33.03	0.821D
I-129	117.77	29.78	1360.	-75.	-0.002	-33.03	0.821D
PB-210	185.24	46.63	861.	517.	0.012	23.47	0.850
TH-234	252.02	63.31	1092.	592.	0.014	25.87	0.855s
RA-223	337.47	84.65	1341.	292.	0.007	37.32	0.877s
TH-234	369.57	92.67	882.	628.	0.015	21.59	1.192s
RA-223	576.02	144.23	823.	8.	0.000	3.54	0.939D
Ra-226	744.09	186.21	808.	362.	0.008	24.55	1.253D
PB-212	952.74	238.33	764.	498.	0.012	26.39	1.163s
RA-224	959.55	240.03	1211.	-150.	-0.003	67.51	1.037s
AC-228	1353.01	338.32	649.	52.	0.001	0.49	1.134D
PB-214	1407.56	351.95	596.	221.	0.005	34.04	1.148s
TL-208	2332.62	583.08	190.	191.	0.004	33.35	0.427s
BI-214	2438.23	609.47	511.	167.	0.004	41.37	1.396s
K-40	5843.24	1460.77	80.	269.	0.006	25.20	0.766s
BI-214	7055.28	1763.99	68.	57.	0.001	49.04	2.372s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-1.0312E-01					
			477.61	-1.031E-01	&(	7.955E-01	2.29E+02 G
			1 of 1 peaks found				
K-40	N	5.4719E+00					
			1460.83	5.472E+00	(	9.030E-01	1.26E+01 G
			1 of 1 peaks found				

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STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-60	F 1.3070E-02						

```
                                Ge3 background 11_21_07.Rpt
                              1332.50 1.307E-02 &(  1.156E-01 2.59E+02 G
                              1173.24 4.078E-02 %   1.050E-01 7.74E+01 G
                                  2 of   2 peaks found

I-129     I  -5.4321E-02
                                29.78-5.432E-02 }   1.270E-01 ******** X
                                29.46-5.432E-02 }   2.391E-01 ******** X
                                33.61-2.491E-03 %   3.687E-01 4.40E+03 X
                                39.57-5.432E-02 %(  5.521E-01 3.04E+02 G
                                34.61-2.405E-01 &   1.844E+00 2.30E+02 X
                                  5 of   5 peaks found

CS-137    I   2.9708E-02
                               661.66 2.971E-02 &(  9.574E-02 9.65E+01 G
                                  1 of   1 peaks found

TL-208    N   2.2178E-01
                               583.19 2.218E-01 *(  7.773E-02 1.67E+01 G
                               860.56 3.902E-01 %   8.439E-01 6.55E+01 G
                                  2 of   2 peaks found

PB-210    N   3.2658E+00
                                46.54 3.266E+00  (  8.816E-01 1.17E+01 G
                                  1 of   1 peaks found

PB-212    N   5.5819E-01
                               238.63 5.582E-01 *(  1.474E-01 1.32E+01 G
                               300.10-8.649E-02 %   2.144E+00 7.37E+02 G
                                  2 of   2 peaks found

PB-214    N   3.8402E-01
                               351.93 3.840E-01 *(  2.025E-01 1.70E+01 G
                               295.22 2.825E-01 %   3.796E-01 4.12E+01 G
                               242.00-1.394E-01 %   8.727E-01 1.87E+02 G
                                  3 of   3 peaks found

BI-214    N   3.6794E-01
                               609.31 3.679E-01 *(  2.385E-01 2.07E+01 G
                              1764.49 9.488E-01 +   6.898E-01 2.45E+01 G
                              1120.29 5.281E-01 %   7.381E-01 4.32E+01 G
                               768.36 5.301E-01 %   1.791E+00 1.01E+02 G
                                  4 of   4 peaks found

RA-223    N   8.8424E-02
                                83.79 3.193E-01 *   1.894E-01 1.87E+01 X
                               269.46 8.842E-02 %(  5.004E-01 1.69E+02 G
                               154.21 1.288E-01 %   8.834E-01 2.05E+02 G
                               144.23 8.842E-02 }   1.424E+00 1.77E+00 G
                               323.87-1.253E-01 %   1.965E+00 4.67E+02 G
                                  5 of   6 peaks found

RA-224    N  -1.7921E+00
                               240.99-1.792E+00 &(  1.966E+00 3.38E+01 G
                                  1 of   1 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    5
STL- St Louis                   Spectrum name: Ge3 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.8991E-01
                               911.20 2.899E-01 %(  4.109E-01 4.37E+01 G
                                           Page 4
```

```
                                Ge3 background 11_21_07.Rpt
                              968.97 2.921E-01 %   6.997E-01 7.23E+01 G
                              338.32 2.899E-01 }   6.828E-01 2.46E-01 G
                                 3 of   3 peaks found

TH-234    N   3.2051E+00
                               63.29 3.262E+00 *(  8.629E-01 1.29E+01 G
                               92.59 3.156E+00 *(  7.091E-01 1.08E+01 G
                                 2 of   2 peaks found

U-235     N   0.0000E+00
                              143.76 1.575E-01 }   4.364E-01 8.36E+01 G
                              163.36 1.070E-02 }   1.003E+00 2.79E+03 G
                              205.31 3.099E-01 }   1.189E+00 1.15E+02 G
                                 3 of   4 peaks found

Ra-226    N   4.0797E+00
                              186.21 4.080E+00 }(  1.522E+00 1.23E+01 G
                                 1 of   1 peaks found

AM-241    T   3.0063E-02
                               59.54 3.006E-02 %(  1.121E-01 1.12E+02 G
                                 1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```



```
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
            Energy   Counts     Counts     Cts/Sec  2 Sigma %
```

Ge3 background 11_21_07.Rpt

RA-223	84.65	1341.	292.	0.007	37.32	3.193E-01
RA-224	240.03	1211.	-150.	-0.003	67.51	-1.792E+00
PB-214	351.95	596.	221.	0.005	34.04	3.840E-01
BI-214	609.47	511.	167.	0.004	41.37	3.679E-01
BI-214	1763.99	68.	57.	0.001	49.04	9.488E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-1.0312E-01	4.5896E+02%	7.955E-01
K-40		5.4719E+00	2.5202E+01%	9.030E-01
CO-60	#A	1.3070E-02	5.1750E+02%	1.156E-01
I-129	#A	-5.4321E-02	6.0811E+02%	5.521E-01
CS-137	#A	2.9708E-02	1.9304E+02%	9.574E-02
TL-208	#	2.2178E-01	3.3349E+01%	7.773E-02
PB-210		3.2658E+00	2.3466E+01%	8.816E-01
PB-212	#	5.5819E-01	2.6390E+01%	1.474E-01
PB-214	#	3.8402E-01	3.4038E+01%	2.025E-01
BI-214	#	3.6794E-01	4.1367E+01%	2.385E-01
RA-223	#A	8.8424E-02	3.3888E+02%	5.004E-01
RA-224	#A	-1.7921E+00	6.7509E+01%	1.966E+00
AC-228	#A	2.8991E-01	8.7364E+01%	4.109E-01
TH-234	#	3.2051E+00	1.6848E+01%	8.629E-01
U-235	#A	0.0000E+00	2.3063E+02%	1.189E+00
Ra-226	#	4.0797E+00	2.4547E+01%	1.522E+00
AM-241	#A	3.0063E-02	2.2457E+02%	1.121E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.4 keV) 1.680E+01 Bq/sample

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 7
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge4 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    1
STL- St Louis                    Spectrum name: Ge4 background 11_21_07.An1

Sample description
     Ge4 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge4 Bkd post 09_07\Ge4 background
                   11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 21:20:23
       Live time:              43200
       Real time:              43294
       Dead time:                  0.22 %
       Detector ID:                    4

Detector system
     Ge 4 SN/181


Calibration
       Filename:                   Ge4 AirFilterCal_74140_334_05_08_07(EE).
                                   Clb
     Ge4 AirFilterCal_74140_334_05_08_07(EE)


       Energy Calibration
            Created:               08-May-2007 13:28:13
            Zero offset:           0.017 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.910E-08 keV/channel^2

       Efficiency Calibration
            Created:               08-May-2007 13:39:26
            Type:                  Polynomial
            Uncertainty:           0.775 %
            Coefficients:         -0.437839  -4.768164   0.564688
                                  -0.057886   0.002608  -0.000044

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.53keV )
       Stop channel:            8000 (  1998.47keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
       Fraction Limit:             0.000%
       Background width:           average of three points.
```

Ge4 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 2
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1398

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.44	117.	0.15	0.80	5.859E-02	29.46	20.350	PBC<MDA	I129
46.39	500.	10.13	0.83	6.160E-02	46.54	4.250	4.417E+00	PB210
63.30	385.	12.06	0.82	6.390E-02	63.29	4.820	2.891E+00	TH234
74.86	126.	20.28	0.84	6.352E-02				
77.23	163.	16.49	0.85	6.347E-02				
92.41	578.	13.01	1.06	6.276E-02	92.59	5.570	3.825E+00	TH234
144.26	17.	0.88	0.90	5.339E-02	143.76	10.960	PBC<MDA	U235
185.83	266.	18.20	1.03	4.428E-02	185.71	57.200	2.430E-01	U235
					186.21	3.590	3.880E+00	Ra226
238.37	223.	16.36	1.06	3.532E-02	238.63	43.300	3.379E-01	PB212
294.99	85.	32.83	1.03	2.863E-02	295.22	19.300	PBC<MDA	PB214
338.12	34.	0.42	1.07	2.500E-02	338.28	2.790	1.109E+00	RA223
351.60	126.	21.13	1.08	2.404E-02	351.93	37.600	3.223E-01	PB214
510.71	983.	5.17	2.12	1.675E-02				
582.75	103.	27.40	0.89	1.482E-02	583.19	84.500	1.899E-01	TL208
608.54	126.	15.99	1.63	1.422E-02	609.31	46.090	4.449E-01	BI214
1024.06	31.	31.88	0.48	8.934E-03				
1119.29	112.	21.18	1.36	8.239E-03	1120.29	15.100	2.075E+00	BI214
1460.75	68.	19.15	1.89	6.425E-03	1460.83	10.670	2.293E+00	K40

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
299.14	74.83	277.	115.	0.003	50.65	0.818	PB-214	
308.62	77.21	295.	148.	0.003	42.44	0.888	PB-214	
2042.44	510.71	228.	983.	0.023	10.33	2.116	TL-208	s
4096.82	1024.06	19.	31.	0.001	63.76	0.479	SR-91	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 3
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Page 2

Ge4 background 11_21_07.Rpt

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.01	29.78	664.	117.	0.003	0.29	0.804D
PB-210	185.42	46.39	458.	500.	0.012	20.27	0.834s
TH-234	253.01	63.30	424.	385.	0.009	24.12	0.816
TH-234	369.42	92.41	822.	578.	0.013	26.02	1.057s
RA-223	576.64	144.23	522.	17.	0.000	1.75	0.905D
Ra-226	744.51	186.21	462.	266.	0.006	25.94	1.035D
PB-212	953.09	238.37	289.	223.	0.005	32.72	1.055
PB-214	1179.54	294.99	347.	85.	0.002	65.66	1.034s
AC-228	1352.85	338.32	320.	34.	0.001	0.85	1.071D
PB-214	1405.98	351.60	291.	126.	0.003	42.26	1.082s
TL-208	2331.16	582.87	184.	52.	0.001	78.17	1.269s
BI-214	2433.85	608.54	80.	126.	0.003	31.98	1.627s
BI-214	4478.11	1119.29	52.	112.	0.003	42.36	1.355s
K-40	5845.49	1460.75	51.	68.	0.002	38.29	1.887

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Name	Nuclide Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	Peak	COMMENTS
Be-7	C	2.5364E-01						
			477.61	2.536E-01	&(	7.571E-01	8.94E+01	G
			1 of 1 peaks found					
K-40	N	2.2933E+00						
			1460.83	2.293E+00	(	1.211E+00	1.91E+01	G
			1 of 1 peaks found					
CO-60	F	3.0919E-02						
			1332.50	3.092E-02	%(	1.270E-01	1.20E+02	G
			1173.24	-1.824E-03	%	1.272E-01	1.99E+03	G
			2 of 2 peaks found					

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 4
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
I-129	1.2169E-01					
		29.78	1.217E-01	}	1.282E-01	1.45E-01 X
		33.61	9.651E-03	%	3.713E-01	1.14E+03 X
		39.57	1.217E-01	%(	5.647E-01	1.39E+02 G

Page 3

```
                                Ge4 background 11_21_07.Rpt
                               34.61 5.812E-01 %   1.700E+00 8.81E+01 X
                                 4 of   5 peaks found

CS-137    I    6.1529E-02
                               661.66 6.153E-02 &(  1.199E-01 5.93E+01 G
                                 1 of   1 peaks found

TL-208    N    9.7012E-02
                               583.19 9.701E-02 ?(  1.219E-01 3.91E+01 G
                               860.56 5.068E-02 %   8.374E-01 4.76E+02 G
                                 2 of   2 peaks found

PB-210    N    4.4166E+00
                                46.54 4.417E+00 @(  9.062E-01 1.01E+01 G
                                 1 of   1 peaks found

PB-212    N    3.3787E-01
                               238.63 3.379E-01  (  1.241E-01 1.64E+01 G
                               300.10 4.578E-01 %   2.233E+00 1.45E+02 G
                                 2 of   2 peaks found

PB-214    N    3.3387E-01
                               351.93 3.223E-01  (  2.104E-01 2.11E+01 G
                               295.22 3.563E-01 *(  3.752E-01 3.28E+01 G
                               242.00-8.994E-02 %   9.155E-01 3.02E+02 G
                                 3 of   3 peaks found

BI-214    N    4.4492E-01
                               609.31 4.449E-01  (  1.567E-01 1.60E+01 G
                              1764.49 3.905E-01 %   9.161E-01 7.06E+01 G
                              1120.29 2.075E+00 +   6.787E-01 2.12E+01 G
                               768.36 3.163E-02 %   2.265E+00 2.07E+03 G
                                 4 of   4 peaks found

RA-223    N    2.3215E-01
                                83.79-2.020E-04 %   1.551E-01 2.27E+04 X
                               269.46 2.321E-01 &(  4.980E-01 6.50E+01 G
                               154.21-5.419E-02 %   8.607E-01 4.71E+02 G
                               144.23 2.321E-01 }   1.470E+00 8.75E-01 G
                               323.87 1.302E-01 &   2.085E+00 4.74E+02 G
                                 5 of   6 peaks found

RA-224    N   -3.8759E-01
                               240.99-3.876E-01 %(  1.566E+00 1.21E+02 G
                                 1 of   1 peaks found

AC-228    N    2.7907E-01
                               911.20 2.791E-01 &(  4.692E-01 5.16E+01 G
                               968.97 2.956E-01 %   7.776E-01 7.89E+01 G
                               338.32 2.791E-01 }   7.075E-01 4.24E-01 G
                                 3 of   3 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    5
STL- St Louis                   Spectrum name: Ge4 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234    N    3.3918E+00
                               63.29 2.891E+00  (  7.418E-01 1.21E+01 G
                               92.59 3.825E+00  (  9.027E-01 1.30E+01 G
                                 2 of   2 peaks found
```

Ge4 background 11_21_07.Rpt

```
U-235     N    0.0000E+00
                              143.76 1.399E-01 }   4.508E-01 9.69E+01 G
                              163.36 3.179E-01 }   9.891E-01 9.36E+01 G
                              205.31 9.367E-02 }   9.329E-01 2.94E+02 G
                                 3 of   4 peaks found

Ra-226    N    3.8798E+00
                              186.21 3.880E+00 }(  1.500E+00 1.30E+01 G
                                 1 of   1 peaks found

AM-241    T    1.6676E-02
                               59.54 1.668E-02 %(  1.068E-01 1.91E+02 G
                                 1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 6
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
PB-214	294.99	347.	85.	0.002	65.66	3.563E-01
PB-214	351.60	291.	126.	0.003	42.26	3.223E-01
K-40	1460.75	51.	68.	0.002	38.29	2.293E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity	Uncertainty 2 Sigma Counting	MDA

Page 5

Ge4 background 11_21_07.Rpt

		Bq/sample		Bq/sample
Be-7	#A	2.5364E-01	1.7871E+02%	7.571E-01
K-40	#	2.2933E+00	3.8293E+01%	1.211E+00
CO-60	#A	3.0919E-02	2.4072E+02%	1.270E-01
I-129	#A	1.2169E-01	2.7780E+02%	5.647E-01
CS-137	#A	6.1529E-02	1.1860E+02%	1.199E-01
TL-208	#A	9.7012E-02	7.8165E+01%	1.219E-01
PB-210	#	4.4166E+00	2.0270E+01%	9.062E-01
PB-212		3.3787E-01	3.2718E+01%	1.241E-01
PB-214	#	3.3387E-01	3.9044E+01%	2.104E-01
BI-214	#	4.4492E-01	3.1983E+01%	1.567E-01
RA-223	#A	2.3215E-01	1.3001E+02%	4.980E-01
RA-224	#A	-3.8759E-01	2.4185E+02%	1.566E+00
AC-228	#A	2.7907E-01	1.0319E+02%	4.692E-01
TH-234		3.3918E+00	1.7740E+01%	7.418E-01
U-235	#A	0.0000E+00	5.8869E+02%	9.329E-01
Ra-226	#	3.8798E+00	2.5937E+01%	1.500E+00
AM-241	#A	1.6676E-02	3.8177E+02%	1.068E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 1998.5 keV) 1.257E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 7
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Laboratory: STL- St Louis

Ge5 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    1
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1

Sample description
     Ge5 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge5 bkgd\Ge5 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:23:41
       Live time:              43200
       Real time:              44675
       Dead time:                  3.30 %
       Detector ID:                    5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   Ge5 airfilter_032707_interp165quad.Clb
     Ge5 airfilter 74140-334_032707 interp_165_quad


       Energy Calibration
            Created:               28-Mar-2007 18:08:23
            Zero offset:           0.272 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.070E-08 keV/channel^2

       Efficiency Calibration
            Created:               28-Mar-2007 18:10:41
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.34 %
            Log(Eff):              1.077627E+00 + (-7.017228E-01*Log(E) ) +
                                   ( -1.776439E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.75keV )
       Stop channel:            8000 (  2000.57keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
0

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    2
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1
                                       Page 1
```

Ge5 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1877

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.93	102.	0.14	0.75	7.146E-02	29.46	20.350	PBC<MDA	I129
46.66	414.	12.87	0.65	7.098E-02	46.54	4.250	3.179E+00	PB210
59.65	80.	33.94	0.71	7.060E-02	59.54	35.700	7.300E-02	AM241
63.18	340.	14.64	0.84	7.034E-02	63.29	4.820	2.322E+00	TH234
74.83	114.	25.18	0.78	6.946E-02				
77.10	91.	30.11	0.78	6.929E-02				
84.34	74.	32.20	0.44	6.875E-02				
92.62	549.	10.31	1.09	6.772E-02	92.59	5.570	3.367E+00	TH234
185.73	327.	15.49	0.92	4.627E-02	185.71	57.200	2.861E-01	U235
					186.21	3.590	4.570E+00	Ra226
238.72	164.	27.40	0.69	3.699E-02	238.63	43.300	2.362E-01	PB212
338.06	31.	0.43	1.04	2.700E-02	338.28	2.790	PBC<MDA	RA223
351.81	195.	22.22	0.90	2.606E-02				
511.11	1014.	5.24	2.08	1.851E-02				
583.25	90.	23.25	0.78	1.638E-02	583.19	84.500	1.505E-01	TL208
609.47	162.	20.78	1.01	1.572E-02	609.31	46.090	5.158E-01	BI214
662.05	150.	19.17	1.43	1.456E-02	661.66	85.210	2.798E-01	CS137
1173.48	41.	36.79	1.77	8.488E-03	1173.24	99.900	PBC<MDA	CO60
1332.05	125.	20.63	1.02	7.518E-03				
1461.10	43.	27.61	1.99	6.882E-03	1460.83	10.670	1.351E+00	K40
1764.57	44.	23.86	0.33	5.736E-03	1764.49	15.400	1.162E+00	BI214

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
298.47	74.83	392.	106.	0.002	67.56	0.809	PB-214	s
307.56	77.10	307.	79.	0.002	75.51	0.760	PB-214	
1407.10	351.81	306.	195.	0.005	44.45	0.904	PB-214	l
2044.52	511.11	240.	1014.	0.023	10.47	2.077	TL-208	s

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STL- St Louis Spectrum name: Ge5 background 11_21_07.An1
Page 2

Ge5 background 11_21_07.Rpt

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected
5328.04	1332.05	79.	100.	0.002	32.20	1.021	CO-60 s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.14	29.78	830.	102.	0.002	0.28	0.749D
PB-210	185.71	46.66	583.	414.	0.010	25.73	0.654s
AM-241	237.70	59.65	260.	80.	0.002	67.89	0.710
TH-234	251.85	63.18	534.	340.	0.008	29.27	0.841s
TH-234	369.69	92.62	568.	549.	0.013	20.62	1.088s
RA-223	576.28	144.23	424.	-4.	0.000	-30.17	0.847D
Ra-226	744.31	186.21	464.	327.	0.008	21.65	0.916D
PB-212	954.48	238.72	410.	164.	0.004	54.79	0.693s
RA-223	1352.94	338.28	354.	-2.	0.000	-30.17	1.040D
AC-228	1353.09	338.32	340.	31.	0.001	0.85	1.040D
PB-214	1407.50	351.92	329.	125.	0.003	44.77	1.053s
TL-208	2333.17	583.25	87.	90.	0.002	46.51	0.781s
BI-214	2438.11	609.47	176.	162.	0.004	41.57	1.012
CS-137	2648.46	662.05	116.	150.	0.003	38.34	1.432s
CO-60	4694.02	1173.48	96.	41.	0.001	73.58	1.772s
K-40	5843.97	1461.10	49.	43.	0.001	55.23	1.988
BI-214	7056.93	1764.57	11.	44.	0.001	47.72	0.329s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	2.9643E-03					
			477.61	2.964E-03	%(	9.373E-01 9.29E+03 G	
			1 of 1 peaks found				
K-40	N	1.3513E+00					
			1460.83	1.351E+00	?(	1.110E+00 2.76E+01 G	
			1 of 1 peaks found				

0

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STL- St Louis Spectrum name: Ge5 background 11_21_07.Anl

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 9.5390E-02					
		1332.50	7.761E-02	%(	1.333E-01 5.28E+01 G	
		1173.24	1.132E-01	(	1.318E-01 3.68E+01 G	

```
                                Ge5 background 11_21_07.Rpt
                                  2 of   2 peaks found

I-129     I   8.6894E-02
                                29.78 8.689E-02 }   1.172E-01 1.40E-01 X
                                33.61-3.808E-02 &   3.942E-01 3.09E+02 X
                                39.57 8.689E-02 %(  4.761E-01 1.64E+02 G
                                34.61-1.386E-01 %   1.664E+00 3.58E+02 X
                                  4 of   5 peaks found

CS-137    I   2.7980E-01
                               661.66 2.798E-01 @(  9.868E-02 1.92E+01 G
                                  1 of   1 peaks found

TL-208    N   1.5053E-01
                               583.19 1.505E-01 *(  7.723E-02 2.33E+01 G
                               860.56 1.989E-01 %   9.708E-01 1.44E+02 G
                                  2 of   2 peaks found

PB-210    N   3.1792E+00
                                46.54 3.179E+00  (  8.839E-01 1.29E+01 G
                                  1 of   1 peaks found

PB-212    N   2.3621E-01
                               238.63 2.362E-01  (  1.402E-01 2.74E+01 G
                               300.10 3.484E-01 %   2.091E+00 1.79E+02 G
                                  2 of   2 peaks found

PB-214    N   2.9533E-01
                               351.93 2.953E-01  (  2.061E-01 2.24E+01 G
                               295.22 2.432E-01 %   3.647E-01 4.60E+01 G
                               242.00 1.720E-01 &   8.469E-01 1.47E+02 G
                                  3 of   3 peaks found

BI-214    N   5.1580E-01
                               609.31 5.158E-01  (  2.058E-01 2.08E+01 G
                              1764.49 1.162E+00 +   4.698E-01 2.39E+01 G
                              1120.29 2.913E-01 &   7.470E-01 7.69E+01 G
                               768.36 7.370E-01 %   2.029E+00 8.25E+01 G
                                  4 of   4 peaks found

RA-223    N  -5.2038E-02
                                83.79-4.616E-02 %   1.480E-01 9.64E+01 X
                               269.46-5.204E-02 &(  5.080E-01 2.90E+02 G
                               154.21-7.645E-02 %   7.471E-01 2.90E+02 G
                               144.23-5.204E-02 }   1.255E+00 ******** G
                               323.87-8.898E-02 %   1.870E+00 6.20E+02 G
                               338.28-5.204E-02 }   2.778E+00 ******** G
                                  6 of   6 peaks found

RA-224    N  -7.1857E-01
                               240.99-7.186E-01 %(  1.725E+00 7.26E+01 G
                                  1 of   1 peaks found
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.3763E-01
                               911.20 2.376E-01 %(  4.360E-01 5.60E+01 G
                               968.97 2.100E-01 %   7.716E-01 1.09E+02 G
                               338.32 2.376E-01 }   6.746E-01 4.26E-01 G
```

```
                                Ge5 background 11_21_07.Rpt
                                  3 of   3 peaks found

TH-234    N   2.3217E+00
                                63.29 2.322E+00 @(  7.538E-01 1.46E+01 G
                                92.59 3.367E+00 +   6.983E-01 1.03E+01 G
                                  2 of   2 peaks found

U-235     N   0.0000E+00
                               143.76 2.214E-01 }   3.882E-01 5.34E+01 G
                               163.36 4.277E-01 }   8.636E-01 6.13E+01 G
                               205.31 3.536E-01 }   1.095E+00 9.31E+01 G
                                  3 of   4 peaks found

Ra-226    N   4.5696E+00
                               186.21 4.570E+00 }(  1.440E+00 1.08E+01 G
                                  1 of   1 peaks found

AM-241    T   7.3002E-02
                                59.54 7.300E-02  (  7.142E-02 3.39E+01 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
0

  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    6
 STL- St Louis                   Spectrum name: Ge5 background 11_21_07.An1

   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


 *************** D I S C A R D E D   I S O T O P E   P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  2 Sigma %

 PB-214     351.92      329.       125.     0.003     44.77   2.953E-01
                                   Page 5
```

Ge5 background 11_21_07.Rpt

CO-60	1173.48	96.	41.	0.001	73.58	1.132E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	2.9643E-03	1.8576E+04%	9.373E-01
K-40	#	1.3513E+00	5.5227E+01%	1.110E+00
CO-60	#A	9.5390E-02	6.4328E+01%	1.333E-01
I-129	#A	8.6894E-02	3.2744E+02%	4.761E-01
CS-137	#	2.7980E-01	3.8336E+01%	9.868E-02
TL-208	#	1.5053E-01	4.6508E+01%	7.723E-02
PB-210	#	3.1792E+00	2.5734E+01%	8.839E-01
PB-212		2.3621E-01	5.4790E+01%	1.402E-01
PB-214	#	2.9533E-01	4.4766E+01%	2.061E-01
BI-214		5.1580E-01	4.1569E+01%	2.058E-01
RA-223	#A	-5.2038E-02	5.7978E+02%	5.080E-01
RA-224	#A	-7.1857E-01	1.4516E+02%	1.725E+00
AC-228	#A	2.3763E-01	1.1204E+02%	4.360E-01
TH-234	#	2.3217E+00	2.9270E+01%	7.538E-01
U-235	#A	0.0000E+00	1.8625E+02%	1.095E+00
Ra-226		4.5696E+00	2.1655E+01%	1.440E+00
AM-241		7.3002E-02	6.7890E+01%	7.142E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.6 keV) 1.268E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 7
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Laboratory: STL- St Louis

Ge7 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    1
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1

Sample description
     Ge7 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge7 bkgd\Ge7 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:50:18
       Live time:              43200
       Real time:              44220
       Dead time:                  2.31 %
       Detector ID:                    7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   Ge7 air filter 01_04_07.Clb
     Ge7 air filter 74140-334 01_04_07


       Energy Calibration
            Created:               04-Jan-2007 09:44:57
            Zero offset:           0.082 keV
            Gain:                  0.250 keV/channel
            Quadratic:             5.157E-09 keV/channel^2

       Efficiency Calibration
            Created:               04-Jan-2007 09:55:23
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.37 %
            Log(Eff):              6.564924E-01 + (-4.575726E-01*Log(E) ) +
                                   ( -3.880790E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.19 %
            Log(Eff):             -6.453588E+00 + ( 1.933612E+00*Log(E) ) +
                                   ( -2.285762E-01*Log(E)^2 )

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.58keV )
       Stop channel:            8000 (  2000.15keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    2
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1
                                       Page 1
```

Ge7 background 11_21_07.Rpt

Random error: 0.0000000E+00
Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 10 cutoff 20.00000 %

Energy Calibration
Normalized diff: 0.2579

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
23.39	188.	17.26	0.62	7.211E-02				
29.55	453.	11.10	0.94	7.991E-02	29.46	20.350	6.457E-01	I129
33.20	135.	27.90	0.47	8.331E-02				
40.27	166.	27.61	0.76	8.808E-02				
46.28	578.	11.03	0.77	9.072E-02	46.54	4.250	3.470E+00	PB210
63.10	498.	9.75	0.76	9.386E-02	63.29	4.820	2.548E+00	TH234
74.41	97.	24.75	0.88	9.388E-02				
77.06	125.	20.92	0.88	9.373E-02				
92.57	671.	8.34	0.99	9.212E-02	92.59	5.570	3.027E+00	TH234
143.96	102.	30.64	0.61	7.609E-02	143.76	10.960	2.842E-01	U235
145.13	1.	10.64	0.95	7.597E-02	144.23	3.220	PBC<MDA	RA223
185.59	330.	10.26	1.07	6.127E-02	185.71	57.200	2.178E-01	U235
197.70	154.	31.14	0.41	5.800E-02				
239.12	229.	23.87	1.02	4.911E-02	238.63	43.300	2.488E-01	PB212
337.98	32.	0.33	1.16	3.598E-02	338.28	2.790	PBC<MDA	RA223
346.03	83.	27.40	0.53	3.525E-02				
351.88	69.	36.45	1.18	3.471E-02	351.93	37.600	PBC<MDA	PB214
583.49	58.	39.50	1.42	2.168E-02	583.19	84.500	PBC<MDA	TL208

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
93.24	23.39	273.	188.	0.004	34.51	0.619	SN-113	s
117.91	29.55	519.	453.	0.010	22.20	0.936	TE-132	l
132.50	33.20	385.	135.	0.003	55.79	0.465	BA-139	l
160.78	40.27	527.	101.	0.002	67.63	0.756	EU-152	s
297.58	74.47	297.	91.	0.002	67.11	0.693	PB-214	
308.21	77.12	258.	104.	0.002	55.87	0.612	PB-214	s

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 3
Page 2

Ge7 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
575.58	143.96	252.	102.	0.002	61.28	0.606	U-235	l
742.11	185.59	232.	330.	0.008	20.52	1.073	U-235	l
790.56	197.70	412.	154.	0.004	62.28	0.414	KR-89	sM
1383.93	346.03	117.	83.	0.002	54.79	0.534	HF-181	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.81	29.78	642.	281.	0.007	24.80	0.827D
I-129	133.40	33.43	566.	89.	0.002	78.15	0.831s
PB-210	184.80	46.28	634.	578.	0.013	22.05	0.767
TH-234	252.09	63.10	413.	498.	0.012	19.50	0.762s
TH-234	370.01	92.57	492.	671.	0.016	16.68	0.985s
RA-223	576.67	144.23	412.	1.	0.000	21.28	0.954D
Ra-226	744.60	186.21	407.	266.	0.006	24.76	1.000D
PB-212	956.25	239.12	460.	229.	0.005	47.75	1.021s
AC-228	1353.09	338.32	350.	32.	0.001	0.67	1.164D
PB-214	1407.31	351.88	284.	69.	0.002	72.91	1.179s
TL-208	2333.81	583.49	232.	58.	0.001	79.01	1.417s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-2.6217E-01					
			477.61	-2.622E-01	%(	6.113E-01 7.04E+01	G
			1 of 1 peaks found				
K-40	N	-7.6775E-02					
			1460.83	-7.677E-02	%(	1.012E+00 3.78E+02	G
			1 of 1 peaks found				
CO-60	F	1.6295E-03					
			1332.50	1.630E-03	%(	9.943E-02 1.73E+03	G
			1173.24	3.709E-02	%	9.526E-02 7.70E+01	G
			2 of 2 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 4
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments

Page 3

Ge7 background 11_21_07.Rpt

```
I-129     I   2.2928E-01
                          29.78 2.147E-01 }   9.218E-02 1.24E+01 X
                          29.46 7.217E-02 }   1.816E-01 7.51E+01 X
                          33.61 2.419E-01     3.072E-01 3.91E+01 X
                          39.57 2.293E-01 %(  4.135E-01 5.49E+01 G
                          34.61-2.853E-01 &   1.439E+00 1.51E+02 X
                            5 of   5 peaks found

CS-137    I   2.5282E-02
                         661.66 2.528E-02 %(  9.732E-02 1.15E+02 G
                            1 of   1 peaks found

TL-208    N   7.3008E-02
                         583.19 7.301E-02 *(  9.303E-02 3.95E+01 G
                         860.56 4.559E-01 %   6.885E-01 4.66E+01 G
                            2 of   2 peaks found

PB-210    N   3.4696E+00
                          46.54 3.470E+00  (  7.203E-01 1.10E+01 G
                            1 of   1 peaks found

PB-212    N   2.4885E-01
                         238.63 2.488E-01 *(  1.116E-01 2.39E+01 G
                         300.10 4.881E-01 %   1.607E+00 9.88E+01 G
                            2 of   2 peaks found

PB-214    N   1.2280E-01
                         351.93 1.228E-01 @(  1.441E-01 3.65E+01 G
                         295.22 1.042E-01 &   2.667E-01 7.72E+01 G
                         242.00-7.215E-02 %   6.071E-01 2.50E+02 G
                            3 of   3 peaks found

BI-214    N   1.2372E-01
                         609.31 1.237E-01 %(  1.679E-01 4.20E+01 G
                        1764.49 3.233E-01 &   7.856E-01 7.30E+01 G
                        1120.29 1.921E-03 &   6.110E-01 9.08E+03 G
                         768.36-1.636E-02 &   1.410E+00 2.48E+03 G
                            4 of   4 peaks found

RA-223    N   5.2717E-03
                          83.79 6.497E-02 %   1.154E-01 5.41E+01 X
                         269.46 5.272E-03 &(  3.606E-01 2.02E+03 G
                         154.21 6.698E-02 &   5.727E-01 2.54E+02 G
                         144.23 5.272E-03 }   9.207E-01 1.06E+01 G
                         323.87 3.705E-01 &   1.454E+00 1.17E+02 G
                            5 of   6 peaks found

RA-224    N  -1.4485E-01
                         240.99-1.448E-01 %(  1.279E+00 2.63E+02 G
                            1 of   1 peaks found

AC-228    N   1.8327E-01
                         911.20 1.833E-01 %(  3.531E-01 5.87E+01 G
                         968.97 2.459E-01 %   5.187E-01 6.39E+01 G
                         338.32 1.833E-01 }   5.128E-01 3.35E-01 G
                            3 of   3 peaks found
```

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 5
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments

Page 4

Ge7 background 11_21_07.Rpt

```
TH-234    N   2.8048E+00
                          63.29 2.548E+00 @(  4.984E-01 9.75E+00 G
                          92.59 3.027E+00 @(  4.785E-01 8.34E+00 G
                            2 of   2 peaks found

U-235     N   3.7275E-02
                         185.71 2.114E-02 }(  7.270E-02 1.03E+02 G
                         163.36 2.303E-01 }(  6.865E-01 8.97E+01 G
                         205.31 2.573E-02 }(  8.217E-01 9.44E+02 G
                            3 of   4 peaks found

Ra-226    N   2.8025E+00
                         186.21 2.803E+00 }(  1.021E+00 1.24E+01 G
                            1 of   1 peaks found

AM-241    T   1.4071E-02
                          59.54 1.407E-02 %(  6.420E-02 1.36E+02 G
                            1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 6
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	642.	281.	0.007	24.80	2.147E-01
I-129	33.43	566.	89.	0.002	78.15	2.419E-01

Ge7 background 11_21_07.Rpt

PB-214	351.88	284.	69.	0.002	72.91	1.228E-01
TL-208	583.49	232.	58.	0.001	79.01	7.301E-02

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity Bq/sample	Time of Count Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.6217E-01	1.4087E+02%	6.113E-01
K-40	#A	-7.6775E-02	7.5553E+02%	1.012E+00
CO-60	#A	1.6295E-03	3.4689E+03%	9.943E-02
I-129	#A	2.2928E-01	1.0977E+02%	4.135E-01
CS-137	#A	2.5282E-02	2.2936E+02%	9.732E-02
TL-208	#A	7.3008E-02	7.9007E+01%	9.303E-02
PB-210		3.4696E+00	2.2051E+01%	7.203E-01
PB-212	#	2.4885E-01	4.7748E+01%	1.116E-01
PB-214	#A	1.2280E-01	7.2905E+01%	1.441E-01
BI-214	#A	1.2372E-01	8.3934E+01%	1.679E-01
RA-223	#A	5.2717E-03	4.0366E+03%	3.606E-01
RA-224	#A	-1.4485E-01	5.2575E+02%	1.279E+00
AC-228	#A	1.8327E-01	1.1731E+02%	3.531E-01
TH-234	#	2.8048E+00	1.2828E+01%	4.984E-01
U-235	A	3.7275E-02	1.7944E+02%	8.217E-01
Ra-226		2.8025E+00	2.7743E+01%	1.021E+00
AM-241	#A	1.4071E-02	2.7247E+02%	6.420E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.2 keV) 9.363E+00 Bq/sample

Analyzed by: _____
403605

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 7
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge8 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    1
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1

Sample description
     Ge8 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge8 bkgd\Ge8 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:52:01
       Live time:              43200
       Real time:              44857
       Dead time:                  3.69 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   Ge8 air filter interp_122_quad.Clb
     Ge8  air filter_interp>122<quad


       Energy Calibration
            Created:               06-Nov-2006 15:12:36
            Zero offset:           0.014 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.050E-09 keV/channel^2

       Efficiency Calibration
            Created:               06-Nov-2006 15:14:26
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.61 %
            Log(Eff):              5.381757E-01 + (-5.615420E-01*Log(E) ) +
                                   ( -2.515438E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.52keV )
       Stop channel:            8000 (  2000.35keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    2
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1
                                       Page 1
```

Ge8 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1437

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
25.85	439.	17.91	0.98	7.362E-02				
29.52	518.	9.97	1.11	7.364E-02	29.46	20.350	7.999E-01	I129
63.12	715.	5.42	0.88	7.330E-02	63.29	4.820	4.686E+00	TH234
84.28	175.	21.65	0.90	7.044E-02	83.79	25.180	2.282E-01	RA223
92.47	1398.	5.34	1.10	6.915E-02	92.59	5.570	8.402E+00	TH234
143.63	200.	22.54	1.08	5.660E-02	143.76	10.960	7.488E-01	U235
185.64	683.	7.50	1.00	4.588E-02	185.71	57.200	6.026E-01	U235
238.54	182.	14.96	1.31	3.726E-02	238.63	43.300	2.605E-01	PB212
295.25	68.	38.42	1.04	3.113E-02	295.22	19.300	PBC<MDA	PB214
338.25	38.	0.33	1.07	2.772E-02	338.28	2.790	1.569E+00	RA223
511.02	945.	5.33	2.38	1.941E-02				
598.49	154.	25.28	0.27	1.689E-02				
609.45	64.	35.63	1.28	1.662E-02	609.31	46.090	PBC<MDA	BI214
898.43	68.	24.98	0.28	1.175E-02				
1461.18	53.	25.04	1.84	7.527E-03	1460.83	10.670	1.526E+00	K40

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
103.30	25.85	1327.	439.	0.010	25.33	0.977	CD-109	s
117.99	29.52	678.	518.	0.012	19.94	1.107	TE-132	l
742.34	185.64	388.	683.	0.016	15.00	0.995	U-235	l
2043.55	511.02	222.	945.	0.022	10.66	2.376	TL-208	s
2393.36	598.49	198.	154.	0.004	50.56	0.267	-	sM
3592.89	898.43	49.	68.	0.002	49.96	0.284	PA-234	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 3
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.

Ge8 background 11_21_07.Rpt

L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.04	29.78	1112.	348.	0.008	0.09	0.812D
TH-234	252.37	63.12	262.	715.	0.017	10.84	0.876
RA-223	337.73	84.47	568.	111.	0.003	63.59	0.858s
TH-234	369.72	92.47	715.	1398.	0.032	10.68	1.100s
U-235	574.85	143.76	431.	140.	0.003	45.31	1.085D
RA-223	576.73	144.23	414.	22.	0.001	0.55	0.910D
Ra-226	744.60	186.21	403.	563.	0.013	13.14	0.946D
PB-212	953.86	238.54	176.	182.	0.004	29.92	1.309s
PB-214	1180.65	295.25	305.	68.	0.002	76.83	1.036s
AC-228	1352.89	338.32	315.	38.	0.001	0.67	1.071D
BI-214	2437.17	609.45	229.	64.	0.001	71.27	1.282s
K-40	5843.55	1461.18	61.	53.	0.001	50.07	1.843s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-2.4489E-01					
			477.61	-2.449E-01	%(	7.495E-01 9.17E+01	G
			1 of 1 peaks found				
K-40	N	1.5256E+00					
			1460.83	1.526E+00	@(	1.130E+00 2.50E+01	G
			1 of 1 peaks found				
CO-60	F	-1.7283E-03					
			1332.50	-1.728E-03	&(	1.225E-01 2.02E+03	G
			1173.24	-2.257E-02	%	1.247E-01 1.62E+02	G
			2 of 2 peaks found				
I-129	I	2.8897E-01					
			29.78	2.890E-01	}	1.314E-01 4.30E-02	X
			33.61	1.305E-01	%	4.324E-01 9.98E+01	X

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 4
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		39.57	2.890E-01	%(	4.905E-01 5.17E+01	G
		34.61	6.433E-01	&	1.630E+00 7.66E+01	X
		4 of 5 peaks found				
CS-137	I	3.6626E-02				

```
                                Ge8 background 11_21_07.Rpt
                               661.66 3.663E-02 &(  1.022E-01 8.37E+01 G
                                  1 of   1 peaks found

TL-208    N   4.6043E-02
                               583.19 4.604E-02 &(  1.122E-01 7.35E+01 G
                               860.56 1.757E-01 %   7.705E-01 1.29E+02 G
                                  2 of   2 peaks found

PB-210    N   4.2338E-01
                                46.54 4.234E-01 %(  8.404E-01 6.03E+01 G
                                  1 of   1 peaks found

PB-212    N   2.6051E-01
                               238.63 2.605E-01  (  9.250E-02 1.50E+01 G
                               300.10 5.416E-01 %   1.886E+00 1.04E+02 G
                                  2 of   2 peaks found

PB-214    N   1.5095E-01
                               351.93 9.453E-02 %(  1.895E-01 6.09E+01 G
                               295.22 2.609E-01 *(  3.237E-01 3.84E+01 G
                               242.00 2.345E-01 %   7.541E-01 9.65E+01 G
                                  3 of   3 peaks found

BI-214    N   1.9362E-01
                               609.31 1.936E-01 *(  2.211E-01 3.56E+01 G
                              1764.49 4.167E-01 %   7.719E-01 5.68E+01 G
                              1120.29 1.241E-01 %   7.957E-01 1.88E+02 G
                               768.36-3.096E-01 &   1.899E+00 1.80E+02 G
                                  4 of   4 peaks found

RA-223    N   2.7553E-01
                                83.79 1.448E-01 *   1.483E-01 3.18E+01 X
                               269.46-8.982E-02 &(  4.789E-01 1.59E+02 G
                               154.21 2.897E-02 &   7.497E-01 7.65E+02 G
                               144.23 2.755E-01 }   1.244E+00 2.77E-01 G
                               323.87 1.690E-02 %   1.742E+00 3.03E+03 G
                                  5 of   6 peaks found

RA-224    N  -7.0362E-02
                               240.99-7.036E-02 &(  1.628E+00 6.86E+02 G
                                  1 of   1 peaks found

AC-228    N   2.7845E-01
                               911.20 2.784E-01 %(  4.056E-01 4.51E+01 G
                               968.97 3.615E-01 %   6.834E-01 5.76E+01 G
                               338.32 2.784E-01 }   6.330E-01 3.34E-01 G
                                  3 of   3 peaks found

TH-234    N   4.6861E+00
                                63.29 4.686E+00  (  5.121E-01 5.42E+00 G
                                92.59 8.402E+00 +   7.655E-01 5.34E+00 G
                                  2 of   2 peaks found
```



```
 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235     N   1.2819E-01
                               185.71 5.276E-02 }(  1.331E-01 7.63E+01 G
                               143.76 5.218E-01 }(  3.715E-01 2.27E+01 G
                                  2 of   4 peaks found
```

Ge8 background 11_21_07.Rpt

```
Ra-226   N   7.9373E+00
                          186.21 7.937E+00 }(  1.356E+00 6.57E+00 G
                             1 of   1 peaks found

AM-241   T  -7.7932E-03
                          59.54-7.793E-03 &(  9.695E-02 3.70E+02 G
                             1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	1112.	348.	0.008	0.09	2.890E-01
RA-223	84.47	568.	111.	0.003	63.59	1.448E-01
RA-223	144.23	414.	22.	0.001	0.55	2.755E-01
PB-214	295.25	305.	68.	0.002	76.83	2.609E-01
BI-214	609.45	229.	64.	0.001	71.27	1.936E-01

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 6
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40	1461.18		61.	53.	0.001	50.07	1.526E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Activity Bq/sample	Time of Count Uncertainty 2 Sigma Counting	MDA Bq/sample

Ge8 background 11_21_07.Rpt

Be-7	#A	-2.4489E-01	1.8340E+02%	7.495E-01
K-40	#	1.5256E+00	5.0072E+01%	1.130E+00
CO-60	#A	-1.7283E-03	4.0408E+03%	1.225E-01
I-129	#A	2.8897E-01	1.0349E+02%	4.905E-01
CS-137	#A	3.6626E-02	1.6736E+02%	1.022E-01
TL-208	#A	4.6043E-02	1.4698E+02%	1.122E-01
PB-210	#A	4.2338E-01	1.2054E+02%	8.404E-01
PB-212		2.6051E-01	2.9920E+01%	9.250E-02
PB-214	#A	1.5095E-01	7.1988E+01%	1.895E-01
BI-214	#A	1.9362E-01	7.1268E+01%	2.211E-01
RA-223	#A	2.7553E-01	4.3437E+01%	4.789E-01
RA-224	#A	-7.0362E-02	1.3722E+03%	1.628E+00
AC-228	#A	2.7845E-01	9.0216E+01%	4.056E-01
TH-234		4.6861E+00	1.0837E+01%	5.121E-01
U-235	#A	1.2819E-01	4.5306E+01%	1.021E+00
Ra-226		7.9373E+00	1.4531E+01%	1.356E+00
AM-241	#A	-7.7932E-03	7.3956E+02%	9.695E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 2000.3 keV) 1.301E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Run Log

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/22/7	7353501	KEGTHIMA	8	2 hrs	1L Marn	e
		KEIFMWICA	7			
		KEIFMWICJ	8			
12/23/7	Daily	Bkg + Source	1,3-8	20+3 min	QA	e
12/23/7	7357010	KEKAMIAC	4	30 min	tuna can	
		KEKAWIAC	5			
		KEKAZIAC	7			
12/23/07	7357010	KEKAMIAD	1	30min	Tuna Can	LW
		KEKAHIAC	3			
		KEKATIAC	4			
		KEKAGIAC	5			
		KEKCCIAC	7			
		KEKCDIAC	1			
		KEKCEIAC	3			
		KEKCFIAC	4			
		KEKCHIAC	5			
		KEKCJIAC	7			
		KEKCKIAC	1			
		KEKCMIAC	3			
		KEKCPIAC	4			
		KEKCQIAC	5			
		KEKCRIAC	7			
		KEQKRIMA	1			e
		KEQKRIAC	3			
	7352122	KEKFEIAC	4			
		KEKFFIAC	5			
		KEKFGIAC	7			

Reviewed By: _____ Date: 12/23/7

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/23/7	7356122	KSKF5IAD	1	30min	tumbler	[illegible]
		KSKFPIAC	3			
		KSKFTIAC	4			
		KSKFVIAC	5			
		KSKF0IAC	7			
		KSKF1IAC	1			
		KSKF5IAC	3			
		KSKF7IAC	4			
		KSKF8IAC	5			
		KSKF9IAC	7			
		KSKG0IAC	1			
		KSKGFIAC	3			
		KSKG6IAC	4			
		KSQKCIAA	5			
		KSQKCIAC	7			
12/20/7	Daily	Bkg + Source	1,3-8	20+30min	QA	SE
	7337395	KC6QE1AD	1	30min	tuna can	
		KC6QL1AD	3			
		KDCLL1AA	4			
		KDCLL1AC	5			
	M070859	1L2307-1	7			

Reviewed By:_____ Date:_____

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gamma Spectroscopy

Batch: 7356122 **Prep Analyst:** 402899

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200262-001	KEKFE1AC	2.5140E+002 g	1.00	2.5140E+002 g	Tuna Can
F7L200262-001X	KEKFE1AD	2.5140E+002 g	1.00	2.5140E+002 g	Tuna Can
F7L200262-002	KEKFF1AC	2.8340E+002 g	1.00	2.8340E+002 g	Tuna Can
F7L200262-003	KEKFG1AC	2.9390E+002 g	1.00	2.9390E+002 g	Tuna Can
F7L200262-004	KEKFP1AC	2.7970E+002 g	1.00	2.7970E+002 g	Tuna Can
F7L200262-005	KEKFT1AC	2.5510E+002 g	1.00	2.5510E+002 g	Tuna Can
F7L200262-006	KEKFV1AC	3.0500E+002 g	1.00	3.0500E+002 g	Tuna Can
F7L200262-007	KEKF01AC	2.3110E+002 g	1.00	2.3110E+002 g	Tuna Can
F7L200262-008	KEKF11AC	3.1520E+002 g	1.00	3.1520E+002 g	Tuna Can
F7L200262-009	KEKF51AC	2.6460E+002 g	1.00	2.6460E+002 g	Tuna Can
F7L200262-010	KEKF71AC	2.6930E+002 g	1.00	2.6930E+002 g	Tuna Can
F7L200262-011	KEKF81AC	2.5590E+002 g	1.00	2.5590E+002 g	Tuna Can
F7L200262-012	KEKF91AC	2.9160E+002 g	1.00	2.9160E+002 g	Tuna Can
F7L200262-013	KEKGD1AC	2.5800E+002 g	1.00	2.5800E+002 g	Tuna Can
F7L200262-014	KEKGF1AC	2.7570E+002 g	1.00	2.7570E+002 g	Tuna Can
F7L200262-015	KEKGG1AC	2.3770E+002 g	1.00	2.3770E+002 g	Tuna Can
F7L220000-122B	KEQKC1AA	3.7280E+002 g	1.00	3.7280E+002 g	Tuna Can

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L220000-122C	KEQKC1AC	3.5120E+002 g	1.00	3.5120E+002 g	Tuna Can

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
F7L220000-122C	GV Tuna Can	AM-241	2.289E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	1.031E+002 pCi/g
F7L220000-122C	GV Tuna Can	CO-60	1.392E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	6.272E+001 pCi/g
F7L220000-122C	GV Tuna Can	CS-137	8.884E+001 dpm/g	351.20 g	4/1/2004 12:00:00AM	4.002E+001 pCi/g

Spiked By | Spike Verified By | Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐ STL-RC-0025	Preparation Of Samples For Gamma Spectroscopy	4.00
☐ STL-RD-0101	Daily Operations Of A Germanium Spectroscopy System	6.00
☐ STL-RD-0103	Maintenance Of The Germanium Spectroscopy System	0.00

DR — Reviewed By
12-27-07 — Review Date

JP — Analyst/Relenquished By
12/27/07 — Release Date
MC — Received By
12-27-07 — Receipt Date

Reprint, spike info correction per RR 12/27/07

DB Analysis ID: 32,979

Sample Description: 7356122_KEKFE1AC_F7L200262-001

Spectrum Filename: KEKFE1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:05:32PM		
Live Time:	1800.00	Real Time:	1804.40
Dead Time:	0.24 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.0857

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
185.80	46.49	111.26	23.74	0.013	66.11	0.561		s
299.10	74.82	253.33	234.67	0.130	15.31	0.869	PB-214	
308.54	77.18	142.00	366.00	0.203	7.69	0.959	PB-214	
349.10	87.24	119.52	99.48	0.055	18.50	0.855	PB-214	D
360.23	90.11	145.32	72.68	0.040	26.23	0.476	PB-214	s
372.59	93.20	255.00	0.00	0.000	2258.32	0.328		s
516.86	129.28	53.02	71.98	0.040	18.54	0.631	AC-228	s
1179.36	294.94	161.38	27.62	0.015	67.77	0.928		s
1352.17	338.15	119.30	15.70	0.009	101.59	1.118		s
1406.12	351.64	253.74	47.26	0.026	49.84	1.145		
3644.30	911.01	100.70	33.30	0.019	46.00	1.047		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.89	46.51	108.45	10.45	0.006	45.97	0.819	s
AM-241	1	246.67	61.71	130.99	-4.39	-0.002	371.67	0.830	s
TH-234	1	253.33	63.38	206.37	24.12	0.013	51.09	0.834	s
EU-155	1	345.96	86.54	315.82	0.00	0.000	2513.26	0.854	D
TH-234	1	371.07	92.82	215.52	79.23	0.044	21.35	0.859	s
AC-228	1	373.18	93.35	298.90	0.00	0.000	1994.99	0.860	s D
U-235	1	373.18	93.35	140.44	11.62	0.006	18.59	0.860	s D
EU-155	1	421.55	105.45	74.67	52.33	0.029	33.16	0.581	s
EU-152	1	482.54	120.70	90.35	5.09	0.003	267.96	0.885	s
EU-154	1	491.75	123.00	125.00	7.13	0.004	225.03	0.886	s
Pa-234	1	523.43	130.93	155.51	-16.15	-0.009	112.00	0.894	s
U-235	1	574.76	143.76	89.81	21.94	0.012	64.71	0.904	
U-235	1	657.24	164.39	89.22	-1.45	-0.001	923.53	0.922	s
U-235	1	820.91	205.31	90.80	-6.66	-0.004	205.87	0.958	s
PB-212	1	954.01	238.60	126.62	676.38	0.376	5.51	0.911	
RA-224	1	959.04	239.85	551.69	-135.35	-0.075	26.00	0.988	s
PB-214	1	959.18	239.89	195.21	-38.99	-0.022	53.14	0.989	s
TL-208	1	1108.02	277.11	42.07	23.74	0.013	43.76	1.019	s
I-131	1	1136.79	284.30	90.42	0.00	0.000	1344.76	1.025	s
PB-214	1	1179.94	295.09	57.52	115.67	0.064	12.64	1.034	s
PB-212	1	1199.68	300.02	50.00	65.00	0.036	29.39	0.437	s
AC-228	1	1352.21	338.16	40.26	105.14	0.058	12.96	1.071	s
EU-152	1	1377.19	344.41	40.22	0.78	0.000	1151.18	1.076	s
PB-214	1	1406.24	351.67	48.25	191.50	0.106	8.55	1.082	
I-131	1	1458.85	364.82	51.62	-6.09	-0.003	171.77	1.092	s
BE-7	1	1909.97	477.60	42.47	0.00	0.000	921.68	1.185	s
CS-134	1	2258.86	564.80	30.87	0.68	0.000	1168.82	1.254	s
CS-134	1	2276.94	569.32	28.91	-1.32	-0.001	-53.62	1.259	s D
Pa-234	1	2277.54	569.47	26.94	-2.41	-0.001	-163.61	1.259	s D
TL-208	1	2331.34	582.92	14.68	177.32	0.099	8.70	1.171	
CS-134	1	2425.36	606.42	45.75	-7.98	-0.004	125.02	1.286	s
BI-214	1	2435.32	608.91	27.24	105.37	0.059	11.24	1.290	
I-131	1	2549.82	637.52	18.35	10.18	0.006	67.28	1.312	s
CS-137	1	2645.70	661.48	31.55	24.70	0.014	37.93	1.331	
EU-154	1	2897.01	724.29	56.43	-9.04	-0.005	122.09	1.378	s
BI-212	1	2907.38	726.88	25.04	39.42	0.022	24.00	1.381	
PA-234M	1	3068.55	767.15	27.75	7.93	0.004	100.45	1.411	s
EU-152	1	3110.52	777.64	20.25	1.67	0.001	388.99	1.420	s
BI-212	1	3148.80	787.20	17.42	2.80	0.002	219.43	1.425	s
CS-134	1	3178.51	794.63	22.14	0.09	0.000	7203.40	1.433	s
CS-134	1	3207.05	801.76	20.09	5.08	0.003	132.40	1.437	s
TL-208	1	3441.46	860.33	14.80	15.91	0.009	42.41	1.481	s
EU-154	1	3492.76	873.15	22.85	1.00	0.001	682.78	1.490	s
Pa-234	1	3523.05	880.71	21.56	-1.73	-0.001	386.79	1.495	s
Pa-234	1	3536.27	884.02	24.93	-2.60	-0.001	278.13	1.497	s

AC-228	1	3644.44	911.04	16.88	95.20	0.053	11.93	1.518	s
Pa-234	1	3773.94	943.40	10.05	2.14	0.001	220.56	1.543	s
EU-152	1	3856.71	964.07	37.79	5.88	0.003	153.61	1.556	s
AC-228	1	3875.54	968.78	22.27	76.92	0.043	14.33	1.559	
EU-154	1	3985.64	996.28	24.35	-3.06	-0.002	235.31	1.579	s
PA-234M	1	4004.54	1001.00	15.88	3.60	0.002	165.02	1.582	s
EU-154	1	4019.51	1004.74	15.51	-2.36	-0.001	244.51	1.585	s
EU-152	1	4442.48	1110.40	23.71	0.03	0.000	23225.74	1.659	s
BI-214	1	4482.03	1120.27	24.12	14.61	0.008	39.62	1.665	s
CO-60	1	4691.99	1172.71	16.33	-3.18	-0.002	188.44	1.701	s
EU-154	1	5101.51	1274.99	12.41	4.51	0.003	120.11	1.768	s
CO-60	1	5331.84	1332.50	33.74	0.00	0.000	821.44	1.806	s
EU-152	1	5633.02	1407.71	10.03	0.51	0.000	887.80	1.854	s
K-40	1	5844.15	1460.42	2.83	215.17	0.120	6.77	0.998	s
BI-214	1	7059.22	1763.72	4.93	12.02	0.007	38.92	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code		MDA Value Becquerels	Code	Comments	
EU-152	T F	1	9.337E-002	344.29	9.337E-002	%	(		3.848E+000G		4.9E+003	26.50
			9.337E-002	121.78	2.868E-001	&			2.650E+000G		4.9E+003	28.58
			9.337E-002	778.92	8.399E-001	%			1.191E+001G		4.9E+003	12.94
			9.337E-002	964.11	3.128E+000	%			1.669E+001G		4.9E+003	14.61
			9.337E-002	1112.07	1.903E-002	%			1.630E+001G		4.9E+003	13.64
			9.337E-002	1408.00	2.603E-001	%			8.900E+000G		4.9E+003	21.00
PB-210	N	1	8.660E+000	46.54	8.660E+000	%	(	P	4.246E+001G		8.1E+003	4.25
RA-224	N	1	-7.601E+001	240.99	-7.601E+001		(		6.299E+001G		7.0E+002	4.10
EU-154	T F I	1	5.842E-001	873.23	5.842E-001	%	(		1.458E+001G		3.1E+003	12.27
			5.842E-001	123.10	2.818E-001	&			2.167E+000G		3.1E+003	40.79
			5.842E-001	1274.54	1.259E+000	%			5.339E+000G		3.1E+003	35.19
			5.842E-001	723.36	-2.736E+000	%			1.141E+001G		3.1E+003	20.22
			5.842E-001	1004.77	-1.056E+000	%			9.411E+000G		3.1E+003	18.01
			5.842E-001	996.33	-2.304E+000	%			1.938E+001G		3.1E+003	10.60
CS-134	T F I	1	-4.289E-001	604.71	-4.289E-001	%	(		1.840E+000G		7.5E+002	97.62
			-4.289E-001	795.87	7.168E-003	%			1.910E+000G		7.5E+002	85.53
			-4.289E-001	569.32	-4.289E-001	%			8.989E+000G		7.5E+002	15.38
			-4.289E-001	801.95	3.901E+000	%			1.812E+001G		7.5E+002	8.69
			-4.289E-001	563.24	3.993E-001	&			1.690E+001G		7.5E+002	8.35
EU-155	T F I	1	4.000E+000	105.31	4.000E+000	*	(		3.285E+000G		1.8E+003	21.20
			4.000E+000	86.54	0.000E+000	%			4.789E+000G		1.8E+003	30.70
PB-212	N	1	3.568E+001	238.63	3.568E+001		(	P	2.909E+000G		7.0E+002	43.30
			3.568E+001	300.03	5.525E+001	+			3.031E+001G		7.0E+002	3.28
PA-234	N	1	3.454E+001	1001.00	3.454E+001	&	(		2.040E+002G		1.6E+012	.84
			3.454E+001	766.41	1.732E+002	&			5.955E+002G		1.6E+012	.29
			3.339E+000	205.33	-2.701E+000	%			1.910E+001G		2.6E+011	5.01
			3.339E+000	163.38	-5.032E-001	&			1.619E+001G		2.6E+011	5.08
			3.339E+000	93.35	3.339E+000	!		E	1.665E+001X		2.6E+011	5.81
U-235	N	1	3.339E+000	143.79	3.339E+000	%	(		7.134E+000G		2.6E+011	10.96
AM-241	T	1	-2.696E-001	59.54	-2.696E-001	%	(		3.441E+000G		1.6E+005	35.90
AC-228	N	1	2.519E+001	911.07	2.435E+001		(		5.592E+000G		2.1E+003	29.00
			2.519E+001	968.97	3.440E+001	+			1.105E+001G		2.1E+003	17.46
			2.519E+001	338.32	2.723E+001	@	(		8.358E+000G		2.1E+003	12.01
			2.519E+001	93.35	0.000E+000	%	}	E	1.739E+001X	A	2.1E+003	5.56
I-131	T F I	1	-2.481E-001	364.48	-2.481E-001	%	(		1.475E+000G		8.0E+000	81.70
			-2.481E-001	284.30	0.000E+000	%			2.034E+001G		8.0E+000	6.14
			-2.481E-001	636.97	7.791E+000	%			1.736E+001G		8.0E+000	7.17
K-40	N	1	2.229E+002	1460.83	2.229E+002		(	P	1.093E+001G		4.7E+011	10.67
BI-212	N	1	2.050E+001	727.33	2.050E+001		(		1.353E+001G		7.0E+002	11.82
			2.050E+001	785.51	1.666E+001	%			1.321E+002G		7.0E+002	1.10
TH-234	N	1	1.758E+001	63.29	1.044E+001	%	(	P	3.013E+001G		1.6E+012	4.82
			1.758E+001	92.59	2.376E+001	@	(	P	2.132E+001G		1.6E+012	5.58
PB-214	N	1	1.644E+001	351.93	1.642E+001		(	P	3.008E+000G		5.8E+005	37.60
			1.644E+001	295.09	1.646E+001	*	(	P	5.415E+000G		5.8E+005	19.30

				1.644E+001	242.00	-1.213E+001	%		2.109E+001G	5.8E+005	7.43
CS-137	T F I		1	1.644E+000	661.66	1.644E+000		(	1.922E+000G	1.1E+004	85.21
Pa-234		N	1	-1.461E+000	131.29	-1.461E+000	%	(	5.502E+000G	1.6E+012	18.00
				-1.461E+000	569.47	-1.461E+000	%		1.634E+001G	1.6E+012	8.20
				-1.461E+000	946.02	1.222E+000	%		9.988E+000G	1.6E+012	13.40
				-1.461E+000	883.24	-1.961E+000	%		1.956E+001G	1.6E+012	9.60
				-1.461E+000	880.53	-2.081E+000	%		2.926E+001G	1.6E+012	6.00
Bi-214		N	1	1.162E+001	609.31	1.208E+001		(P	3.098E+000G	5.8E+005	46.09
				1.162E+001	1120.29	8.525E+000	%	P	1.493E+001G	5.8E+005	15.10
				1.162E+001	1764.49	1.024E+001	?	(	1.113E+001G	5.8E+005	15.40
				1.067E+001	277.28	9.773E+000	%		1.356E+001G	7.0E+002	6.31
				1.067E+001	860.56	9.062E+000	%		1.176E+001G	7.0E+002	12.42
TL-208	F	N	1	1.067E+001	583.02	1.067E+001		(P	1.237E+000G	7.0E+002	84.50
BE-7		N P C	1	0.000E+000	477.60	0.000E+000	%	(	1.340E+001G	5.3E+001	10.52
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	&	(	3.039E+000G	1.9E+003	99.98
				0.000E+000	1173.24	-2.912E-001	%		1.975E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<			921.68	921.68	1.340E+001
K-40		2.229E+002	2.229E+002	6.86	7.46	1.093E+001
CO-60	<			821.44	821.45	3.039E+000
I-131	<	-2.481E-001	-2.509E-001	171.77	171.80	1.475E+000
CS-134	<	-4.289E-001	-4.289E-001	125.02	125.06	1.840E+000
CS-137	<	1.644E+000	1.644E+000	37.93	38.04	1.922E+000
EU-152	<	9.337E-002	9.337E-002	1.151.18	1.151.18	3.848E+000
EU-154	<	5.842E-001	5.842E-001	682.78	682.79	1.458E+001
RA-224	<	-7.601E+001	-7.602E+001	26.00	26.17	6.299E+001
PB-210	<	8.660E+000	8.660E+000	137.52	137.57	4.246E+001
PB-212		3.568E+001	3.568E+001	5.59	6.34	2.909E+000
PB-214	<	1.644E+001	1.644E+001	7.86	8.36	3.008E+000
AC-228	<	2.519E+001	2.520E+001	8.81	9.27	5.592E+000
Pa-234	<	-1.461E+000	-1.461E+000	112.00	112.04	5.502E+000
AM-241	<	-2.696E-001	-2.696E-001	371.67	371.69	3.441E+000
EU-155	#	4.000E+000	4.000E+000	33.16	33.33	3.285E+000
TL-208		1.067E+001	1.067E+001	8.81	9.27	1.237E+000
BI-212	<	2.050E+001	2.050E+001	24.00	24.17	1.353E+001
BI-214	<	1.162E+001	1.162E+001	11.80	12.15	3.098E+000
TH-234	<	1.758E+001	1.758E+001	27.83	28.07	3.013E+001
PA-234M	<	3.454E+001	3.454E+001	165.02	165.05	2.040E+002
U-235	<	3.339E+000	3.339E+000	64.71	64.78	7.134E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 273.26 Bq/sample

Analyzed by: _____

403605

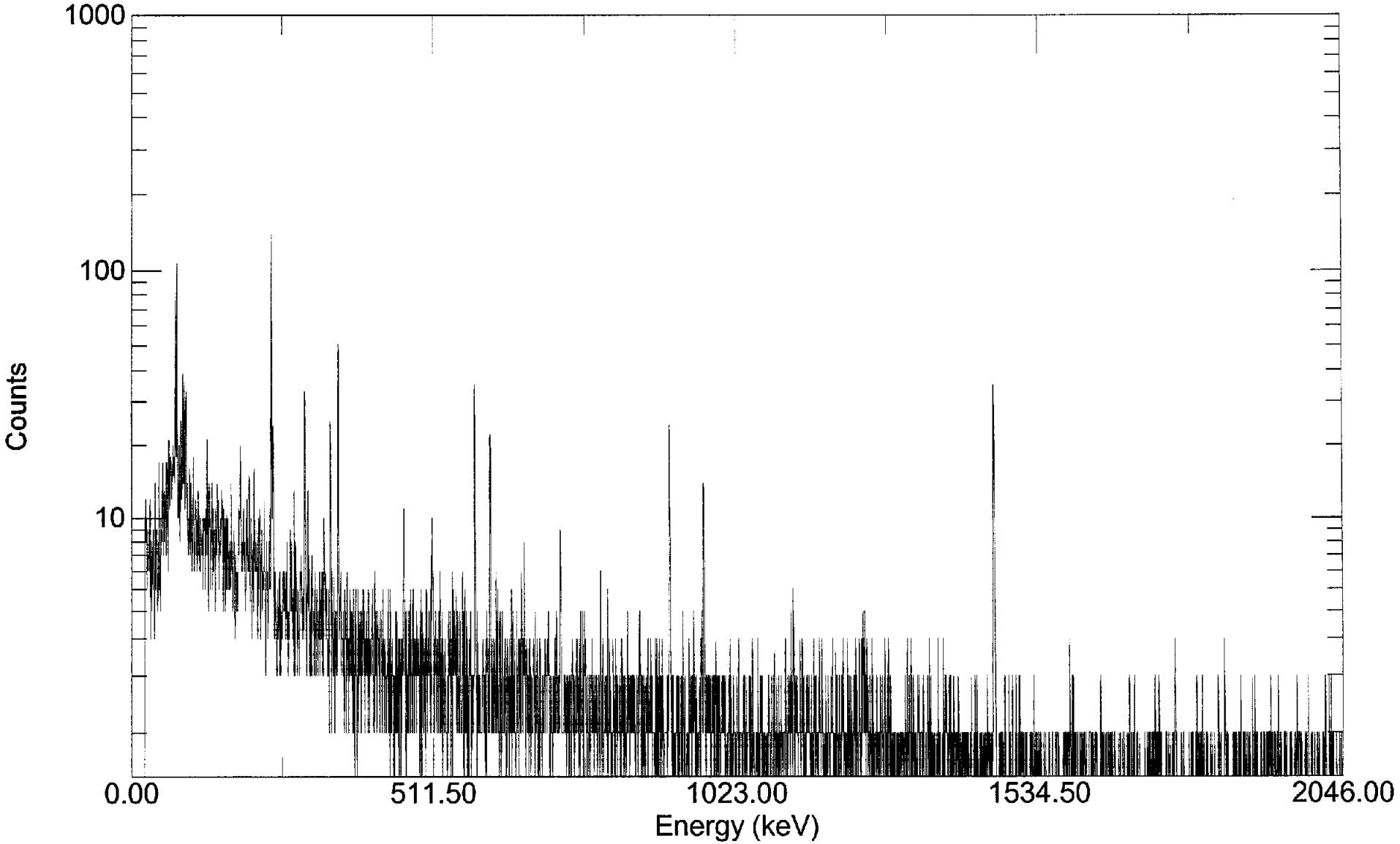
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKFE1AC

7356122_KEKFE1AC_F7L200262-001



Acquired: 23-Dec-2007 3:05:32 PM
File: C:\User\spectra\KEKFE1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.40 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,982

Sample Description: 7356122_KEKFE1AD_F7L200262-001X

Spectrum Filename: KEKFE1AD.An1

Acquisition Information

Start Time:	23-Dec-2007 3:44:51PM		
Live Time:	1800.00	Real Time:	1811.48
Dead Time:	0.63 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1138

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.87	74.68	266.33	322.67	0.179	11.36	0.948	BI-207	
307.82	77.17	283.50	484.50	0.269	8.66	0.799	PB-214	
336.18	84.26	133.10	112.90	0.063	17.25	0.819	TA-182	M
347.96	87.20	150.38	188.62	0.105	11.73	0.835	PB-214	
359.16	90.00	130.00	96.00	0.053	21.92	0.945	PB-214	M
835.44	209.08	137.45	121.55	0.068	16.38	0.967	AC-228	
1311.30	328.04	67.50	70.50	0.039	29.81	0.449	AC-228	s
1351.89	338.19	208.55	12.45	0.007	166.46	1.074		
2435.96	609.19	191.54	15.46	0.009	129.16	1.126		
3644.14	911.20	151.52	21.48	0.012	83.88	1.415		

s = Peak fails shape tests.

D = Peak area deconvoluted.

Test America St. Louis

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.39	46.81	100.96	33.04	0.018	26.05	0.717	s
AM-241	1	237.94	59.70	257.22	0.02	0.000	91961.90	0.824	s
TH-234	1	251.09	62.99	211.90	54.10	0.030	28.54	0.697	
EU-155	1	341.52	85.59	372.65	-50.59	-0.028	55.77	0.849	
TH-234	1	370.79	92.91	250.01	129.99	0.072	17.62	1.515	s
U-235	1	372.54	93.35	209.84	7.28	0.004	33.34	0.855	s D
AC-228	1	372.54	93.35	469.81	0.00	0.000	2395.83	0.855	s D
EU-155	1	420.63	105.37	98.00	49.00	0.027	37.80	0.348	s
EU-152	1	486.48	121.84	204.33	-8.10	-0.004	252.18	0.881	s
EU-154	1	498.41	124.82	152.08	16.38	0.009	109.31	0.882	s
Pa-234	1	520.33	130.30	233.51	-38.57	-0.021	58.29	0.890	s
U-235	1	576.65	144.38	184.79	13.44	0.007	113.33	0.901	s
U-235	1	652.65	163.38	209.93	-4.28	-0.002	1562.48	0.919	s
U-235	1	820.35	205.30	147.57	-12.03	-0.007	175.30	0.957	s
PB-212	1	953.66	238.63	69.25	728.94	0.405	3.87	0.987	D
RA-224	1	963.07	240.99	119.49	103.51	0.058	17.88	0.989	D
PB-214	1	967.12	242.00	152.23	46.77	0.026	34.49	0.990	D
TL-208	1	1109.18	277.51	32.00	71.00	0.039	19.33	1.051	s
I-131	1	1137.32	284.55	83.66	9.81	0.005	135.71	1.028	s
PB-214	1	1178.43	294.82	51.21	186.79	0.104	10.63	0.862	s
PB-212	1	1200.77	300.41	47.67	102.33	0.057	17.61	1.200	s
AC-228	1	1352.10	338.24	74.02	153.64	0.085	10.87	1.076	
EU-152	1	1374.04	343.72	74.39	-0.14	0.000	8943.42	1.081	s
PB-214	1	1406.73	351.90	59.65	251.35	0.140	8.37	1.072	
I-131	1	1460.94	365.45	31.77	16.80	0.009	53.36	1.099	s
BE-7	1	1913.43	478.57	34.10	9.89	0.005	89.39	1.198	s
CS-134	1	2251.16	562.99	53.60	1.70	0.001	612.96	1.273	s
CS-134	1	2276.47	569.32	49.12	0.00	0.000	938.08	1.278	s D
Pa-234	1	2277.07	569.47	43.07	-6.97	-0.004	-166.44	1.278	s D
TL-208	1	2331.85	583.16	34.92	246.08	0.137	7.78	1.064	
CS-134	1	2418.04	604.71	334.19	1.86	0.001	1393.48	1.309	s
BI-214	1	2435.77	609.14	43.62	158.92	0.088	8.98	1.313	
I-131	1	2547.60	637.10	49.75	-6.23	-0.003	164.93	1.337	s
CS-137	1	2645.41	661.55	38.85	36.24	0.020	29.46	1.358	s
EU-154	1	2893.72	723.62	72.90	-12.25	-0.007	102.62	1.411	s
BI-212	1	2907.95	727.17	21.42	51.85	0.029	18.77	1.414	
PA-234M	1	3059.63	765.09	40.70	-6.19	-0.003	151.14	1.447	s
EU-152	1	3119.57	780.07	38.75	-5.57	-0.003	163.76	1.458	s
BI-212	1	3140.85	785.39	35.10	13.80	0.008	66.40	1.463	s
CS-134	1	3179.22	794.98	26.45	21.18	0.012	40.63	1.472	s
CS-134	1	3209.32	802.51	25.35	0.43	0.000	1672.33	1.477	s
TL-208	1	3441.00	860.42	0.00	74.00	0.041	11.62	0.950	s
EU-154	1	3493.20	873.47	21.68	3.80	0.002	180.82	1.537	s
Pa-234	1	3518.12	879.70	25.18	-0.68	0.000	1049.15	1.543	s
Pa-234	1	3535.12	883.94	24.66	4.19	0.002	174.39	1.546	s

AC-228	1	3643.84	911.12	27.10	142.18	0.079	9.42	1.569	
Pa-234	1	3779.70	945.08	29.37	-3.01	-0.002	261.44	1.598	s
EU-152	1	3856.59	964.30	49.81	18.08	0.010	60.02	1.613	s
AC-228	1	3874.82	968.86	34.51	93.05	0.052	13.09	1.617	
EU-154	1	3984.49	996.27	24.83	0.89	0.000	797.05	1.640	s
PA-234M	1	4002.16	1000.69	22.06	2.82	0.002	243.32	1.643	s
EU-154	1	4020.90	1005.37	29.30	-2.05	-0.001	380.12	1.647	s
EU-152	1	4447.14	1111.91	26.85	0.04	0.000	19280.06	1.735	s
BI-214	1	4480.64	1120.28	29.46	37.80	0.021	21.90	1.741	s
CO-60	1	4691.57	1173.00	41.44	-3.29	-0.002	282.41	1.784	s
EU-154	1	5095.09	1273.86	12.12	8.15	0.005	69.81	1.866	s
CO-60	1	5329.80	1332.52	31.46	-3.12	-0.002	260.87	1.912	s
EU-152	1	5620.03	1405.06	15.23	2.27	0.001	251.98	1.972	s
K-40	1	5842.70	1460.71	12.54	334.46	0.186	5.37	1.962	
BI-214	1	7057.52	1764.32	10.15	28.31	0.016	19.99	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
TL-208	F N	1	9.941E+000	583.02	9.941E+000	(P	1.222E+000G		7.0E+002	84.50
			9.941E+000	277.28	2.235E+001	*	9.153E+000G		7.0E+002	6.31
			9.941E+000	860.56	2.671E+001	+	2.660E+000G		7.0E+002	12.42
CS-134	T F I	1	6.667E-002	604.71	6.667E-002	% (	3.154E+000G		7.5E+002	97.62
			6.667E-002	795.87	1.051E+000	%	1.324E+000G		7.5E+002	85.53
			6.667E-002	569.32	0.000E+000	& }	7.467E+000G		7.5E+002	15.38
			6.667E-002	801.95	2.100E-001	%	1.285E+001G		7.5E+002	8.69
			6.667E-002	563.24	6.791E-001	%	1.469E+001G		7.5E+002	8.35
I-131	T F I	1	4.990E-001	364.48	4.990E-001	& (	8.608E-001G		8.0E+000	81.70
			4.990E-001	284.30	3.231E+000	%	1.493E+001G		8.0E+000	6.14
			4.990E-001	636.97	-3.160E+000	%	1.803E+001G		8.0E+000	7.17
RA-224	N	1	4.545E+001	240.99	4.545E+001	(	2.356E+001G		7.0E+002	4.10
EU-155	T F I	1	3.030E+000	105.31	3.030E+000	(	3.021E+000G		1.8E+003	21.20
			3.030E+000	86.54	-2.253E+000	%	4.127E+000G		1.8E+003	30.70
PB-212	N	1	3.011E+001	238.63	3.011E+001	(P	1.714E+000G		7.0E+002	43.30
			3.011E+001	300.03	6.562E+001	*	2.237E+001G		7.0E+002	3.28
Pa-234	N	1	-2.855E+000	131.29	-2.855E+000	% (	5.472E+000G		1.6E+012	18.00
			-2.855E+000	569.47	-2.855E+000	&	1.363E+001G		1.6E+012	8.20
			-2.855E+000	946.02	-1.074E+000	%	9.995E+000G		1.6E+012	13.40
			-2.855E+000	883.24	1.994E+000	%	1.229E+001G		1.6E+012	9.60
			-2.855E+000	880.53	-5.170E-001	%	1.981E+001G		1.6E+012	6.00
BE-7	N P C	1	2.781E+000	477.60	2.781E+000	% (	8.416E+000G		5.3E+001	10.52
TH-234	N	1	2.526E+001	63.29	1.840E+001	% (P	2.399E+001G		1.6E+012	4.82
			2.526E+001	92.59	3.118E+001	* (P	1.833E+001G		1.6E+012	5.58
AC-228	N	1	2.513E+001	911.07	2.287E+001	(P	4.337E+000G		2.1E+003	29.00
			2.513E+001	968.97	2.596E+001	(P	8.392E+000G		2.1E+003	17.46
			2.513E+001	338.32	2.939E+001	(P	8.187E+000G		2.1E+003	12.01
			2.513E+001	93.35	0.000E+000	% } E	1.688E+001X	A	2.1E+003	5.56
PB-210	N	1	2.087E+001	46.54	2.087E+001	% (P	3.129E+001G		8.1E+003	4.25
K-40	N	1	2.064E+002	1460.83	2.064E+002	(P	1.186E+001G		4.7E+011	10.67
CO-60	T F	1	-1.912E-001	1332.50	-1.912E-001	% (	1.770E+000G		1.9E+003	99.98
			-1.912E-001	1173.24	-1.837E-001	%	1.828E+000G		1.9E+003	99.90
BI-212	N	1	1.749E+001	727.33	1.749E+001	(	8.188E+000G		7.0E+002	11.82
			1.749E+001	785.51	5.279E+001	%	1.159E+002G		7.0E+002	1.10
PA-234	N	1	1.676E+001	1001.00	1.676E+001	% (	1.465E+002G		1.6E+012	.84
			1.676E+001	766.41	-8.709E+001	&	4.562E+002G		1.6E+012	.29
U-235	N	1	1.675E+000	143.79	1.675E+000	& (P	8.230E+000G		2.6E+011	10.96
			1.675E+000	205.33	-3.897E+000	& P	1.921E+001G		2.6E+011	5.01
			1.675E+000	163.38	-1.210E+000	& P	1.983E+001G		2.6E+011	5.08
			1.675E+000	93.35	1.675E+000	! E	1.616E+001X		2.6E+011	5.81
CS-137	T F I	1	1.587E+000	661.66	1.587E+000	(	1.391E+000G		1.1E+004	85.21
PB-214	N	1	1.581E+001	351.93	1.581E+001	(P	2.434E+000G		5.8E+005	37.60
			1.581E+001	295.09	2.011E+001	+ P	3.882E+000G		5.8E+005	19.30
			1.581E+001	242.00	1.136E+001	- P	1.463E+001G		5.8E+005	7.43

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EU-154	T F I	1	1.402E+000	873.23	1.402E+000	%	(		9.008E+000G	3.1E+003	12.27
			1.402E+000	123.10	5.290E-001	&			1.944E+000G	3.1E+003	40.79
			1.402E+000	1274.54	1.375E+000	%			3.193E+000G	3.1E+003	35.19
			1.402E+000	723.36	-2.406E+000	%			8.348E+000G	3.1E+003	20.22
			1.402E+000	1004.77	-5.684E-001	%			7.750E+000G	3.1E+003	18.01
			1.402E+000	996.33	4.180E-001	%			1.215E+001G	3.1E+003	10.60
BI-214	N	1	1.281E+001	609.31	1.214E+001		(	P	2.559E+000G	5.8E+005	46.09
			1.281E+001	1120.29	1.352E+001		(	P	1.001E+001G	5.8E+005	15.10
			1.281E+001	1764.49	1.412E+001		(	P	8.757E+000G	5.8E+005	15.40
			-1.198E-002	964.11	6.006E+000	%			1.183E+001G	4.9E+003	14.61
			-1.198E-002	1112.07	1.497E-002	%			1.057E+001G	4.9E+003	13.64
			-1.198E-002	1408.00	6.916E-001	%			6.365E+000G	4.9E+003	21.00
EU-152	T F	1	-1.198E-002	344.29	-1.198E-002	&	(		3.767E+000G	4.9E+003	26.50
			-1.198E-002	121.78	-3.726E-001	%			3.191E+000G	4.9E+003	28.58
			-1.198E-002	778.92	-1.799E+000	%			1.025E+001G	4.9E+003	12.94
AM-241	T	1	1.192E-003	59.54	1.192E-003	&	(		3.744E+000G	1.6E+005	35.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	2.781E+000	2.786E+000	89.39	89.43	8.416E+000
K-40		2.064E+002	2.064E+002	5.57	6.29	1.186E+001
CO-60	<	-1.912E-001	-1.912E-001	260.87	260.88	1.770E+000
I-131	<	4.990E-001	5.058E-001	53.36	53.43	8.608E-001
CS-134	<	6.667E-002	6.668E-002	1,393.48	1,393.49	3.154E+000
EU-154	<	1.402E+000	1.402E+000	180.82	180.84	9.008E+000
CS-137	<	1.587E+000	1.587E+000	29.46	29.60	1.391E+000
EU-152	<	-1.198E-002	-1.198E-002	8,943.42	8,943.42	3.767E+000
EU-155		3.030E+000	3.031E+000	37.80	37.95	3.021E+000
TL-208		9.941E+000	9.943E+000	8.06	8.56	1.222E+000
BI-212	<	1.749E+001	1.749E+001	18.77	18.99	8.188E+000
BI-214	<	1.281E+001	1.281E+001	9.64	10.06	2.559E+000
AC-228	<	2.513E+001	2.513E+001	6.70	7.29	4.337E+000
TH-234		2.526E+001	2.526E+001	24.47	24.75	2.399E+001
PA-234M	<	1.676E+001	1.676E+001	243.32	243.34	1.465E+002
U-235	<	1.675E+000	1.675E+000	144.89	144.92	8.230E+000
RA-224		4.545E+001	4.546E+001	17.88	18.13	2.356E+001
PB-210	#	2.087E+001	2.087E+001	49.28	49.43	3.129E+001
PB-212		3.011E+001	3.011E+001	3.99	4.98	1.714E+000
PB-214		1.581E+001	1.581E+001	8.77	9.23	2.434E+000
Pa-234	<	-2.855E+000	-2.855E+000	58.29	58.37	5.472E+000
AM-241	<	1.192E-003	1.192E-003	91,961.90	91,961.90	3.744E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 336.01 Bq/sample

Analyzed by: _____

403605

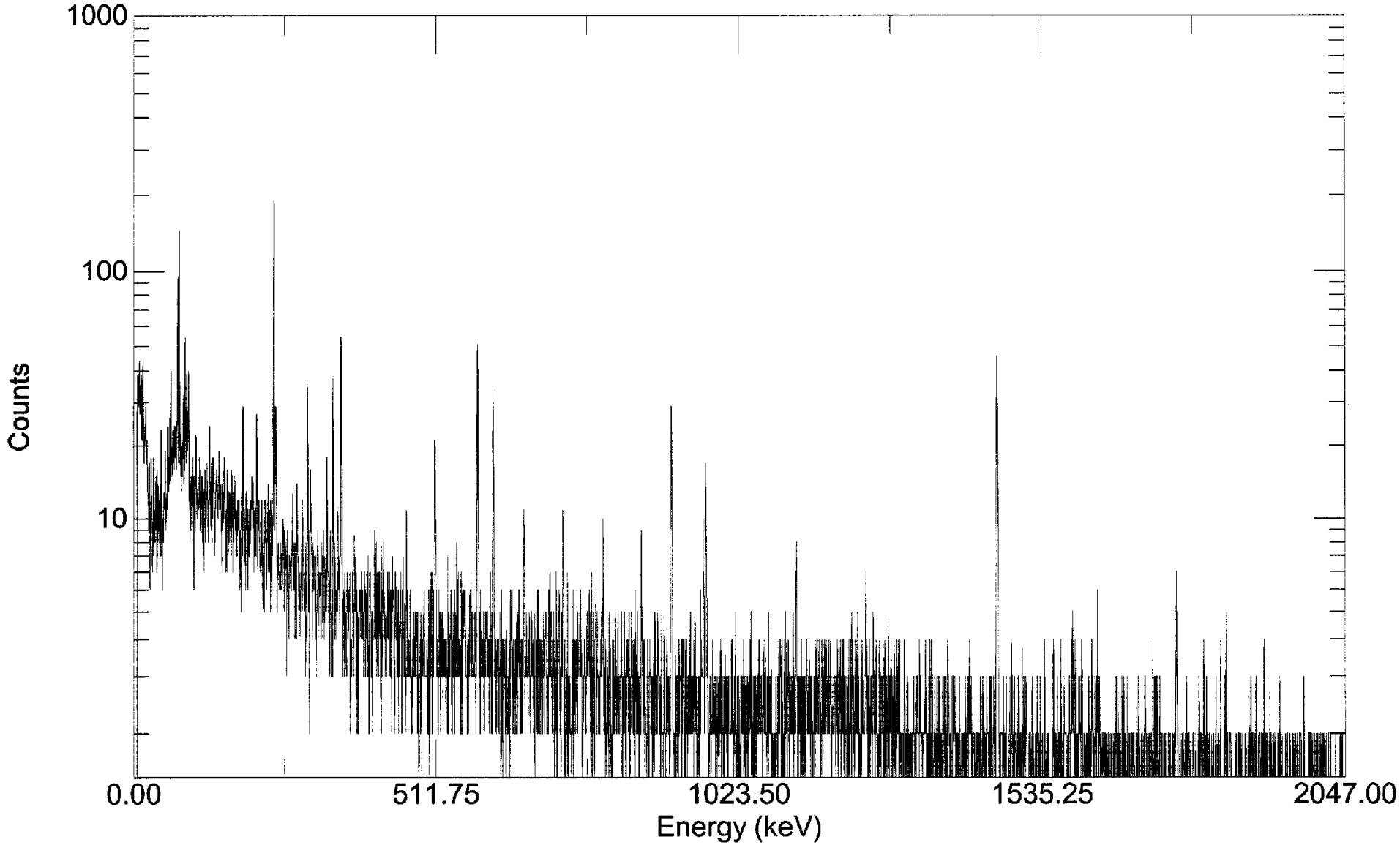
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKFE1AD

7356122_KEKFE1AD_F7L200262-001X



Acquired: 23-Dec-2007 3:44:51 PM
File: C:\User\spectra\KEKFE1AD.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.48 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,981

Sample Description: 7356122_KEKFF1AC_F7L200262-002

Spectrum Filename: KEKFF1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:05:24PM		
Live Time:	1800.00	Real Time:	1910.24
Dead Time:	5.77 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1615

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.14	74.75	229.33	153.67	0.085	20.52	0.609	PB-214	
307.25	77.02	144.00	269.00	0.149	9.84	0.731	PB-214	
347.14	86.99	88.93	114.07	0.063	14.98	0.805	TB-160	
357.75	89.64	74.00	91.00	0.051	16.99	1.024	PB-214	sM
371.89	93.03	130.20	78.80	0.044	23.37	0.795	TH-234	D
624.34	156.24	36.67	32.33	0.018	36.10	0.685	TA-182	
741.95	185.62	83.33	114.67	0.064	20.36	0.679	U-235	s
1180.57	295.21	109.01	36.99	0.021	43.18	0.636		s
1353.88	338.52	133.23	22.77	0.013	74.68	1.018		
1407.92	352.02	196.19	36.81	0.020	56.28	1.047		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.84	46.69	74.10	35.90	0.020	27.53	0.429	s
AM-241	1	237.25	59.54	179.88	-12.16	-0.007	215.04	0.761	s
TH-234	1	252.28	63.29	169.33	69.67	0.039	32.24	0.343	s
EU-155	1	344.98	86.45	206.82	-3.07	-0.002	664.31	0.788	
TH-234	1	369.56	92.59	219.34	42.24	0.023	32.87	0.795	D
AC-228	1	372.61	93.35	244.79	0.00	0.000	2044.50	0.795	s D
U-235	1	372.61	93.35	160.31	5.44	0.003	42.55	0.795	s D
EU-155	1	418.94	104.92	134.55	8.74	0.005	190.79	0.808	s
EU-152	1	483.64	121.09	81.58	14.51	0.008	91.88	0.824	s
EU-154	1	489.35	122.51	117.97	-8.11	-0.005	192.55	0.826	
Pa-234	1	525.20	131.47	141.75	2.52	0.001	671.63	0.834	s
U-235	1	574.28	143.73	119.71	10.28	0.006	123.24	0.847	
U-235	1	652.08	163.17	83.18	10.13	0.006	108.89	0.867	s
U-235	1	822.77	205.81	81.63	-3.04	-0.002	424.14	0.909	s
PB-212	1	954.68	238.77	98.48	504.52	0.280	5.99	1.022	
RA-224	1	959.22	239.91	547.73	-161.22	-0.090	21.99	0.944	s
PB-214	1	964.96	241.34	94.20	36.30	0.020	41.30	0.945	s
TL-208	1	1109.90	277.55	73.05	12.74	0.007	98.91	0.980	s
I-131	1	1133.71	283.50	40.63	-2.58	-0.001	354.37	0.987	s
PB-214	1	1180.57	295.21	38.50	86.43	0.048	14.25	0.998	s
PB-212	1	1201.88	300.54	30.00	48.00	0.027	27.80	0.440	s
AC-228	1	1353.43	338.40	43.91	95.73	0.053	14.15	1.040	
EU-152	1	1375.51	343.92	38.45	-2.15	-0.001	412.66	1.045	s
PB-214	1	1407.68	351.96	39.63	165.98	0.092	9.05	1.053	
I-131	1	1463.46	365.90	31.37	6.04	0.003	137.29	1.065	
BE-7	1	1911.73	477.92	27.61	1.62	0.001	465.78	1.173	s
CS-134	1	2253.95	563.45	28.14	3.61	0.002	214.57	1.252	s
CS-134	1	2277.45	569.32	33.76	-0.60	0.000	-38.50	1.258	s D
Pa-234	1	2278.05	569.47	29.51	0.38	0.000	148.11	1.258	s D
TL-208	1	2333.46	583.32	11.08	138.92	0.077	9.32	1.046	
CS-134	1	2423.99	605.95	26.00	-3.64	-0.002	204.76	1.290	s
BI-214	1	2437.82	609.40	21.40	105.60	0.059	11.97	0.898	s
I-131	1	2548.13	636.97	16.36	0.00	0.000	572.00	1.319	s
CS-137	1	2647.04	661.70	41.15	1.12	0.001	119.23	1.342	s
EU-154	1	2893.71	723.36	125.17	0.00	0.000	1582.21	1.397	s
BI-212	1	2909.73	727.36	29.57	17.92	0.010	48.98	1.400	s
PA-234M	1	3065.53	766.31	28.76	-2.23	-0.001	346.26	1.434	s
EU-152	1	3117.77	779.37	23.47	-1.30	-0.001	534.83	1.445	s
BI-212	1	3149.73	787.35	21.26	-0.39	0.000	1679.12	1.451	s
CS-134	1	3181.49	795.29	26.62	12.89	0.007	63.11	1.460	s
CS-134	1	3208.30	802.00	21.47	4.28	0.002	160.61	1.465	s
TL-208	1	3442.57	860.56	30.40	0.00	0.000	779.69	1.516	s
EU-154	1	3484.18	870.97	12.96	2.22	0.001	239.21	1.527	s
Pa-234	1	3523.89	880.89	27.83	-5.12	-0.003	152.14	1.533	s
Pa-234	1	3532.67	883.09	19.98	0.00	0.000	52518.46	1.535	s
AC-228	1	3646.70	911.60	23.22	97.52	0.054	12.30	1.559	s

Pa-234	1	3784.64	946.08	12.37	2.66	0.001	196.61	1.588	s
EU-152	1	3856.73	964.11	217.21	0.00	0.000	2084.29	1.603	s
AC-228	1	3876.47	969.05	25.61	30.14	0.017	29.93	1.607	s
EU-154	1	3984.55	996.07	22.46	-1.29	-0.001	528.03	1.630	s
PA-234M	1	4000.49	1000.05	19.04	-0.77	0.000	807.14	1.633	s
EU-154	1	4019.76	1004.87	16.61	0.18	0.000	3287.18	1.637	s
EU-152	1	4445.33	1111.29	15.14	2.13	0.001	267.07	1.723	s
BI-214	1	4481.32	1120.29	42.00	0.00	0.000	916.52	1.730	s
CO-60	1	4693.69	1173.40	19.36	-0.81	0.000	773.80	1.772	s
EU-154	1	5093.95	1273.50	23.52	0.02	0.000	33364.07	1.850	s
CO-60	1	5331.01	1332.79	14.92	7.56	0.004	80.85	1.894	s
EU-152	1	5616.50	1404.20	10.69	0.06	0.000	7490.24	1.950	s
K-40	1	5844.06	1461.12	0.00	161.00	0.089	7.88	1.788	
BI-214	1	7058.60	1764.98	4.16	14.21	0.008	28.33	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
BI-212	N	1	8.935E+000	727.33	8.935E+000	% (	1.398E+001G		7.0E+002	11.82
			8.935E+000	785.51	-2.228E+000	%	1.382E+002G		7.0E+002	1.10
RA-224	N	1	-8.705E+001	240.99	-8.705E+001	(	6.035E+001G		7.0E+002	4.10
TL-208	F N	1	8.026E+000	583.02	8.026E+000	(P	1.053E+000G		7.0E+002	84.50
			8.026E+000	277.28	5.041E+000	%	1.683E+001G		7.0E+002	6.31
			8.026E+000	860.56	0.000E+000	%	1.548E+001G		7.0E+002	12.42
CO-60	T F	1	7.309E-001	1332.50	7.309E-001	% (	2.001E+000G		1.9E+003	99.98
			7.309E-001	1173.24	-7.080E-002	%	2.023E+000G		1.9E+003	99.90
CS-137	T F I	1	7.141E-002	661.66	7.141E-002	% (P	2.082E+000G		1.1E+004	85.21
PA-234M	N	1	-7.061E+000	1001.00	-7.061E+000	% (	2.107E+002G		1.6E+012	.84
			-7.061E+000	766.41	-4.674E+001	%	5.799E+002G		1.6E+012	.29
AM-241	T	1	-6.918E-001	59.54	-6.918E-001	& (P	3.710E+000G		1.6E+005	35.90
EU-155	T F I	1	6.476E-001	105.31	6.476E-001	% (	4.208E+000G		1.8E+003	21.20
			6.476E-001	86.54	-1.662E-001	%	3.771E+000G	A	1.8E+003	30.70
BE-7	N P C	1	6.299E-001	477.60	6.299E-001	& (	1.058E+001G		5.3E+001	10.52
TH-234	N	1	2.822E+001	63.29	2.822E+001	@ (P	2.566E+001G		1.6E+012	4.82
			2.822E+001	92.59	1.226E+001	% P	2.082E+001G		1.6E+012	5.58
PB-210	N	1	2.636E+001	46.54	2.636E+001	% (P	3.144E+001G		8.1E+003	4.25
PB-212	N	1	2.559E+001	238.63	2.559E+001	(P	2.483E+000G		7.0E+002	43.30
			2.559E+001	300.03	3.920E+001	*	2.306E+001G		7.0E+002	3.28
EU-152	T F	1	-2.469E-001	344.29	-2.469E-001	% (	3.622E+000G		4.9E+003	26.50
			-2.469E-001	121.78	7.926E-001	&	2.448E+000G		4.9E+003	28.58
			-2.469E-001	778.92	-6.260E-001	%	1.219E+001G		4.9E+003	12.94
			-2.469E-001	964.11	0.000E+000	&	3.629E+001G		4.9E+003	14.61
			-2.469E-001	1112.07	1.302E+000	&	1.273E+001G		4.9E+003	13.64
			-2.469E-001	1408.00	2.976E-002	%	8.640E+000G		4.9E+003	21.00
AC-228	N	1	2.384E+001	911.16	2.385E+001	(	6.154E+000G		2.1E+003	29.00
			2.384E+001	968.97	1.287E+001	-	1.123E+001G		2.1E+003	17.46
			2.384E+001	338.32	2.382E+001	(	8.357E+000G		2.1E+003	12.01
			2.384E+001	93.35	0.000E+000	% } E	1.794E+001G	A	2.1E+003	5.56
			2.366E-001	636.97	0.000E+000	%	1.584E+001G		8.0E+000	7.17
I-131	T F I	1	2.366E-001	364.48	2.366E-001	& (	1.128E+000G		8.0E+000	81.70

			2.366E-001	284.30	-1.074E+000	%			1.347E+001G	8.0E+000	6.14
Pa-234	N	1	2.205E-001	131.29	2.205E-001	%	(		5.096E+000G	1.6E+012	18.00
			2.205E-001	569.47	2.205E-001	%			1.635E+001G	1.6E+012	8.20
			2.205E-001	946.02	1.453E+000	%			1.042E+001G	1.6E+012	13.40
			2.205E-001	883.24	-2.986E-003	%			1.696E+001G	1.6E+012	9.60
			2.205E-001	880.53	-5.891E+000	%			3.138E+001G	1.6E+012	6.00
CS-134	T F I	1	-1.880E-001	604.71	-1.880E-001	%	(		1.366E+000G	7.5E+002	97.62
			-1.880E-001	795.87	9.567E-001	&			1.986E+000G	7.5E+002	85.53
			-1.880E-001	569.32	-1.880E-001	%			9.262E+000G	7.5E+002	15.38
			-1.880E-001	801.95	3.146E+000	%			1.787E+001G	7.5E+002	8.69
			-1.880E-001	563.24	2.046E+000	%			1.556E+001G	7.5E+002	8.35
K-40	N	1	1.574E+002	1460.83	1.574E+002		(		7.204E+000G	4.7E+011	10.67
U-235	N	1	1.513E+000	143.79	1.513E+000	%	(	P	7.902E+000G	2.6E+011	10.96
			1.513E+000	205.33	-1.186E+000	&			1.748E+001G	2.6E+011	5.01
			1.513E+000	163.38	3.389E+000	%		P	1.512E+001G	2.6E+011	5.08
			1.513E+000	93.35	1.513E+000	%		E	1.717E+001X	2.6E+011	5.81
PB-214	N	1	1.305E+001	351.93	1.368E+001		(	P	2.641E+000G	5.8E+005	37.60
			1.305E+001	295.09	1.182E+001		(	P	4.324E+000G	5.8E+005	19.30
			1.305E+001	242.00	1.085E+001	%			1.433E+001G	5.8E+005	7.43
EU-154	T F I	1	1.238E+000	873.23	1.238E+000	%	(		1.088E+001G	3.1E+003	12.27
			1.238E+000	123.10	-3.109E-001	%			2.043E+000G	3.1E+003	40.79
			1.238E+000	1274.54	5.442E-003	%			6.698E+000G	3.1E+003	35.19
			1.238E+000	723.36	0.000E+000	%			1.591E+001G	3.1E+003	20.22
			1.238E+000	1004.77	7.493E-002	&			9.250E+000G	3.1E+003	18.01
			1.238E+000	996.33	-9.261E-001	%			1.784E+001G	3.1E+003	10.60
BI-214	N	1	1.155E+001	609.31	1.162E+001		(	P	2.670E+000G	5.8E+005	46.09
			1.155E+001	1120.29	0.000E+000	%			1.827E+001G	5.8E+005	15.10
			1.155E+001	1764.49	1.133E+001	?	(	P	9.742E+000G	5.8E+005	15.40

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	#	-1.880E-001	-1.881E-001	204.76	204.78	1.366E+000
CS-137	#	7.141E-002	7.141E-002	785.65	785.66	2.082E+000
BE-7	#	6.299E-001	6.309E-001	465.78	465.79	1.058E+001
K-40		1.574E+002	1.574E+002	7.88	8.41	7.204E+000
CO-60	#	7.309E-001	7.309E-001	80.85	80.90	2.001E+000
I-131	#	2.366E-001	2.392E-001	137.29	137.32	1.128E+000
EU-152	#	-2.469E-001	-2.469E-001	412.66	412.67	3.622E+000
EU-154	#	1.238E+000	1.238E+000	239.21	239.23	1.088E+001
TL-208		8.026E+000	8.028E+000	9.57	10.00	1.053E+000
PB-210		2.636E+001	2.636E+001	40.76	40.95	3.144E+001
PB-212		2.559E+001	2.559E+001	6.07	6.77	2.483E+000
PB-214	#	1.305E+001	1.305E+001	8.70	9.16	2.641E+000
RA-224	#	-8.705E+001	-8.706E+001	21.99	22.19	6.035E+001
AC-228	#	2.384E+001	2.384E+001	9.38	9.81	6.154E+000
Pa-234	#	2.205E-001	2.205E-001	671.63	671.64	5.096E+000
U-235	#	1.513E+000	1.513E+000	152.91	152.94	7.902E+000
AM-241	#	-6.918E-001	-6.918E-001	273.62	273.65	3.710E+000
EU-155	#	6.476E-001	6.476E-001	190.79	190.82	4.208E+000
BI-212	#	8.935E+000	8.936E+000	48.98	49.06	1.398E+001
BI-214		1.155E+001	1.155E+001	12.73	13.06	2.670E+000
TH-234	#	2.822E+001	2.822E+001	38.79	38.97	2.566E+001
PA-234M	#	-7.061E+000	-7.061E+000	807.14	807.14	2.107E+002

= All peaks for activity calculation had bad shape

Test America St Louis

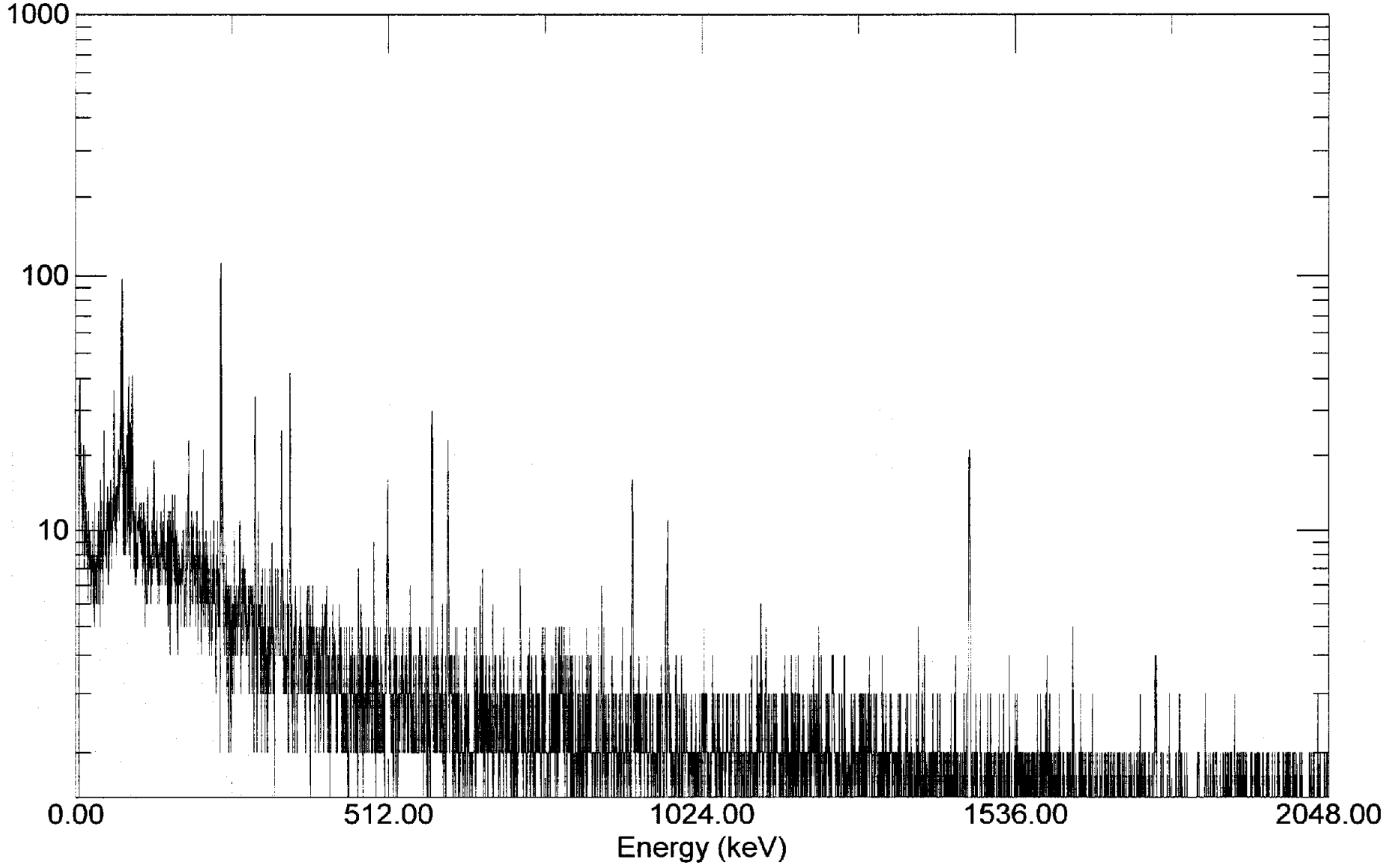
Total Activity (37.74 to 2,000.57 keV) 230.76 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKFF1AC

7356122_KEKFF1AC_F7L200262-002



Acquired: 23-Dec-2007 3:05:24 PM
File: C:\User\spectra\KEKFF1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1910.24 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,980

Sample Description: 7356122_KEKFG1AC_F7L200262-003

Spectrum Filename: KEKFG1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:06:07PM		
Live Time:	1800.00	Real Time:	1819.52
Dead Time:	1.07 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2056

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.69	74.64	276.00	155.00	0.086	22.89	0.889	PB-214	
307.88	77.18	174.00	244.00	0.136	11.34	0.922	PB-214	
1180.58	295.32	135.43	27.57	0.015	62.65	0.951		s
1407.03	351.92	206.88	47.12	0.026	45.56	1.255		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	183.83	46.18	83.60	59.40	0.033	21.14	1.694	s
AM-241	1	238.26	59.78	178.39	9.99	0.006	191.76	0.846	s
TH-234	1	253.60	63.62	168.08	78.92	0.044	25.86	0.807	s
EU-155	1	345.32	86.54	254.14	-6.21	-0.003	365.47	0.874	s
TH-234	1	371.58	93.11	200.46	139.54	0.078	18.89	1.207	s
AC-228	1	372.56	93.35	234.34	57.34	0.032	2.55	0.882	s D
U-235	1	372.56	93.35	513.42	0.00	0.000	2209.07	0.882	s D
EU-155	1	420.42	105.31	213.16	-1.27	-0.001	1628.92	0.894	s
EU-152	1	486.50	121.83	152.20	-13.02	-0.007	136.84	0.912	s
EU-154	1	492.59	123.35	129.05	16.66	0.009	99.48	0.913	s
Pa-234	1	528.52	132.33	89.40	20.42	0.011	69.11	0.922	s
U-235	1	574.17	143.74	92.42	32.82	0.018	44.96	0.935	s
U-235	1	649.10	162.47	101.04	10.08	0.006	144.50	0.955	s
U-235	1	819.87	205.16	78.60	21.55	0.012	62.05	0.999	s
PB-212	1	954.52	238.81	151.21	479.79	0.267	7.74	1.066	
RA-224	1	960.39	240.28	534.40	-112.56	-0.063	30.54	1.036	s
PB-214	1	967.20	241.98	178.36	65.44	0.036	31.40	1.037	s
TL-208	1	1109.26	277.49	45.00	55.00	0.031	31.62	1.034	
I-131	1	1148.57	287.32	31.53	1.68	0.001	479.04	1.081	s
PB-214	1	1181.04	295.43	38.93	112.09	0.062	12.30	1.092	s
PB-212	1	1199.47	300.04	36.00	70.00	0.039	23.39	0.788	s
AC-228	1	1352.38	338.26	44.22	74.23	0.041	17.18	1.136	s
EU-152	1	1377.30	344.49	40.82	11.40	0.006	84.64	1.142	s
PB-214	1	1407.50	352.04	49.61	179.83	0.100	9.10	1.150	s
I-131	1	1458.72	364.84	40.31	-6.92	-0.004	135.24	1.163	s
BE-7	1	1909.81	477.60	35.09	0.00	0.000	837.77	1.277	s
CS-134	1	2252.42	563.24	46.63	0.00	0.000	965.72	1.363	s
CS-134	1	2276.76	569.32	37.95	0.00	0.000	0.00	1.369	s D
Pa-234	1	2277.35	569.47	39.36	3.01	0.002	29.71	1.369	s D
TL-208	1	2332.74	583.31	19.41	151.59	0.084	11.53	1.563	
CS-134	1	2418.33	604.71	208.14	0.00	0.000	2040.28	1.403	s
BI-214	1	2437.07	609.40	7.80	180.20	0.100	8.14	1.453	s
I-131	1	2550.52	637.75	34.76	-5.85	-0.003	148.37	1.435	s
CS-137	1	2646.95	661.86	36.68	22.10	0.012	42.61	1.459	s
EU-154	1	2894.10	723.64	51.80	-6.11	-0.003	171.41	1.519	s
BI-212	1	2909.54	727.50	27.02	23.84	0.013	37.02	1.523	
PA-234M	1	3072.85	768.32	27.54	6.70	0.004	117.24	1.561	s
EU-152	1	3117.59	779.51	10.91	4.07	0.002	124.93	1.573	s
BI-212	1	3141.20	785.41	21.13	5.00	0.003	137.49	1.579	s
CS-134	1	3179.22	794.91	18.11	15.37	0.009	46.74	1.589	s
CS-134	1	3207.87	802.08	23.18	-3.75	-0.002	188.89	1.595	s
TL-208	1	3444.28	861.17	16.49	15.62	0.009	44.62	1.650	s
EU-154	1	3496.23	874.16	18.93	-1.32	-0.001	473.31	1.662	s
Pa-234	1	3520.84	880.31	20.33	5.05	0.003	133.96	1.669	s
Pa-234	1	3533.93	883.58	28.82	-0.84	0.000	905.36	1.672	s
AC-228	1	3645.41	911.45	26.76	62.38	0.035	17.26	1.698	s

Test Am St Louis

Pa-234	1	3776.60	944.25	20.17	-1.51	-0.001	429.17	1.731	s
EU-152	1	3856.05	964.11	247.61	0.00	0.000	2225.35	1.748	s
AC-228	1	3877.22	969.40	28.12	26.07	0.014	34.80	1.752	s
EU-154	1	3984.93	996.33	24.52	0.00	0.000	700.26	1.778	s
PA-234M	1	4000.67	1000.26	22.35	2.54	0.001	270.55	1.782	s
EU-154	1	4021.75	1005.53	17.34	4.26	0.002	146.40	1.785	s
EU-152	1	4433.54	1108.48	9.74	2.42	0.001	193.40	1.884	s
BI-214	1	4483.18	1120.89	3.83	39.17	0.022	19.39	0.456	s
CO-60	1	4686.70	1171.77	23.02	-4.45	-0.002	159.63	1.939	s
EU-154	1	5097.80	1274.54	66.74	0.00	0.000	1155.33	2.030	s
CO-60	1	5330.71	1332.77	25.13	-3.60	-0.002	203.85	2.081	s
EU-152	1	5650.92	1412.83	9.44	-2.55	-0.001	181.48	2.147	s
K-40	1	5844.08	1461.12	0.00	278.00	0.154	6.00	1.881	
BI-214	1	7060.18	1765.17	3.05	23.36	0.013	23.24	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
			9.575E-001	1112.07	1.114E+000	&	7.946E+000G		4.9E+003	13.64
			9.575E-001	1408.00	-9.407E-001	%	6.280E+000G		4.9E+003	21.00
EU-152	T F	1	9.575E-001	344.29	9.575E-001	* (	2.729E+000G		4.9E+003	26.50
			9.575E-001	121.78	-5.137E-001	%	2.375E+000G		4.9E+003	28.58
			9.575E-001	778.92	1.458E+000	%	6.479E+000G		4.9E+003	12.94
			9.575E-001	964.11	0.000E+000	%	2.894E+001G		4.9E+003	14.61
BI-212	N	1	8.804E+000	727.33	8.804E+000	(	9.948E+000G		7.0E+002	11.82
			8.804E+000	785.51	2.120E+001	%	1.023E+002G		7.0E+002	1.10
EU-155	T F I	1	-6.781E-002	105.31	-6.781E-002	% (	3.779E+000G		1.8E+003	21.20
			-6.781E-002	86.54	-2.426E-001	%	3.010E+000G	A	1.8E+003	30.70
TL-208	F N	1	6.457E+000	583.02	6.457E+000	(P	9.898E-001G		7.0E+002	84.50
			6.457E+000	277.28	1.594E+001	+	9.843E+000G		7.0E+002	6.31
			6.457E+000	860.56	6.344E+000	%	8.785E+000G		7.0E+002	12.42
EU-154	T F I	1	-5.505E-001	873.23	-5.505E-001	% (	9.567E+000G		3.1E+003	12.27
			-5.505E-001	123.10	4.611E-001	%	1.540E+000G		3.1E+003	40.79
			-5.505E-001	1274.54	0.000E+000	%	8.208E+000G		3.1E+003	35.19
			-5.505E-001	723.36	-1.313E+000	%	7.790E+000G		3.1E+003	20.22
			-5.505E-001	1004.77	1.363E+000	%	7.070E+000G		3.1E+003	18.01
			-5.505E-001	996.33	0.000E+000	%	1.391E+001G		3.1E+003	10.60
RA-224	N	1	-4.445E+001	240.99	-4.445E+001	& (	4.362E+001G		7.0E+002	4.10
AM-241	T	1	4.315E-001	59.54	4.315E-001	& (	2.806E+000G		1.6E+005	35.90
PB-210	N	1	3.546E+001	46.54	3.546E+001	* (P	2.706E+001G		8.1E+003	4.25
U-235	N	1	3.500E+000	143.79	3.500E+000	* (	5.068E+000G		2.6E+011	10.96
			3.500E+000	205.33	6.136E+000	%	1.254E+001G		2.6E+011	5.01
			3.500E+000	163.38	2.450E+000	%	1.205E+001G		2.6E+011	5.08
			3.500E+000	93.35	0.000E+000	% }	E 1.486E+001X		2.6E+011	5.81
			2.678E+001	92.59	2.921E+001	* (P	1.438E+001G		1.6E+012	5.58
TH-234	N	1	2.678E+001	63.29	2.395E+001	* (P	1.916E+001G		1.6E+012	4.82
CO-60	T F	1	-2.654E-001	1332.50	-2.654E-001	% (	1.922E+000G		1.9E+003	99.98
			-2.654E-001	1173.24	-2.934E-001	%	1.652E+000G		1.9E+003	99.90
K-40	N	1	2.088E+002	1460.83	2.088E+002	(	5.536E+000G		4.7E+011	10.67
I-131	T F I	1	-1.988E-001	364.48	-1.988E-001	% (	9.278E-001G		8.0E+000	81.70

			-1.988E-001	284.30	5.114E-001	%			8.792E+000G		8.0E+000	6.14
			-1.988E-001	636.97	-3.175E+000	%			1.638E+001G		8.0E+000	7.17
PB-212	N	1	1.780E+001	238.63	1.780E+001		(	P	2.226E+000G		7.0E+002	43.30
			1.780E+001	300.03	4.188E+001	*			1.835E+001G		7.0E+002	3.28
PA-234M	N	1	1.742E+001	1001.00	1.742E+001	%	(		1.697E+002G		1.6E+012	.84
			1.742E+001	766.41	1.042E+002	&			4.220E+002G		1.6E+012	.29
BI-214	N	1	1.497E+001	609.31	1.463E+001		(	P	1.277E+000G		5.8E+005	46.09
			1.497E+001	1120.29	1.641E+001		(		4.957E+000G		5.8E+005	15.10
			1.497E+001	1764.49	1.456E+001	?	(		6.765E+000G		5.8E+005	15.40
Pa-234	N	1	1.294E+000	131.29	1.294E+000	%	(		2.963E+000G		1.6E+012	18.00
			1.294E+000	569.47	1.294E+000	%			1.373E+001G		1.6E+012	8.20
			1.294E+000	946.02	-6.152E-001	%			9.647E+000G		1.6E+012	13.40
			1.294E+000	883.24	-4.538E-001	%			1.489E+001G		1.6E+012	9.60
			1.294E+000	880.53	4.326E+000	%			2.033E+001G		1.6E+012	6.00
AC-228	N	1	1.202E+001	911.16	1.139E+001		(		4.897E+000G		2.1E+003	29.00
			1.202E+001	968.97	8.336E+000	-			8.766E+000G		2.1E+003	17.46
			1.202E+001	338.32	1.354E+001		(		6.147E+000G		2.1E+003	12.01
			1.202E+001	93.35	1.202E+001	!		E	1.552E+001G	A	2.1E+003	5.56
PB-214	N	1	1.099E+001	351.93	1.087E+001	*	(	P	2.147E+000G		5.8E+005	37.60
			1.099E+001	295.09	1.123E+001		(		3.184E+000G		5.8E+005	19.30
			1.099E+001	242.00	1.431E+001	+			1.420E+001G		5.8E+005	7.43
CS-137 T F I		1	1.043E+000	661.66	1.043E+000	&	(	P	1.460E+000G		1.1E+004	85.21
BE-7	N P C	1	0.000E+000	477.60	0.000E+000	%	(		8.672E+000G		5.3E+001	10.52
CS-134 T F I		1	0.000E+000	604.71	0.000E+000	%	(		2.663E+000G		7.5E+002	97.62
			0.000E+000	795.87	8.476E-001	%			1.243E+000G		7.5E+002	85.53
			0.000E+000	569.32	0.000E+000	%			7.199E+000G		7.5E+002	15.38
			0.000E+000	801.95	-2.047E+000	%			1.374E+001G		7.5E+002	8.69
			0.000E+000	563.24	0.000E+000	%			1.443E+001G		7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#			837.77	837.77	8.672E+000
K-40		2.088E+002	2.088E+002	6.00	6.67	5.536E+000
CO-60	#	-2.654E-001	-2.654E-001	203.85	203.87	1.922E+000
I-131	#	-1.988E-001	-2.010E-001	135.24	135.27	9.278E-001
CS-134	#			2,040.28	2,040.29	2.663E+000
EU-154	#	-5.505E-001	-5.505E-001	473.31	473.32	9.567E+000
PB-212		1.780E+001	1.780E+001	7.89	8.44	2.226E+000
PB-214	#	1.099E+001	1.099E+001	7.69	8.21	2.147E+000
BI-212	#	8.804E+000	8.805E+000	37.02	37.14	9.948E+000
CS-137	#	1.043E+000	1.043E+000	44.04	44.14	1.460E+000
EU-152	#	9.575E-001	9.575E-001	84.64	84.69	2.729E+000
EU-155	#	-6.781E-002	-6.782E-002	1,628.92	1,628.93	3.779E+000
TL-208		6.457E+000	6.457E+000	11.72	12.07	9.898E-001
PB-210	#	3.546E+001	3.546E+001	29.72	29.97	2.706E+001
BI-214		1.497E+001	1.497E+001	8.23	8.73	1.277E+000
RA-224	#	-4.445E+001	-4.446E+001	30.54	30.68	4.362E+001
AC-228	#	1.202E+001	1.202E+001	12.18	12.51	4.897E+000
PA-234M	#	1.742E+001	1.742E+001	270.55	270.56	1.697E+002
U-235	#	3.500E+000	3.500E+000	44.96	45.06	5.068E+000
Pa-234	#	1.294E+000	1.294E+000	69.11	69.18	2.963E+000
TH-234	#	2.678E+001	2.678E+001	19.88	20.22	1.916E+001
AM-241	#	4.315E-001	4.315E-001	191.76	191.80	2.806E+000

= All peaks for activity calculation had bad shape

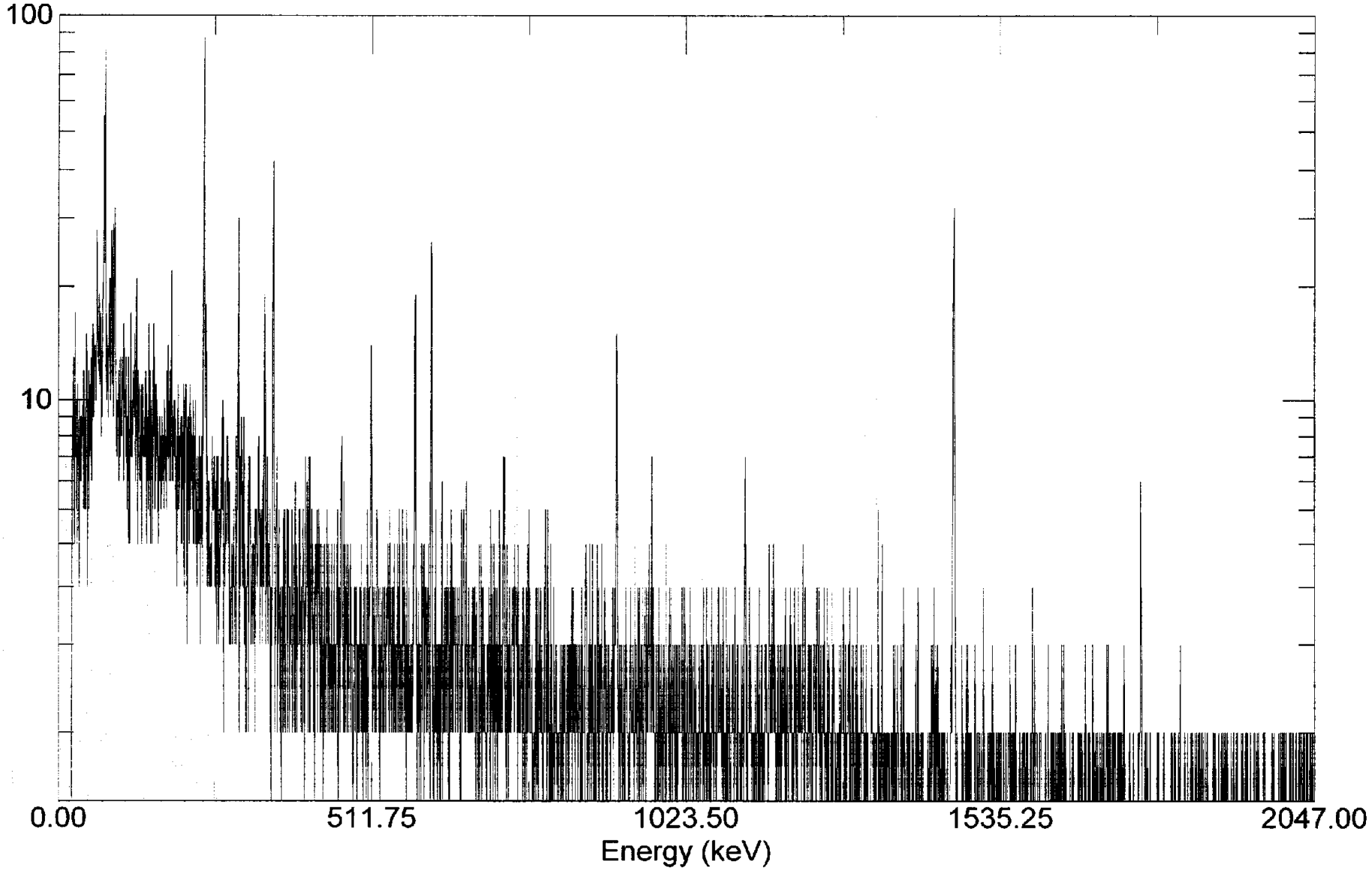
Total Activity (37.72 to 2,000.15 keV) 310.26 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKFG1AC

7356122_KEKFG1AC_F7L200262-003



Acquired: 23-Dec-2007 3:06:07 PM
File: C:\User\spectra\KEKFG1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1819.52 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,983

Sample Description: 7356122_KEKFP1AC_F7L200262-004

Spectrum Filename: KEKFP1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:45:31PM		
Live Time:	1800.00	Real Time:	1814.48
Dead Time:	0.80 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2446

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.86	74.80	345.00	336.00	0.187	10.55	0.959	PB-214	
307.26	77.15	437.33	486.67	0.270	9.39	1.031	PB-214	
347.11	87.10	305.82	196.18	0.109	14.49	0.781	PB-214	s
358.01	89.82	210.83	116.17	0.065	19.96	0.778	PB-214	M
611.71	153.18	148.83	90.17	0.050	29.56	0.782	CS-136	s
1407.47	351.95	311.70	49.30	0.027	52.61	1.287		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.59	46.51	259.88	17.16	0.010	58.68	0.864	s
AM-241	1	238.41	59.95	135.00	58.00	0.032	34.29	0.510	s
TH-234	1	252.95	63.58	472.46	9.97	0.006	88.01	0.882	s
EU-155	1	344.88	86.54	587.08	9.01	0.005	381.89	0.906	s
TH-234	1	370.68	92.99	472.04	95.05	0.053	26.26	0.912	s
AC-228	1	372.14	93.35	451.10	24.16	0.013	112.26	1.469	s D
U-235	1	372.14	93.35	350.72	8.37	0.005	32.88	0.913	s D
EU-155	1	420.04	105.31	362.75	1.31	0.001	2051.52	0.925	s
EU-152	1	485.96	121.78	284.41	1.34	0.001	1784.51	0.942	s
EU-154	1	489.75	122.72	256.94	0.55	0.000	4116.91	0.943	s
Pa-234	1	519.66	130.19	304.29	-34.71	-0.019	73.08	0.952	s
U-235	1	574.30	143.84	275.60	15.36	0.009	135.76	0.964	s
U-235	1	655.18	164.04	264.88	0.73	0.000	3151.83	0.984	s
U-235	1	816.89	204.43	189.98	-9.98	-0.006	197.79	1.027	s
PB-212	1	954.66	238.84	290.75	1317.25	0.732	4.25	1.123	s
RA-224	1	960.17	240.22	1196.90	-208.00	-0.116	24.52	1.062	
PB-214	1	968.78	242.37	567.21	-27.10	-0.015	125.76	1.063	
TL-208	1	1109.17	277.44	99.00	115.00	0.064	22.33	0.434	s
I-131	1	1138.14	284.67	115.42	9.71	0.005	159.79	1.105	s
PB-214	1	1179.89	295.10	135.63	120.68	0.067	15.80	1.116	s
PB-212	1	1200.13	300.16	79.17	102.83	0.057	20.23	0.716	s
AC-228	1	1352.73	338.28	81.48	283.52	0.158	9.49	1.138	
EU-152	1	1373.21	343.40	78.13	-3.12	-0.002	404.88	1.164	s
PB-214	1	1406.91	351.82	121.66	238.52	0.133	8.78	1.171	
I-131	1	1464.68	366.25	68.65	0.16	0.000	7490.50	1.184	s
BE-7	1	1910.50	477.63	64.01	7.59	0.004	153.37	1.292	s
CS-134	1	2251.03	562.72	53.04	13.66	0.008	80.12	1.372	s
CS-134	1	2277.45	569.32	93.46	0.00	0.000	989.95	1.378	s D
Pa-234	1	2278.04	569.47	72.77	-6.04	-0.003	-174.36	1.378	s D
TL-208	1	2332.29	583.03	58.13	444.88	0.247	6.49	1.415	
CS-134	1	2424.28	606.01	88.67	-10.86	-0.006	126.36	1.410	s
BI-214	1	2437.42	609.30	73.63	163.35	0.091	10.23	1.415	s
I-131	1	2536.62	634.09	23.88	13.09	0.007	59.58	1.440	s
CS-137	1	2648.59	662.07	79.68	1.72	0.001	737.28	1.462	s
EU-154	1	2897.50	724.28	125.30	-27.54	-0.015	60.56	1.518	s
BI-212	1	2908.84	727.11	36.91	89.51	0.050	14.28	1.521	s
PA-234M	1	3064.12	765.92	70.42	-8.24	-0.005	148.18	1.556	s
EU-152	1	3106.66	776.55	36.56	1.20	0.001	715.50	1.567	s
BI-212	1	3136.94	784.12	73.03	-13.01	-0.007	96.93	1.572	s
CS-134	1	3178.54	794.52	24.94	42.03	0.023	22.81	1.582	s
CS-134	1	3205.61	801.29	36.95	-0.58	0.000	1478.83	1.587	s
TL-208	1	3441.42	860.23	7.17	87.83	0.049	13.77	0.709	s
EU-154	1	3491.93	872.85	28.13	-3.83	-0.002	202.49	1.649	s
Pa-234	1	3523.33	880.70	35.36	-2.82	-0.002	304.63	1.655	s
Pa-234	1	3534.99	883.62	29.76	5.74	0.003	140.82	1.657	s

AC-228	1	3644.00	910.87	7.68	291.32	0.162	6.18	1.565	
Pa-234	1	3786.56	946.51	35.73	-0.67	0.000	1258.51	1.710	s
EU-152	1	3858.15	964.40	130.63	13.74	0.008	120.69	1.726	s
AC-228	1	3872.04	967.88	17.00	255.00	0.142	8.00	1.616	
EU-154	1	3984.69	996.04	29.24	-3.57	-0.002	220.90	1.753	s
PA-234M	1	4004.30	1000.94	28.73	6.57	0.004	121.85	1.756	s
EU-154	1	4017.81	1004.32	39.54	-0.85	0.000	1047.50	1.760	s
EU-152	1	4453.47	1113.25	36.73	-6.06	-0.003	147.07	1.847	s
BI-214	1	4479.25	1119.69	34.66	33.57	0.019	28.29	1.854	s
CO-60	1	4699.47	1174.76	37.50	-0.44	0.000	1974.40	1.896	s
EU-154	1	5098.47	1274.54	65.22	0.00	0.000	1142.06	1.975	s
CO-60	1	5330.21	1332.50	18.06	0.00	0.000	600.95	2.019	s
EU-152	1	5644.06	1411.00	16.48	-0.72	0.000	801.16	2.076	s
K-40	1	5841.02	1460.27	18.21	367.79	0.204	5.50	2.297	s
BI-214	1	7054.89	1763.97	12.25	20.04	0.011	28.99	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PB-210	N	1	9.941E+000	46.54	9.941E+000	* (P	4.509E+001G		8.1E+003	4.25
RA-224	N	1	-8.593E+001	240.99	-8.593E+001	(	6.772E+001G		7.0E+002	4.10
			7.522E-002	86.54	3.701E-001	%	4.751E+000G		1.8E+003	30.70
EU-155	T F I	1	7.522E-002	105.31	7.522E-002	% (	5.236E+000G		1.8E+003	21.20
CS-134	T F I	1	7.501E-001	604.71	-3.767E-001	% (	1.616E+000G		7.5E+002	97.62
			7.501E-001	795.87	2.036E+000	? (	1.259E+000G		7.5E+002	85.53
			7.501E-001	569.32	0.000E+000	& }	8.552E+000G		7.5E+002	15.38
			7.501E-001	801.95	-2.798E-001	%	1.488E+001G		7.5E+002	8.69
			7.501E-001	563.24	5.255E+000	%	1.410E+001G		7.5E+002	8.35
CS-137	T F I	1	7.311E-002	661.66	7.311E-002	& (	1.882E+000G		1.1E+004	85.21
PB-212	N	1	5.117E+001	238.63	5.117E+001	* (P	3.192E+000G		7.0E+002	43.30
			5.117E+001	300.03	6.241E+001	+	2.681E+001G		7.0E+002	3.28
AC-228	N	1	4.758E+001	911.07	4.596E+001	(P	2.465E+000G		2.1E+003	29.00
			4.758E+001	968.97	6.993E+001	+	6.013E+000G		2.1E+003	17.46
			4.758E+001	338.32	5.150E+001	(P	8.133E+000G		2.1E+003	12.01
			4.758E+001	93.35	5.366E+000	% } E	1.732E+001X	A	2.1E+003	5.56
			4.425E-003	284.30	3.021E+000	%	1.643E+001G		8.0E+000	6.14
			4.425E-003	636.97	6.426E+000	%	1.251E+001G		8.0E+000	7.17
I-131	T F I	1	4.425E-003	364.48	4.425E-003	% (	1.168E+000G		8.0E+000	81.70
			3.849E+001	766.41	-1.130E+002	%	5.732E+002G		1.6E+012	.29
PA-234	N	1	3.849E+001	1001.00	3.849E+001	& (	1.623E+002G		1.6E+012	.84
BI-212	N	1	2.937E+001	727.33	2.937E+001	* (	1.018E+001G		7.0E+002	11.82
			2.937E+001	785.51	-4.854E+001	%	1.587E+002G		7.0E+002	1.10
EU-152	T F	1	-2.602E-001	344.29	-2.602E-001	& (	3.663E+000G		4.9E+003	26.50
			-2.602E-001	121.78	5.713E-002	&	3.471E+000G		4.9E+003	28.58
			-2.602E-001	778.92	3.798E-001	%	9.735E+000G		4.9E+003	12.94
			-2.602E-001	964.11	4.488E+000	%	1.828E+001G		4.9E+003	14.61
			-2.602E-001	1112.07	-2.360E+000	%	1.205E+001G		4.9E+003	13.64
			-2.602E-001	1408.00	-2.205E-001	%	6.584E+000G		4.9E+003	21.00
AM-241	T	1	2.564E+000	59.54	2.564E+000	(	2.513E+000G		1.6E+005	35.90
Pa-234	N	1	-2.386E+000	131.29	-2.386E+000	% (	5.774E+000G		1.6E+012	18.00
			-2.386E+000	569.47	-2.386E+000	&	1.677E+001G		1.6E+012	8.20
			-2.386E+000	946.02	-2.369E-001	%	1.073E+001G		1.6E+012	13.40
			-2.386E+000	883.24	2.672E+000	%	1.310E+001G		1.6E+012	9.60
			-2.386E+000	880.53	-2.093E+000	%	2.262E+001G		1.6E+012	6.00
K-40	N	1	2.272E+002	1460.83	2.272E+002	@ (P	1.396E+001G		4.7E+011	10.67
BE-7	N P C	1	2.049E+000	477.60	2.049E+000	% (	1.079E+001G		5.3E+001	10.52
U-235	N	1	1.779E+000	143.79	1.779E+000	* (P	9.279E+000G		2.6E+011	10.96
			1.779E+000	205.33	-3.029E+000	&	2.031E+001G		2.6E+011	5.01
			1.779E+000	163.38	1.924E-001	&	2.068E+001G		2.6E+011	5.08
			1.779E+000	93.35	1.779E+000	! E	1.913E+001X		2.6E+011	5.81
TL-208	F N	1	1.735E+001	583.02	1.735E+001	(P	1.492E+000G		7.0E+002	84.50
			1.735E+001	277.28	3.419E+001	+	1.459E+001G		7.0E+002	6.31
			1.735E+001	860.56	3.102E+001	+	5.364E+000G		7.0E+002	12.42

EU-154	T F I	1	-1.384E+000	873.23	-1.384E+000	%	(		9.912E+000G	3.1E+003	12.27
			-1.384E+000	123.10	1.651E-002	&			2.319E+000G	3.1E+003	40.79
			-1.384E+000	1274.54	0.000E+000	&			6.766E+000G	3.1E+003	35.19
			-1.384E+000	723.36	-5.261E+000	%			1.048E+001G	3.1E+003	20.22
			-1.384E+000	1004.77	-2.332E-001	%			8.745E+000G	3.1E+003	18.01
			-1.384E+000	996.33	-1.645E+000	%			1.287E+001G	3.1E+003	10.60
PB-214	N	1	1.359E+001	351.93	1.426E+001		(	P	3.236E+000G	5.8E+005	37.60
			1.359E+001	295.09	1.229E+001	*	(	P	5.803E+000G	5.8E+005	19.30
			1.359E+001	242.00	-6.196E+000	%			2.599E+001G	5.8E+005	7.43
TH-234	N	1	1.274E+001	63.29	3.104E+000	*	(	P	3.238E+001G	1.6E+012	4.82
			1.274E+001	92.59	2.106E+001	*	(	P	2.303E+001G	1.6E+012	5.58
			1.164E+001	1120.29	1.187E+001		(	P	1.066E+001G	5.8E+005	15.10
			1.164E+001	1764.49	1.011E+001	?	(	P	9.593E+000G	5.8E+005	15.40
BI-214	N	1	1.164E+001	609.31	1.207E+001	@	(	P	3.155E+000G	5.8E+005	46.09
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		1.377E+000G	1.9E+003	99.98
			0.000E+000	1173.24	-2.436E-002	%			1.730E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	7.501E-001	7.502E-001	22.81	22.99	1.616E+000
BE-7	<	2.049E+000	2.053E+000	153.37	153.40	1.079E+001
K-40	#	2.272E+002	2.272E+002	5.67	6.38	1.396E+001
CO-60	<			600.95	600.96	1.377E+000
I-131	<	4.425E-003	4.485E-003	7,490.50	7,490.50	1.168E+000
CS-137	<	7.311E-002	7.311E-002	737.28	737.28	1.882E+000
EU-152	<	-2.602E-001	-2.602E-001	404.88	404.89	3.663E+000
TL-208		1.735E+001	1.736E+001	6.60	7.20	1.492E+000
RA-224	<	-8.593E+001	-8.594E+001	24.52	24.70	6.772E+001
PB-210	<	9.941E+000	9.941E+000	132.30	132.36	4.509E+001
PB-212	#	5.117E+001	5.118E+001	4.31	5.25	3.192E+000
AC-228		4.758E+001	4.758E+001	5.71	6.39	2.465E+000
Pa-234	<	-2.386E+000	-2.386E+000	73.08	73.14	5.774E+000
U-235	<	1.779E+000	1.779E+000	154.71	154.74	9.279E+000
AM-241		2.564E+000	2.564E+000	34.29	34.51	2.513E+000
EU-154	<	-1.384E+000	-1.384E+000	202.49	202.52	9.912E+000
EU-155	<	7.522E-002	7.523E-002	2,051.52	2,051.52	5.236E+000
PB-214	<	1.359E+001	1.359E+001	9.11	9.56	3.236E+000
BI-212	<	2.937E+001	2.938E+001	14.28	14.57	1.018E+001
BI-214	<	1.164E+001	1.164E+001	10.67	11.05	3.155E+000
TH-234	<	1.274E+001	1.274E+001	33.49	33.69	3.238E+001
PA-234M	<	3.849E+001	3.849E+001	121.85	121.89	1.623E+002

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 345.88 Bq/sample

Analyzed by: _____

403605

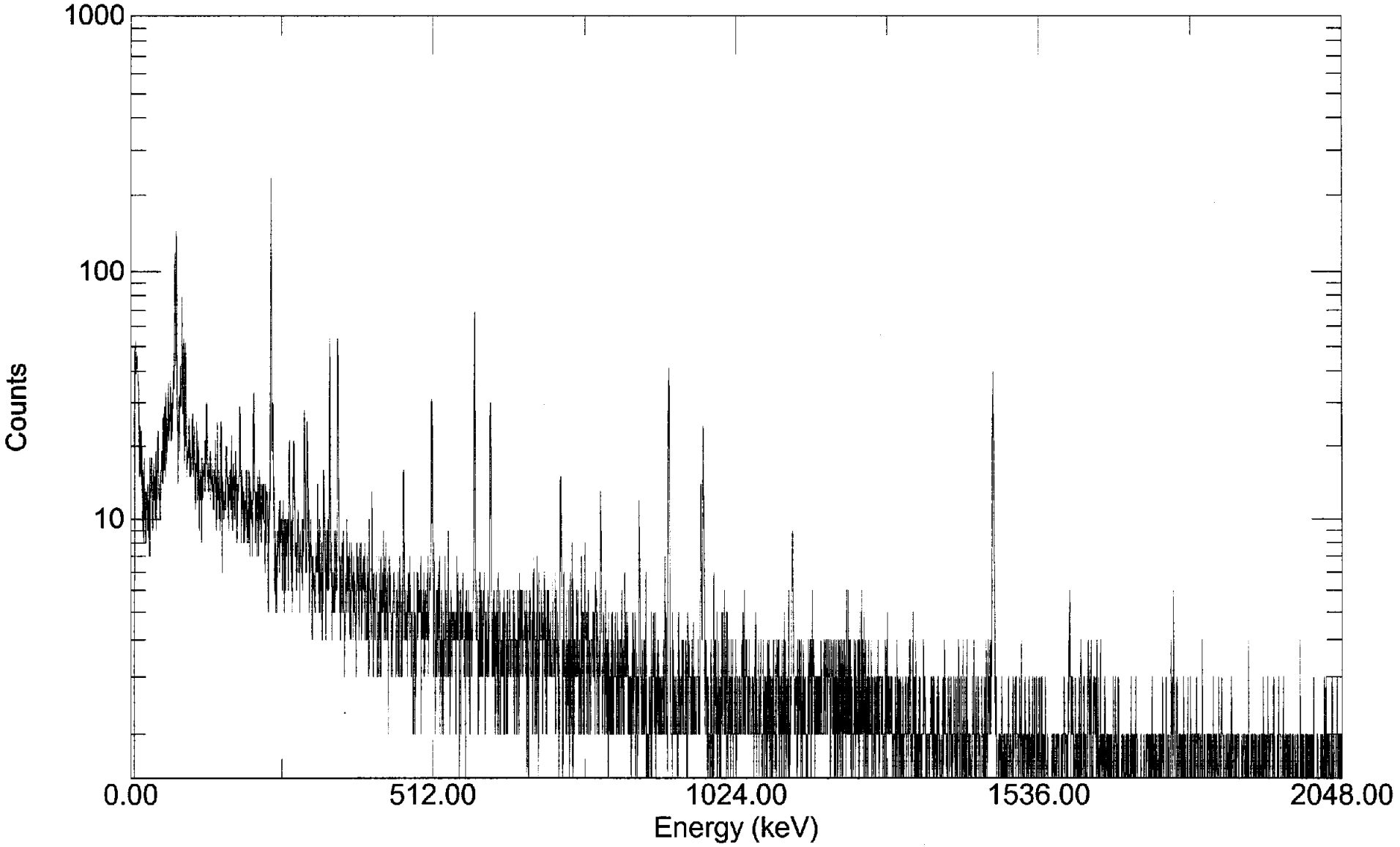
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKFP1AC

7356122_KEKFP1AC_F7L200262-004



Acquired: 23-Dec-2007 3:45:31 PM
File: C:\User\spectra\KEKFP1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1814.48 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,986

Sample Description: 7356122_KEKFT1AC_F7L200262-005

Spectrum Filename: KEKFT1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:47:12PM		
Live Time:	1800.00	Real Time:	1804.24
Dead Time:	0.24 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2194

Test America St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
185.79	46.49	92.51	14.49	0.008	97.49	0.750		
298.47	74.67	149.33	143.67	0.080	17.63	0.786	PB-214	
308.82	77.26	140.00	231.00	0.128	11.62	0.877	PB-214	s
349.07	87.32	51.40	115.60	0.064	12.78	0.904	PB-214	
359.48	89.93	69.67	50.33	0.028	27.36	0.785	PB-214	
3643.86	910.90	82.29	13.71	0.008	97.42	0.777		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.13	46.57	80.39	14.70	0.008	35.02	0.819	
AM-241	1	236.57	59.18	113.34	-3.27	-0.002	463.48	0.830	s
TH-234	1	253.00	63.29	164.43	25.53	0.014	44.26	0.834	s
EU-155	1	343.49	85.93	209.60	-35.14	-0.020	60.65	0.854	s
TH-234	1	370.92	92.79	191.77	23.93	0.013	40.80	0.859	s
AC-228	1	373.18	93.35	193.56	19.43	0.011	88.64	0.860	s D
U-235	1	373.18	93.35	145.69	-0.19	0.000	-198.55	0.860	s D
EU-155	1	427.26	106.88	51.57	13.13	0.007	82.14	0.871	s
EU-152	1	486.93	121.80	89.47	11.91	0.007	116.02	0.885	
EU-154	1	491.88	123.04	102.23	-7.64	-0.004	190.62	0.886	s
Pa-234	1	521.18	130.36	91.37	-7.19	-0.004	191.62	0.894	s
U-235	1	577.55	144.46	84.92	-0.36	0.000	3638.92	0.904	s
U-235	1	654.42	163.68	89.55	6.17	0.003	220.67	0.922	s
U-235	1	819.01	204.84	76.47	-11.44	-0.006	112.10	0.958	s
PB-212	1	954.15	238.63	56.02	287.98	0.160	6.65	0.986	D
RA-224	1	963.56	240.99	69.00	45.00	0.025	30.06	0.988	D
PB-214	1	967.61	242.00	55.91	40.09	0.022	30.75	0.989	D
TL-208	1	1108.73	277.28	69.86	1.45	0.001	821.38	1.019	s
I-131	1	1136.86	284.32	23.89	13.00	0.007	59.99	1.025	s
PB-214	1	1180.08	295.12	38.21	136.79	0.076	12.85	1.061	
PB-212	1	1198.72	299.78	23.33	35.67	0.020	29.86	0.306	s
AC-228	1	1351.23	337.92	32.36	38.52	0.021	26.38	1.071	s
EU-152	1	1377.05	344.37	27.41	-1.54	-0.001	486.70	1.076	s
PB-214	1	1405.75	351.55	42.58	158.42	0.088	12.22	1.207	s
I-131	1	1462.34	365.69	23.53	1.92	0.001	365.07	1.092	s
BE-7	1	1909.20	477.40	23.98	-0.22	0.000	3094.16	1.185	s
CS-134	1	2252.25	563.15	17.67	5.42	0.003	117.83	1.254	s
CS-134	1	2276.94	569.32	22.85	1.23	0.001	494.07	1.259	s D
Pa-234	1	2277.54	569.47	17.68	-1.07	-0.001	-124.66	1.259	s D
TL-208	1	2330.46	582.70	11.18	97.82	0.054	12.23	0.939	s
CS-134	1	2407.20	601.88	6.93	7.39	0.004	62.38	1.286	s
BI-214	1	2435.20	608.88	15.92	101.08	0.056	12.40	1.149	
I-131	1	2551.46	637.93	23.35	-2.80	-0.002	251.21	1.312	s
CS-137	1	2644.10	661.09	26.95	5.77	0.003	133.84	1.331	s
EU-154	1	2893.29	723.36	113.28	0.00	0.000	1505.20	1.378	s
BI-212	1	2907.66	726.95	29.19	20.16	0.011	43.95	1.381	s
PA-234M	1	3060.65	765.18	17.11	-0.77	0.000	770.18	1.411	s
EU-152	1	3115.00	778.76	21.22	-1.93	-0.001	345.77	1.420	s
BI-212	1	3142.44	785.62	19.11	6.35	0.004	105.20	1.425	s
CS-134	1	3179.56	794.89	6.44	6.25	0.003	70.01	1.433	s
CS-134	1	3205.72	801.43	9.77	3.46	0.002	138.64	1.437	s
TL-208	1	3441.70	860.39	18.48	6.29	0.003	104.61	1.481	s
EU-154	1	3480.01	869.96	15.30	0.11	0.000	5150.62	1.490	s
Pa-234	1	3520.99	880.20	16.56	1.75	0.001	337.64	1.495	s
Pa-234	1	3538.51	884.58	15.63	2.45	0.001	236.85	1.497	s

AC-228	1	3644.24	910.99	16.88	78.98	0.044	13.44	1.518	s
Pa-234	1	3788.53	947.04	16.76	0.15	0.000	3817.15	1.543	s
EU-152	1	3866.57	966.54	33.83	-5.94	-0.003	144.51	1.556	s
AC-228	1	3875.50	968.77	18.66	25.38	0.014	31.21	1.559	s
EU-154	1	3981.42	995.23	21.78	-5.74	-0.003	122.38	1.579	s
PA-234M	1	4003.98	1000.86	15.49	2.00	0.001	286.62	1.582	s
EU-154	1	4015.65	1003.78	15.94	-1.31	-0.001	439.79	1.585	s
EU-152	1	4460.31	1114.85	12.83	-0.44	0.000	1153.81	1.659	s
BI-214	1	4479.89	1119.74	4.65	30.35	0.017	16.90	0.437	s
CO-60	1	4705.69	1176.14	11.22	-0.48	0.000	1001.58	1.701	s
EU-154	1	5098.52	1274.24	12.83	-1.68	-0.001	310.51	1.768	s
CO-60	1	5332.27	1332.61	14.29	1.75	0.001	313.88	1.806	s
EU-152	1	5632.65	1407.61	5.07	5.52	0.003	71.74	1.854	s
K-40	1	5844.42	1460.49	8.39	195.02	0.108	7.31	1.887	s
BI-214	1	7061.69	1764.33	2.32	16.46	0.009	27.92	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
BE-7	N P C	1	-9.086E-002	477.60	-9.086E-002	% (	1.034E+001G		5.3E+001	10.52
I-131	T F I	1	7.814E-002	364.48	7.814E-002	& (	1.032E+000G		8.0E+000	81.70
			7.814E-002	284.30	5.622E+000	%	1.103E+001G		8.0E+000	6.14
			7.814E-002	636.97	-2.144E+000	%	1.931E+001G		8.0E+000	7.17
			-6.506E-001	883.24	1.846E+000	%	1.591E+001G		1.6E+012	9.60
			-6.506E-001	880.53	2.102E+000	&	2.605E+001G		1.6E+012	6.00
Pa-234	N	1	-6.506E-001	131.29	-6.506E-001	% (	4.274E+000G		1.6E+012	18.00
			-6.506E-001	569.47	-6.506E-001	%	1.355E+001G		1.6E+012	8.20
			-6.506E-001	946.02	8.682E-002	%	1.244E+001G		1.6E+012	13.40
			6.280E-002	1274.54	-4.702E-001	%	5.417E+000G		3.1E+003	35.19
			6.280E-002	723.36	0.000E+000	%	1.583E+001G		3.1E+003	20.22
			6.280E-002	1004.77	-5.853E-001	%	9.523E+000G		3.1E+003	18.01
			6.280E-002	996.33	-4.325E+000	%	1.844E+001G		3.1E+003	10.60
EU-154	T F I	1	6.280E-002	873.23	6.280E-002	% (	1.222E+001G		3.1E+003	12.27
			6.280E-002	123.10	-3.021E-001	%	1.970E+000G		3.1E+003	40.79
TL-208	F N	1	5.885E+000	583.02	5.885E+000	(P	1.101E+000G		7.0E+002	84.50
			5.885E+000	277.28	5.956E-001	&	1.715E+001G		7.0E+002	6.31
			5.885E+000	860.56	3.582E+000	%	1.296E+001G		7.0E+002	12.42
U-235	N	1	-5.456E-002	143.79	-5.456E-002	% (	6.948E+000G		2.6E+011	10.96
			-5.456E-002	205.33	-4.636E+000	&	1.762E+001G		2.6E+011	5.01
			-5.456E-002	163.38	2.137E+000	&	1.622E+001G		2.6E+011	5.08
			-5.456E-002	93.35	-5.456E-002	% E	1.694E+001X		2.6E+011	5.81
CS-134	T F I	1	3.974E-001	604.71	3.974E-001	% (	8.054E-001G		7.5E+002	97.62
			3.974E-001	795.87	4.842E-001	%	1.127E+000G		7.5E+002	85.53
			3.974E-001	569.32	3.974E-001	%	8.089E+000G		7.5E+002	15.38
			3.974E-001	801.95	2.655E+000	%	1.326E+001G		7.5E+002	8.69
			3.974E-001	563.24	3.201E+000	&	1.317E+001G		7.5E+002	8.35
CS-137	T F I	1	3.841E-001	661.66	3.841E-001	* (	1.790E+000G		1.1E+004	85.21
RA-224	N	1	2.527E+001	240.99	2.527E+001	(	2.326E+001G		7.0E+002	4.10
K-40	N	1	2.020E+002	1460.83	2.020E+002	(P	1.680E+001G		4.7E+011	10.67
AC-228	N	1	2.020E+001	911.07	2.020E+001	(	5.592E+000G		2.1E+003	29.00
			2.020E+001	968.97	1.135E+001	-	1.021E+001G		2.1E+003	17.46
			2.020E+001	338.32	9.975E+000	-	7.567E+000G		2.1E+003	12.01
			2.020E+001	93.35	5.833E+000	% } E	1.770E+001X	A	2.1E+003	5.56
AM-241	T	1	-2.009E-001	59.54	-2.009E-001	& (	3.212E+000G		1.6E+005	35.90
PA-234	N	1	1.921E+001	1001.00	1.921E+001	% (	2.018E+002G		1.6E+012	.84
			1.921E+001	766.41	-1.678E+001	%	4.803E+002G		1.6E+012	.29
EU-152	T F	1	-1.840E-001	344.29	-1.840E-001	% (	3.233E+000G		4.9E+003	26.50
			-1.840E-001	121.78	6.713E-001	%	2.638E+000G		4.9E+003	28.58
			-1.840E-001	778.92	-9.691E-001	%	1.216E+001G		4.9E+003	12.94
			-1.840E-001	964.11	-3.160E+000	%	1.587E+001G		4.9E+003	14.61
			-1.840E-001	1112.07	-2.842E-001	%	1.245E+001G		4.9E+003	13.64
			-1.840E-001	1408.00	2.811E+000	%	6.729E+000G		4.9E+003	21.00
CO-60	T F	1	1.791E-001	1332.50	1.791E-001	% (	2.075E+000G		1.9E+003	99.98

			1.791E-001	1173.24	-4.382E-002	%			1.679E+000G	1.9E+003	99.90
PB-212	N	1	1.519E+001	238.63	1.519E+001		(	P	1.983E+000G	7.0E+002	43.30
			1.519E+001	300.03	3.031E+001	+			2.144E+001G	7.0E+002	3.28
			1.340E+001	295.09	1.946E+001	+		P	4.485E+000G	5.8E+005	19.30
			1.340E+001	242.00	1.247E+001		(		1.168E+001G	5.8E+005	7.43
PB-214	N	1	1.340E+001	351.93	1.359E+001	*	(	P	2.840E+000G	5.8E+005	37.60
BI-214	N	1	1.220E+001	609.31	1.159E+001		(	P	2.441E+000G	5.8E+005	46.09
			1.220E+001	1120.29	1.771E+001	+		P	7.441E+000G	5.8E+005	15.10
			1.220E+001	1764.49	1.403E+001	?	(		8.366E+000G	5.8E+005	15.40
PB-210	N	1	1.218E+001	46.54	1.218E+001	%	(	P	3.687E+001G	8.1E+003	4.25
TH-234	N	1	1.104E+001	63.29	1.104E+001	*	(	P	2.702E+001G	1.6E+012	4.82
			1.104E+001	92.59	7.176E+000	%		P	2.016E+001G	1.6E+012	5.58
BI-212	N	1	1.048E+001	727.33	1.048E+001	%	(		1.450E+001G	7.0E+002	11.82
			1.048E+001	785.51	3.782E+001	%			1.376E+002G	7.0E+002	1.10
EU-155	T F I	1	1.003E+000	105.31	1.003E+000	&	(		2.765E+000G	1.8E+003	21.20
			1.003E+000	86.54	-1.968E+000	%			3.930E+000G	1.8E+003	30.70

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-9.086E-002	-9.104E-002	3,094.16	3,094.16	1.034E+001
K-40	<	2.020E+002	2.020E+002	7.41	7.97	1.680E+001
CO-60	<	1.791E-001	1.791E-001	313.88	313.89	2.075E+000
I-131	<	7.814E-002	7.922E-002	365.07	365.08	1.032E+000
CS-134	<	3.974E-001	3.974E-001	62.38	62.44	8.054E-001
CS-137	<	3.841E-001	3.841E-001	133.84	133.87	1.790E+000
EU-152	<	-1.840E-001	-1.840E-001	486.70	486.71	3.233E+000
EU-155	<	1.003E+000	1.003E+000	82.14	82.21	2.765E+000
TL-208		5.885E+000	5.886E+000	12.50	12.83	1.101E+000
BI-212	<	1.048E+001	1.049E+001	43.95	44.05	1.450E+001
BI-214		1.220E+001	1.220E+001	13.05	13.36	2.441E+000
TH-234	<	1.104E+001	1.104E+001	72.05	72.15	2.702E+001
PA-234M	<	1.921E+001	1.921E+001	286.62	286.64	2.018E+002
U-235	<	-5.456E-002	-5.456E-002	3,638.92	3,638.92	6.948E+000
EU-154	<	6.280E-002	6.280E-002	5,150.62	5,150.62	1.222E+001
RA-224		2.527E+001	2.528E+001	30.06	30.21	2.326E+001
PB-210	<	1.218E+001	1.218E+001	84.60	84.69	3.687E+001
PB-212		1.519E+001	1.519E+001	6.86	7.49	1.983E+000
PB-214		1.340E+001	1.340E+001	12.63	12.95	2.840E+000
AC-228	<	2.020E+001	2.021E+001	13.44	13.75	5.592E+000
Pa-234	<	-6.506E-001	-6.506E-001	191.62	191.64	4.274E+000
AM-241	<	-2.009E-001	-2.009E-001	463.48	463.49	3.212E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 71.95 Bq/sample

Analyzed by: _____

403605

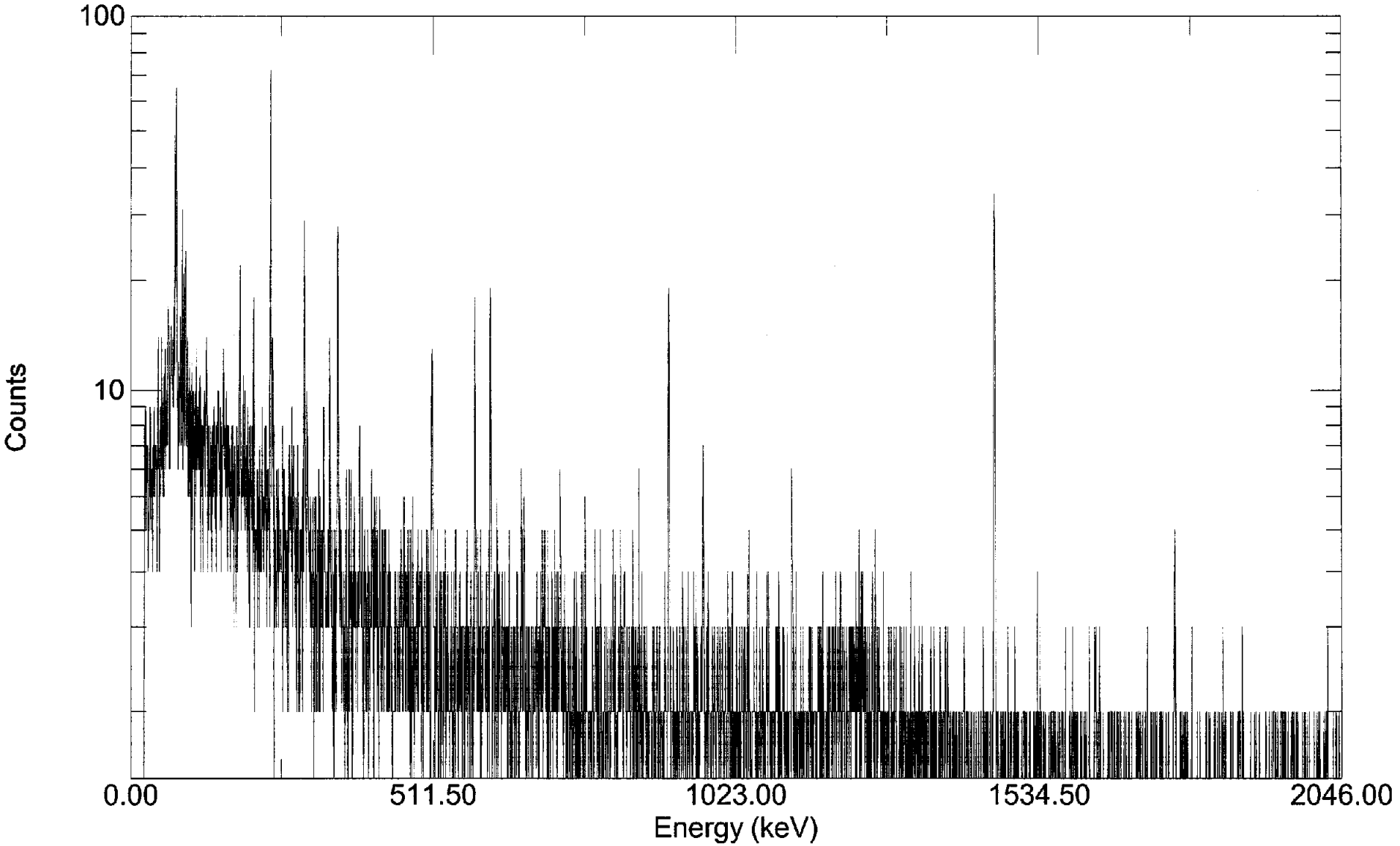
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKFT1AC

7356122_KEKFT1AC_F7L200262-005



Acquired: 23-Dec-2007 3:47:12 PM
File: C:\User\spectra\KEKFT1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.24 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,985

Sample Description: 7356122_KEKFV1AC_F7L200262-006

Spectrum Filename: KEKFV1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:45:09PM		
Live Time:	1800.00	Real Time:	1931.30
Dead Time:	6.80 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1119

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.10	74.74	456.00	339.00	0.188	13.96	0.794	PB-214	
307.37	77.05	369.00	566.00	0.314	7.98	0.827	PB-214	
347.59	87.10	347.97	35.03	0.019	77.17	1.144		s
358.07	89.72	136.00	166.00	0.092	12.61	0.815	PB-214	s
514.49	128.80	152.36	105.64	0.059	19.18	0.632	AC-228	
837.11	209.40	191.33	164.67	0.091	14.21	1.059	AC-228	
1081.11	270.36	50.67	106.33	0.059	16.07	0.792	AC-228	s
1637.63	409.42	19.17	61.83	0.034	20.10	0.906	AC-228	s
1853.11	463.27	41.67	72.33	0.040	23.45	0.775	SB-125	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.37	46.58	129.26	39.74	0.022	34.78	0.387	s
AM-241	1	239.04	59.98	307.44	-4.30	-0.002	2500.28	0.761	s
TH-234	1	251.51	63.10	340.95	25.22	0.014	66.84	0.764	s
EU-155	1	347.76	87.14	284.20	171.97	0.096	15.82	0.788	s
TH-234	1	372.08	93.22	309.72	115.22	0.064	19.32	0.795	s
AC-228	1	372.61	93.35	234.50	204.52	0.114	1.45	0.912	s D
U-235	1	372.61	93.35	266.33	7.46	0.004	38.19	0.795	s D
EU-155	1	416.90	104.42	194.28	8.26	0.005	241.16	0.808	s
EU-152	1	485.20	121.48	219.02	-2.05	-0.001	1022.53	0.824	s
EU-154	1	488.18	122.22	158.52	15.49	0.009	117.75	0.826	s
Pa-234	1	523.90	131.15	225.15	-4.11	-0.002	518.69	0.834	s
U-235	1	574.45	143.78	181.69	14.11	0.008	116.76	0.847	s
U-235	1	658.88	164.87	122.53	11.85	0.007	115.31	0.867	s
U-235	1	820.05	205.13	194.39	-7.34	-0.004	271.29	0.909	s
PB-212	1	954.37	238.70	153.48	1007.52	0.560	4.06	1.013	
RA-224	1	963.54	240.99	104.85	90.15	0.050	19.21	0.944	D
PB-214	1	967.59	242.00	167.66	53.34	0.030	36.96	0.945	D
TL-208	1	1109.72	277.51	61.40	51.98	0.029	25.43	0.980	s
I-131	1	1136.65	284.24	75.73	6.68	0.004	188.16	0.987	
PB-214	1	1180.43	295.18	97.91	126.09	0.070	18.61	1.071	
PB-212	1	1199.72	300.00	77.00	90.00	0.050	23.55	0.592	s
AC-228	1	1352.41	338.15	47.67	253.33	0.141	8.89	1.086	s
EU-152	1	1380.86	345.26	80.58	-0.52	0.000	2460.54	1.045	s
PB-214	1	1407.32	351.87	53.54	234.46	0.130	9.53	0.967	s
I-131	1	1457.32	364.36	59.81	-3.95	-0.002	281.12	1.065	s
BE-7	1	1910.86	477.70	62.11	-7.82	-0.004	146.97	1.173	s
CS-134	1	2250.14	562.50	43.88	22.55	0.013	46.57	1.252	
CS-134	1	2277.45	569.32	34.15	2.42	0.001	11.04	1.258	s D
Pa-234	1	2278.05	569.47	75.93	-0.62	0.000	-186.69	1.258	s D
TL-208	1	2333.74	583.39	15.75	329.25	0.183	5.86	1.230	
CS-134	1	2414.66	603.62	38.90	-4.27	-0.002	212.07	1.290	s
BI-214	1	2438.42	609.55	48.73	152.27	0.085	13.99	1.340	s
I-131	1	2548.13	636.97	71.82	0.00	0.000	1198.50	1.319	s
CS-137	1	2648.02	661.94	34.62	5.63	0.003	69.72	1.342	s
EU-154	1	2901.08	725.20	80.97	-13.97	-0.008	94.91	1.397	s
BI-212	1	2909.44	727.29	11.67	108.33	0.060	12.66	0.833	s
PA-234M	1	3071.35	767.76	32.50	-0.27	0.000	3004.86	1.434	s
EU-152	1	3113.16	778.21	23.39	4.78	0.003	150.35	1.445	s
BI-212	1	3141.89	785.40	42.62	-2.95	-0.002	318.30	1.451	s
CS-134	1	3180.46	795.04	27.08	25.07	0.014	35.50	1.460	s
CS-134	1	3207.22	801.73	31.20	-2.94	-0.002	274.91	1.465	s
TL-208	1	3443.22	860.73	6.17	65.83	0.037	15.93	0.814	s
EU-154	1	3494.09	873.44	16.57	2.20	0.001	270.44	1.527	s
Pa-234	1	3525.90	881.40	19.04	0.69	0.000	906.32	1.533	s
Pa-234	1	3529.94	882.41	21.11	-1.06	-0.001	620.67	1.535	s
AC-228	1	3645.39	911.27	0.00	238.00	0.132	6.48	1.794	

Pa-234	1	3788.80	947.12	19.36	-0.13	0.000	4683.50	1.588	s
EU-152	1	3863.69	965.85	114.23	2.16	0.001	703.45	1.603	s
AC-228	1	3877.77	969.37	9.67	138.33	0.077	10.09	1.694	
EU-154	1	3986.20	996.48	21.13	2.19	0.001	303.96	1.630	s
PA-234M	1	4005.85	1001.40	21.65	2.14	0.001	314.82	1.633	s
EU-154	1	4015.74	1003.87	26.64	-3.28	-0.002	229.49	1.637	s
EU-152	1	4448.48	1112.07	84.30	0.00	0.000	1298.49	1.723	s
BI-214	1	4481.27	1120.27	5.67	54.33	0.030	17.66	0.888	s
CO-60	1	4680.94	1170.21	14.31	-0.28	0.000	1930.33	1.772	s
EU-154	1	5085.96	1271.50	23.33	-5.80	-0.003	124.93	1.850	s
CO-60	1	5329.86	1332.50	16.22	1.00	0.001	579.77	1.894	s
EU-152	1	5631.70	1408.00	0.00	0.00	0.000	100.00	1.950	s
K-40	1	5843.99	1461.10	0.00	187.00	0.104	7.31	1.352	s
BI-214	1	7061.07	1765.60	8.82	8.00	0.004	49.53	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
CO-60	T F	1	9.637E-002	1332.50	9.637E-002	%	(		2.075E+000G			1.9E+003	99.98
			9.637E-002	1173.24	-2.427E-002	%			1.772E+000G			1.9E+003	99.90
CS-134	T F I	1	7.516E-001	604.71	-2.205E-001	%	(		1.640E+000G			7.5E+002	97.62
			7.516E-001	795.87	1.861E+000	?	(		2.001E+000G			7.5E+002	85.53
			7.516E-001	569.32	7.516E-001	%			9.310E+000G			7.5E+002	15.38
			7.516E-001	801.95	-2.162E+000	%			2.113E+001G			7.5E+002	8.69
			7.516E-001	563.24	1.280E+001	%			1.905E+001G			7.5E+002	8.35
EU-155	T F I	1	6.123E-001	105.31	6.123E-001	%	(		5.016E+000G			1.8E+003	21.20
			6.123E-001	86.54	9.301E+000	*			4.396E+000G		A	1.8E+003	30.70
AC-228	N	1	5.945E+001	911.16	5.821E+001		(		1.802E+000G			2.1E+003	29.00
			5.945E+001	968.97	5.907E+001		(		7.343E+000G			2.1E+003	17.46
			5.945E+001	338.32	6.303E+001	*	(		8.679E+000G			2.1E+003	12.01
			5.945E+001	93.35	5.945E+001			E	2.153E+001G		A	2.1E+003	5.56
EU-152	T F	1	-5.921E-002	344.29	-5.921E-002	&	(		5.104E+000G			4.9E+003	26.50
			-5.921E-002	121.78	-1.121E-001	&			3.916E+000G			4.9E+003	28.58
			-5.921E-002	778.92	2.302E+000	%			1.217E+001G			4.9E+003	12.94
			-5.921E-002	964.11	1.097E+000	&			2.670E+001G			4.9E+003	14.61
			-5.921E-002	1112.07	0.000E+000	%			2.779E+001G			4.9E+003	13.64
			-5.921E-002	1408.00	0.000E+000	%			3.548E+000G			4.9E+003	21.00
BI-212	N	1	5.401E+001	727.33	5.401E+001		(		9.286E+000G			7.0E+002	11.82
			5.401E+001	785.51	-1.685E+001	&			1.892E+002G			7.0E+002	1.10
PB-212	N	1	5.110E+001	238.63	5.110E+001		(	P	3.065E+000G			7.0E+002	43.30
			5.110E+001	300.03	7.350E+001	+			3.561E+001G			7.0E+002	3.28
RA-224	N	1	4.868E+001	240.99	4.868E+001		(		2.723E+001G			7.0E+002	4.10
Pa-234	N	1	-3.599E-001	131.29	-3.599E-001	%	(		6.361E+000G			1.6E+012	18.00
			-3.599E-001	569.47	-3.599E-001	%			2.527E+001G			1.6E+012	8.20
			-3.599E-001	946.02	-7.263E-002	%			1.267E+001G			1.6E+012	13.40
			-3.599E-001	883.24	-7.634E-001	%			1.737E+001G			1.6E+012	9.60
			-3.599E-001	880.53	7.897E-001	%			2.649E+001G			1.6E+012	6.00
CS-137	T F I	1	3.597E-001	661.66	3.597E-001	%	(	P	1.924E+000G			1.1E+004	85.21
BE-7	N P C	1	-3.043E+000	477.60	-3.043E+000	%	(		1.535E+001G			5.3E+001	10.52
PB-210	N	1	2.918E+001	46.54	2.918E+001	%	(	P	4.089E+001G			8.1E+003	4.25

AM-241	T		1	-2.446E-001	59.54	-2.446E-001	&	(	P		4.803E+000G	1.6E+005	35.90
TH-234		N	1	2.268E+001	63.29	1.022E+001	*	(	P		3.596E+001G	1.6E+012	4.82
				2.268E+001	92.59	3.344E+001	*	(	P		2.459E+001G	1.6E+012	5.58
U-235		N	1	2.077E+000	143.79	2.077E+000	%	(	P		9.642E+000G	2.6E+011	10.96
				2.077E+000	205.33	-2.862E+000	%				2.640E+001G	2.6E+011	5.01
				2.077E+000	163.38	3.962E+000	&		P		1.815E+001G	2.6E+011	5.08
				2.077E+000	93.35	2.077E+000	!			E	2.191E+001X	2.6E+011	5.81
PA-234M		N	1	1.958E+001	1001.00	1.958E+001	&	(			2.231E+002G	1.6E+012	.84
				1.958E+001	766.41	-5.628E+000	%				6.129E+002G	1.6E+012	.29
TL-208	F	N	1	1.913E+001	583.02	1.902E+001		(	P		1.225E+000G	7.0E+002	84.50
				1.913E+001	277.28	2.057E+001	?	(			1.552E+001G	7.0E+002	6.31
				1.913E+001	860.56	3.588E+001	+				7.785E+000G	7.0E+002	12.42
PB-214		N	1	1.831E+001	351.93	1.932E+001	@	(	P		3.033E+000G	5.8E+005	37.60
				1.831E+001	295.09	1.724E+001		(	P		6.675E+000G	5.8E+005	19.30
				1.831E+001	242.00	1.595E+001		(			1.885E+001G	5.8E+005	7.43
K-40		N	1	1.828E+002	1460.83	1.828E+002		(			7.204E+000G	4.7E+011	10.67
				1.676E+001	1120.29	3.017E+001	+				7.664E+000G	5.8E+005	15.10
				1.676E+001	1764.49	6.380E+000	%		P		1.320E+001G	5.8E+005	15.40
BI-214		N	1	1.676E+001	609.31	1.676E+001	@	(	P		3.878E+000G	5.8E+005	46.09
I-131	T F I		1	-1.549E-001	364.48	-1.549E-001	%	(			1.518E+000G	8.0E+000	81.70
				-1.549E-001	284.30	2.778E+000	%				1.798E+001G	8.0E+000	6.14
				-1.549E-001	636.97	0.000E+000	%				3.101E+001G	8.0E+000	7.17
EU-154	T F I		1	1.227E+000	873.23	1.227E+000	%	(			1.210E+001G	3.1E+003	12.27
				1.227E+000	123.10	5.934E-001	%				2.352E+000G	3.1E+003	40.79
				1.227E+000	1274.54	-1.534E+000	%				6.674E+000G	3.1E+003	35.19
				1.227E+000	723.36	-4.054E+000	&				1.295E+001G	3.1E+003	20.22
				1.227E+000	1004.77	-1.397E+000	%				1.141E+001G	3.1E+003	18.01
				1.227E+000	996.33	1.578E+000	&				1.736E+001G	3.1E+003	10.60

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	#	-1.549E-001	-1.570E-001	281.12	281.14	1.518E+000
CS-134	#	7.516E-001	7.517E-001	35.50	35.62	1.640E+000
BE-7	#	-3.043E+000	-3.049E+000	146.97	147.00	1.535E+001
K-40		1.828E+002	1.828E+002	7.31	7.88	7.204E+000
CO-60	#	9.637E-002	9.637E-002	579.77	579.77	2.075E+000
CS-137	#	3.597E-001	3.597E-001	147.10	147.13	1.924E+000
EU-152	#	-5.921E-002	-5.921E-002	2,460.54	2,460.54	5.104E+000
EU-155	#	6.123E-001	6.124E-001	241.16	241.18	5.016E+000
TL-208		1.913E+001	1.913E+001	5.93	6.59	1.225E+000
PB-210		2.918E+001	2.918E+001	49.89	50.04	4.089E+001
PB-212		5.110E+001	5.110E+001	4.09	5.07	3.065E+000
RA-224		4.868E+001	4.868E+001	19.21	19.44	2.723E+001
AC-228		5.945E+001	5.946E+001	4.98	5.75	1.802E+000
PA-234M	#	1.958E+001	1.958E+001	314.82	314.84	2.231E+002
U-235	#	2.077E+000	2.077E+000	137.24	137.27	9.642E+000
AM-241	#	-2.446E-001	-2.446E-001	4,426.51	4,426.51	4.803E+000
EU-154	#	1.227E+000	1.227E+000	270.44	270.45	1.210E+001
PB-214		1.831E+001	1.831E+001	9.74	10.16	3.033E+000
BI-212		5.401E+001	5.402E+001	12.66	12.99	9.286E+000
BI-214	#	1.676E+001	1.676E+001	14.61	14.89	3.878E+000
Pa-234	#	-3.599E-001	-3.599E-001	518.69	518.70	6.361E+000
TH-234	#	2.268E+001	2.268E+001	23.15	23.45	3.596E+001

= All peaks for activity calculation had bad shape

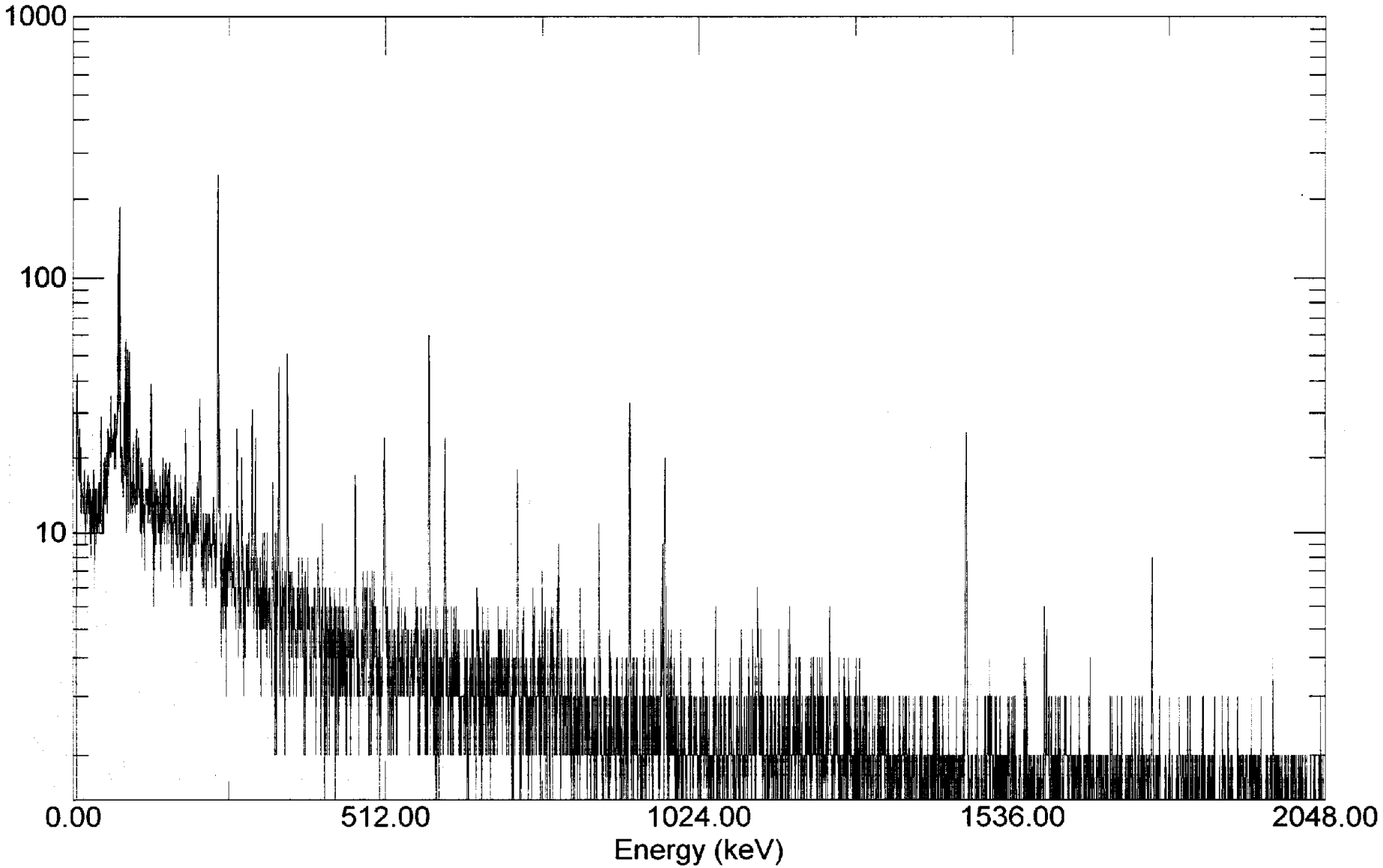
Total Activity (37.74 to 2,000.57 keV) 450.22 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKFV1AC

7356122_KEKFV1AC_F7L200262-006



Acquired: 23-Dec-2007 3:45:09 PM
File: C:\User\spectra\KEKFV1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1931.30 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,984

Sample Description: 7356122_KEKF01AC_F7L200262-007

Spectrum Filename: KEKF01AC.An1

Acquisition Information

Start Time:	23-Dec-2007 3:45:57PM		
Live Time:	1800.00	Real Time:	1824.08
Dead Time:	1.32 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.4483

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.63	74.62	216.00	155.00	0.086	19.85	0.943	BI-207	
308.10	77.24	187.50	250.50	0.139	12.02	1.081	PB-214	s
1407.38	352.01	190.25	49.75	0.028	41.69	1.177		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.76	46.66	130.71	7.46	0.004	49.57	0.832	s
AM-241	1	238.37	59.81	131.47	1.14	0.001	1430.08	0.846	
TH-234	1	251.93	63.20	156.42	102.58	0.057	22.30	1.024	s
EU-155	1	345.32	86.54	260.35	2.48	0.001	921.35	0.874	s
TH-234	1	370.63	92.87	192.63	63.37	0.035	30.53	0.615	s
U-235	1	372.56	93.35	169.68	-5.54	-0.003	-158.05	0.882	s D
AC-228	1	372.56	93.35	169.68	43.91	0.024	3.15	0.882	s D
EU-155	1	419.72	105.14	130.47	17.88	0.010	93.37	0.894	s
EU-152	1	483.66	121.12	100.61	-2.07	-0.001	687.16	0.912	s
EU-154	1	493.31	123.53	111.00	8.90	0.005	170.72	0.913	s
Pa-234	1	531.48	133.07	75.83	-4.13	-0.002	302.15	0.922	s
U-235	1	571.28	143.02	104.56	-10.42	-0.006	142.25	0.935	s
U-235	1	653.37	163.54	96.17	1.59	0.001	877.80	0.955	s
U-235	1	820.38	205.28	98.21	-3.81	-0.002	371.22	0.999	s
PB-212	1	955.25	238.99	179.54	420.46	0.234	9.20	1.135	s
RA-224	1	961.37	240.53	487.49	-85.71	-0.048	38.00	1.036	
PB-214	1	961.59	240.58	256.59	-47.20	-0.026	50.15	1.037	
TL-208	1	1106.15	276.71	48.57	14.45	0.008	73.12	1.074	s
I-131	1	1136.80	284.37	48.91	3.71	0.002	271.61	1.081	s
PB-214	1	1180.74	295.36	62.96	83.72	0.047	17.29	1.092	
PB-212	1	1201.40	300.52	33.00	36.00	0.020	38.29	1.154	
AC-228	1	1352.71	338.34	44.68	66.39	0.037	18.80	1.136	s
EU-152	1	1380.47	345.28	34.97	-0.24	0.000	3431.31	1.142	s
PB-214	1	1407.88	352.13	55.09	160.36	0.089	10.02	1.150	s
I-131	1	1456.32	364.24	34.36	-3.01	-0.002	281.45	1.163	s
BE-7	1	1909.47	477.51	27.37	0.59	0.000	1261.91	1.277	s
CS-134	1	2251.96	563.12	25.97	0.01	0.000	58072.15	1.363	s
CS-134	1	2276.76	569.32	30.48	1.33	0.001	478.91	1.369	s D
Pa-234	1	2277.35	569.47	30.46	-0.61	0.000	-79.07	1.369	s D
TL-208	1	2333.07	583.40	8.74	115.26	0.064	10.20	0.809	s
CS-134	1	2406.57	601.77	13.10	8.16	0.005	71.82	1.403	s
BI-214	1	2436.89	609.35	32.53	90.39	0.050	13.38	1.408	s
I-131	1	2545.98	636.62	25.39	3.82	0.002	193.23	1.435	s
CS-137	1	2645.29	661.44	34.26	0.05	0.000	1031.56	1.459	s
EU-154	1	2895.49	723.99	35.22	-4.62	-0.003	187.45	1.519	s
BI-212	1	2905.04	726.37	23.67	-0.40	0.000	1720.66	1.523	s
PA-234M	1	3065.20	766.41	19.63	0.00	0.000	626.60	1.561	s
EU-152	1	3123.13	780.89	20.11	0.27	0.000	2318.71	1.573	s
BI-212	1	3141.55	785.50	25.92	1.42	0.001	512.82	1.579	s
CS-134	1	3177.03	794.37	17.77	6.05	0.003	106.64	1.589	s
CS-134	1	3200.97	800.35	15.01	6.57	0.004	92.10	1.595	s
TL-208	1	3441.81	860.56	20.22	5.59	0.003	121.35	1.650	s
EU-154	1	3492.17	873.15	20.24	1.12	0.001	573.74	1.662	s
Pa-234	1	3520.19	880.15	17.02	-0.16	0.000	3621.08	1.669	s
Pa-234	1	3529.62	882.51	14.46	-1.67	-0.001	331.29	1.672	s
AC-228	1	3645.41	911.45	27.90	48.59	0.027	21.03	1.698	s

Pa-234	1	3784.75	946.29	30.02	0.01	0.000	53910.70	1.731	s
EU-152	1	3856.91	964.33	27.22	5.26	0.003	146.87	1.748	s
AC-228	1	3877.85	969.56	24.42	24.27	0.013	35.23	1.752	s
EU-154	1	3969.98	992.59	10.75	-0.79	0.000	597.76	1.778	s
PA-234M	1	4006.95	1001.83	18.75	2.90	0.002	219.27	1.782	s
EU-154	1	4010.46	1002.71	15.11	0.61	0.000	913.43	1.785	s
EU-152	1	4447.89	1112.07	28.38	-3.32	-0.002	233.62	1.884	s
BI-214	1	4482.28	1120.66	27.18	20.01	0.011	43.10	1.891	s
CO-60	1	4689.69	1172.51	17.03	3.60	0.002	170.63	1.939	s
EU-154	1	5094.97	1273.84	14.57	2.94	0.002	192.91	2.030	s
CO-60	1	5318.19	1329.64	18.26	-2.07	-0.001	299.91	2.081	s
EU-152	1	5638.18	1409.64	7.92	0.11	0.000	3524.38	2.147	s
K-40	1	5844.02	1461.10	19.06	234.97	0.131	7.03	2.192	
BI-214	1	7060.83	1765.33	11.00	14.04	0.008	42.76	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code		Peak MDA Value Becquerels	Code	Comments	
EU-155	T F I	1	9.554E-001	105.31	9.554E-001	*	(	2.988E+000G		1.8E+003	21.20
			9.554E-001	86.54	9.706E-002	&		3.046E+000G	A	1.8E+003	30.70
PB-214	N	1	9.249E+000	351.93	9.691E+000	*	(P	2.254E+000G		5.8E+005	37.60
			9.249E+000	295.09	8.387E+000		(	3.975E+000G		5.8E+005	19.30
			9.249E+000	242.00	-1.032E+001	%		1.692E+001G		5.8E+005	7.43
AC-228	N	1	9.206E+000	911.16	8.873E+000		(	4.989E+000G		2.1E+003	29.00
			9.206E+000	968.97	7.760E+000	?	(	8.228E+000G		2.1E+003	17.46
			9.206E+000	338.32	1.211E+001	*	(	6.177E+000G		2.1E+003	12.01
			9.206E+000	93.35	9.206E+000	!	E	1.329E+001G	A	2.1E+003	5.56
I-131	T F I	1	-8.644E-002	364.48	-8.644E-002	%	(	8.626E-001G		8.0E+000	81.70
			-8.644E-002	284.30	1.130E+000	%		1.075E+001G		8.0E+000	6.14
			-8.644E-002	636.97	2.075E+000	%		1.421E+001G		8.0E+000	7.17
BI-214	N	1	7.339E+000	609.31	7.339E+000	*	(P	2.378E+000G		5.8E+005	46.09
			7.339E+000	1120.29	8.381E+000	%		1.131E+001G		5.8E+005	15.10
			7.339E+000	1764.49	8.754E+000	%		1.133E+001G		5.8E+005	15.40
AM-241	T	1	4.909E-002	59.54	4.909E-002	&	(	2.425E+000G		1.6E+005	35.90
TL-208	F N	1	4.909E+000	583.02	4.909E+000	@	(P	7.022E-001G		7.0E+002	84.50
			4.909E+000	277.28	4.186E+000	&		1.020E+001G		7.0E+002	6.31
			4.909E+000	860.56	2.270E+000	%		9.610E+000G		7.0E+002	12.42
			4.679E-001	723.36	-9.932E-001	%		6.525E+000G		3.1E+003	20.22
			4.679E-001	1004.77	1.943E-001	%		6.657E+000G		3.1E+003	18.01
			4.679E-001	996.33	-4.259E-001	&		9.700E+000G		3.1E+003	10.60
EU-154	T F I	1	4.679E-001	873.23	4.679E-001	%	(	9.853E+000G		3.1E+003	12.27
			4.679E-001	123.10	2.463E-001	&		1.434E+000G		3.1E+003	40.79
			4.679E-001	1274.54	5.908E-001	%		4.125E+000G		3.1E+003	35.19
PB-210	N	1	4.451E+000	46.54	4.451E+000	*	(P	3.343E+001G		8.1E+003	4.25
RA-224	N	1	-3.385E+001	240.99	-3.385E+001	&	(	4.171E+001G		7.0E+002	4.10
TH-234	N	1	3.114E+001	63.29	3.114E+001	*	(P	1.851E+001G		1.6E+012	4.82
			3.114E+001	92.59	1.327E+001	%	P	1.411E+001G		1.6E+012	5.58
CS-134	T F I	1	3.108E-001	604.71	3.108E-001	%	(	7.455E-001G		7.5E+002	97.62
			3.108E-001	795.87	3.335E-001	%		1.233E+000G		7.5E+002	85.53
			3.108E-001	569.32	3.051E-001	%	}	6.513E+000G		7.5E+002	15.38

			3.108E-001	801.95	3.588E+000	&			1.134E+001G	7.5E+002	8.69
			3.108E-001	563.24	5.188E-003	&			1.106E+001G	7.5E+002	8.35
			-2.617E-001	880.53	-1.384E-001	%			1.880E+001G	1.6E+012	6.00
Pa-234	N	1	-2.617E-001	131.29	-2.617E-001	%	(		2.742E+000G	1.6E+012	18.00
			-2.617E-001	569.47	-2.617E-001	%			1.222E+001G	1.6E+012	8.20
			-2.617E-001	946.02	5.866E-003	%			1.153E+001G	1.6E+012	13.40
			-2.617E-001	883.24	-8.969E-001	%			1.098E+001G	1.6E+012	9.60
CS-137	T F !	1	2.524E-003	661.66	2.524E-003	%	(	P	1.415E+000G	1.1E+004	85.21
EU-152	T F	1	-2.052E-002	344.29	-2.052E-002	%	(		2.543E+000G	4.9E+003	26.50
			-2.052E-002	121.78	-8.187E-002	%			1.951E+000G	4.9E+003	28.58
			-2.052E-002	778.92	9.822E-002	%			8.449E+000G	4.9E+003	12.94
			-2.052E-002	964.11	2.002E+000	%			1.028E+001G	4.9E+003	14.61
			-2.052E-002	1112.07	-1.528E+000	%			1.268E+001G	4.9E+003	13.64
			-2.052E-002	1408.00	4.180E-002	%			5.837E+000G	4.9E+003	21.00
PA-234M	N	1	1.988E+001	1001.00	1.988E+001	%	(		1.570E+002G	1.6E+012	.84
			1.988E+001	766.41	0.000E+000	&			3.628E+002G	1.6E+012	.29
K-40	N	1	1.765E+002	1460.83	1.765E+002		(		1.732E+001G	4.7E+011	10.67
BE-7	N P C	1	1.686E-001	477.60	1.686E-001	%	(		7.749E+000G	5.3E+001	10.52
PB-212	N	1	1.560E+001	238.63	1.560E+001	*	(	P	2.417E+000G	7.0E+002	43.30
			1.560E+001	300.03	2.154E+001	+			1.764E+001G	7.0E+002	3.28
CO-60	T F	1	-1.527E-001	1332.50	-1.527E-001	%	(		1.668E+000G	1.9E+003	99.98
			-1.527E-001	1173.24	2.370E-001	%			1.446E+000G	1.9E+003	99.90
BI-212	N	1	-1.483E-001	727.33	-1.483E-001	%	(		9.374E+000G	7.0E+002	11.82
			-1.483E-001	785.51	6.034E+000	&			1.121E+002G	7.0E+002	1.10
U-235	N	1	-1.111E+000	143.79	-1.111E+000	%	(		5.372E+000G	2.6E+011	10.96
			-1.111E+000	205.33	-1.086E+000	%			1.392E+001G	2.6E+011	5.01
			-1.111E+000	163.38	3.856E-001	%			1.177E+001G	2.6E+011	5.08
			-1.111E+000	93.35	-1.111E+000	!		E	1.272E+001X	2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	1.686E-001	1.690E-001	1,261.91	1,261.91	7.749E+000
K-40	#	1.765E+002	1.765E+002	7.03	7.62	1.732E+001
CO-60	#	-1.527E-001	-1.527E-001	299.91	299.92	1.668E+000
I-131	#	-8.644E-002	-8.763E-002	281.45	281.47	8.626E-001
CS-134	#	3.108E-001	3.108E-001	71.82	71.88	7.455E-001
CS-137	#	2.524E-003	2.524E-003	15,400.11	15,400.11	1.415E+000
EU-152	#	-2.052E-002	-2.052E-002	3,431.31	3,431.31	2.543E+000
EU-155	#	9.554E-001	9.554E-001	93.37	93.43	2.988E+000
TL-208	#	4.909E+000	4.910E+000	10.41	10.81	7.022E-001
BI-212	#	-1.483E-001	-1.483E-001	1,720.66	1,720.66	9.374E+000
BI-214	#	7.339E+000	7.339E+000	13.70	14.00	2.378E+000
RA-224	#	-3.385E+001	-3.386E+001	38.00	38.11	4.171E+001
AC-228	#	9.206E+000	9.206E+000	15.04	15.31	4.989E+000
TH-234	#	3.114E+001	3.114E+001	26.81	27.06	1.851E+001
PA-234M	#	1.988E+001	1.988E+001	219.27	219.29	1.570E+002
U-235	#	-1.111E+000	-1.111E+000	142.25	142.28	5.372E+000
EU-154	#	4.679E-001	4.679E-001	573.74	573.75	9.853E+000
PB-210	#	4.451E+000	4.451E+000	209.86	209.89	3.343E+001
PB-212		1.560E+001	1.560E+001	9.40	9.87	2.417E+000
PB-214	#	9.249E+000	9.249E+000	10.04	10.44	2.254E+000
Pa-234	#	-2.617E-001	-2.617E-001	302.15	302.16	2.742E+000
AM-241	#	4.909E-002	4.909E-002	1,430.08	1,430.08	2.425E+000

= All peaks for activity calculation had bad shape

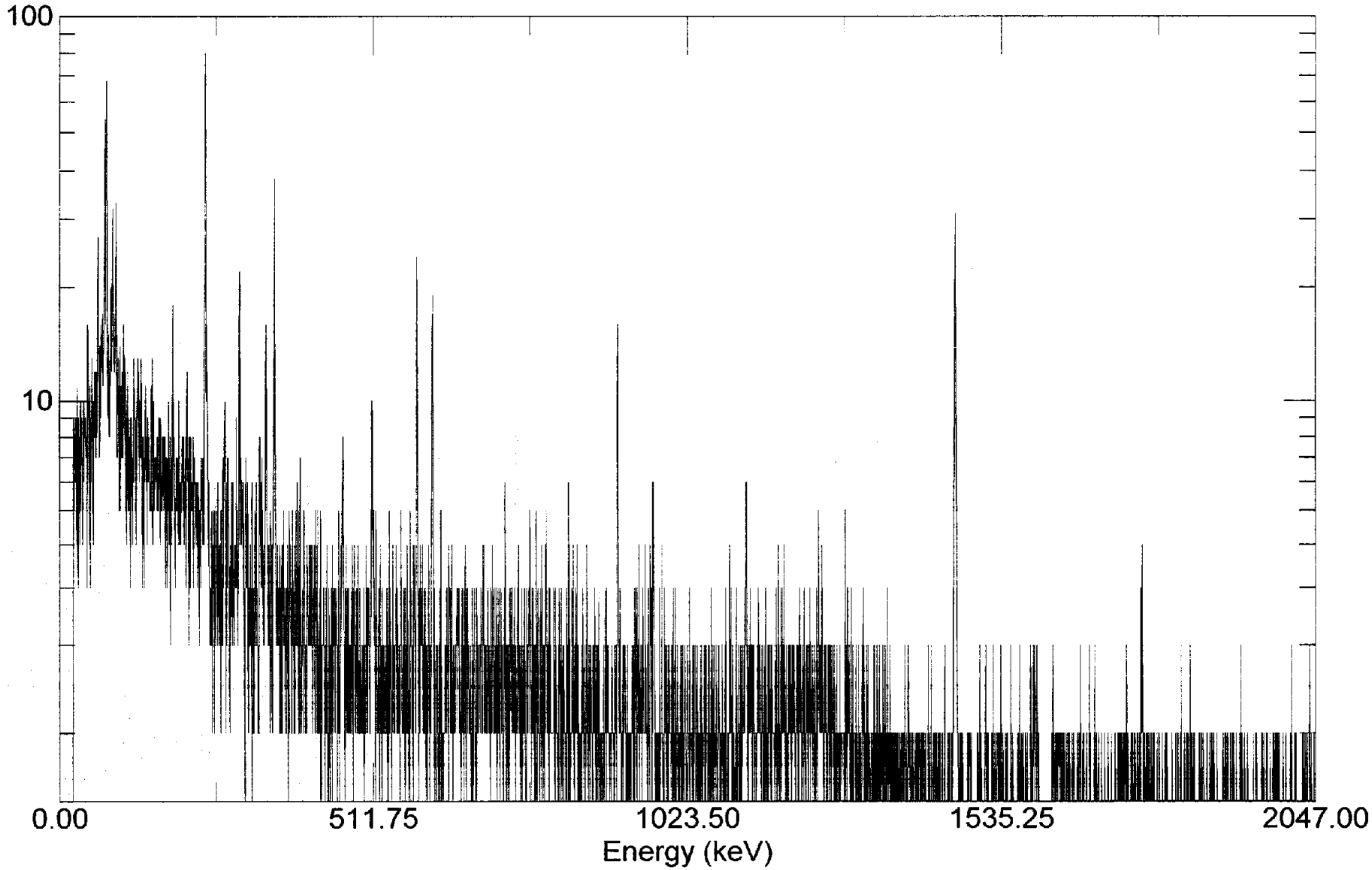
Total Activity (37.72 to 2,000.15 keV) 51.64 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKF01AC

7356122_KEKF01AC_F7L200262-007



Acquired: 23-Dec-2007 3:45:57 PM
File: C:\User\spectra\KEKF01AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1824.08 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,987

Sample Description: 7356122_KEKF11AC_F7L200262-008

Spectrum Filename: KEKF11AC.An1

Acquisition Information

Start Time:	23-Dec-2007 4:26:32PM		
Live Time:	1800.00	Real Time:	1810.64
Dead Time:	0.59 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2006

TestAmerica St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.41	74.82	266.33	229.67	0.128	15.40	0.658	PB-214	
307.28	77.03	270.00	296.00	0.164	12.94	0.695	PB-214	
358.75	89.90	143.06	76.94	0.043	24.77	0.522	PB-214	sM
516.37	129.31	171.48	83.52	0.046	24.73	0.705	AC-228	
597.50	149.59	62.50	44.50	0.025	36.46	0.550	TE-131	s
742.22	185.77	104.00	70.00	0.039	30.35	0.637	U-235	s
833.34	208.55	84.22	88.78	0.049	18.07	0.680	LU-177	s
1351.12	337.99	166.04	46.96	0.026	41.46	0.880		
2435.96	609.19	186.71	33.29	0.018	60.57	1.117		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

Test Amerida St. Louis

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.14	46.75	134.46	29.54	0.016	37.10	0.528	s
AM-241	1	232.85	58.43	149.94	0.39	0.000	4424.41	0.824	s
TH-234	1	253.10	63.49	216.90	86.10	0.048	23.61	0.772	s
EU-155	1	347.96	87.21	238.08	90.21	0.050	26.38	0.849	s
TH-234	1	370.93	92.95	198.01	78.99	0.044	19.62	1.412	s
AC-228	1	372.54	93.35	347.83	0.00	0.000	2186.32	0.855	s D
U-235	1	372.54	93.35	189.86	11.55	0.006	18.77	0.855	s D
EU-155	1	423.63	106.12	153.21	16.86	0.009	106.67	0.866	s
EU-152	1	479.30	120.04	115.45	0.56	0.000	2697.27	0.881	s
EU-154	1	488.00	122.22	150.62	-12.32	-0.007	143.68	0.882	s
Pa-234	1	524.47	131.33	211.10	2.82	0.002	731.28	0.890	
U-235	1	572.84	143.43	142.71	21.34	0.012	69.41	0.901	
U-235	1	652.81	163.42	144.15	13.98	0.008	102.02	0.919	s
U-235	1	820.30	205.29	132.63	-9.40	-0.005	225.50	0.957	s
PB-212	1	953.66	238.63	65.21	585.79	0.325	4.33	0.987	D
RA-224	1	963.07	240.99	127.48	61.52	0.034	28.92	0.989	D
PB-214	1	967.12	242.00	100.92	72.08	0.040	20.65	0.990	D
TL-208	1	1106.84	276.93	65.17	47.83	0.027	39.82	0.674	s
I-131	1	1141.10	285.49	43.91	0.41	0.000	2316.08	1.028	s
PB-214	1	1180.05	295.23	55.88	135.13	0.075	12.90	0.985	s
PB-212	1	1198.24	299.78	34.67	54.33	0.030	24.79	0.510	s
AC-228	1	1351.58	338.11	85.97	87.46	0.049	17.27	1.076	s
EU-152	1	1373.08	343.49	60.55	1.60	0.001	694.14	1.081	s
PB-214	1	1406.36	351.81	44.49	202.51	0.113	8.45	0.880	
I-131	1	1454.42	363.82	68.37	-9.25	-0.005	130.59	1.099	s
BE-7	1	1909.51	477.59	37.22	6.87	0.004	131.20	1.198	s
CS-134	1	2249.19	562.50	24.56	13.58	0.008	58.32	1.273	s
CS-134	1	2276.47	569.32	27.75	-0.95	-0.001	-3.59	1.278	s D
Pa-234	1	2277.07	569.47	28.55	0.51	0.000	152.60	1.278	s D
TL-208	1	2331.20	583.00	20.92	231.08	0.128	7.50	1.203	
CS-134	1	2402.30	600.78	-20.86	-5.76	-0.003	17.35	1.309	s
BI-214	1	2435.64	609.11	43.03	161.58	0.090	8.87	1.313	s
I-131	1	2546.81	636.90	27.34	7.23	0.004	108.88	1.337	s
CS-137	1	2645.37	661.54	34.40	25.86	0.014	37.62	1.358	s
EU-154	1	2891.33	723.02	47.46	-3.97	-0.002	250.59	1.411	s
BI-212	1	2909.21	727.49	35.27	23.73	0.013	40.91	1.414	s
PA-234M	1	3063.27	766.00	40.70	-0.23	0.000	3902.61	1.447	s
EU-152	1	3113.19	778.48	24.22	-1.95	-0.001	364.02	1.458	s
BI-212	1	3141.32	785.51	45.66	0.00	0.000	955.61	1.463	s
CS-134	1	3178.54	794.81	26.49	19.75	0.011	43.19	1.472	
CS-134	1	3208.57	802.32	40.94	-7.23	-0.004	130.56	1.477	s
TL-208	1	3440.02	860.17	0.00	47.00	0.026	14.59	0.598	s
EU-154	1	3493.07	873.44	30.79	-4.06	-0.002	199.57	1.537	s
Pa-234	1	3521.96	880.66	28.70	-1.18	-0.001	650.40	1.543	s
Pa-234	1	3532.30	883.24	16.20	0.00	0.000	569.21	1.546	s

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AC-228	1	3643.78	911.11	31.17	102.22	0.057	11.81	1.569	
Pa-234	1	3785.06	946.42	22.19	4.17	0.002	167.15	1.598	s
EU-152	1	3857.73	964.59	38.73	14.13	0.008	67.72	1.613	s
AC-228	1	3874.98	968.90	26.63	58.77	0.033	16.82	1.617	
EU-154	1	3988.99	997.39	29.36	-4.55	-0.003	174.72	1.640	s
PA-234M	1	4005.18	1001.44	18.90	10.03	0.006	68.96	1.643	s
EU-154	1	4016.87	1004.36	28.77	-3.91	-0.002	200.63	1.647	s
EU-152	1	4448.01	1112.13	19.63	2.55	0.001	253.86	1.735	s
BI-214	1	4480.89	1120.34	28.73	19.02	0.011	33.95	1.741	s
CO-60	1	4692.51	1173.24	26.64	0.00	0.000	729.95	1.784	s
EU-154	1	5097.83	1274.54	16.04	0.00	0.000	566.32	1.866	s
CO-60	1	5330.43	1332.68	15.76	0.76	0.000	748.99	1.912	s
EU-152	1	5632.37	1408.14	17.80	-1.49	-0.001	409.98	1.972	s
K-40	1	5842.25	1460.60	12.54	257.46	0.143	6.09	1.724	
BI-214	1	7057.33	1764.27	12.41	14.70	0.008	30.20	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
TL-208	F N	1	9.335E+000	583.02	9.335E+000	(P	9.704E-001G		7.0E+002	84.50
			9.335E+000	277.28	1.506E+001	+	1.270E+001G		7.0E+002	6.31
			9.335E+000	860.56	1.696E+001	+	2.660E+000G		7.0E+002	12.42
BI-212	N	1	8.006E+000	727.33	8.006E+000	% (	1.025E+001G		7.0E+002	11.82
			8.006E+000	785.51	0.000E+000	%	1.308E+002G		7.0E+002	1.10
PA-234	N	1	5.972E+001	1001.00	5.972E+001	% (	1.368E+002G		1.6E+012	.84
			5.972E+001	766.41	-3.256E+000	&	4.563E+002G		1.6E+012	.29
CO-60	T F	1	4.655E-002	1332.50	4.655E-002	% (	1.302E+000G		1.9E+003	99.98
			4.655E-002	1173.24	0.000E+000	%	1.496E+000G		1.9E+003	99.90
EU-155	T F I	1	2.803E+000	105.31	1.042E+000	% (	3.735E+000G		1.8E+003	21.20
			2.803E+000	86.54	4.018E+000	(	3.323E+000G		1.8E+003	30.70
I-131	T F I	1	-2.749E-001	364.48	-2.749E-001	% (	1.225E+000G		8.0E+000	81.70
			-2.749E-001	284.30	1.336E-001	%	1.107E+001G		8.0E+000	6.14
			-2.749E-001	636.97	3.662E+000	%	1.372E+001G		8.0E+000	7.17
RA-224	N	1	2.701E+001	240.99	2.701E+001	(	2.429E+001G		7.0E+002	4.10
U-235	N	1	2.658E+000	143.79	2.658E+000	% (P	7.273E+000G		2.6E+011	10.96
			2.658E+000	205.33	-3.045E+000	% P	1.826E+001G		2.6E+011	5.01
			2.658E+000	163.38	3.947E+000	% P	1.657E+001G		2.6E+011	5.08
			2.658E+000	93.35	2.658E+000	! E	1.540E+001X		2.6E+011	5.81
PB-212	N	1	2.419E+001	238.63	2.419E+001	(P	1.666E+000G		7.0E+002	43.30
			2.419E+001	300.03	3.484E+001	+	1.933E+001G		7.0E+002	13.28
TH-234	N	1	2.373E+001	63.29	2.928E+001	* (P	2.426E+001G		1.6E+012	4.82
			2.373E+001	92.59	1.895E+001	(P	1.638E+001G		1.6E+012	5.58
Pa-234	N	1	2.087E-001	131.29	2.087E-001	& (	5.212E+000G		1.6E+012	18.00
			2.087E-001	569.47	2.087E-001	&	1.130E+001G		1.6E+012	8.20
			2.087E-001	946.02	1.490E+000	%	8.814E+000G		1.6E+012	13.40
			2.087E-001	883.24	0.000E+000	%	1.021E+001G		1.6E+012	9.60
			2.087E-001	880.53	-8.933E-001	%	2.101E+001G		1.6E+012	6.00
CS-134	T F I	1	-2.068E-001	604.71	-2.068E-001	& (	2.645E-001G		7.5E+002	97.62
			-2.068E-001	795.87	9.801E-001	%	1.325E+000G		7.5E+002	85.53
			-2.068E-001	569.32	-2.068E-001	&	5.948E+000G		7.5E+002	15.38
			-2.068E-001	801.95	-3.550E+000	%	1.597E+001G		7.5E+002	8.69
			-2.068E-001	563.24	5.415E+000	%	1.029E+001G		7.5E+002	8.35
BE-7	N P C	1	1.933E+000	477.60	1.933E+000	& (	8.758E+000G		5.3E+001	10.52
AM-241	T	1	1.893E-002	59.54	1.893E-002	& (	2.889E+000G		1.6E+005	35.90
PB-210	N	1	1.866E+001	46.54	1.866E+001	% (P	3.584E+001G		8.1E+003	4.25
			1.649E+001	93.35	0.000E+000	+ } E	1.609E+001X	A	2.1E+003	5.56
AC-228	N	1	1.649E+001	911.07	1.644E+001	(P	4.620E+000G		2.1E+003	29.00
			1.649E+001	968.97	1.639E+001	(P	7.464E+000G		2.1E+003	17.46
			1.649E+001	338.32	1.673E+001	(P	8.783E+000G		2.1E+003	12.01
K-40	N	1	1.589E+002	1460.83	1.589E+002	(P	1.186E+001G		4.7E+011	10.67
EU-154	T F I	1	-1.498E+000	873.23	-1.498E+000	% (	1.054E+001G		3.1E+003	12.27
			-1.498E+000	123.10	-3.980E-001	%	1.935E+000G		3.1E+003	40.79
			-1.498E+000	1274.54	0.000E+000	%	3.604E+000G		3.1E+003	35.19

				-1.498E+000	723.36	-7.795E-001	&			6.838E+000G	3.1E+003	20.22
				-1.498E+000	1004.77	-1.084E+000	%			7.686E+000G	3.1E+003	18.01
				-1.498E+000	996.33	-2.133E+000	%			1.310E+001G	3.1E+003	10.60
				1.401E-001	1112.07	1.003E+000	&			9.196E+000G	4.9E+003	13.64
				1.401E-001	1408.00	-4.526E-001	%			6.816E+000G	4.9E+003	21.00
EU-152	T F		1	1.401E-001	344.29	1.401E-001	%	(		3.422E+000G	4.9E+003	26.50
				1.401E-001	121.78	2.596E-002	%			2.430E+000G	4.9E+003	28.58
				1.401E-001	778.92	-6.302E-001	%			8.287E+000G	4.9E+003	12.94
				1.401E-001	964.11	4.696E+000	%			1.054E+001G	4.9E+003	14.61
PB-214		N	1	1.335E+001	351.93	1.274E+001		(	P	2.125E+000G	5.8E+005	37.60
				1.335E+001	295.09	1.455E+001	@	(	P	4.042E+000G	5.8E+005	19.30
				1.335E+001	242.00	1.752E+001	+		P	1.203E+001G	5.8E+005	7.43
BI-214		N	1	1.235E+001	609.31	1.235E+001	@	(	P	2.543E+000G	5.8E+005	46.09
				1.235E+001	1120.29	6.803E+000	%		P	9.901E+000G	5.8E+005	15.10
				1.235E+001	1764.49	7.333E+000	%		P	9.540E+000G	5.8E+005	15.40
CS-137	T F I		1	1.133E+000	661.66	1.133E+000	?	(		1.316E+000G	1.1E+004	85.21

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.933E+000	1.938E+000	131.20	131.23	8.758E+000
K-40		1.589E+002	1.589E+002	6.38	7.02	1.186E+001
CO-60	<	4.655E-002	4.656E-002	748.99	749.00	1.302E+000
I-131	<	-2.749E-001	-2.793E-001	130.59	130.62	1.225E+000
CS-134	<	-2.068E-001	-2.069E-001	17.35	17.59	2.645E-001
EU-154	<	-1.498E+000	-1.498E+000	199.57	199.59	1.054E+001
PB-210	#	1.866E+001	1.866E+001	74.09	74.19	3.584E+001
PB-212		2.419E+001	2.420E+001	4.49	5.40	1.666E+000
PB-214		1.335E+001	1.335E+001	8.21	8.70	2.125E+000
BI-212	<	8.006E+000	8.007E+000	40.91	41.01	1.025E+001
Pa-234	<	2.087E-001	2.087E-001	731.28	731.28	5.212E+000
TH-234		2.373E+001	2.373E+001	23.30	23.59	2.426E+001
CS-137	<	1.133E+000	1.133E+000	37.62	37.73	1.316E+000
EU-152	<	1.401E-001	1.401E-001	694.14	694.15	3.422E+000
EU-155	<	2.803E+000	2.803E+000	26.38	26.59	3.735E+000
TL-208		9.335E+000	9.337E+000	7.79	8.31	9.704E-001
RA-224		2.701E+001	2.702E+001	28.92	29.07	2.429E+001
BI-214	<	1.235E+001	1.235E+001	9.51	9.94	2.543E+000
AC-228	<	1.649E+001	1.649E+001	9.43	9.86	4.620E+000
PA-234M	<	5.972E+001	5.972E+001	68.96	69.02	1.368E+002
U-235	<	2.658E+000	2.658E+000	81.58	81.63	7.273E+000
AM-241	<	1.893E-002	1.893E-002	4.424.41	4.424.41	2.889E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 256.52 Bq/sample

Analyzed by: _____

403605

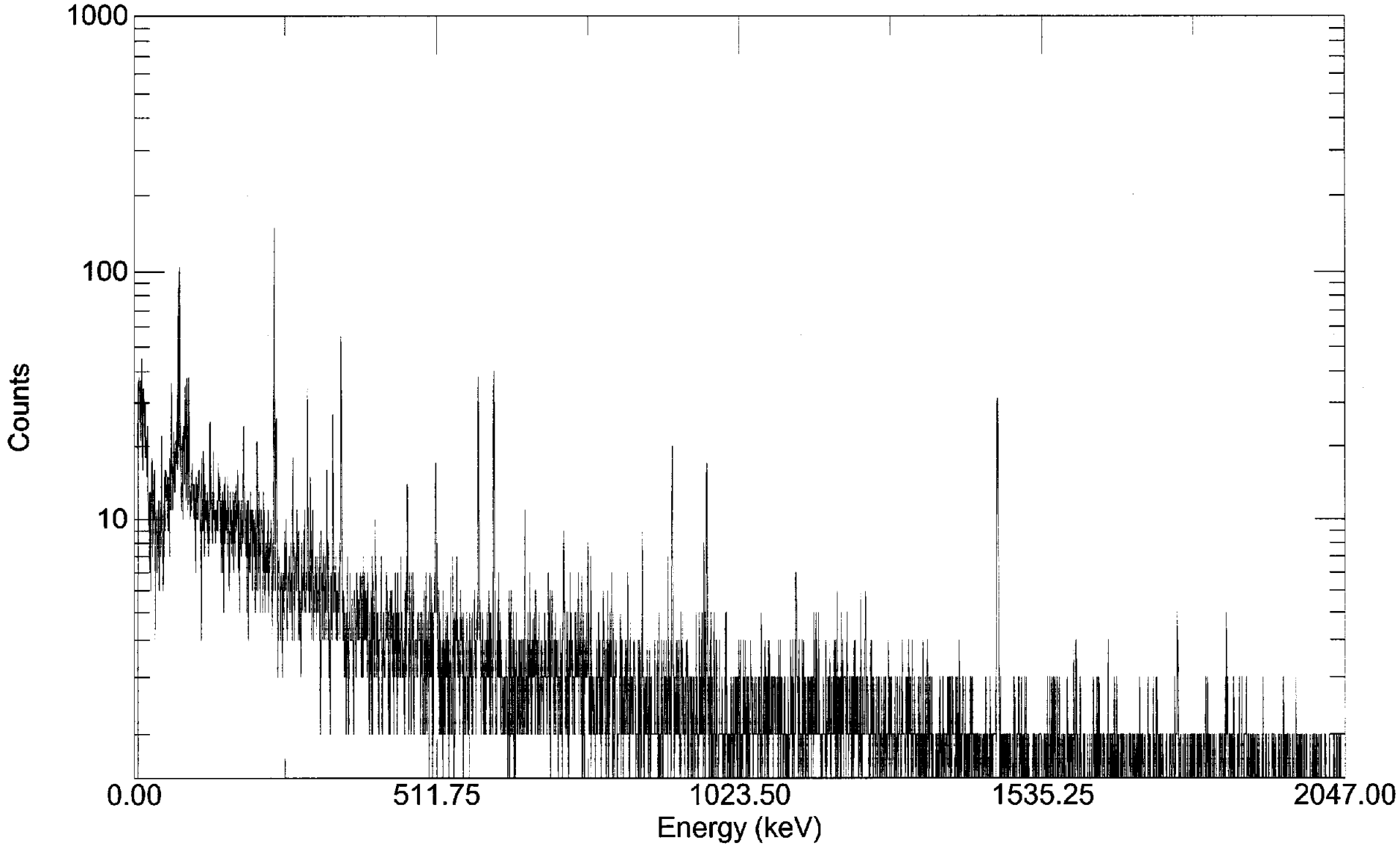
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKF11AC

7356122_KEKF11AC_F7L200262-008



Acquired: 23-Dec-2007 4:26:31 PM
File: C:\User\spectra\KEKF11AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.64 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,988

Sample Description: 7356122_KEKF51AC_F7L200262-009

Spectrum Filename: KEKF51AC.An1

Acquisition Information

Start Time:	23-Dec-2007 4:27:21PM		
Live Time:	1800.00	Real Time:	1814.98
Dead Time:	0.83 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.4144

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
296.75	74.52	325.33	194.67	0.108	19.14	0.668	PB-214	s
307.47	77.20	291.83	241.17	0.134	15.29	0.745	PB-214	
370.63	92.97	345.00	0.00	0.000	2626.79	0.577		s
2042.07	510.51	18.67	126.33	0.070	12.06	0.682	J-133	s
2436.85	609.15	138.72	52.28	0.029	34.73	1.101	BI-214	

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	182.82	46.07	106.53	54.47	0.030	26.38	0.921	
AM-241	1	237.04	59.61	280.69	-9.06	-0.005	263.48	0.878	s
TH-234	1	251.55	63.23	301.67	4.96	0.003	81.49	0.882	s
EU-155	1	347.06	87.09	268.89	87.12	0.048	28.69	0.906	s
TH-234	1	370.93	93.05	308.14	42.56	0.024	36.60	0.912	s
AC-228	1	372.14	93.35	321.80	0.00	0.000	2200.00	0.913	s D
U-235	1	372.14	93.35	236.69	3.57	0.002	59.60	0.913	s D
EU-155	1	419.10	105.08	156.84	8.92	0.005	201.43	0.925	s
EU-152	1	483.11	121.06	120.02	7.51	0.004	209.49	0.942	s
EU-154	1	495.17	124.08	137.38	1.67	0.001	998.14	0.943	s
Pa-234	1	526.82	131.98	177.29	2.87	0.002	659.78	0.952	s
U-235	1	576.47	144.38	166.10	6.54	0.004	211.19	0.964	s
U-235	1	652.99	163.49	144.55	13.01	0.007	133.62	0.984	s
U-235	1	819.42	205.06	93.84	8.64	0.005	162.15	1.027	s
PB-212	1	954.43	238.78	185.75	624.25	0.347	6.43	1.074	s
RA-224	1	960.46	240.29	578.61	-96.31	-0.054	36.76	1.062	
PB-214	1	966.87	241.89	82.50	75.50	0.042	25.28	1.029	s
TL-208	1	1111.06	277.91	35.00	32.00	0.018	38.10	0.247	s
I-131	1	1128.42	282.25	42.94	7.64	0.004	126.59	1.105	s
PB-214	1	1179.26	294.95	47.98	130.02	0.072	13.75	0.974	
PB-212	1	1199.40	299.98	49.83	58.17	0.032	29.73	0.389	s
AC-228	1	1352.82	338.30	71.02	80.51	0.045	17.96	1.158	s
EU-152	1	1375.85	344.06	58.39	7.27	0.004	153.25	1.164	s
PB-214	1	1406.95	351.82	64.20	218.80	0.122	10.61	1.214	s
I-131	1	1464.50	366.20	38.79	6.20	0.003	147.64	1.184	s
BE-7	1	1916.22	479.06	33.33	-1.87	-0.001	442.55	1.292	s
CS-134	1	2249.68	562.38	38.32	0.51	0.000	1712.09	1.372	s
CS-134	1	2277.45	569.32	39.37	-1.79	-0.001	-42.15	1.378	s D
Pa-234	1	2278.04	569.47	34.49	0.50	0.000	129.97	1.378	s D
TL-208	1	2332.87	583.17	33.96	200.04	0.111	9.65	1.498	s
CS-134	1	2418.84	604.65	68.37	-10.87	-0.006	111.77	1.410	s
BI-214	1	2437.29	609.26	46.16	126.50	0.070	10.91	1.415	
I-131	1	2550.58	637.57	28.82	3.49	0.002	224.02	1.440	s
CS-137	1	2651.88	662.89	39.94	-0.22	0.000	4128.56	1.462	s
EU-154	1	2893.64	723.31	63.40	-9.83	-0.005	118.88	1.518	s
BI-212	1	2908.70	727.08	36.63	24.27	0.013	40.69	1.521	s
PA-234M	1	3066.66	766.55	42.59	-0.12	0.000	7975.28	1.556	s
EU-152	1	3112.59	778.03	34.30	-0.53	0.000	1573.95	1.567	s
BI-212	1	3148.46	787.00	29.05	1.29	0.001	597.78	1.572	s
CS-134	1	3183.93	795.87	27.36	0.00	0.000	739.73	1.582	s
CS-134	1	3208.27	801.95	48.13	0.00	0.000	981.14	1.587	s
TL-208	1	3441.87	860.34	25.58	7.85	0.004	97.89	1.638	s
EU-154	1	3491.12	872.65	34.00	-3.83	-0.002	221.15	1.649	s
Pa-234	1	3522.56	880.51	35.21	-3.99	-0.002	216.07	1.655	s
Pa-234	1	3533.15	883.16	35.31	-3.27	-0.002	262.94	1.657	s

AC-228	1	3644.36	910.96	22.86	96.27	0.053	12.01	1.681	
Pa-234	1	3784.61	946.02	29.27	0.00	0.000	765.14	1.710	s
EU-152	1	3854.97	963.61	58.59	2.36	0.001	463.24	1.726	s
AC-228	1	3875.11	968.64	43.46	46.69	0.026	24.75	1.730	s
EU-154	1	3987.87	996.84	26.94	0.98	0.001	753.30	1.753	s
PA-234M	1	4003.21	1000.67	28.22	1.67	0.001	457.02	1.756	s
EU-154	1	4016.27	1003.94	34.23	-2.67	-0.001	315.63	1.760	s
EU-152	1	4452.77	1113.07	31.81	-0.78	0.000	1023.72	1.847	s
BI-214	1	4480.79	1120.08	27.51	29.52	0.016	28.89	1.854	s
CO-60	1	4693.71	1173.32	34.94	4.35	0.002	198.19	1.896	s
EU-154	1	5103.93	1275.91	23.00	0.63	0.000	1076.04	1.975	s
CO-60	1	5332.63	1333.11	15.66	0.98	0.001	581.31	2.019	s
EU-152	1	5630.06	1407.50	16.77	3.24	0.002	187.38	2.076	s
K-40	1	5840.42	1460.12	11.21	324.79	0.180	5.46	1.705	s
BI-214	1	7047.04	1762.01	24.98	-4.90	-0.003	272.82	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PA-234	N	1	9.775E+000	1001.00	9.775E+000	% (	1.610E+002G		1.6E+012	.84
			9.775E+000	766.41	-1.587E+000	&	4.540E+002G		1.6E+012	.29
BI-214	N	1	9.617E+000	609.31	9.347E+000	(P	2.540E+000G		5.8E+005	46.09
			9.617E+000	1120.29	1.044E+001	(P	9.603E+000G		5.8E+005	15.10
			9.617E+000	1764.49	-2.469E+000	% P	1.311E+001G		5.8E+005	15.40
CS-137	T F I	1	-9.206E-003	661.66	-9.206E-003	% (	1.366E+000G		1.1E+004	85.21
BI-212	N	1	7.963E+000	727.33	7.963E+000	* (	1.014E+001G		7.0E+002	11.82
			7.963E+000	785.51	4.809E+000	%	1.038E+002G		7.0E+002	1.10
TL-208	F N	1	7.923E+000	583.02	7.804E+000	* (P	1.165E+000G		7.0E+002	84.50
			7.923E+000	277.28	9.514E+000	(	9.002E+000G		7.0E+002	6.31
			7.923E+000	860.56	2.772E+000	%	9.282E+000G		7.0E+002	12.42
U-235	N	1	7.582E-001	143.79	7.582E-001	& (P	7.274E+000G		2.6E+011	10.96
			7.582E-001	205.33	2.622E+000	&	1.452E+001G		2.6E+011	5.01
			7.582E-001	163.38	3.425E+000	%	1.547E+001G		2.6E+011	5.08
			7.582E-001	93.35	7.582E-001	%	E 1.581E+001X		2.6E+011	5.81
EU-152	T F	1	6.064E-001	344.29	6.064E-001	& (	3.197E+000G		4.9E+003	26.50
			6.064E-001	121.78	3.207E-001	%	2.296E+000G		4.9E+003	28.58
			6.064E-001	778.92	-1.665E-001	%	9.455E+000G		4.9E+003	12.94
			6.064E-001	964.11	7.709E-001	%	1.254E+001G		4.9E+003	14.61
			6.064E-001	1112.07	-3.051E-001	%	1.128E+001G		4.9E+003	13.64
			6.064E-001	1408.00	9.852E-001	&	6.634E+000G		4.9E+003	21.00
CO-60	T F	1	5.979E-002	1332.50	5.979E-002	% (	1.293E+000G		1.9E+003	99.98
			5.979E-002	1173.24	2.408E-001	%	1.676E+000G		1.9E+003	99.90
BE-7	N P C	1	-5.049E-001	477.60	-5.049E-001	& (	7.993E+000G		5.3E+001	10.52
AM-241	T	1	-4.007E-001	59.54	-4.007E-001	% (	3.571E+000G		1.6E+005	35.90
RA-224	N	1	-3.979E+001	240.99	-3.979E+001	(	4.743E+001G		7.0E+002	4.10
CS-134	T F I	1	-3.771E-001	604.71	-3.771E-001	% (	1.431E+000G		7.5E+002	97.62
			-3.771E-001	795.87	0.000E+000	%	1.312E+000G		7.5E+002	85.53
			-3.771E-001	569.32	-3.771E-001	%	6.728E+000G		7.5E+002	15.38
			-3.771E-001	801.95	0.000E+000	%	1.680E+001G		7.5E+002	8.69
			-3.771E-001	563.24	1.974E-001	&	1.214E+001G		7.5E+002	8.35
PB-210	N	1	3.156E+001	46.54	3.156E+001	(P	2.943E+001G		8.1E+003	4.25
PB-212	N	1	2.425E+001	238.63	2.425E+001	@ (P	2.572E+000G		7.0E+002	43.30
			2.425E+001	300.03	3.530E+001	+	2.161E+001G		7.0E+002	3.28
EU-155	T F I	1	2.326E+000	105.31	5.104E-001	% (	3.496E+000G		1.8E+003	21.20
			2.326E+000	86.54	3.580E+000	* (	3.251E+000G		1.8E+003	30.70
K-40	N	1	2.006E+002	1460.83	2.006E+002	@ (P	1.131E+001G		4.7E+011	10.67
Pa-234	N	1	1.970E-001	131.29	1.970E-001	% (	4.452E+000G		1.6E+012	18.00
			1.970E-001	569.47	1.970E-001	%	1.188E+001G		1.6E+012	8.20
			1.970E-001	946.02	0.000E+000	%	9.802E+000G		1.6E+012	13.40
			1.970E-001	883.24	-1.523E+000	%	1.416E+001G		1.6E+012	9.60
			1.970E-001	880.53	-2.969E+000	%	2.258E+001G		1.6E+012	6.00
I-131	T F I	1	1.753E-001	364.48	1.753E-001	& (	8.972E-001G		8.0E+000	81.70
			1.753E-001	284.30	2.378E+000	%	1.035E+001G		8.0E+000	6.14

			1.753E-001	636.97	1.713E+000	%			1.361E+001G		8.0E+000	7.17
TH-234	N	1	1.544E+000	63.29	1.544E+000	*	(	P	2.605E+001G		1.6E+012	4.82
			1.544E+000	92.59	9.430E+000	%		P	1.873E+001G		1.6E+012	5.58
AC-228	N	1	1.436E+001	911.07	1.519E+001		(	P	3.942E+000G		2.1E+003	29.00
			1.436E+001	968.97	1.281E+001	*	(		9.168E+000G		2.1E+003	17.46
			1.436E+001	338.32	1.462E+001		(	P	7.626E+000G		2.1E+003	12.01
			1.436E+001	93.35	0.000E+000	%	}	E	1.652E+001X	A	2.1E+003	5.56
			-1.385E+000	123.10	4.991E-002	%			1.718E+000G		3.1E+003	40.79
			-1.385E+000	1274.54	1.064E-001	&			4.203E+000G		3.1E+003	35.19
			-1.385E+000	723.36	-1.879E+000	&			7.607E+000G		3.1E+003	20.22
			-1.385E+000	1004.77	-7.299E-001	%			8.188E+000G		3.1E+003	18.01
			-1.385E+000	996.33	4.535E-001	%			1.241E+001G		3.1E+003	10.60
EU-154	T F I	1	-1.385E+000	873.23	-1.385E+000	%	(		1.080E+001G		3.1E+003	12.27
PB-214	N	1	1.361E+001	351.93	1.308E+001	*	(	P	2.395E+000G		5.8E+005	37.60
			1.361E+001	295.09	1.324E+001		(	P	3.564E+000G		5.8E+005	19.30
			1.361E+001	242.00	1.726E+001	@	(		1.030E+001G		5.8E+005	7.43

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-5.049E-001	-5.061E-001	442.55	442.56	7.993E+000
K-40	#	2.006E+002	2.006E+002	5.64	6.36	1.131E+001
CO-60	<	5.979E-002	5.979E-002	581.31	581.31	1.293E+000
I-131	<	1.753E-001	1.781E-001	147.64	147.67	8.972E-001
CS-134	<	-3.771E-001	-3.772E-001	111.77	111.81	1.431E+000
CS-137	<	-9.206E-003	-9.206E-003	4.128.56	4.128.56	1.366E+000
EU-155	<	2.326E+000	2.326E+000	28.69	28.89	3.496E+000
PB-214		1.361E+001	1.361E+001	10.34	10.73	2.395E+000
BI-212	<	7.963E+000	7.965E+000	40.69	40.80	1.014E+001
BI-214	<	9.617E+000	9.617E+000	11.51	11.86	2.540E+000
EU-152	<	6.064E-001	6.064E-001	153.25	153.27	3.197E+000
EU-154	<	-1.385E+000	-1.385E+000	221.15	221.17	1.080E+001
TL-208		7.923E+000	7.924E+000	10.04	10.44	1.165E+000
RA-224	<	-3.979E+001	-3.979E+001	36.76	36.88	4.743E+001
PB-210		3.156E+001	3.156E+001	36.80	37.01	2.943E+001
PB-212	#	2.425E+001	2.425E+001	6.64	7.28	2.572E+000
AC-228	<	1.436E+001	1.436E+001	11.07	11.44	3.942E+000
Pa-234	<	1.970E-001	1.970E-001	659.78	659.78	4.452E+000
U-235	<	7.582E-001	7.582E-001	280.39	280.41	7.274E+000
AM-241	<	-4.007E-001	-4.007E-001	263.48	263.51	3.571E+000
TH-234	<	1.544E+000	1.544E+000	487.10	487.11	2.605E+001
PA-234M	<	9.775E+000	9.775E+000	457.02	457.03	1.610E+002

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 277.99 Bq/sample

Analyzed by: _____

403605

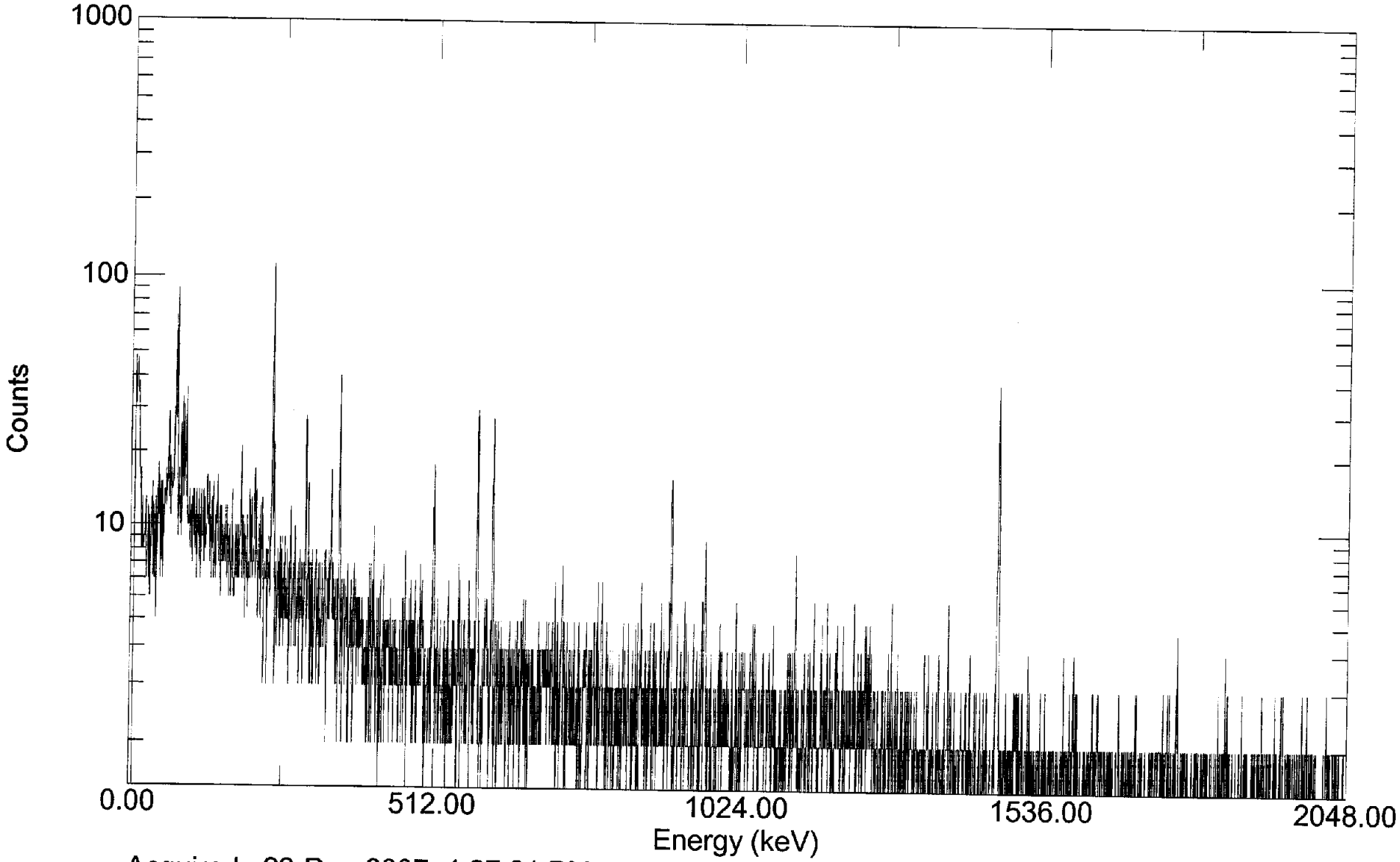
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKF51AC

7356122_KEKF51AC_F7L200262-009



Acquired: 23-Dec-2007 4:27:21 PM
File: C:\User\spectra\KEKF51AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1814.98 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,990

Sample Description: 7356122_KEKF71AC_F7L200262-010

Spectrum Filename: KEKF71AC.An1

Acquisition Information

Start Time:	23-Dec-2007 4:28:03PM		
Live Time:	1800.00	Real Time:	1804.86
Dead Time:	0.27 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2143

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.10	74.82	131.67	105.33	0.059	20.28	0.951	PB-214	
308.94	77.28	170.00	219.00	0.122	13.47	0.801	PB-214	
348.53	87.19	174.92	18.08	0.010	106.09	0.510		s
359.89	90.03	42.14	116.86	0.065	12.14	1.096	PB-214	s
372.27	93.12	153.56	64.44	0.036	29.91	0.871	U-235	s
516.37	129.16	51.94	70.06	0.039	18.83	0.479	AC-228	s
836.65	209.25	25.00	25.00	0.014	38.30	0.484	AC-228	s
1351.15	337.89	92.31	24.69	0.014	58.60	1.088		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.60	46.44	109.55	3.98	0.002	57.36	0.819	s
AM-241	1	238.74	59.73	186.75	-16.46	-0.009	120.00	0.830	s
TH-234	1	253.58	63.44	174.85	16.15	0.009	58.13	0.834	s
EU-155	1	348.22	87.11	173.76	70.95	0.039	28.83	0.854	s
TH-234	1	365.14	91.34	260.99	-72.25	-0.040	47.42	0.859	s
AC-228	1	373.18	93.35	129.53	55.73	0.031	3.24	0.860	s D
U-235	1	373.18	93.35	129.53	-0.61	0.000	-220.07	0.860	s D
EU-155	1	422.00	105.56	93.68	15.84	0.009	90.02	0.871	
EU-152	1	486.32	121.65	88.55	7.01	0.004	193.68	0.885	s
EU-154	1	495.53	123.95	98.70	-0.16	0.000	8956.65	0.886	s
Pa-234	1	525.16	131.36	146.99	-12.81	-0.007	136.71	0.894	s
U-235	1	576.23	144.13	103.97	-1.14	-0.001	1264.69	0.904	s
U-235	1	651.78	163.02	85.93	9.85	0.005	136.86	0.922	s
U-235	1	819.76	205.03	71.21	5.26	0.003	230.99	0.958	s
PB-212	1	954.15	238.63	58.40	355.60	0.198	5.90	0.986	D
RA-224	1	963.56	240.99	75.76	60.24	0.033	24.16	0.988	D
PB-214	1	967.61	242.00	71.17	46.83	0.026	29.37	0.989	D
TL-208	1	1108.35	277.19	30.33	61.67	0.034	24.24	0.390	s
I-131	1	1135.96	284.09	33.45	5.45	0.003	156.14	1.025	s
PB-214	1	1178.88	294.82	24.88	76.12	0.042	15.77	1.083	
PB-212	1	1199.63	300.01	29.33	42.67	0.024	31.41	0.361	s
AC-228	1	1351.80	338.06	32.17	71.31	0.040	16.33	1.071	s
EU-152	1	1376.64	344.27	36.59	-1.96	-0.001	441.38	1.076	s
PB-214	1	1406.18	351.65	23.24	180.76	0.100	8.64	0.614	s
I-131	1	1457.06	364.37	42.22	-0.95	-0.001	968.95	1.092	s
BE-7	1	1908.64	477.26	34.23	-5.01	-0.003	170.98	1.185	s
CS-134	1	2252.60	563.24	27.13	-3.15	-0.002	240.87	1.254	s
CS-134	1	2276.94	569.32	17.67	6.30	0.004	92.09	1.259	s D
Pa-234	1	2277.54	569.47	29.00	-1.91	-0.001	-158.44	1.259	s D
TL-208	1	2331.63	582.99	2.18	128.82	0.072	8.74	1.241	s
CS-134	1	2418.35	604.66	33.57	0.07	0.000	11110.51	1.286	s
BI-214	1	2435.72	609.01	21.92	112.08	0.062	12.16	1.430	s
I-131	1	2549.56	637.46	21.59	-2.76	-0.002	245.31	1.312	s
CS-137	1	2644.69	661.23	28.87	-0.13	0.000	6066.15	1.331	s
EU-154	1	2897.02	724.29	27.98	-0.16	0.000	4784.67	1.378	s
BI-212	1	2906.95	726.77	15.28	15.58	0.009	43.60	1.381	s
PA-234M	1	3069.85	767.48	15.38	4.94	0.003	121.02	1.411	s
EU-152	1	3122.76	780.70	14.79	-0.65	0.000	843.15	1.420	s
BI-212	1	3141.37	785.35	14.26	3.00	0.002	187.39	1.425	s
CS-134	1	3186.34	796.59	28.42	-3.02	-0.002	256.03	1.433	s
CS-134	1	3207.81	801.95	23.96	0.00	0.000	692.28	1.437	s
TL-208	1	3439.75	859.90	14.00	8.01	0.004	74.90	1.481	s
EU-154	1	3485.72	871.39	15.00	0.65	0.000	856.96	1.490	s
Pa-234	1	3523.45	880.81	14.29	1.73	0.001	317.59	1.495	s
Pa-234	1	3534.49	883.57	10.57	2.32	0.001	208.52	1.497	s

AC-228	1	3643.74	910.87	7.73	62.59	0.035	14.12	1.518	
Pa-234	1	3784.44	946.02	57.74	0.00	0.000	1074.65	1.543	s
EU-152	1	3867.05	966.66	46.30	-11.06	-0.006	92.02	1.556	s
AC-228	1	3876.04	968.90	22.03	21.22	0.012	38.07	1.559	s
EU-154	1	3985.83	996.33	34.83	0.00	0.000	834.62	1.579	s
PA-234M	1	4002.25	1000.43	9.15	4.09	0.002	115.73	1.582	s
EU-154	1	4015.78	1003.81	20.36	-4.40	-0.002	152.79	1.585	s
EU-152	1	4455.04	1113.53	15.71	2.20	0.001	263.43	1.659	s
BI-214	1	4481.24	1120.08	4.65	24.35	0.014	18.57	0.999	s
CO-60	1	4692.82	1172.92	14.43	1.80	0.001	308.12	1.701	s
EU-154	1	5104.29	1275.68	18.01	-3.75	-0.002	168.20	1.768	s
CO-60	1	5331.84	1332.50	16.87	0.00	0.000	580.85	1.806	s
EU-152	1	5630.69	1407.12	11.15	1.49	0.001	327.60	1.854	s
K-40	1	5843.95	1460.37	6.02	151.85	0.084	8.20	1.887	s
BI-214	1	7059.41	1763.77	4.99	10.30	0.006	43.73	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Analysis Code	MDA Value Becquerels	Code	Comments	
CS-137	T F I	1	-8.345E-003	661.66	-8.345E-003	% (	1.847E+000G		1.1E+004	85.21
BI-212	N	1	8.101E+000	727.33	8.101E+000	% (	1.088E+001G		7.0E+002	11.82
			8.101E+000	785.51	1.786E+001	%	1.211E+002G		7.0E+002	1.10
TL-208	F N	1	7.750E+000	583.02	7.750E+000	@ (P	5.775E-001G		7.0E+002	84.50
			7.750E+000	277.28	2.539E+001	*	1.168E+001G		7.0E+002	6.31
			7.750E+000	860.56	4.564E+000	%	1.148E+001G		7.0E+002	12.42
TH-234	N	1	6.986E+000	63.29	6.986E+000	% (P	2.783E+001G		1.6E+012	4.82
			6.986E+000	92.59	-2.166E+001	% P	2.338E+001G		1.6E+012	5.58
CS-134	T F I	1	3.967E-003	604.71	3.967E-003	% (	1.597E+000G		7.5E+002	97.62
			3.967E-003	795.87	-2.342E-001	%	2.136E+000G		7.5E+002	85.53
			3.967E-003	569.32	2.041E+000	& }	8.263E+000G		7.5E+002	15.38
			3.967E-003	801.95	0.000E+000	%	1.959E+001G		7.5E+002	8.69
			3.967E-003	563.24	-1.858E+000	%	1.594E+001G		7.5E+002	8.35
			3.919E+001	766.41	1.079E+002	%	4.585E+002G		1.6E+012	.29
PA-234	N	1	3.919E+001	1001.00	3.919E+001	% (	1.611E+002G		1.6E+012	.84
I-131	T F I	1	-3.887E-002	364.48	-3.887E-002	% (	1.345E+000G		8.0E+000	81.70
			-3.887E-002	284.30	2.357E+000	%	1.283E+001G		8.0E+000	6.14
			-3.887E-002	636.97	-2.115E+000	%	1.865E+001G		8.0E+000	7.17
EU-154	T F I	1	3.770E-001	873.23	3.770E-001	& (	1.212E+001G		3.1E+003	12.27
			3.770E-001	123.10	-6.205E-003	&	1.938E+000G		3.1E+003	40.79
			3.770E-001	1274.54	-1.046E+000	%	6.276E+000G		3.1E+003	35.19
			3.770E-001	723.36	-4.737E-002	%	8.278E+000G		3.1E+003	20.22
			3.770E-001	1004.77	-1.964E+000	%	1.061E+001G		3.1E+003	18.01
			3.770E-001	996.33	0.000E+000	%	2.277E+001G		3.1E+003	10.60
RA-224	N	1	3.383E+001	240.99	3.383E+001	(	2.430E+001G		7.0E+002	4.10
PB-210	N	1	3.299E+000	46.54	3.299E+000	% (P	4.266E+001G		8.1E+003	4.25
EU-155	T F I	1	2.845E+000	105.31	1.210E+000	% (	3.655E+000G		1.8E+003	21.20
			2.845E+000	86.54	3.973E+000	& (	3.592E+000G		1.8E+003	30.70
EU-152	T F	1	-2.342E-001	344.29	-2.342E-001	& (	3.685E+000G		4.9E+003	26.50
			-2.342E-001	121.78	3.950E-001	%	2.625E+000G		4.9E+003	28.58
			-2.342E-001	778.92	-3.281E-001	%	1.038E+001G		4.9E+003	12.94
			-2.342E-001	964.11	-5.891E+000	%	1.832E+001G		4.9E+003	14.61
			-2.342E-001	1112.07	1.413E+000	%	1.359E+001G		4.9E+003	13.64
			-2.342E-001	1408.00	7.586E-001	%	9.309E+000G		4.9E+003	21.00
BE-7	N P C	1	-2.030E+000	477.60	-2.030E+000	% (	1.214E+001G		5.3E+001	10.52
			1.876E+001	300.03	3.626E+001	+	2.375E+001G		7.0E+002	3.28
PB-212	N	1	1.876E+001	238.63	1.876E+001	(P	2.021E+000G		7.0E+002	43.30
U-235	N	1	-1.740E-001	143.79	-1.740E-001	% (	7.644E+000G		2.6E+011	10.96
			-1.740E-001	205.33	2.132E+000	&	1.704E+001G		2.6E+011	5.01
			-1.740E-001	163.38	3.413E+000	&	1.591E+001G		2.6E+011	5.08
			-1.740E-001	93.35	-1.740E-001	! E	1.602E+001X		2.6E+011	5.81
AC-228	N	1	1.673E+001	911.07	1.601E+001	(	4.008E+000G		2.1E+003	29.00
			1.673E+001	968.97	9.490E+000	-	1.099E+001G		2.1E+003	17.46
			1.673E+001	338.32	1.847E+001	* (	7.546E+000G		2.1E+003	12.01

			1.673E+001	93.35	1.673E+001	!		E	1.674E+001X	A	2.1E+003	5.56
K-40	N	1	1.573E+002	1460.83	1.573E+002		(P		1.465E+001G		4.7E+011	10.67
PB-214	N	1	1.535E+001	351.93	1.550E+001		(P		2.159E+000G		5.8E+005	37.60
			1.535E+001	295.09	1.083E+001	-	P		3.693E+000G		5.8E+005	19.30
			1.535E+001	242.00	1.456E+001		(		1.307E+001G		5.8E+005	7.43
BI-214	N	1	1.318E+001	609.31	1.285E+001	@	(P		2.811E+000G		5.8E+005	46.09
			1.318E+001	1120.29	1.421E+001		(P		7.441E+000G		5.8E+005	15.10
			1.318E+001	1764.49	8.775E+000	%			1.118E+001G		5.8E+005	15.40
Pa-234	N	1	-1.159E+000	131.29	-1.159E+000	%	(		5.356E+000G		1.6E+012	18.00
			-1.159E+000	569.47	-1.159E+000	%			1.689E+001G		1.6E+012	8.20
			-1.159E+000	946.02	0.000E+000	&			2.178E+001G		1.6E+012	13.40
			-1.159E+000	883.24	1.750E+000	%			1.345E+001G		1.6E+012	9.60
			-1.159E+000	880.53	2.083E+000	%			2.443E+001G		1.6E+012	6.00
AM-241	T	1	-1.010E+000	59.54	-1.010E+000	%	(		4.076E+000G		1.6E+005	35.90
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		2.230E+000G		1.9E+003	99.98
			0.000E+000	1173.24	1.648E-001	&			1.871E+000G		1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-2.030E+000	-2.035E+000	170.98	171.00	1.214E+001
K-40	<	1.573E+002	1.573E+002	8.36	8.86	1.465E+001
CO-60	<			580.85	580.85	2.230E+000
I-131	<	-3.887E-002	-3.950E-002	968.95	968.95	1.345E+000
CS-134	<	3.967E-003	3.968E-003	11,110.51	11,110.51	1.597E+000
EU-154	<	3.770E-001	3.771E-001	856.96	856.96	1.212E+001
EU-155	<	2.845E+000	2.845E+000	28.83	29.03	3.655E+000
PB-214		1.535E+001	1.535E+001	8.89	9.34	2.159E+000
BI-212	<	8.101E+000	8.103E+000	43.60	43.69	1.088E+001
BI-214		1.318E+001	1.318E+001	12.73	13.05	2.811E+000
CS-137	<	-8.345E-003	-8.345E-003	6,066.15	6,066.15	1.847E+000
EU-152	<	-2.342E-001	-2.342E-001	441.38	441.39	3.685E+000
TL-208	#	7.750E+000	7.752E+000	8.89	9.34	5.775E-001
RA-224		3.383E+001	3.384E+001	24.16	24.34	2.430E+001
PB-210	<	3.299E+000	3.299E+000	357.25	357.27	4.266E+001
PB-212		1.876E+001	1.876E+001	6.05	6.75	2.021E+000
AC-228	<	1.673E+001	1.673E+001	10.79	11.17	4.008E+000
Pa-234	<	-1.159E+000	-1.159E+000	136.71	136.75	5.356E+000
U-235	<	-1.740E-001	-1.740E-001	1,264.69	1,264.69	7.644E+000
AM-241	<	-1.010E+000	-1.010E+000	120.00	120.06	4.076E+000
TH-234	<	6.986E+000	6.986E+000	115.83	115.88	2.783E+001
PA-234M	<	3.919E+001	3.919E+001	115.73	115.76	1.611E+002

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 88.87 Bq/sample

Analyzed by: _____

403605

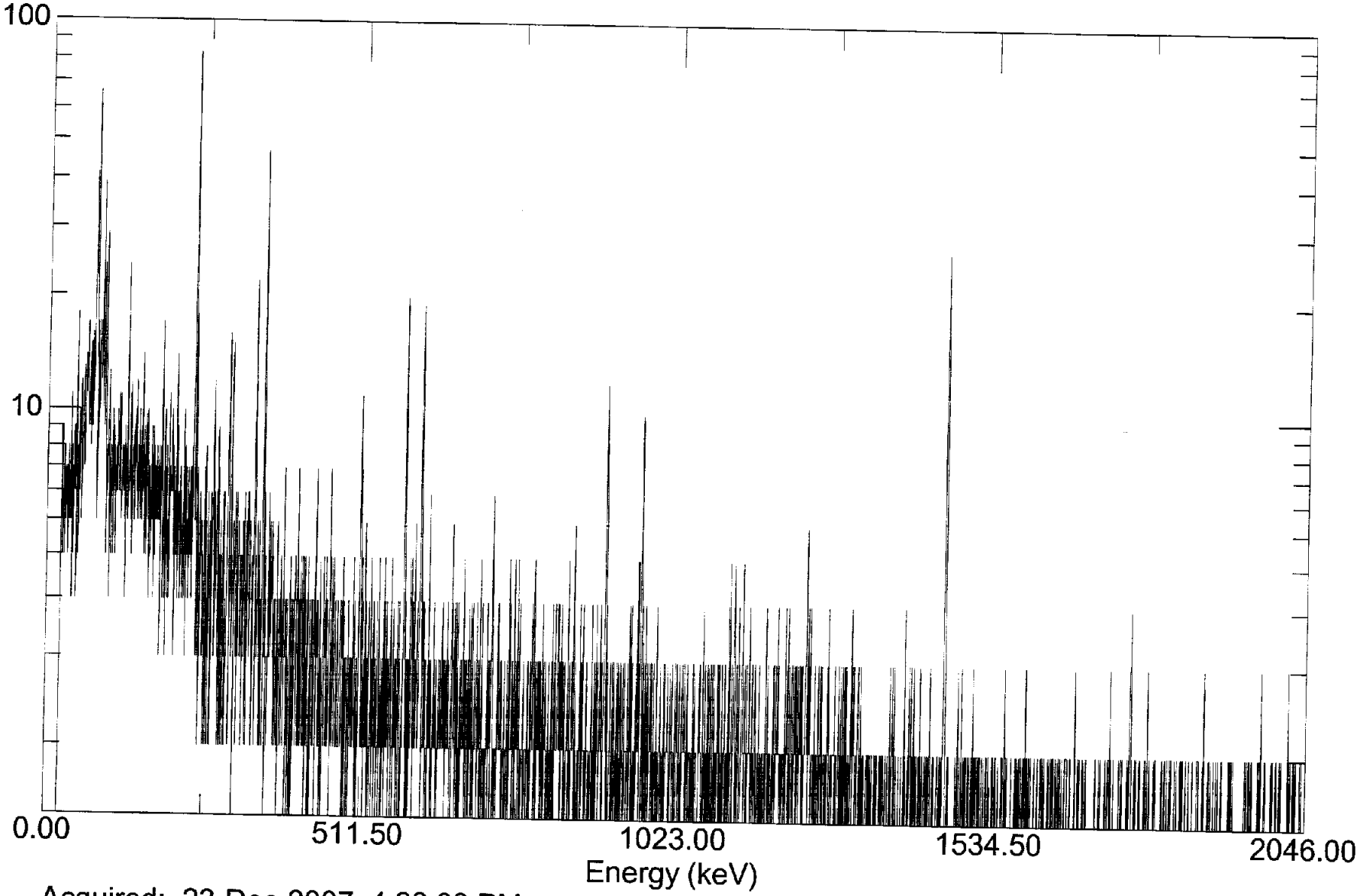
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKF71AC

7356122_KEKF71AC_F7L200262-010



Acquired: 23-Dec-2007 4:28:03 PM
File: C:\User\spectra\KEKF71AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.86 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,991

Sample Description: 7356122_KEKF81AC_F7L200262-011

Spectrum Filename: KEKF81AC.An1

Acquisition Information

Start Time:	23-Dec-2007 4:26:35PM		
Live Time:	1800.00	Real Time:	1940.90
Dead Time:	7.26 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1141

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.16	74.75	294.00	239.00	0.133	15.74	0.722	PB-214	
307.48	77.08	157.67	333.33	0.185	8.38	0.850	PB-214	
347.15	86.99	240.00	22.00	0.012	101.82	0.943		s
358.70	89.88	127.83	92.17	0.051	24.19	0.782	PB-214	M
745.09	186.41	101.50	104.50	0.058	22.67	0.822	PA-234	s
1310.67	327.72	25.33	67.67	0.038	19.45	0.529	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.08	46.26	82.26	51.74	0.029	24.03	1.011	s
AM-241	1	233.52	58.61	153.61	20.55	0.011	75.48	0.761	s
TH-234	1	253.30	63.55	227.17	94.83	0.053	28.44	0.991	s
EU-155	1	347.45	87.07	198.81	120.00	0.067	18.96	0.788	s
TH-234	1	369.56	92.59	179.43	39.57	0.022	31.04	0.794	D
U-235	1	372.61	93.35	167.52	-1.47	-0.001	-4620.61	0.795	s D
AC-228	1	372.61	93.35	154.03	135.58	0.075	2.08	0.795	D
EU-155	1	419.82	105.14	137.01	15.88	0.009	107.23	0.808	s
EU-152	1	486.83	121.89	141.19	-3.84	-0.002	440.95	0.824	s
EU-154	1	493.81	123.63	119.82	15.59	0.009	102.50	0.826	s
Pa-234	1	522.65	130.84	192.04	-23.11	-0.013	87.32	0.834	
U-235	1	576.11	144.19	157.61	-2.77	-0.002	5985.60	0.847	
U-235	1	652.92	163.38	128.06	0.46	0.000	648.25	0.867	s
U-235	1	819.12	204.90	95.11	15.23	0.008	94.14	0.909	s
PB-212	1	954.20	238.65	74.31	588.69	0.327	4.84	0.967	
RA-224	1	963.54	240.99	88.27	57.73	0.032	26.51	0.944	D
PB-214	1	967.59	242.00	42.91	-6.91	-0.004	139.27	0.945	D
TL-208	1	1110.66	277.74	47.50	55.50	0.031	28.68	0.368	s
I-131	1	1136.89	284.30	69.00	0.00	0.000	1174.73	0.987	s
PB-214	1	1180.63	295.23	38.58	157.42	0.087	11.83	1.251	s
PB-212	1	1201.20	300.37	22.17	62.83	0.035	19.83	1.068	s
AC-228	1	1353.04	338.31	35.00	177.00	0.098	11.11	1.350	s
EU-152	1	1378.73	344.73	46.91	-6.31	-0.004	158.70	1.045	s
PB-214	1	1408.17	352.08	45.54	186.46	0.104	10.17	1.131	s
I-131	1	1457.80	364.48	59.81	0.00	0.000	1093.71	1.065	s
BE-7	1	1914.69	478.66	30.66	0.09	0.000	8249.84	1.173	s
CS-134	1	2240.48	560.08	17.20	1.56	0.001	383.40	1.252	s
CS-134	1	2277.45	569.32	25.10	0.53	0.000	703.33	1.258	s D
Pa-234	1	2278.05	569.47	32.62	-3.47	-0.002	-176.72	1.258	s D
TL-208	1	2332.80	583.15	8.25	216.75	0.120	7.10	1.389	s
CS-134	1	2405.70	601.37	15.32	3.21	0.002	181.44	1.290	s
BI-214	1	2438.16	609.49	6.73	149.27	0.083	8.01	0.887	s
I-131	1	2547.43	636.80	21.49	12.22	0.007	60.80	1.319	s
CS-137	1	2651.40	662.79	37.38	-10.88	-0.006	176.73	1.342	s
EU-154	1	2890.09	722.45	27.12	-1.26	-0.001	591.47	1.397	s
BI-212	1	2911.26	727.74	16.73	42.03	0.023	20.67	1.400	s
PA-234M	1	3066.07	766.44	37.21	-1.83	-0.001	476.59	1.434	s
EU-152	1	3118.02	779.43	35.09	-4.81	-0.003	180.21	1.445	s
BI-212	1	3144.55	786.06	23.96	10.26	0.006	74.35	1.451	s
CS-134	1	3180.62	795.08	24.60	9.23	0.005	82.78	1.460	s
CS-134	1	3208.32	802.00	16.40	2.31	0.001	256.90	1.465	s
TL-208	1	3442.27	860.49	25.26	4.22	0.002	175.29	1.516	s
EU-154	1	3489.80	872.37	18.35	-3.70	-0.002	171.62	1.527	s
Pa-234	1	3522.44	880.53	14.89	0.00	0.000	545.68	1.533	s
Pa-234	1	3528.63	882.08	17.09	-1.00	-0.001	591.81	1.535	s
AC-228	1	3646.19	911.47	5.67	153.33	0.085	9.02	1.603	

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Pa-234	1	3784.44	946.04	26.29	-0.55	0.000	1332.10	1.588	s
EU-152	1	3857.41	964.28	85.19	0.19	0.000	6929.50	1.603	s
AC-228	1	3874.87	968.65	6.67	134.33	0.075	10.14	1.460	
EU-154	1	3989.11	997.21	20.44	-4.35	-0.002	154.55	1.630	s
PA-234M	1	4004.20	1000.98	13.57	3.33	0.002	165.87	1.633	s
EU-154	1	4019.60	1004.83	28.89	-4.28	-0.002	184.16	1.637	s
EU-152	1	4448.08	1111.98	21.02	2.79	0.002	239.69	1.723	s
BI-214	1	4483.56	1120.85	0.00	54.00	0.030	13.61	0.519	s
CO-60	1	4697.87	1174.44	21.99	-1.53	-0.001	442.18	1.772	s
EU-154	1	5099.47	1274.88	19.74	-0.28	0.000	2273.45	1.850	s
CO-60	1	5329.86	1332.50	17.18	0.00	0.000	586.26	1.894	s
EU-152	1	5640.08	1410.10	12.26	-3.14	-0.002	167.73	1.950	s
K-40	1	5843.78	1461.05	0.00	227.00	0.126	6.64	1.610	
BI-214	1	7057.33	1764.67	9.58	7.70	0.004	52.37	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
			-7.225E-001	778.92	-2.316E+000	%	1.461E+001G		4.9E+003	12.94
			-7.225E-001	964.11	9.581E-002	%	2.324E+001G		4.9E+003	14.61
			-7.225E-001	1112.07	1.706E+000	&	1.470E+001G		4.9E+003	13.64
			-7.225E-001	1408.00	-1.510E+000	%	9.161E+000G		4.9E+003	21.00
EU-152	T F	1	-7.225E-001	344.29	-7.225E-001	% (	3.968E+000G		4.9E+003	26.50
			-7.225E-001	121.78	-2.096E-001	&	3.174E+000G		4.9E+003	28.58
CS-137	T F I	1	-6.947E-001	661.66	-6.947E-001	% (P	1.993E+000G		1.1E+004	85.21
U-235	N	1	-4.076E-001	143.79	-4.076E-001	% (P	9.008E+000G		2.6E+011	10.96
			-4.076E-001	205.33	5.940E+000	&	1.879E+001G		2.6E+011	5.01
			-4.076E-001	163.38	1.552E-001	& P	1.854E+001G		2.6E+011	5.08
			-4.076E-001	93.35	-4.076E-001	! E	1.754E+001X		2.6E+011	5.81
AC-228	N	1	3.941E+001	911.16	3.750E+001	(	3.376E+000G		2.1E+003	29.00
			3.941E+001	968.97	5.736E+001	+	6.295E+000G		2.1E+003	17.46
			3.941E+001	338.32	4.404E+001	(	7.534E+000G		2.1E+003	12.01
			3.941E+001	93.35	3.941E+001	- E	1.760E+001G	A	2.1E+003	5.56
TH-234	N	1	3.842E+001	63.29	3.842E+001	(P	2.955E+001G		1.6E+012	4.82
			3.842E+001	92.59	1.149E+001	% P	1.890E+001G		1.6E+012	5.58
PB-210	N	1	3.799E+001	46.54	3.799E+001	* (P	3.302E+001G		8.1E+003	4.25
BE-7	N P C	1	3.697E-002	477.60	3.697E-002	% (	1.110E+001G		5.3E+001	10.52
RA-224	N	1	3.117E+001	240.99	3.117E+001	(	2.510E+001G		7.0E+002	4.10
PA-234M	N	1	3.043E+001	1001.00	3.043E+001	& (	1.818E+002G		1.6E+012	.84
			3.043E+001	766.41	-3.836E+001	%	6.519E+002G		1.6E+012	.29
PB-212	N	1	2.985E+001	238.63	2.985E+001	(P	2.175E+000G		7.0E+002	43.30
			2.985E+001	300.03	5.131E+001	+	2.013E+001G		7.0E+002	3.28
K-40	N	1	2.219E+002	1460.83	2.219E+002	(	7.204E+000G		4.7E+011	10.67
BI-212	N	1	2.095E+001	727.33	2.095E+001	(	1.085E+001G		7.0E+002	11.82
			2.095E+001	785.51	5.858E+001	%	1.457E+002G		7.0E+002	1.10
EU-154	T F I	1	-2.068E+000	873.23	-2.068E+000	% (	1.266E+001G		3.1E+003	12.27
			-2.068E+000	123.10	5.972E-001	%	2.058E+000G		3.1E+003	40.79
			-2.068E+000	1274.54	-7.339E-002	%	6.196E+000G		3.1E+003	35.19
			-2.068E+000	723.36	-3.654E-001	&	7.827E+000G		3.1E+003	20.22
			-2.068E+000	1004.77	-1.824E+000	%	1.183E+001G		3.1E+003	18.01

				-2.068E+000	996.33	-3.130E+000	%			1.710E+001G		3.1E+003	10.60
				-2.024E+000	880.53	0.000E+000	%			2.379E+001G		1.6E+012	6.00
Pa-234		N	1	-2.024E+000	131.29	-2.024E+000	&	(		5.893E+000G		1.6E+012	18.00
				-2.024E+000	569.47	-2.024E+000	%			1.711E+001G		1.6E+012	8.20
				-2.024E+000	946.02	-2.986E-001	&			1.452E+001G		1.6E+012	13.40
				-2.024E+000	883.24	-7.219E-001	%			1.583E+001G		1.6E+012	9.60
CS-134	T F I		1	1.655E-001	604.71	1.655E-001	%	(		1.081E+000G		7.5E+002	97.62
				1.655E-001	795.87	6.855E-001	%			1.917E+000G		7.5E+002	85.53
				1.655E-001	569.32	1.655E-001	%			8.102E+000G		7.5E+002	15.38
				1.655E-001	801.95	1.696E+000	&			1.587E+001G		7.5E+002	8.69
				1.655E-001	563.24	8.875E-001	%			1.250E+001G		7.5E+002	8.35
Bi-214		N	1	1.643E+001	609.31	1.643E+001		(	P	1.628E+000G		5.8E+005	46.09
				1.643E+001	1120.29	2.998E+001	*			4.092E+000G		5.8E+005	15.10
				1.643E+001	1764.49	6.143E+000	%		P	1.366E+001G		5.8E+005	15.40
Pb-214		N	1	1.536E+001	351.93	1.536E+001	@	(	P	2.815E+000G		5.8E+005	37.60
				1.536E+001	295.09	2.152E+001	+		P	4.328E+000G		5.8E+005	19.30
				1.536E+001	242.00	-2.067E+000	%			9.937E+000G		5.8E+005	7.43
				1.252E+001	860.56	2.301E+000	%			1.424E+001G		7.0E+002	12.42
Tl-208	F	N	1	1.252E+001	583.02	1.252E+001	@	(	P	9.299E-001G		7.0E+002	84.50
				1.252E+001	277.28	2.196E+001	+			1.378E+001G		7.0E+002	6.31
Eu-155	T F I		1	1.177E+000	105.31	1.177E+000	*	(		4.244E+000G		1.8E+003	21.20
				1.177E+000	86.54	6.490E+000	*			3.700E+000G	A	1.8E+003	30.70
Am-241	T		1	1.169E+000	59.54	1.169E+000	*	(	P	3.440E+000G		1.6E+005	35.90
Co-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(		2.128E+000G		1.9E+003	99.98
				0.000E+000	1173.24	-1.329E-001	%			2.140E+000G		1.9E+003	99.90
I-131	T F I		1	0.000E+000	364.48	0.000E+000	&	(		1.518E+000G		8.0E+000	81.70
				0.000E+000	284.30	0.000E+000	%			1.722E+001G		8.0E+000	6.14
				0.000E+000	636.97	8.980E+000	%			1.787E+001G		8.0E+000	7.17

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	3.697E-002	3.706E-002	8,249.84	8,249.84	1.110E+001
K-40		2.219E+002	2.219E+002	6.64	7.25	7.204E+000
CO-60	#			586.26	586.26	2.128E+000
I-131	#			1,093.71	1,093.71	1.518E+000
CS-134	#	1.655E-001	1.655E-001	181.44	181.46	1.081E+000
EU-154	#	-2.068E+000	-2.068E+000	171.62	171.64	1.266E+001
PB-210	#	3.799E+001	3.799E+001	32.04	32.28	3.302E+001
PB-212		2.985E+001	2.986E+001	4.90	5.74	2.175E+000
PB-214	#	1.536E+001	1.536E+001	10.45	10.84	2.815E+000
CS-137	#	-6.947E-001	-6.947E-001	278.27	278.29	1.993E+000
EU-152	#	-7.225E-001	-7.225E-001	158.70	158.72	3.968E+000
EU-155	#	1.177E+000	1.177E+000	107.23	107.28	4.244E+000
TL-208	#	1.252E+001	1.253E+001	7.23	7.78	9.299E-001
BI-212	#	2.095E+001	2.096E+001	20.67	20.88	1.085E+001
BI-214		1.643E+001	1.643E+001	8.37	8.85	1.628E+000
RA-224		3.117E+001	3.118E+001	26.51	26.68	2.510E+001
AC-228		3.941E+001	3.942E+001	7.16	7.71	3.376E+000
TH-234	#	3.842E+001	3.842E+001	32.69	32.90	2.955E+001
PA-234M	#	3.043E+001	3.043E+001	165.87	165.90	1.818E+002
U-235	#	-4.076E-001	-4.076E-001	11,335.02	11,335.02	9.008E+000
Pa-234	#	-2.024E+000	-2.024E+000	87.32	87.38	5.893E+000
AM-241	#	1.169E+000	1.169E+000	87.64	87.73	3.440E+000

= All peaks for activity calculation had bad shape

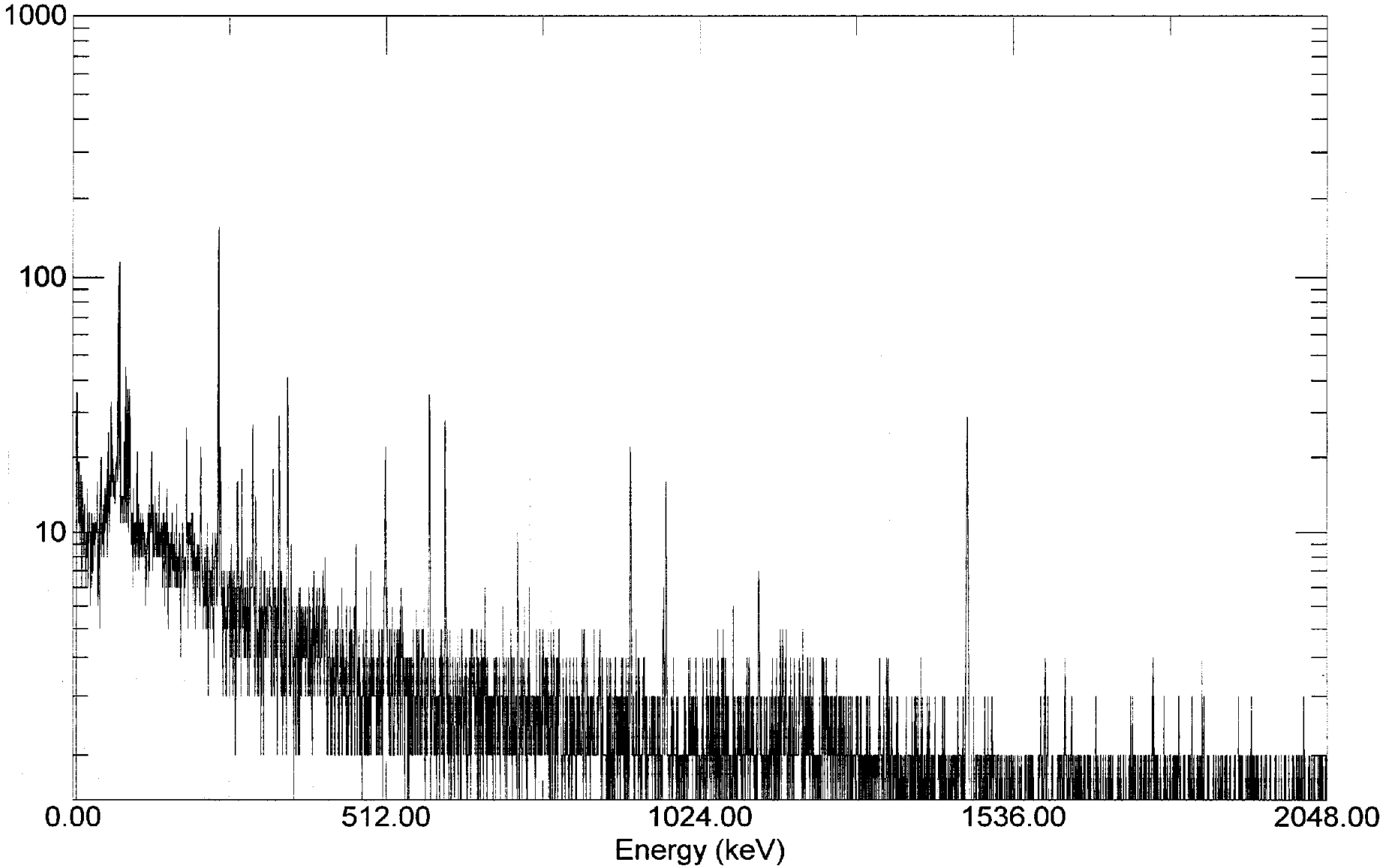
Total Activity (37.74 to 2,000.57 keV) 443.05 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKF81AC

7356122_KEKF81AC_F7L200262-011



Acquired: 23-Dec-2007 4:26:36 PM
File: C:\User\spectra\KEKF81AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1940.90 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,989

Sample Description: 7356122_KEKF91AC_F7L200262-012

Spectrum Filename: KEKF91AC.An1

Acquisition Information

Start Time:	23-Dec-2007 4:27:43PM		
Live Time:	1800.00	Real Time:	1824.70
Dead Time:	1.35 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	**Status**	**Comments**
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.3209

Test Sample St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.20	74.76	280.00	193.00	0.107	17.75	0.655	PB-214	
307.48	77.08	353.33	254.67	0.141	16.59	1.073	BI-207	s
1312.84	328.38	41.33	81.67	0.045	22.46	0.593	RH-106M	s
1407.17	351.95	252.68	28.32	0.016	81.58	1.218		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.49	46.84	133.47	10.07	0.006	46.53	0.832	s
AM-241	1	238.60	59.87	206.83	-10.63	-0.006	193.71	0.846	s
TH-234	1	252.95	63.45	274.36	10.62	0.006	73.98	0.850	s
EU-155	1	345.32	86.54	362.89	-6.21	-0.003	435.92	0.874	s
TH-234	1	371.10	92.98	259.91	56.69	0.031	27.67	0.881	s
U-235	1	372.56	93.35	165.48	0.71	0.000	181.57	0.882	s D
AC-228	1	372.56	93.35	165.48	55.79	0.031	2.83	0.882	s D
EU-155	1	420.31	105.29	181.40	14.78	0.008	131.51	0.894	s
EU-154	1	483.31	121.03	98.60	4.34	0.002	327.11	0.913	s
EU-152	1	485.70	121.63	166.04	-11.14	-0.006	166.29	0.912	s
Pa-234	1	523.17	131.00	170.07	1.26	0.001	1471.86	0.922	s
U-235	1	571.39	143.05	144.21	1.34	0.001	1267.92	0.935	s
U-235	1	651.85	163.16	104.61	0.22	0.000	6523.90	0.955	s
U-235	1	820.38	205.28	106.84	-8.72	-0.005	170.96	0.999	s
PB-212	1	956.02	239.19	117.54	602.46	0.335	5.67	1.210	s
RA-224	1	960.68	240.35	636.81	-117.60	-0.065	31.72	1.036	s
PB-214	1	966.72	241.86	226.14	31.77	0.018	69.26	1.037	s
TL-208	1	1110.80	277.87	36.83	40.17	0.022	33.53	1.111	
I-131	1	1137.92	284.65	59.08	21.33	0.012	55.37	1.081	s
PB-214	1	1181.04	295.43	53.55	92.41	0.051	15.29	1.092	s
PB-212	1	1200.35	300.26	82.22	24.45	0.014	56.21	1.097	
AC-228	1	1352.90	338.39	60.49	83.15	0.046	17.18	1.136	s
EU-152	1	1376.49	344.29	100.95	0.00	0.000	1420.90	1.142	s
PB-214	1	1407.66	352.08	61.10	196.46	0.109	8.91	1.150	s
I-131	1	1455.26	363.97	38.13	2.68	0.001	331.62	1.163	s
BE-7	1	1910.19	477.69	37.76	1.61	0.001	545.34	1.277	s
CS-134	1	2248.73	562.32	25.24	4.23	0.002	174.75	1.363	s
CS-134	1	2276.76	569.32	31.09	-0.19	0.000	-36.13	1.369	s D
Pa-234	1	2277.35	569.47	31.08	0.18	0.000	117.04	1.369	s D
TL-208	1	2332.84	583.34	23.41	177.59	0.099	10.36	1.041	s
CS-134	1	2421.81	605.58	44.44	-1.14	-0.001	831.90	1.403	s
BI-214	1	2436.55	609.26	29.47	183.53	0.102	10.77	1.604	s
I-131	1	2547.40	636.97	59.86	0.00	0.000	1094.15	1.435	s
CS-137	1	2648.29	662.19	25.34	4.66	0.003	136.71	1.459	s
EU-154	1	2887.44	721.98	30.38	4.79	0.003	168.93	1.519	s
BI-212	1	2909.02	727.37	28.26	14.57	0.008	57.88	1.523	s
PA-234M	1	3064.83	766.32	44.64	-1.02	-0.001	934.34	1.561	s
EU-152	1	3115.24	778.92	18.15	0.00	0.000	602.51	1.573	s
BI-212	1	3140.32	785.19	26.07	2.06	0.001	356.84	1.579	s
CS-134	1	3181.26	795.42	18.85	14.04	0.008	51.25	1.589	s
CS-134	1	3206.34	801.69	21.08	0.24	0.000	2706.98	1.595	s
TL-208	1	3441.76	860.54	25.95	8.34	0.005	93.09	1.650	s
EU-154	1	3493.19	873.40	29.43	-5.54	-0.003	144.92	1.662	s
Pa-234	1	3520.69	880.28	22.04	-0.05	0.000	14313.98	1.669	s
Pa-234	1	3532.55	883.24	43.08	0.00	0.000	928.23	1.672	s
AC-228	1	3644.67	911.27	40.22	56.17	0.031	20.81	1.698	s

Pa-234	1	3782.40	945.70	17.80	1.61	0.001	379.99	1.731	s
EU-152	1	3851.77	963.04	45.18	-9.35	-0.005	106.75	1.748	s
AC-228	1	3876.84	969.31	37.50	20.94	0.012	46.77	1.752	s
EU-154	1	3984.93	996.33	53.26	0.00	0.000	1032.08	1.778	s
PA-234M	1	4003.11	1000.87	14.09	5.15	0.003	112.00	1.782	s
EU-154	1	4020.23	1005.15	15.25	1.87	0.001	303.67	1.785	s
EU-152	1	4469.60	1117.49	8.48	-0.27	0.000	1550.22	1.884	s
BI-214	1	4483.00	1120.84	0.00	52.00	0.029	13.87	0.394	s
CO-60	1	4692.64	1173.25	33.91	-1.77	-0.001	470.86	1.939	s
EU-154	1	5097.80	1274.54	33.37	0.00	0.000	816.94	2.030	s
CO-60	1	5330.60	1332.74	18.63	2.00	0.001	313.55	2.081	s
EU-152	1	5632.19	1408.15	17.88	2.99	0.002	207.91	2.147	s
K-40	1	5844.75	1461.29	0.00	258.00	0.143	6.23	2.025	
BI-214	1	7042.69	1760.80	24.48	-7.94	-0.004	95.04	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
Pa-234	N	1	7.952E-002	131.29	7.952E-002	% (	4.021E+000G		1.6E+012	18.00
			7.952E-002	569.47	7.952E-002	%	1.233E+001G		1.6E+012	8.20
			7.952E-002	946.02	6.552E-001	%	9.130E+000G		1.6E+012	13.40
			7.952E-002	883.24	0.000E+000	%	1.789E+001G		1.6E+012	9.60
			7.952E-002	880.53	-3.978E-002	%	2.107E+001G		1.6E+012	6.00
EU-155	T F I	1	7.893E-001	105.31	7.893E-001	% (	3.498E+000G		1.8E+003	21.20
			7.893E-001	86.54	-2.426E-001	%	3.576E+000G	A	1.8E+003	30.70
I-131	T F I	1	7.697E-002	364.48	7.697E-002	& (	9.045E-001G		8.0E+000	81.70
			7.697E-002	284.30	6.495E+000	%	1.173E+001G		8.0E+000	6.14
			7.697E-002	636.97	0.000E+000	%	2.103E+001G		8.0E+000	7.17
TL-208	F N	1	7.564E+000	583.02	7.564E+000	(P	1.076E+000G		7.0E+002	84.50
			7.564E+000	277.28	1.164E+001	+	8.980E+000G		7.0E+002	6.31
			7.564E+000	860.56	3.386E+000	%	1.074E+001G		7.0E+002	12.42
PB-210	N	1	6.015E+000	46.54	6.015E+000	% (P	3.376E+001G		8.1E+003	4.25
			5.380E+000	785.51	8.748E+000	%	1.124E+002G		7.0E+002	1.10
BI-212	N	1	5.380E+000	727.33	5.380E+000	* (	1.015E+001G		7.0E+002	11.82
RA-224	N	1	-4.645E+001	240.99	-4.645E+001	* (	4.751E+001G		7.0E+002	4.10
BE-7	N P C	1	4.607E-001	477.60	4.607E-001	% (	8.966E+000G		5.3E+001	10.52
AM-241	T	1	-4.594E-001	59.54	-4.594E-001	& (	3.012E+000G		1.6E+005	35.90
CS-134	T F I	1	-4.343E-002	604.71	-4.343E-002	% (	1.286E+000G		7.5E+002	97.62
			-4.343E-002	795.87	7.741E-001	%	1.265E+000G		7.5E+002	85.53
			-4.343E-002	569.32	-4.343E-002	%	6.574E+000G		7.5E+002	15.38
			-4.343E-002	801.95	1.314E-001	%	1.317E+001G		7.5E+002	8.69
			-4.343E-002	563.24	1.769E+000	&	1.092E+001G		7.5E+002	8.35
PA-234M	N	1	3.535E+001	1001.00	3.535E+001	% (	1.385E+002G		1.6E+012	.84
			3.535E+001	766.41	-1.580E+001	&	5.257E+002G		1.6E+012	.29
TH-234	N	1	3.223E+000	63.29	3.223E+000	% (P	2.425E+001G		1.6E+012	4.82
			3.223E+000	92.59	1.187E+001	& P	1.630E+001G		1.6E+012	5.58
EU-154	T F I	1	-2.305E+000	873.23	-2.305E+000	% (	1.165E+001G		3.1E+003	12.27
			-2.305E+000	123.10	1.201E-001	%	1.355E+000G		3.1E+003	40.79
			-2.305E+000	1274.54	0.000E+000	%	5.964E+000G		3.1E+003	35.19
			-2.305E+000	723.36	1.030E+000	%	6.101E+000G		3.1E+003	20.22

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			-2.305E+000	1004.77	5.991E-001	%			6.685E+000G		3.1E+003	18.01
			-2.305E+000	996.33	0.000E+000	%			1.980E+001G		3.1E+003	10.60
PB-212	N	1	2.235E+001	238.63	2.235E+001	*	(	P	1.974E+000G		7.0E+002	43.30
			2.235E+001	300.03	1.463E+001	%			2.690E+001G		7.0E+002	3.28
CS-137 T F I		1	2.199E-001	661.66	2.199E-001	&	(	P	1.235E+000G		1.1E+004	85.21
K-40	N	1	1.938E+002	1460.83	1.938E+002		(		5.536E+000G		4.7E+011	10.67
BI-214	N	1	1.490E+001	609.31	1.490E+001	@	(	P	2.274E+000G		5.8E+005	46.09
			1.490E+001	1120.29	2.178E+001	+			3.087E+000G		5.8E+005	15.10
			1.490E+001	1764.49	-4.949E+000	%			1.607E+001G		5.8E+005	15.40
CO-60 T F		1	1.473E-001	1332.50	1.473E-001	%	(		1.683E+000G		1.9E+003	99.98
			1.473E-001	1173.24	-1.168E-001	%			1.967E+000G		1.9E+003	99.90
			1.432E-001	93.35	1.432E-001	%		E	1.257E+001X		2.6E+011	5.81
U-235	N	1	1.432E-001	143.79	1.432E-001	%	(		6.258E+000G		2.6E+011	10.96
			1.432E-001	205.33	-2.484E+000	%			1.449E+001G		2.6E+011	5.01
			1.432E-001	163.38	5.392E-002	%			1.224E+001G		2.6E+011	5.08
PB-214	N	1	1.187E+001	351.93	1.187E+001	@	(	P	2.365E+000G		5.8E+005	37.60
			1.187E+001	295.09	9.257E+000	-			3.687E+000G		5.8E+005	19.30
			1.187E+001	242.00	6.948E+000	%			1.592E+001G		5.8E+005	7.43
AC-228	N	1	1.170E+001	911.16	1.026E+001	@	(		5.892E+000G		2.1E+003	29.00
			1.170E+001	968.97	6.695E+000	%			9.989E+000G		2.1E+003	17.46
			1.170E+001	338.32	1.517E+001	*	(		7.106E+000G		2.1E+003	12.01
			1.170E+001	93.35	1.170E+001	!		E	1.314E+001G	A	2.1E+003	5.56
			0.000E+000	964.11	-3.560E+000	%			1.295E+001G		4.9E+003	14.61
			0.000E+000	1112.07	-1.233E-001	%			7.498E+000G		4.9E+003	13.64
			0.000E+000	1408.00	1.104E+000	%			8.268E+000G		4.9E+003	21.00
EU-152 T F		1	0.000E+000	344.29	0.000E+000	&	(		4.162E+000G		4.9E+003	26.50
			0.000E+000	121.78	-4.396E-001	%			2.476E+000G		4.9E+003	28.58
			0.000E+000	778.92	0.000E+000	%			8.075E+000G		4.9E+003	12.94

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	4.607E-001	4.618E-001	545.34	545.35	8.966E+000
K-40		1.938E+002	1.938E+002	6.23	6.88	5.536E+000
CO-60	#	1.473E-001	1.473E-001	313.55	313.57	1.683E+000
I-131	#	7.697E-002	7.822E-002	331.62	331.63	9.045E-001
CS-134	#	-4.343E-002	-4.343E-002	831.90	831.91	1.286E+000
EU-154	#	-2.305E+000	-2.305E+000	144.92	144.94	1.165E+001
EU-155	#	7.893E-001	7.894E-001	131.51	131.55	3.498E+000
TL-208		7.564E+000	7.565E+000	10.50	10.89	1.076E+000
BI-214		1.490E+001	1.490E+001	10.89	11.27	2.274E+000
RA-224	#	-4.645E+001	-4.646E+001	31.72	31.86	4.751E+001
AC-228	#	1.170E+001	1.170E+001	13.49	13.80	5.892E+000
CS-137	#	2.199E-001	2.199E-001	158.57	158.60	1.235E+000
EU-152	#			1,420.90	1,420.90	4.162E+000
PB-210	#	6.015E+000	6.015E+000	157.86	157.90	3.376E+001
PB-212	#	2.235E+001	2.235E+001	5.76	6.49	1.974E+000
PB-214	#	1.187E+001	1.187E+001	9.04	9.49	2.365E+000
BI-212	#	5.380E+000	5.381E+000	57.88	57.95	1.015E+001
Pa-234	#	7.952E-002	7.952E-002	1,471.86	1,471.86	4.021E+000
AM-241	#	-4.594E-001	-4.594E-001	193.71	193.75	3.012E+000
TH-234	#	3.223E+000	3.223E+000	218.52	218.55	2.425E+001
PA-234M	#	3.535E+001	3.535E+001	112.00	112.04	1.385E+002
U-235	#	1.432E-001	1.432E-001	1,267.92	1,267.92	6.258E+000

= All peaks for activity calculation had bad shape

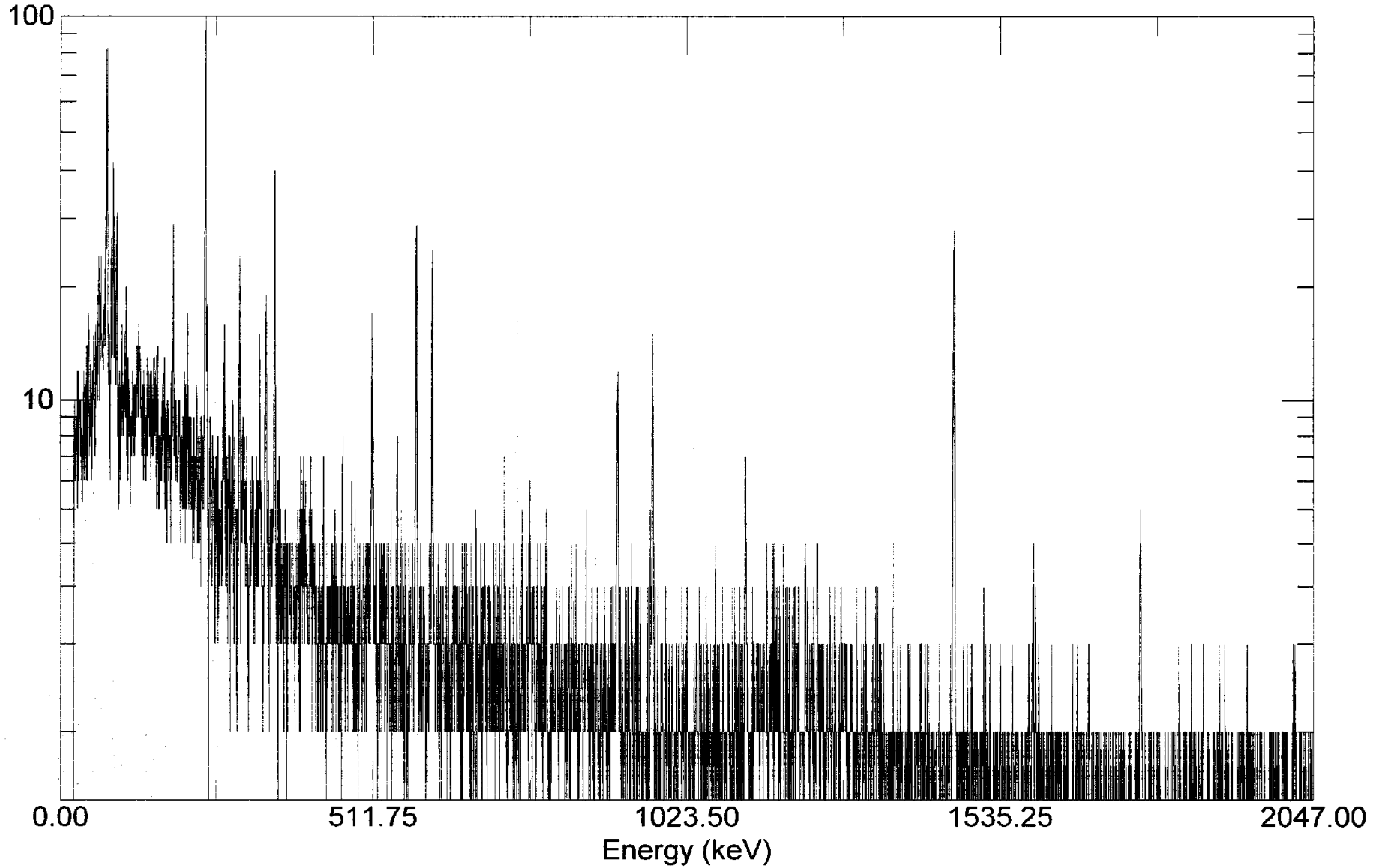
Total Activity (37.72 to 2,000.15 keV) 238.59 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKF91AC

7356122_KEKF91AC_F7L200262-012



Acquired: 23-Dec-2007 4:27:43 PM
File: C:\User\spectra\KEKF91AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1824.70 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,992

Sample Description: 7356122_KEKGD1AC_F7L200262-013

Spectrum Filename: KEKGD1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 5:03:31PM		
Live Time:	1800.00	Real Time:	1810.22
Dead Time:	0.56 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.0672

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.61	74.62	309.00	243.00	0.135	15.83	0.622	PB-214	
307.65	77.13	270.00	375.00	0.208	10.17	0.769	PB-214	
347.94	87.20	281.89	35.11	0.020	69.71	0.765		s
358.86	89.93	97.50	89.50	0.050	20.40	0.917	PB-214	M
513.75	128.66	80.48	54.52	0.030	26.93	0.803	AC-228	
837.16	209.51	100.00	119.00	0.066	20.91	1.264	AC-228	s
1078.34	269.80	102.00	114.00	0.063	24.72	0.859	AC-228	
1351.61	338.12	180.44	13.56	0.008	142.69	1.327		s
2436.11	609.23	169.20	19.80	0.011	95.61	1.153		
3643.93	911.14	166.67	13.33	0.007	139.67	1.365		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.33	46.55	113.96	44.04	0.024	25.13	0.619	s
AM-241	1	233.76	58.65	178.85	0.43	0.000	4375.97	0.824	s
TH-234	1	252.19	63.26	245.90	121.10	0.067	21.31	0.632	s
EU-155	1	348.14	87.25	218.66	130.23	0.072	18.29	0.849	s
TH-234	1	371.45	93.08	265.18	134.82	0.075	18.87	0.872	s
AC-228	1	372.54	93.35	205.57	104.21	0.058	1.62	0.855	s D
U-235	1	372.54	93.35	205.57	4.18	0.002	52.34	0.855	s D
EU-155	1	420.70	105.39	170.88	22.87	0.013	83.50	0.866	s
EU-152	1	487.16	122.01	152.17	-11.72	-0.007	151.64	0.881	s
EU-154	1	498.65	124.88	122.73	1.27	0.001	1232.38	0.882	s
Pa-234	1	521.92	130.70	214.26	-17.05	-0.009	123.83	0.890	s
U-235	1	572.85	143.43	152.55	7.73	0.004	153.26	0.901	s
U-235	1	652.12	163.25	161.35	-2.75	-0.002	7690.79	0.919	s
U-235	1	815.80	204.17	102.80	-1.06	-0.001	1318.95	0.957	s
PB-212	1	953.66	238.63	68.81	624.79	0.347	4.20	0.987	D
RA-224	1	963.07	240.99	133.16	65.84	0.037	27.68	0.989	D
PB-214	1	967.12	242.00	111.80	72.20	0.040	21.45	0.990	D
TL-208	1	1110.52	277.85	32.50	49.50	0.028	25.81	0.539	s
I-131	1	1136.33	284.30	72.00	0.00	0.000	1200.00	1.028	s
PB-214	1	1179.52	295.10	56.88	183.13	0.102	10.99	1.442	s
PB-212	1	1198.48	299.84	26.00	56.00	0.031	21.00	1.212	s
AC-228	1	1351.76	338.16	53.64	146.21	0.081	10.43	1.076	s
EU-152	1	1376.32	344.29	44.42	6.06	0.003	160.88	1.081	s
PB-214	1	1406.68	351.88	63.99	217.01	0.121	9.66	0.664	s
I-131	1	1466.25	366.78	32.59	7.91	0.004	108.10	1.099	s
BE-7	1	1910.90	477.94	45.52	0.53	0.000	1821.38	1.198	s
CS-134	1	2249.15	562.49	38.01	4.63	0.003	193.83	1.273	s
CS-134	1	2276.47	569.32	60.02	0.00	0.000	800.00	1.278	s D
Pa-234	1	2277.07	569.47	39.28	-3.08	-0.002	-156.25	1.278	s D
TL-208	1	2330.80	582.90	22.92	263.08	0.146	7.20	1.454	
CS-134	1	2407.55	602.09	19.55	3.99	0.002	164.48	1.309	s
BI-214	1	2436.09	609.22	46.40	144.25	0.080	9.63	1.313	
I-131	1	2545.77	636.64	36.64	-1.93	-0.001	448.69	1.337	s
CS-137	1	2643.47	661.06	33.02	0.74	0.000	1108.91	1.358	s
EU-154	1	2899.77	725.13	72.90	-13.85	-0.008	91.25	1.411	s
BI-212	1	2908.25	727.25	30.87	52.77	0.029	20.28	1.414	
PA-234M	1	3063.03	765.94	52.27	-5.47	-0.003	191.72	1.447	s
EU-152	1	3126.31	781.76	25.29	-0.66	0.000	1077.60	1.458	s
BI-212	1	3140.87	785.40	39.03	9.26	0.005	100.95	1.463	s
CS-134	1	3178.06	794.69	23.12	20.61	0.011	39.67	1.472	s
CS-134	1	3212.54	803.31	29.71	-6.94	-0.004	117.37	1.477	s
TL-208	1	3441.52	860.55	0.00	53.00	0.029	13.74	1.437	
EU-154	1	3493.73	873.60	26.84	-3.54	-0.002	213.75	1.537	s
Pa-234	1	3512.81	878.37	20.44	-0.45	0.000	1437.43	1.543	s
Pa-234	1	3532.21	883.22	27.43	-2.28	-0.001	331.28	1.546	s

AC-228	1	3644.30	911.24	18.57	157.70	0.088	8.48	1.569	
Pa-234	1	3784.37	946.25	23.64	0.33	0.000	2080.46	1.598	s
EU-152	1	3851.76	963.09	42.76	0.71	0.000	1316.80	1.613	s
AC-228	1	3875.09	968.92	32.11	80.77	0.045	14.17	1.617	
EU-154	1	3982.74	995.83	30.28	-3.23	-0.002	247.56	1.640	s
PA-234M	1	4004.57	1001.29	27.40	6.42	0.004	121.87	1.643	s
EU-154	1	4021.99	1005.64	32.95	1.33	0.001	615.81	1.647	s
EU-152	1	4448.98	1112.37	39.00	-3.95	-0.002	229.01	1.735	s
BI-214	1	4482.21	1120.68	41.17	13.23	0.007	49.93	1.741	s
CO-60	1	4695.29	1173.93	30.62	-0.45	0.000	1746.20	1.784	s
EU-154	1	5086.90	1271.81	19.69	-3.59	-0.002	182.60	1.866	s
CO-60	1	5328.19	1332.12	12.29	4.84	0.003	112.13	1.912	s
EU-152	1	5631.80	1408.00	55.91	0.00	0.000	1057.44	1.972	s
K-40	1	5842.49	1460.66	12.54	347.46	0.193	5.27	2.145	
BI-214	1	7056.24	1764.00	15.05	11.07	0.006	37.99	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code		MDA Value Becquerels	Code	Comments	
U-235	N	1	9.629E-001	143.79	9.629E-001	*	(P		7.508E+000G		2.6E+011	10.96
			9.629E-001	205.33	-3.443E-001	%	P		1.618E+001G		2.6E+011	5.01
			9.629E-001	163.38	-7.762E-001	%	P		1.748E+001G		2.6E+011	5.08
			9.629E-001	93.35	9.629E-001	%		E	1.600E+001X		2.6E+011	5.81
CS-134	T F I	1	5.540E-001	604.71	1.432E-001	&	(		8.366E-001G		7.5E+002	97.62
			5.540E-001	795.87	1.023E+000	?	(		1.247E+000G		7.5E+002	85.53
			5.540E-001	569.32	0.000E+000	&	}		7.837E+000G		7.5E+002	15.38
			5.540E-001	801.95	-3.408E+000	%			1.380E+001G		7.5E+002	8.69
			5.540E-001	563.24	1.848E+000	%			1.254E+001G		7.5E+002	8.35
			5.317E-001	1408.00	0.000E+000	&			1.144E+001G		4.9E+003	21.00
EU-152	T F	1	5.317E-001	344.29	5.317E-001	%	(		2.965E+000G		4.9E+003	26.50
			5.317E-001	121.78	-5.397E-001	&			2.771E+000G		4.9E+003	28.58
			5.317E-001	778.92	-2.147E-001	%			8.449E+000G		4.9E+003	12.94
			5.317E-001	964.11	2.343E-001	%			1.103E+001G		4.9E+003	14.61
			5.317E-001	1112.07	-1.556E+000	%			1.252E+001G		4.9E+003	13.64
EU-155	T F I	1	4.009E+000	105.31	1.414E+000	*	(		3.935E+000G		1.8E+003	21.20
			4.009E+000	86.54	5.800E+000	*	(		3.190E+000G		1.8E+003	30.70
PA-234	N	1	3.823E+001	1001.00	3.823E+001	%	(		1.614E+002G		1.6E+012	.84
			3.823E+001	766.41	-7.695E+001	%			5.120E+002G		1.6E+012	.29
TH-234	N	1	3.644E+001	63.29	4.118E+001	*	(P		2.577E+001G		1.6E+012	4.82
			3.644E+001	92.59	3.234E+001	*	(P		1.885E+001G		1.6E+012	5.58
CS-137	T F I	1	3.228E-002	661.66	3.228E-002	%	(		1.292E+000G		1.1E+004	85.21
CO-60	T F	1	2.969E-001	1332.50	2.969E-001	%	(		1.169E+000G		1.9E+003	99.98
			2.969E-001	1173.24	-2.514E-002	%			1.593E+000G		1.9E+003	99.90
RA-224	N	1	2.891E+001	240.99	2.891E+001		(		2.480E+001G		7.0E+002	4.10
PB-210	N	1	2.782E+001	46.54	2.782E+001	*	(P		3.313E+001G		8.1E+003	4.25
PB-212	N	1	2.581E+001	238.63	2.581E+001		(P		1.708E+000G		7.0E+002	43.30
			2.581E+001	300.03	3.591E+001	+			1.697E+001G		7.0E+002	3.28
AC-228	N	1	2.505E+001	911.07	2.536E+001		(P		3.666E+000G		2.1E+003	29.00
			2.505E+001	968.97	2.253E+001		(P		8.122E+000G		2.1E+003	17.46
			2.505E+001	338.32	2.797E+001		(P		7.046E+000G		2.1E+003	12.01
			2.505E+001	93.35	2.505E+001	!		E	1.671E+001X	A	2.1E+003	5.56
I-131	T F I	1	2.350E-001	364.48	2.350E-001	%	(		8.708E-001G		8.0E+000	81.70
			2.350E-001	284.30	0.000E+000	&			1.392E+001G		8.0E+000	6.14
			2.350E-001	636.97	-9.795E-001	%			1.567E+001G		8.0E+000	7.17
K-40	N	1	2.144E+002	1460.83	2.144E+002		(P		1.186E+001G		4.7E+011	10.67
AM-241	T	1	2.091E-002	59.54	2.091E-002	%	(		3.144E+000G		1.6E+005	35.90
BI-212	N	1	1.780E+001	727.33	1.780E+001		(		9.648E+000G		7.0E+002	11.82
			1.780E+001	785.51	3.540E+001	&			1.217E+002G		7.0E+002	1.10
BE-7	N P C	1	1.478E-001	477.60	1.478E-001	&	(		9.606E+000G		5.3E+001	10.52
PB-214	N	1	1.429E+001	351.93	1.365E+001		(P		2.515E+000G		5.8E+005	37.60
			1.429E+001	295.09	1.972E+001	*	P		4.076E+000G		5.8E+005	19.30
			1.429E+001	242.00	1.754E+001		(P		1.263E+001G		5.8E+005	7.43
EU-154	T F I	1	-1.306E+000	873.23	-1.306E+000	%	(		9.909E+000G		3.1E+003	12.27

				-1.306E+000	123.10	4.117E-002	&			1.755E+000G	3.1E+003	40.79
				-1.306E+000	1274.54	-6.054E-001	%			3.944E+000G	3.1E+003	35.19
				-1.306E+000	723.36	-2.720E+000	%			8.348E+000G	3.1E+003	20.22
				-1.306E+000	1004.77	3.694E-001	%			8.173E+000G	3.1E+003	18.01
				-1.306E+000	996.33	-1.512E+000	%			1.329E+001G	3.1E+003	10.60
Pa-234		N	1	-1.262E+000	131.29	-1.262E+000	%	(		5.250E+000G	1.6E+012	18.00
				-1.262E+000	569.47	-1.262E+000	&			1.307E+001G	1.6E+012	8.20
				-1.262E+000	946.02	1.185E-001	%			9.067E+000G	1.6E+012	13.40
				-1.262E+000	883.24	-1.085E+000	%			1.289E+001G	1.6E+012	9.60
				-1.262E+000	880.53	-3.395E-001	%			1.805E+001G	1.6E+012	6.00
Bl-214		N	1	1.102E+001	609.31	1.102E+001		(	P	2.633E+000G	5.8E+005	46.09
				1.102E+001	1120.29	4.733E+000	%		P	1.166E+001G	5.8E+005	15.10
				1.102E+001	1764.49	5.520E+000	%		P	1.037E+001G	5.8E+005	15.40
TL-208	F	N	1	1.063E+001	583.02	1.063E+001		(	P	1.011E+000G	7.0E+002	84.50
				1.063E+001	277.28	1.558E+001	*			9.217E+000G	7.0E+002	6.31
				1.063E+001	860.56	1.913E+001	+			2.660E+000G	7.0E+002	12.42

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	<	2.350E-001	2.393E-001	108.10	108.14	8.708E-001
CS-134	<	5.540E-001	5.541E-001	39.67	39.78	8.366E-001
EU-154	<	-1.306E+000	-1.306E+000	213.75	213.77	9.909E+000
PB-212		2.581E+001	2.581E+001	4.35	5.28	1.708E+000
PB-214		1.429E+001	1.429E+001	10.19	10.59	2.515E+000
BI-212	<	1.780E+001	1.780E+001	20.28	20.49	9.648E+000
BE-7	<	1.478E-001	1.482E-001	1,821.38	1,821.38	9.606E+000
K-40		2.144E+002	2.144E+002	5.46	6.20	1.186E+001
CO-60	<	2.969E-001	2.969E-001	112.13	112.16	1.169E+000
CS-137	<	3.228E-002	3.228E-002	1,108.91	1,108.91	1.292E+000
EU-152	<	5.317E-001	5.317E-001	160.88	160.91	2.965E+000
EU-155	<	4.009E+000	4.009E+000	18.29	18.60	3.935E+000
TL-208		1.063E+001	1.063E+001	7.45	7.99	1.011E+000
RA-224		2.891E+001	2.892E+001	27.68	27.84	2.480E+001
PB-210	#	2.782E+001	2.782E+001	41.93	42.11	3.313E+001
BI-214	<	1.102E+001	1.102E+001	10.41	10.80	2.633E+000
AC-228	<	2.505E+001	2.505E+001	6.75	7.34	3.666E+000
PA-234M	<	3.823E+001	3.823E+001	121.87	121.90	1.614E+002
U-235	<	9.629E-001	9.629E-001	227.48	227.49	7.508E+000
AM-241	<	2.091E-002	2.091E-002	4,375.97	4,375.97	3.144E+000
Pa-234	<	-1.262E+000	-1.262E+000	123.83	123.86	5.250E+000
TH-234	#	3.644E+001	3.644E+001	19.01	19.36	2.577E+001

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 330.50 Bq/sample

Analyzed by: _____

403605

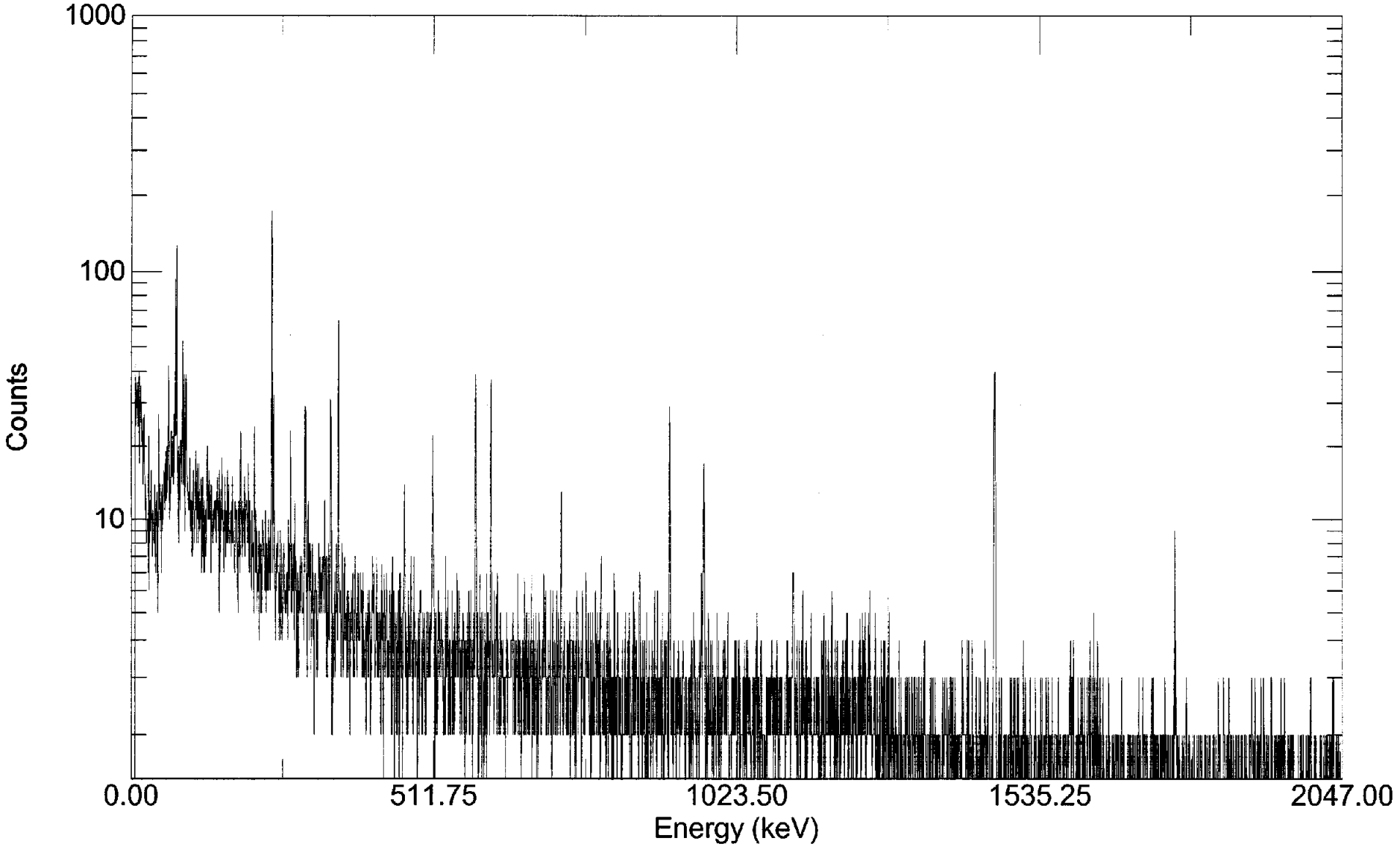
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKGD1AC

7356122_KEKGD1AC_F7L200262-013



Acquired: 23-Dec-2007 5:03:32 PM
File: C:\User\spectra\KEKGD1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.22 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,993

Sample Description: 7356122_KEKGF1AC_F7L200262-014

Spectrum Filename: KEKGF1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 5:04:20PM		
Live Time:	1800.00	Real Time:	1819.74
Dead Time:	1.08 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1060

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.83	74.79	4235.83	2247.17	1.248	6.05	0.870	PB-214	
307.07	77.10	3472.00	3489.00	1.938	3.65	0.840	PB-214	
336.24	84.32	1539.14	472.86	0.263	12.60	0.903	TA-182	D
347.40	87.11	1998.13	1211.87	0.673	5.96	0.906	PB-214	D
358.27	89.89	1486.80	957.20	0.532	6.55	1.035	PB-214	M
395.89	99.28	1584.00	326.00	0.181	25.04	1.199	AC-228	s
457.68	114.71	1431.33	384.67	0.214	20.71	1.068	PA-234	s
515.19	129.08	1987.70	932.30	0.518	7.51	1.078	AC-228	s
616.36	154.35	1167.00	325.00	0.181	21.74	1.204	XE-138	s
836.25	209.27	1555.18	1218.82	0.677	5.40	1.072	AC-228	s
1079.95	270.14	1020.00	938.00	0.521	9.58	1.331	AC-228	s
1311.47	327.97	596.00	566.00	0.314	10.52	1.117	AC-228	s
1637.22	409.35	338.83	329.17	0.183	12.68	1.709	AC-228	s
1810.95	452.76	326.33	121.67	0.068	33.33	0.454	TE-131	s
1851.53	462.90	389.33	722.67	0.401	7.81	1.307	AC-228	s
2042.58	510.63	442.00	1245.00	0.692	5.42	1.559	TL-208	s
2564.47	641.05	167.77	88.23	0.049	23.33	0.643		s
3018.52	754.52	256.67	229.33	0.127	19.42	1.406	PA-234	
3179.09	794.66	510.56	39.44	0.022	82.58	1.732		
3858.17	964.41	222.16	344.84	0.192	8.15	1.355	AC-228	M
4191.72	1047.80	26.00	59.00	0.033	23.83	0.583	CS-136	s
5700.87	1425.21	13.00	41.00	0.023	25.62	0.295		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.30	46.69	1353.15	37.43	0.021	88.50	0.864	s
AM-241	1	238.00	59.85	2702.32	-33.74	-0.019	218.58	0.878	s
TH-234	1	252.30	63.42	3054.90	78.55	0.044	76.05	0.882	s
EU-155	1	344.88	86.54	2939.05	253.95	0.141	30.84	0.906	D
TH-234	1	365.22	91.62	3153.50	111.65	0.062	58.01	0.912	s
AC-228	1	372.14	93.35	2199.97	1620.64	0.900	3.66	1.203	s D
U-235	1	372.14	93.35	2487.89	26.06	0.014	27.09	0.913	s D
EU-155	1	419.76	105.24	1545.33	573.67	0.319	14.60	1.573	s
EU-152	1	478.00	119.79	1195.44	-26.26	-0.015	187.19	0.942	s
EU-154	1	492.05	123.30	1867.35	19.36	0.011	316.42	0.943	s
Pa-234	1	519.35	130.11	2099.03	-174.82	-0.097	37.83	0.952	s
U-235	1	573.80	143.71	1832.92	47.80	0.027	121.98	0.964	s
U-235	1	657.66	164.66	1506.40	-0.27	0.000	20547.69	0.984	s
U-235	1	825.58	206.60	1436.29	-70.46	-0.039	77.00	1.027	s
PB-212	1	953.82	238.63	1614.34	10366.66	5.759	1.12	1.060	D
RA-224	1	963.24	240.99	2893.28	1000.72	0.556	8.23	1.062	D
PB-214	1	967.29	242.00	1533.48	216.52	0.120	26.46	1.063	D
TL-208	1	1109.00	277.39	712.00	551.00	0.306	11.64	1.359	s
I-131	1	1137.63	284.55	838.92	-4.43	-0.002	924.94	1.105	s
PB-214	1	1179.29	294.95	682.48	452.52	0.251	13.39	1.201	
PB-212	1	1199.86	300.09	919.67	689.33	0.383	11.57	1.211	
AC-228	1	1352.87	338.32	789.81	2343.19	1.302	3.72	1.342	s
EU-152	1	1375.52	343.97	684.36	-26.48	-0.015	141.05	1.164	s
PB-214	1	1407.08	351.86	681.20	932.80	0.518	7.98	1.168	s
I-131	1	1457.34	364.41	592.59	26.17	0.015	133.02	1.184	s
BE-7	1	1908.24	477.07	459.72	6.01	0.003	505.89	1.292	s
CS-134	1	2249.85	562.42	399.15	91.20	0.051	32.70	1.372	s
CS-134	1	2277.45	569.32	455.74	12.30	0.007	180.98	1.378	D
Pa-234	1	2278.04	569.47	478.28	-30.42	-0.017	-454.59	1.378	D
TL-208	1	2332.48	583.07	322.96	3648.04	2.027	2.08	1.464	s
CS-134	1	2419.07	604.71	1795.82	0.00	0.000	5993.03	1.410	s
BI-214	1	2437.14	609.23	342.45	670.55	0.373	7.89	1.590	
I-131	1	2548.18	636.97	469.96	-4.09	-0.002	751.50	1.440	s
CS-137	1	2640.46	660.04	346.96	20.16	0.011	132.57	1.462	s
BI-212	1	2909.30	727.23	300.67	870.33	0.484	6.53	1.680	s
EU-154	1	2910.28	727.47	968.04	-161.38	-0.090	28.38	1.518	s
PA-234M	1	3065.68	766.31	440.11	-20.86	-0.012	143.92	1.556	s
EU-152	1	3117.09	779.16	327.73	-15.50	-0.009	167.14	1.567	
BI-212	1	3141.89	785.36	288.00	254.00	0.141	22.04	0.450	s
CS-134	1	3178.93	794.62	133.51	429.90	0.239	6.14	1.582	s
CS-134	1	3206.70	801.56	186.80	4.42	0.002	440.18	1.587	s
TL-208	1	3441.55	860.26	179.67	479.33	0.266	9.62	1.637	
EU-154	1	3492.63	873.03	148.86	9.46	0.005	185.28	1.649	s
Pa-234	1	3520.42	879.98	134.40	-9.12	-0.005	182.77	1.655	s
Pa-234	1	3550.75	887.56	74.86	6.39	0.004	195.57	1.657	s

AC-228	1	3644.03	910.88	51.68	2553.32	1.419	2.10	1.746	
Pa-234	1	3775.19	943.67	125.66	0.12	0.000	12741.64	1.710	s
EU-152	1	3855.67	963.78	1311.48	13.07	0.007	392.77	1.726	
AC-228	1	3875.26	968.68	545.71	1221.07	0.678	3.94	1.730	s
EU-154	1	3985.13	996.15	75.06	5.00	0.003	248.88	1.753	s
PA-234M	1	4002.36	1000.46	76.36	1.20	0.001	1031.39	1.756	s
EU-154	1	4020.26	1004.93	93.39	-0.55	0.000	2503.33	1.760	s
EU-152	1	4440.31	1109.96	71.75	30.42	0.017	43.35	1.847	s
BI-214	1	4479.41	1119.74	64.27	158.73	0.088	14.94	1.286	s
CO-60	1	4688.35	1171.98	87.27	-7.26	-0.004	185.68	1.896	s
EU-154	1	5098.47	1274.54	212.86	0.00	0.000	2063.31	1.975	s
CO-60	1	5329.98	1332.44	68.79	6.13	0.003	195.66	2.019	s
EU-152	1	5632.87	1408.20	82.93	-0.67	0.000	1918.21	2.076	s
K-40	1	5839.44	1459.87	46.54	405.46	0.225	6.63	1.718	s
BI-214	1	7058.22	1764.80	9.69	148.31	0.082	9.66	0.717	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
CS-137	T F I	1	8.561E-001	661.66	8.561E-001	& (	3.802E+000G		1.1E+004	85.21
I-131	T F I	1	7.398E-001	364.48	7.398E-001	& (	3.284E+000G		8.0E+000	81.70
			7.398E-001	284.30	-1.380E+000	%	4.286E+001G		8.0E+000	6.14
			7.398E-001	636.97	-2.007E+000	%	5.091E+001G		8.0E+000	7.17
PA-234	N	1	7.050E+000	1001.00	7.050E+000	% (	2.546E+002G		1.6E+012	.84
			7.050E+000	766.41	-2.859E+002	&	1.377E+003G		1.6E+012	.29
U-235	N	1	5.539E+000	143.79	5.539E+000	% (P	2.343E+001G		2.6E+011	10.96
			5.539E+000	205.33	-2.138E+001	%	5.441E+001G		2.6E+011	5.01
			5.539E+000	163.38	-7.034E-002	%	4.834E+001G		2.6E+011	5.08
			5.539E+000	93.35	5.539E+000	! E	4.998E+001X		2.6E+011	5.81
			5.475E+001	295.09	4.609E+001	- P	1.268E+001G		5.8E+005	19.30
			5.475E+001	242.00	4.950E+001	(	4.234E+001G		5.8E+005	7.43
PB-214	N	1	5.475E+001	351.93	5.578E+001	* (P	7.435E+000G		5.8E+005	37.60
BI-214	N	1	5.117E+001	609.31	4.955E+001	(P	6.572E+000G		5.8E+005	46.09
			5.117E+001	1120.29	5.614E+001	@ (P	1.417E+001G		5.8E+005	15.10
			5.117E+001	1764.49	7.479E+001	+ P	8.684E+000G		5.8E+005	15.40
RA-224	N	1	4.134E+002	240.99	4.134E+002	(	1.047E+002G		7.0E+002	4.10
AC-228	N	1	4.095E+002	911.07	4.028E+002	(P	5.712E+000G		2.1E+003	29.00
			4.095E+002	968.97	3.349E+002	&	3.060E+001G		2.1E+003	17.46
			4.095E+002	338.32	4.256E+002	* (P	2.428E+001G		2.1E+003	12.01
			4.095E+002	93.35	3.599E+002	- } E	4.661E+001X	A	2.1E+003	5.56
PB-212	N	1	4.038E+002	238.63	4.027E+002	(P	7.379E+000G		7.0E+002	43.30
			4.038E+002	300.03	4.183E+002	(	8.741E+001G		7.0E+002	3.28
CO-60	T F	1	3.747E-001	1332.50	3.747E-001	% (	2.530E+000G		1.9E+003	99.98
			3.747E-001	1173.24	-4.022E-001	%	2.561E+000G		1.9E+003	99.90
EU-154	T F I	1	3.419E+000	873.23	3.419E+000	% (	2.153E+001G		3.1E+003	12.27
			3.419E+000	123.10	5.802E-001	%	6.115E+000G		3.1E+003	40.79
			3.419E+000	1274.54	0.000E+000	&	1.186E+001G		3.1E+003	35.19
			3.419E+000	723.36	-3.083E+001	+	2.822E+001G		3.1E+003	20.22
			3.419E+000	1004.77	-1.493E-001	%	1.304E+001G		3.1E+003	18.01
			3.419E+000	996.33	2.308E+000	%	1.987E+001G		3.1E+003	10.60
EU-155	T F I	1	3.284E+001	105.31	3.284E+001	* (	1.064E+001G		1.8E+003	21.20
			3.284E+001	86.54	1.044E+001	-	1.049E+001G		1.8E+003	30.70
BI-212	N	1	2.856E+002	727.33	2.856E+002	@ (	2.741E+001G		7.0E+002	11.82
			2.856E+002	785.51	9.475E+002	+	3.051E+002G		7.0E+002	1.10
K-40	N	1	2.505E+002	1460.83	2.505E+002	* (P	2.131E+001G		4.7E+011	10.67
TH-234	N	1	2.446E+001	63.29	2.446E+001	% (P	8.105E+001G		1.6E+012	4.82
			2.446E+001	92.59	2.474E+001	% P	5.859E+001G		1.6E+012	5.58
			-2.209E+000	121.78	-1.121E+000	&	6.995E+000G		4.9E+003	28.58
			-2.209E+000	778.92	-4.884E+000	&	2.744E+001G		4.9E+003	12.94
			-2.209E+000	964.11	4.270E+000	%	5.601E+001G		4.9E+003	14.61
			-2.209E+000	1112.07	1.184E+001	&	1.642E+001G		4.9E+003	13.64
			-2.209E+000	1408.00	-2.048E-001	%	1.374E+001G		4.9E+003	21.00
EU-152	T F	1	-2.209E+000	344.29	-2.209E+000	% (	1.040E+001G		4.9E+003	26.50

PB-210		N	1	2.168E+001	46.54	2.168E+001	%	(	P	1.009E+002G	8.1E+003	4.25
BE-7		N P C	1	1.623E+000	477.60	1.623E+000	%	(		2.770E+001G	5.3E+001	10.52
AM-241	T		1	-1.491E+000	59.54	-1.491E+000	&	(		1.083E+001G	1.6E+005	35.90
TL-208	F	N	1	1.423E+002	583.02	1.423E+002	@	(	P	3.373E+000G	7.0E+002	84.50
				1.423E+002	277.28	1.638E+002	*			3.777E+001G	7.0E+002	6.31
				1.423E+002	860.56	1.693E+002	+			2.302E+001G	7.0E+002	12.42
				-1.202E+001	883.24	2.976E+000	&			2.004E+001G	1.6E+012	9.60
				-1.202E+001	880.53	-6.782E+000	%			4.219E+001G	1.6E+012	6.00
Pa-234		N	1	-1.202E+001	131.29	-1.202E+001	?	(		1.486E+001G	1.6E+012	18.00
				-1.202E+001	569.47	-1.202E+001	&			4.133E+001G	1.6E+012	8.20
				-1.202E+001	946.02	4.369E-002	%			1.929E+001G	1.6E+012	13.40
CS-134	T F I		1	1.083E+001	604.71	0.000E+000	%	(		6.945E+000G	7.5E+002	97.62
				1.083E+001	795.87	2.082E+001	?	(		2.739E+000G	7.5E+002	85.53
				1.083E+001	569.32	2.591E+000	&			2.152E+001G	7.5E+002	15.38
				1.083E+001	801.95	2.118E+000	%			3.183E+001G	7.5E+002	8.69
				1.083E+001	563.24	3.509E+001		(		3.687E+001G	7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.623E+000	1.627E+000	505.89	505.89	2.770E+001
K-40	#	2.505E+002	2.505E+002	6.82	7.42	2.131E+001
CO-60	<	3.747E-001	3.747E-001	195.66	195.68	2.530E+000
I-131	<	7.398E-001	7.534E-001	133.02	133.05	3.284E+000
EU-154	<	3.419E+000	3.419E+000	185.28	185.30	2.153E+001
CS-134	<	1.083E+001	1.083E+001	6.14	6.79	6.945E+000
CS-137	<	8.561E-001	8.561E-001	132.57	132.60	3.802E+000
EU-152	<	-2.209E+000	-2.209E+000	141.05	141.08	1.040E+001
EU-155		3.284E+001	3.284E+001	14.60	14.98	1.064E+001
TL-208		1.423E+002	1.423E+002	2.09	3.56	3.373E+000
BI-212		2.856E+002	2.857E+002	6.53	7.14	2.741E+001
BI-214		5.117E+001	5.117E+001	7.97	8.48	6.572E+000
TH-234	<	2.446E+001	2.446E+001	99.95	100.02	8.105E+001
PA-234M	<	7.050E+000	7.050E+000	1,031.39	1,031.39	2.546E+002
U-235	<	5.539E+000	5.539E+000	127.45	127.48	2.343E+001
AM-241	<	-1.491E+000	-1.491E+000	218.58	218.62	1.083E+001
RA-224		4.134E+002	4.135E+002	8.23	8.76	1.047E+002
PB-210	<	2.168E+001	2.169E+001	139.39	139.45	1.009E+002
PB-212		4.038E+002	4.039E+002	1.12	3.19	7.379E+000
PB-214		5.475E+001	5.475E+001	8.06	8.55	7.436E+000
AC-228		4.095E+002	4.095E+002	2.10	3.56	5.712E+000
Pa-234	<	-1.202E+001	-1.202E+001	37.83	37.95	1.486E+001

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 2,043.85 Bq/sample

Analyzed by: _____

403605

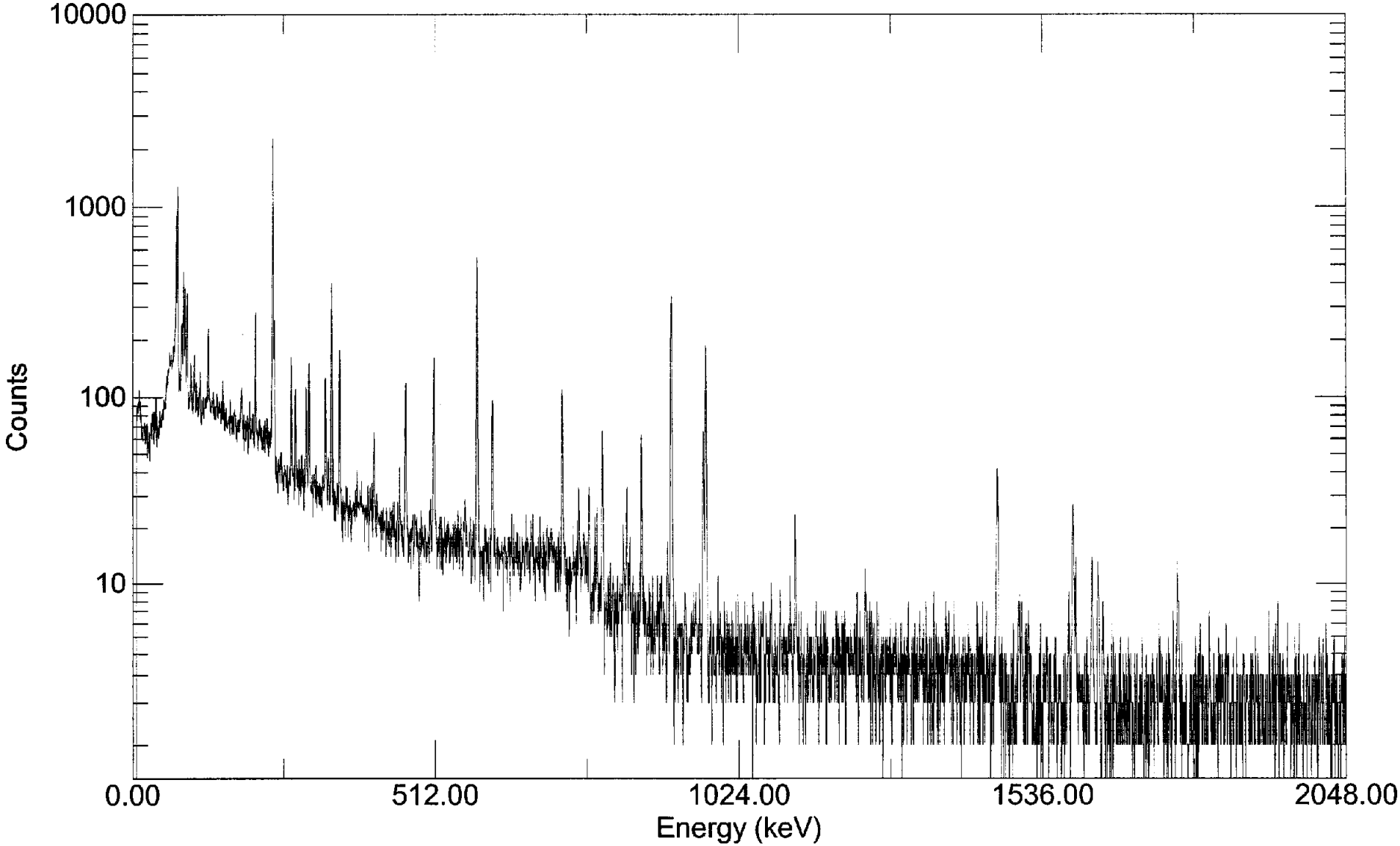
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKGF1AC

7356122_KEKGF1AC_F7L200262-014



Acquired: 23-Dec-2007 5:04:20 PM
File: C:\User\spectra\KEKGF1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1819.74 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 32,994

Sample Description: 7356122_KEKGG1AC_F7L200262-015

Spectrum Filename: KEKGG1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 5:05:06PM		
Live Time:	1800.00	Real Time:	1803.82
Dead Time:	0.21 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1335

TestAmerica St. Louis

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.29	74.87	140.00	133.00	0.074	17.68	0.977	PB-214	
308.51	77.18	108.17	250.83	0.139	9.41	0.832	PB-214	
348.41	87.16	119.51	104.49	0.058	17.74	0.871	PB-214	s
360.01	90.06	69.99	59.01	0.033	23.90	0.627	PB-214	s
2041.60	510.50	17.50	92.50	0.051	15.74	0.598	J-133	s
3643.67	910.85	72.94	22.06	0.012	58.73	0.849		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.94	46.52	77.48	47.52	0.026	24.73	1.132	s
AM-241	1	238.00	59.54	156.06	3.90	0.002	455.87	0.830	s
TH-234	1	252.42	63.15	168.19	14.97	0.008	59.07	0.834	s
EU-155	1	345.96	86.54	173.53	4.85	0.003	387.01	0.854	s
TH-234	1	368.15	92.09	243.47	-24.50	-0.014	4824.61	0.859	s
AC-228	1	373.18	93.35	160.93	60.17	0.033	3.42	0.860	s D
U-235	1	373.18	93.35	160.93	5.76	0.003	34.82	0.860	s D
EU-155	1	423.23	105.87	75.88	30.76	0.017	43.92	0.871	s
EU-152	1	485.17	121.36	116.95	3.47	0.002	444.17	0.885	s
EU-154	1	493.19	123.36	132.16	-11.13	-0.006	149.08	0.886	s
Pa-234	1	523.56	130.96	145.27	-9.53	-0.005	181.84	0.894	s
U-235	1	579.64	144.98	81.51	10.88	0.006	121.16	0.904	s
U-235	1	648.56	162.22	56.41	1.77	0.001	605.25	0.922	s
U-235	1	821.34	205.42	75.09	0.05	0.000	24390.67	0.958	s
PB-212	1	954.24	238.66	69.29	429.71	0.239	6.19	1.020	
RA-224	1	958.96	239.84	437.50	-124.27	-0.069	25.44	0.988	
PB-214	1	965.84	241.56	56.67	42.33	0.024	38.06	0.595	s
TL-208	1	1107.47	276.97	31.13	17.00	0.009	52.36	1.019	
I-131	1	1143.08	285.87	48.09	-8.48	-0.005	120.62	1.025	
PB-214	1	1180.23	295.16	51.88	93.12	0.052	20.13	0.934	s
PB-212	1	1201.14	300.39	29.17	80.83	0.045	18.82	1.264	s
AC-228	1	1352.43	338.21	36.41	64.22	0.036	18.23	1.071	
EU-152	1	1384.15	346.14	25.63	2.74	0.002	268.01	1.076	s
PB-214	1	1406.16	351.65	61.91	163.09	0.091	13.88	0.556	s
I-131	1	1458.73	364.79	31.60	-2.26	-0.001	358.59	1.092	s
BE-7	1	1910.97	477.84	25.87	3.23	0.002	229.44	1.185	s
CS-134	1	2252.72	563.27	28.93	2.65	0.001	293.26	1.254	s
CS-134	1	2276.94	569.32	28.77	-1.30	-0.001	-52.02	1.259	s D
Pa-234	1	2277.54	569.47	30.34	-1.42	-0.001	-156.69	1.259	s D
TL-208	1	2330.88	582.80	13.85	142.15	0.079	10.37	1.257	
CS-134	1	2424.86	606.29	42.89	-7.83	-0.004	123.52	1.286	s
BI-214	1	2436.06	609.09	11.08	111.92	0.062	10.70	1.320	s
I-131	1	2551.41	637.92	23.06	-0.37	0.000	1838.37	1.312	s
CS-137	1	2648.02	662.06	20.19	11.56	0.006	62.34	1.331	s
EU-154	1	2896.02	724.04	49.02	-6.70	-0.004	152.75	1.378	s
BI-212	1	2908.07	727.05	23.61	25.83	0.014	33.09	1.381	s
PA-234M	1	3062.24	765.58	22.29	-3.61	-0.002	192.53	1.411	s
EU-152	1	3118.93	779.74	15.16	-2.19	-0.001	259.93	1.420	s
BI-212	1	3145.00	786.26	21.25	-3.90	-0.002	174.62	1.425	s
CS-134	1	3177.35	794.34	20.76	1.21	0.001	539.66	1.433	s
CS-134	1	3207.81	801.95	9.04	0.00	0.000	425.15	1.437	s
TL-208	1	3442.13	860.50	13.86	7.15	0.004	82.57	1.481	s
EU-154	1	3508.14	876.99	8.12	1.84	0.001	230.88	1.490	s
Pa-234	1	3525.18	881.25	15.16	3.75	0.002	155.78	1.495	s
Pa-234	1	3534.38	883.54	14.22	1.76	0.001	312.14	1.497	s

AC-228	1	3644.21	910.99	13.37	72.94	0.041	13.69	1.518	s
Pa-234	1	3788.09	946.93	14.94	0.52	0.000	1052.49	1.543	s
EU-152	1	3857.41	964.25	24.65	10.21	0.006	75.56	1.556	
AC-228	1	3875.22	968.70	19.52	24.90	0.014	32.11	1.559	s
EU-154	1	3985.24	996.18	22.29	-2.30	-0.001	298.10	1.579	s
PA-234M	1	4008.70	1002.04	10.81	-1.10	-0.001	435.09	1.582	s
EU-154	1	4023.45	1005.73	8.19	-1.98	-0.001	216.71	1.585	s
EU-152	1	4447.60	1111.68	14.95	2.58	0.001	220.48	1.659	s
BI-214	1	4482.84	1120.48	24.78	5.05	0.003	72.92	1.665	s
CO-60	1	4694.08	1173.24	25.43	0.00	0.000	713.09	1.701	s
EU-154	1	5098.34	1274.20	22.89	-3.71	-0.002	189.67	1.768	s
CO-60	1	5331.84	1332.50	0.00	0.00	0.000	100.00	1.806	s
EU-152	1	5632.85	1407.66	8.00	0.44	0.000	911.73	1.854	s
K-40	1	5844.40	1460.48	2.83	191.17	0.106	7.18	1.707	
BI-214	1	7065.25	1765.22	11.41	-0.94	-0.001	516.29	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
I-131	T F I	1	-9.196E-002	364.48	-9.196E-002	% (	1.178E+000G		8.0E+000	81.70
			-9.196E-002	284.30	-3.669E+000	&	1.515E+001G		8.0E+000	6.14
			-9.196E-002	636.97	-2.840E-001	&	1.921E+001G		8.0E+000	7.17
Pa-234	N	1	-8.617E-001	131.29	-8.617E-001	& (	5.326E+000G		1.6E+012	18.00
			-8.617E-001	569.47	-8.617E-001	%	1.724E+001G		1.6E+012	8.20
			-8.617E-001	946.02	2.992E-001	%	1.184E+001G		1.6E+012	13.40
			-8.617E-001	883.24	1.326E+000	%	1.527E+001G		1.6E+012	9.60
			-8.617E-001	880.53	4.504E+000	%	2.507E+001G		1.6E+012	6.00
TL-208	F N	1	8.552E+000	583.02	8.552E+000	(P	1.207E+000G		7.0E+002	84.50
			8.552E+000	277.28	7.001E+000	%	1.182E+001G		7.0E+002	6.31
			8.552E+000	860.56	4.073E+000	&	1.143E+001G		7.0E+002	12.42
CS-137	T F I	1	7.695E-001	661.66	7.695E-001	% (	1.574E+000G		1.1E+004	85.21
RA-224	N	1	-6.979E+001	240.99	-6.979E+001	(	5.626E+001G		7.0E+002	4.10
TH-234	N	1	6.478E+000	63.29	6.478E+000	% (P	2.732E+001G		1.6E+012	4.82
			6.478E+000	92.59	-7.345E+000	% P	2.261E+001G		1.6E+012	5.58
CS-134	T F I	1	-4.211E-001	604.71	-4.211E-001	% (	1.786E+000G		7.5E+002	97.62
			-4.211E-001	795.87	9.388E-002	%	1.856E+000G		7.5E+002	85.53
			-4.211E-001	569.32	-4.211E-001	%	8.969E+000G		7.5E+002	15.38
			-4.211E-001	801.95	0.000E+000	%	1.284E+001G		7.5E+002	8.69
			-4.211E-001	563.24	1.567E+000	%	1.641E+001G		7.5E+002	8.35
PB-210	N	1	3.938E+001	46.54	3.938E+001	(P	3.624E+001G		8.1E+003	4.25
EU-152	T F	1	3.270E-001	344.29	3.270E-001	% (	3.137E+000G		4.9E+003	26.50
			3.270E-001	121.78	1.956E-001	&	2.994E+000G		4.9E+003	28.58
			3.270E-001	778.92	-1.104E+000	%	1.049E+001G		4.9E+003	12.94
			3.270E-001	964.11	5.435E+000	%	1.376E+001G		4.9E+003	14.61
			3.270E-001	1112.07	1.659E+000	%	1.330E+001G		4.9E+003	13.64
			3.270E-001	1408.00	2.266E-001	%	8.096E+000G		4.9E+003	21.00
AM-241	T	1	2.394E-001	59.54	2.394E-001	% (	3.740E+000G		1.6E+005	35.90
EU-155	T F I	1	2.351E+000	105.31	2.351E+000	& (	3.310E+000G		1.8E+003	21.20
			2.351E+000	86.54	2.714E-001	%	3.589E+000G		1.8E+003	30.70
PB-212	N	1	2.267E+001	238.63	2.267E+001	(P	2.189E+000G		7.0E+002	43.30
			2.267E+001	300.03	6.870E+001	*	2.369E+001G		7.0E+002	3.28
K-40	N	1	1.981E+002	1460.83	1.981E+002	(P	1.093E+001G		4.7E+011	10.67
AC-228	N	1	1.806E+001	911.07	1.866E+001	(	5.053E+000G		2.1E+003	29.00
			1.806E+001	968.97	1.114E+001	-	1.042E+001G		2.1E+003	17.46
			1.806E+001	338.32	1.663E+001	(	7.983E+000G		2.1E+003	12.01
			1.806E+001	93.35	1.806E+001	! E	1.856E+001X	A	2.1E+003	5.56
U-235	N	1	1.657E+000	143.79	1.657E+000	* (	6.815E+000G		2.6E+011	10.96
			1.657E+000	205.33	2.037E-002	%	1.747E+001G		2.6E+011	5.01
			1.657E+000	163.38	6.128E-001	%	1.307E+001G		2.6E+011	5.08
			1.657E+000	93.35	1.657E+000	! E	1.777E+001X		2.6E+011	5.81
PB-214	N	1	1.367E+001	351.93	1.399E+001	(P	3.377E+000G		5.8E+005	37.60
			1.367E+001	295.09	1.325E+001	* (P	5.162E+000G		5.8E+005	19.30
			1.367E+001	242.00	1.317E+001	* (	1.175E+001G		5.8E+005	7.43

BI-212	N	1	1.343E+001	727.33	1.343E+001		(		1.318E+001G	7.0E+002	11.82
			1.343E+001	785.51	-2.325E+001	%			1.442E+002G	7.0E+002	1.10
BE-7	N P C	1	1.309E+000	477.60	1.309E+000	%	(		1.070E+001G	5.3E+001	10.52
BI-214	N	1	1.283E+001	609.31	1.283E+001	@	(	P	2.089E+000G	5.8E+005	46.09
			1.283E+001	1120.29	2.946E+000	%		P	1.512E+001G	5.8E+005	15.10
			1.283E+001	1764.49	-8.049E-001	%			1.573E+001G	5.8E+005	15.40
EU-154	T F I	1	1.075E+000	873.23	1.075E+000	%	(		9.335E+000G	3.1E+003	12.27
			1.075E+000	123.10	-4.402E-001	%			2.225E+000G	3.1E+003	40.79
			1.075E+000	1274.54	-1.035E+000	%			6.980E+000G	3.1E+003	35.19
			1.075E+000	723.36	-2.027E+000	%			1.069E+001G	3.1E+003	20.22
			1.075E+000	1004.77	-8.833E-001	%			7.169E+000G	3.1E+003	18.01
			1.075E+000	996.33	-1.732E+000	%			1.863E+001G	3.1E+003	10.60
PA-234	N	1	-1.050E+001	1001.00	-1.050E+001	%	(		1.728E+002G	1.6E+012	.84
			-1.050E+001	766.41	-7.876E+001	%			5.398E+002G	1.6E+012	.29
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		7.522E-001G	1.9E+003	99.98
			0.000E+000	1173.24	0.000E+000	%			2.402E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.309E+000	1.312E+000	229.44	229.46	1.070E+001
K-40		1.981E+002	1.981E+002	7.29	7.85	1.093E+001
CO-60	<			100.00	100.04	7.522E-001
I-131	<	-9.196E-002	-9.366E-002	358.59	358.60	1.178E+000
CS-134	<	-4.211E-001	-4.212E-001	123.52	123.55	1.786E+000
CS-137	<	7.695E-001	7.695E-001	62.34	62.40	1.574E+000
EU-152	<	3.270E-001	3.270E-001	268.01	268.03	3.137E+000
EU-154	<	1.075E+000	1.075E+000	230.88	230.90	9.335E+000
EU-155	<	2.351E+000	2.352E+000	43.92	44.05	3.310E+000
TL-208		8.552E+000	8.554E+000	10.53	10.92	1.207E+000
RA-224	<	-6.979E+001	-6.980E+001	25.44	25.61	5.626E+001
PB-210		3.938E+001	3.938E+001	35.56	35.77	3.624E+001
PB-212		2.267E+001	2.267E+001	6.33	7.00	2.189E+000
PB-214		1.367E+001	1.367E+001	14.33	14.61	3.377E+000
BI-212	<	1.343E+001	1.343E+001	33.09	33.22	1.318E+001
BI-214	#	1.283E+001	1.283E+001	11.20	11.56	2.089E+000
AC-228	<	1.806E+001	1.807E+001	11.40	11.76	5.053E+000
Pa-234	<	-8.617E-001	-8.617E-001	181.84	181.86	5.326E+000
TH-234	<	6.478E+000	6.478E+000	122.29	122.35	2.732E+001
PA-234M	<	-1.050E+001	-1.050E+001	435.09	435.10	1.728E+002
U-235	<	1.657E+000	1.657E+000	121.16	121.20	6.815E+000
AM-241	<	2.394E-001	2.394E-001	455.87	455.88	3.740E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 295.15 Bq/sample

Analyzed by: _____

403605

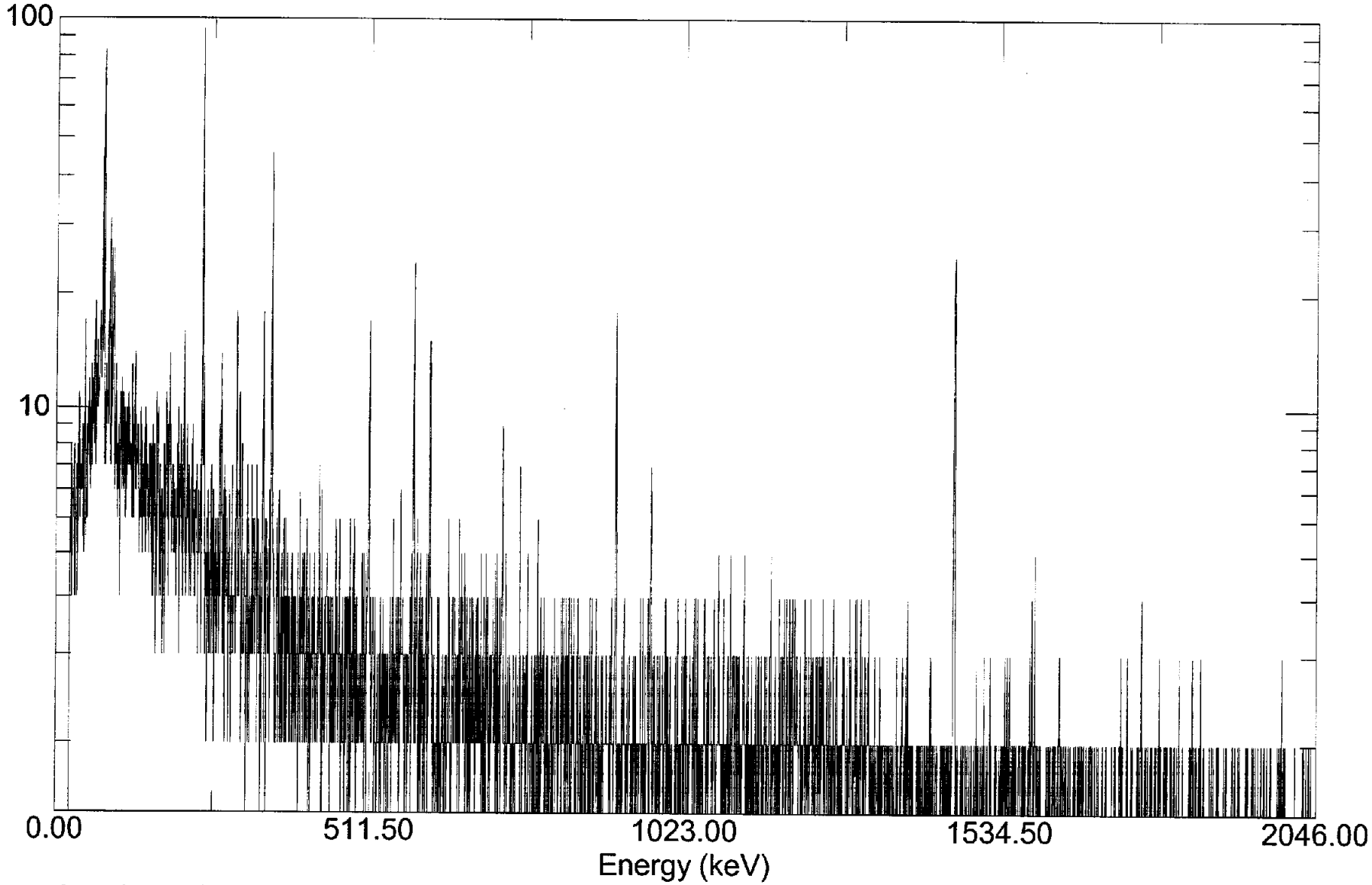
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKGG1AC

7356122_KEKGG1AC_F7L200262-015



Acquired: 23-Dec-2007 5:05:06 PM
File: C:\User\spectra\KEKGG1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1803.82 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,996

Sample Description: 7356122_KEQKC1AA_F7L220000-122B

Spectrum Filename: KEQKC1AA.An1

Acquisition Information

Start Time:	23-Dec-2007 5:03:59PM		
Live Time:	1800.00	Real Time:	1892.02
Dead Time:	4.86 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	23-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0000

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty Sigma%	FWHM keV	Suspected Nuclide	Code

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.66	46.40	41.21	-7.73	-0.004	79.45	0.749	s
AM-241	1	235.99	59.22	13.96	3.31	0.002	79.73	0.761	s
TH-234	1	251.52	63.10	27.89	-3.21	-0.002	56.55	0.764	s
EU-155	1	345.23	86.51	23.50	-3.14	-0.002	225.76	0.788	s
TH-234	1	369.53	92.58	38.15	-7.36	-0.004	43.80	0.795	
U-235	1	372.61	93.35	1.16	14.75	0.008	22.74	0.795	s D
AC-228	1	372.61	93.35	15.88	0.00	0.000	0.00	0.795	s D
EU-155	1	423.54	106.07	12.78	4.19	0.002	130.18	0.808	s
EU-152	1	486.39	121.78	12.79	0.00	0.000	505.72	0.824	s
EU-154	1	492.63	123.33	15.13	-2.12	-0.001	268.53	0.826	s
Pa-234	1	524.53	131.30	21.66	-1.97	-0.001	342.18	0.834	s
U-235	1	575.58	144.06	18.03	0.04	0.000	230.52	0.847	s
U-235	1	652.56	163.29	14.21	-3.97	-0.002	260.07	0.867	s
U-235	1	820.22	205.18	21.30	-0.05	0.000	12593.08	0.909	s
PB-212	1	952.87	238.32	18.29	4.27	0.002	52.62	0.942	s
RA-224	1	962.76	240.79	23.51	-5.87	-0.003	123.85	0.944	s
PB-214	1	967.25	241.91	14.39	-0.20	0.000	2735.38	0.945	s
TL-208	1	1109.03	277.34	21.37	-3.13	-0.002	216.12	0.980	s
I-131	1	1131.86	283.04	12.75	0.11	0.000	4730.53	0.987	s
PB-214	1	1184.75	296.26	15.47	-0.43	0.000	246.17	0.998	s
PB-212	1	1199.38	299.91	18.13	0.15	0.000	4033.97	1.002	s
AC-228	1	1357.70	339.47	15.78	-2.46	-0.001	237.26	1.040	s
EU-152	1	1376.62	344.20	7.58	1.26	0.001	322.10	1.045	s
PB-214	1	1409.38	352.38	20.97	-4.09	-0.002	512.55	1.053	s
I-131	1	1460.99	365.28	4.16	3.50	0.002	98.12	1.065	s
BE-7	1	1904.56	476.13	3.73	2.44	0.001	128.88	1.173	s
CS-134	1	2257.43	564.32	20.28	-4.71	-0.003	142.96	1.252	s
CS-134	1	2277.45	569.32	16.43	-0.35	0.000	-28.20	1.258	s D
Pa-234	1	2278.05	569.47	8.89	-0.30	0.000	-58.93	1.258	s D
TL-208	1	2333.74	583.39	14.97	-2.75	-0.002	483.10	1.270	s
CS-134	1	2420.24	605.01	13.87	-2.10	-0.001	260.22	1.290	s
BI-214	1	2433.65	608.36	14.72	-2.60	-0.001	108.62	1.294	s
I-131	1	2548.13	636.97	7.82	0.00	0.000	395.49	1.319	s
CS-137	1	2646.27	661.50	12.42	-3.81	-0.002	157.41	1.342	s
EU-154	1	2893.71	723.36	8.38	0.00	0.000	409.37	1.397	s
BI-212	1	2908.13	726.96	1.01	1.00	0.001	173.33	1.400	s
PA-234M	1	3065.96	766.41	8.73	0.00	0.000	417.89	1.434	s
EU-152	1	3117.97	779.42	10.21	-0.67	0.000	687.65	1.445	s
BI-212	1	3144.88	786.14	3.89	0.95	0.001	311.57	1.451	s
CS-134	1	3183.78	795.87	9.31	0.00	0.000	431.56	1.460	s
CS-134	1	3208.12	801.95	0.00	0.00	0.000	100.00	1.465	s
TL-208	1	3442.57	860.56	9.90	0.00	0.000	444.99	1.516	s
EU-154	1	3493.24	873.23	0.00	0.00	0.000	100.00	1.527	s
Pa-234	1	3520.74	880.11	4.16	2.68	0.001	123.62	1.533	s
Pa-234	1	3533.28	883.24	21.17	0.00	0.000	650.64	1.535	s
AC-228	1	3644.94	911.16	0.00	0.00	0.000	100.00	1.559	s

Pa-234	1	3783.89	945.90	9.93	-2.37	-0.001	198.85	1.588	s
EU-152	1	3856.73	964.11	0.00	0.00	0.000	100.00	1.603	s
AC-228	1	3876.17	968.97	0.00	0.00	0.000	100.00	1.607	s
EU-154	1	3985.59	996.33	11.94	0.00	0.000	488.58	1.630	s
PA-234M	1	4006.06	1001.45	0.17	1.83	0.001	80.69	1.633	s
EU-154	1	4019.37	1004.77	0.00	0.00	0.000	100.00	1.637	s
EU-152	1	4449.88	1112.43	8.33	2.43	0.001	179.90	1.723	s
BI-214	1	4481.32	1120.29	14.20	0.00	0.000	533.00	1.730	s
CO-60	1	4693.06	1173.24	0.00	0.00	0.000	100.00	1.772	s
EU-154	1	5098.13	1274.54	16.59	0.00	0.000	575.94	1.850	s
CO-60	1	5333.68	1333.46	1.21	3.80	0.002	65.68	1.894	s
EU-152	1	5635.31	1408.90	3.21	0.07	0.000	3779.64	1.950	s
K-40	1	5847.50	1461.98	1.11	6.11	0.003	47.21	1.988	s
BI-214	1	7056.62	1764.49	1.85	-1.85	-0.001	100.00	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
BE-7	N P C	1	9.497E-001	477.60	9.497E-001	& (	4.555E+000G		5.3E+001	10.52
K-40	N	1	5.973E+000	1460.83	5.973E+000	% (	7.439E+000G		4.7E+011	10.67
U-235	N	1	5.886E-003	143.79	5.886E-003	% (P	3.311E+000G		2.6E+011	10.96
			5.886E-003	205.33	-2.023E-002	%	9.447E+000G		2.6E+011	5.01
			5.886E-003	163.38	-1.328E+000	% P	6.780E+000G		2.6E+011	5.08
			5.886E-003	93.35	4.104E+000	& } E	5.921E+000X		2.6E+011	5.81
PB-210	N	1	-5.673E+000	46.54	-5.673E+000	& (P	2.395E+001G		8.1E+003	4.25
			4.994E-001	785.51	5.418E+000	%	6.799E+001G		7.0E+002	1.10
BI-212	N	1	4.994E-001	727.33	4.994E-001	% (	3.682E+000G		7.0E+002	11.82
CO-60	T F	1	3.671E-001	1332.50	3.671E-001	% (	7.578E-001G		1.9E+003	99.98
			3.671E-001	1173.24	0.000E+000	%	6.422E-001G		1.9E+003	99.90
PB-214	N	1	-3.372E-001	351.93	-3.372E-001	% (P	1.982E+000G		5.8E+005	37.60
			-3.372E-001	295.09	-5.935E-002	% P	2.877E+000G		5.8E+005	19.30
			-3.372E-001	242.00	-5.883E-002	%	6.095E+000G		5.8E+005	7.43
RA-224	N	1	-3.171E+000	240.99	-3.171E+000	% (	1.366E+001G		7.0E+002	4.10
EU-155	T F I	1	3.106E-001	105.31	3.106E-001	* (	1.436E+000G		1.8E+003	21.20
			3.106E-001	86.54	-1.697E-001	%	1.369E+000G	A	1.8E+003	30.70
BI-214	N	1	-2.863E-001	609.31	-2.863E-001	& (P	2.265E+000G		5.8E+005	46.09
			-2.863E-001	1120.29	0.000E+000	%	1.126E+001G		5.8E+005	15.10
			-2.863E-001	1764.49	-1.473E+000	% P	7.211E+000G		5.8E+005	15.40
CS-137	T F I	1	-2.431E-001	661.66	-2.431E-001	% (P	1.222E+000G		1.1E+004	85.21
PB-212	N	1	2.168E-001	238.63	2.168E-001	* (P	1.148E+000G		7.0E+002	43.30
			2.168E-001	300.03	1.222E-001	&	1.842E+001G		7.0E+002	3.28
AM-241	T	1	1.886E-001	59.54	1.886E-001	% (P	1.145E+000G		1.6E+005	35.90
Pa-234	N	1	-1.722E-001	131.29	-1.722E-001	% (	2.137E+000G		1.6E+012	18.00
			-1.722E-001	569.47	-1.722E-001	%	9.688E+000G		1.6E+012	8.20
			-1.722E-001	946.02	-1.294E+000	%	9.491E+000G		1.6E+012	13.40
			-1.722E-001	883.24	0.000E+000	%	1.739E+001G		1.6E+012	9.60
			-1.722E-001	880.53	3.084E+000	%	1.404E+001G		1.6E+012	6.00
PA-234M	N	1	1.670E+001	1001.00	1.670E+001	% (	6.740E+001G		1.6E+012	.84
			1.670E+001	766.41	0.000E+000	%	3.450E+002G		1.6E+012	.29
TL-208	F N	1	-1.588E-001	583.02	-1.588E-001	% (P	1.198E+000G		7.0E+002	84.50

				-1.588E-001	277.28	-1.240E+000	%			9.596E+000G		7.0E+002	6.31
				-1.588E-001	860.56	0.000E+000	%			9.470E+000G		7.0E+002	12.42
EU-152	T	F	1	1.441E-001	344.29	1.441E-001	&	(		1.781E+000G		4.9E+003	26.50
				1.441E-001	121.78	0.000E+000	&			1.059E+000G		4.9E+003	28.58
				1.441E-001	778.92	-3.219E-001	%			8.485E+000G		4.9E+003	12.94
				1.441E-001	964.11	0.000E+000	%			3.747E+000G		4.9E+003	14.61
				1.441E-001	1112.07	1.483E+000	%			9.871E+000G		4.9E+003	13.64
				1.441E-001	1408.00	3.244E-002	%			5.323E+000G		4.9E+003	21.00
I-131	T	F	I 1	1.372E-001	364.48	1.372E-001	%	(		4.782E-001G		8.0E+000	81.70
				1.372E-001	284.30	4.447E-002	%			8.044E+000G		8.0E+000	6.14
				1.372E-001	636.97	0.000E+000	%			1.157E+001G		8.0E+000	7.17
TH-234		N	1	-1.299E+000	63.29	-1.299E+000	*	(	P	1.107E+001G		1.6E+012	4.82
				-1.299E+000	92.59	-2.137E+000	%		P	9.141E+000G		1.6E+012	5.58
CS-134	T	F	I 1	-1.084E-001	604.71	-1.084E-001	%	(		1.036E+000G		7.5E+002	97.62
				-1.084E-001	795.87	0.000E+000	%			1.257E+000G		7.5E+002	85.53
				-1.084E-001	569.32	-1.084E-001	%			6.716E+000G		7.5E+002	15.38
				-1.084E-001	801.95	0.000E+000	%			5.419E+000G		7.5E+002	8.69
				-1.084E-001	563.24	-2.670E+000	%			1.344E+001G		7.5E+002	8.35
				0.000E+000	1004.77	0.000E+000	%			3.142E+000G		3.1E+003	18.01
				0.000E+000	996.33	0.000E+000	%			1.353E+001G		3.1E+003	10.60
AC-228		N	1	0.000E+000	911.16	0.000E+000	%	(		1.802E+000G		2.1E+003	29.00
				0.000E+000	968.97	0.000E+000	%			3.147E+000G		2.1E+003	17.46
EU-154	T	F	I 1	0.000E+000	873.23	0.000E+000	%	(		4.115E+000G		3.1E+003	12.27
				0.000E+000	123.10	-8.119E-002	%			7.983E-001G		3.1E+003	40.79
				0.000E+000	1274.54	0.000E+000	%			5.740E+000G		3.1E+003	35.19
				0.000E+000	723.36	0.000E+000	%			4.699E+000G		3.1E+003	20.22
				0.000E+000	338.32	-6.116E-001	&			5.280E+000G		2.1E+003	12.01
				0.000E+000	93.35	0.000E+000	&		E	6.187E+000G	A	2.1E+003	5.56

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T	= Thermal Neutron Activation	F	= Fast Neutron Activation	I	= Fission Product
P	= Photon Reaction	N	= Naturally Occurring Isotope	C	= Charged Particle Reaction
M	= No MDA Calculation				

Peak Codes:

G	= Gamma Ray	X	= X-Ray	P	= Positron Decay
S	= Single - Escape	D	= Double - Escape	K	= Key Line
A	= Not in Average				

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CO-60	#	3.671E-001	3.671E-001	65.68	65.74	7.578E-001
I-131	#	1.372E-001	1.397E-001	98.12	98.16	4.782E-001
CS-134	#	-1.084E-001	-1.084E-001	260.22	260.23	1.036E+000
CS-137	#	-2.431E-001	-2.431E-001	415.82	415.83	1.222E+000
EU-152	#	1.441E-001	1.442E-001	322.10	322.11	1.781E+000
EU-155	#	3.106E-001	3.107E-001	130.18	130.22	1.436E+000
TL-208	#	-1.588E-001	-1.588E-001	1,142.39	1,142.39	1.198E+000
BI-214	#	-2.863E-001	-2.863E-001	389.59	389.60	2.265E+000
RA-224	#	-3.171E+000	-3.171E+000	123.85	123.89	1.366E+001
AC-228	#			100.00	100.04	1.802E+000
TH-234	#	-1.299E+000	-1.299E+000	306.31	306.33	1.107E+001
PA-234M	#	1.670E+001	1.670E+001	80.69	80.74	6.740E+001
U-235	#	5.886E-003	5.886E-003	14,499.51	14,499.51	3.311E+000
EU-154	#			100.00	100.04	4.115E+000
PB-210	#	-5.673E+000	-5.673E+000	256.98	257.01	2.395E+001
PB-212	#	2.168E-001	2.168E-001	136.50	136.53	1.148E+000
PB-214	#	-3.372E-001	-3.372E-001	1,164.70	1,164.71	1.982E+000
BI-212	#	4.994E-001	4.995E-001	173.33	173.35	3.682E+000
Pa-234	#	-1.722E-001	-1.722E-001	342.18	342.20	2.137E+000
AM-241	#	1.886E-001	1.886E-001	159.41	159.46	1.145E+000
BE-7	#	9.497E-001	9.523E-001	128.88	128.91	4.555E+000
K-40	#	5.973E+000	5.973E+000	47.21	47.30	7.439E+000

= All peaks for activity calculation had bad shape

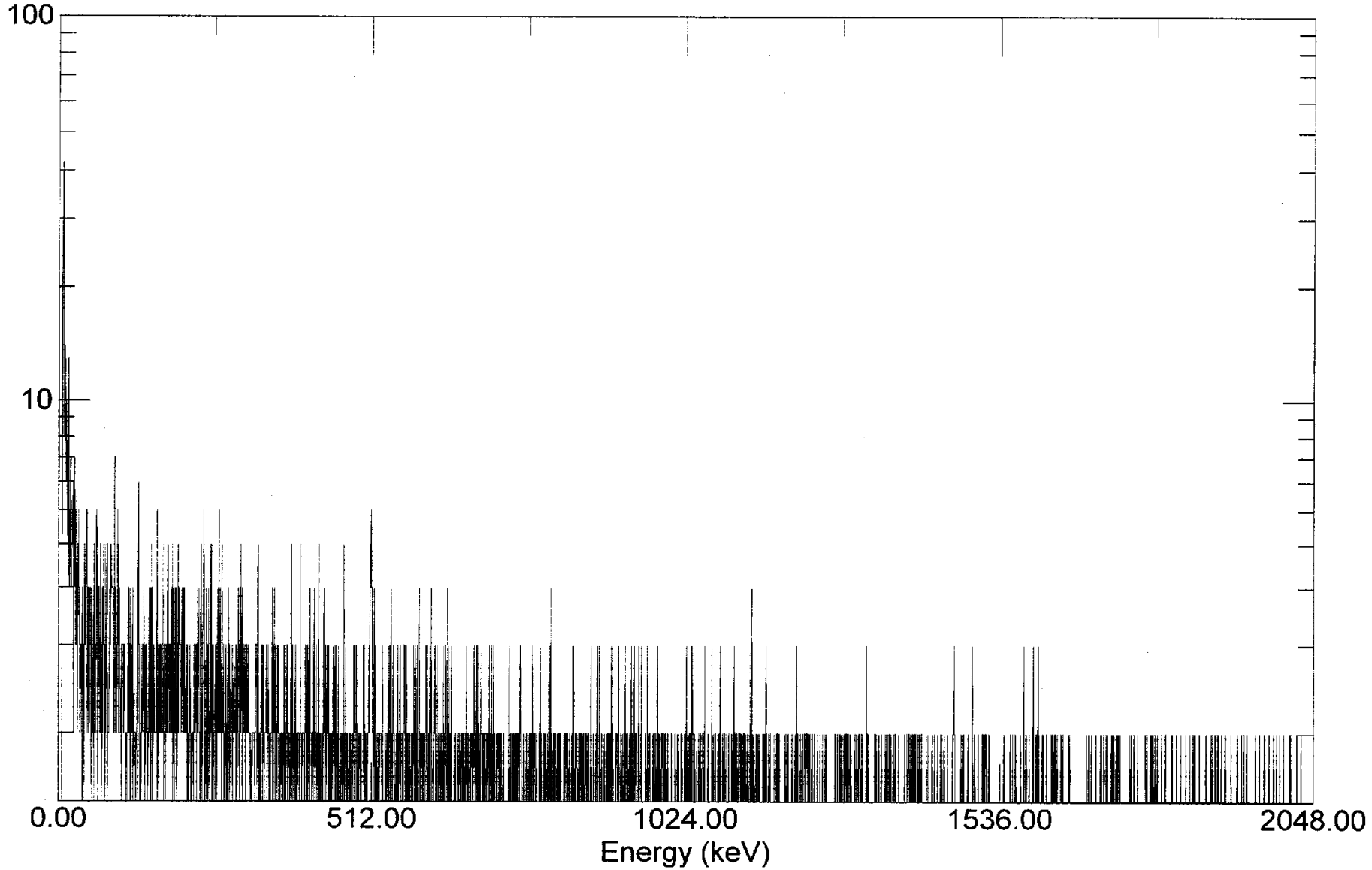
Total Activity (37.74 to 2,000.57 keV) 0.00 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEQKC1AA

7356122_KEQKC1AA_F7L220000-122B



Acquired: 23-Dec-2007 5:03:59 PM
File: C:\User\spectra\KEQKC1AA.spc
Detector: #0 Ge 5 SN/157

Real Time: 1892.02 s. Live Time: 1800.00 s.
Channels: 8192

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DB Analysis ID: 32,995

Sample Description: 7356122_KEQKC1AC_F7L220000-122C

Spectrum Filename: KEQKC1AC.An1

Acquisition Information

Start Time:	23-Dec-2007 5:04:42PM		
Live Time:	1800.00	Real Time:	1831.14
Dead Time:	1.70 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	01-Apr-2004 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1117

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
145.47	36.59	2091.00	443.00	0.246	20.76	1.308	XE-133M	s
199.54	50.10	5342.50	573.50	0.319	24.21	1.091	EU-155	s
351.26	88.03	2649.20	7316.80	4.065	1.54	1.032	PB-214	s
487.34	122.04	1960.19	32.81	0.018	191.61	1.006		
3065.17	766.40	352.35	87.65	0.049	32.12	0.573	J-134	sD

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.31	46.55	8622.27	25623.73	14.235	1.01	1.021	s
AM-241	1	237.31	59.54	6127.00	30383.00	16.879	0.80	1.039	s
TH-234	1	247.04	61.98	2558.95	-296.92	-0.165	26.49	0.850	s
EU-155	1	345.32	86.54	8720.85	27.31	0.015	483.99	0.874	s
TH-234	1	370.04	92.72	1991.64	87.61	0.049	55.02	0.881	s
U-235	1	372.56	93.35	1585.56	0.00	0.000	0.00	0.882	s D
AC-228	1	372.56	93.35	1760.79	0.00	0.000	4905.10	0.882	s D
EU-155	1	418.94	104.94	1822.90	3.41	0.002	1772.73	0.894	s
EU-152	1	487.18	122.00	1830.13	889.54	0.494	7.58	0.912	
EU-154	1	491.58	123.10	1707.66	42.77	0.024	137.49	0.913	s
Pa-234	1	523.33	131.04	1644.04	10.44	0.006	550.07	0.922	s
U-235	1	574.34	143.79	1396.41	0.00	0.000	5284.71	0.935	s
U-235	1	659.07	164.96	1070.73	0.70	0.000	6586.29	0.955	s
U-235	1	822.70	205.86	1410.69	43.28	0.024	123.67	0.999	s
PB-212	1	953.90	238.66	1099.54	276.46	0.154	24.75	1.385	s
RA-224	1	961.60	240.58	1442.49	-72.73	-0.040	74.78	1.036	s
PB-214	1	965.49	241.55	1320.19	-38.74	-0.022	133.62	1.037	s
TL-208	1	1108.51	277.30	1190.84	-35.41	-0.020	138.83	1.074	s
I-131	1	1143.21	285.98	971.99	-4.01	-0.002	1101.36	1.081	s
PB-214	1	1180.77	295.37	1123.69	24.38	0.014	195.51	1.092	s
PB-212	1	1198.48	299.79	1110.85	-1.63	-0.001	2895.61	1.097	
AC-228	1	1352.86	338.38	992.61	52.57	0.029	85.88	1.136	s
EU-152	1	1375.81	344.12	1067.96	-18.00	-0.010	257.78	1.142	s
PB-214	1	1406.51	351.79	997.77	62.44	0.035	69.40	1.150	s
I-131	1	1456.03	364.17	1037.95	-0.56	0.000	8144.07	1.163	s
BE-7	1	1908.98	477.39	1051.17	-3.75	-0.002	1225.24	1.277	s
CS-134	1	2237.29	559.45	313.11	25.10	0.014	101.70	1.363	s
CS-134	1	2276.76	569.32	625.60	0.00	0.000	2638.18	1.369	s D
Pa-234	1	2277.35	569.47	586.74	1.54	0.001	236.45	1.369	s D
TL-208	1	2332.37	583.22	657.50	31.00	0.017	109.73	1.382	s
CS-134	1	2415.75	604.06	525.52	30.99	0.017	106.15	1.403	
BI-214	1	2437.67	609.54	609.78	28.19	0.016	116.37	1.408	s
I-131	1	2545.47	636.49	523.59	33.77	0.019	97.37	1.435	s
CS-137	1	2646.63	661.78	690.08	10871.92	6.040	1.19	1.647	
EU-154	1	2894.55	723.75	547.87	-1.82	-0.001	1816.64	1.519	s
BI-212	1	2912.99	728.36	459.37	45.65	0.025	68.03	1.523	s
PA-234M	1	3065.20	766.41	559.07	24.35	0.014	138.81	1.561	s D
EU-152	1	3115.67	779.03	612.03	18.60	0.010	189.50	1.573	s
BI-212	1	3138.66	784.78	513.95	25.58	0.014	126.90	1.579	s
CS-134	1	3183.03	795.87	683.71	2.26	0.001	1641.08	1.589	s
CS-134	1	3203.74	801.04	518.09	27.28	0.015	119.55	1.595	s
TL-208	1	3444.80	861.31	781.70	-16.98	-0.009	234.19	1.650	s
EU-154	1	3488.74	872.29	668.83	28.62	0.016	129.13	1.662	s
Pa-234	1	3523.21	880.91	766.37	31.52	0.018	125.46	1.669	s
Pa-234	1	3538.92	884.83	740.83	-8.43	-0.005	457.95	1.672	s
AC-228	1	3645.54	911.49	875.31	55.34	0.031	76.80	1.698	s

Pa-234	1	3788.93	947.33	1010.20	28.71	0.016	157.67	1.731	s
EU-152	1	3856.67	964.27	919.09	21.62	0.012	199.44	1.748	s
AC-228	1	3869.84	967.56	833.93	-39.54	-0.022	104.51	1.752	s
EU-154	1	3984.64	996.26	756.33	-23.14	-0.013	169.35	1.778	s
PA-234M	1	4002.39	1000.70	722.05	-14.82	-0.008	257.80	1.782	s
EU-154	1	4019.43	1004.96	735.41	-17.10	-0.010	225.53	1.785	s
EU-152	1	4446.85	1111.81	731.60	23.94	0.013	161.12	1.884	s
BI-214	1	4478.79	1119.79	583.13	-9.17	-0.005	374.01	1.891	s
CO-60	1	4693.54	1173.48	325.33	7718.67	4.288	1.38	2.099	
EU-154	1	5104.66	1276.26	59.15	8.64	0.005	130.45	2.030	s
CO-60	1	5330.71	1332.77	17.00	7003.00	3.891	1.21	2.098	
EU-152	1	5631.05	1407.86	30.09	5.11	0.003	158.16	2.147	s
K-40	1	5841.60	1460.50	25.96	7.79	0.004	99.19	2.192	s
BI-214	1	7059.04	1764.88	30.64	7.67	0.004	108.21	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
TH-234	N	1	-9.012E+001	63.29	-9.012E+001	(P	7.237E+001G		1.6E+012	4.82
			-9.012E+001	92.59	1.834E+001 %	P	4.411E+001G		1.6E+012	5.58
			6.614E-001	946.02	1.172E+001 %		6.155E+001G		1.6E+012	13.40
			6.614E-001	883.24	-4.528E+000 %		6.959E+001G		1.6E+012	9.60
			6.614E-001	880.53	2.702E+001 &		1.129E+002G		1.6E+012	6.00
Pa-234	N	1	6.614E-001	131.29	6.614E-001 %	(	1.214E+001G		1.6E+012	18.00
			6.614E-001	569.47	6.614E-001 &		4.969E+001G		1.6E+012	8.20
K-40	N	1	5.851E+000	1460.83	5.851E+000 %	(	1.987E+001G		4.7E+011	10.67
CS-137	T F I	1	5.132E+002	661.66	5.132E+002	(P	5.906E+000G		1.1E+004	85.21
CO-60	T F	1	5.125E+002	1332.50	5.162E+002	(	1.616E+000G		1.9E+003	99.98
			5.125E+002	1173.24	5.087E+002	(	5.718E+000G		1.9E+003	99.90
			3.773E+000	295.09	2.442E+000 %		1.592E+001G		5.8E+005	19.30
			3.773E+000	242.00	-8.472E+000 %		3.762E+001G		5.8E+005	7.43
PB-214	N	1	3.773E+000	351.93	3.773E+000 *	(P	9.059E+000G		5.8E+005	37.60
RA-224	N	1	-2.872E+001	240.99	-2.872E+001 %	(	7.097E+001G		7.0E+002	4.10
BI-214	N	1	2.289E+000	609.31	2.289E+000 &	(P	9.562E+000G		5.8E+005	46.09
			2.289E+000	1120.29	-3.840E+000 &		4.827E+001G		5.8E+005	15.10
			2.289E+000	1764.49	4.785E+000 %		1.777E+001G		5.8E+005	15.40
EU-155	T F I	1	1.820E-001	105.31	1.820E-001 *	(	1.077E+001G		1.8E+003	21.20
			1.820E-001	86.54	1.068E+000 %		1.712E+001G	A	1.8E+003	30.70
EU-152	T F	1	1.748E+001	344.29	-1.513E+000 &	(	1.302E+001G		4.9E+003	26.50
			1.748E+001	121.78	3.510E+001	(	7.972E+000G		4.9E+003	28.58
			1.748E+001	778.92	6.657E+000 %		4.223E+001G		4.9E+003	12.94
			1.748E+001	964.11	8.229E+000 %		5.479E+001G		4.9E+003	14.61
			1.748E+001	1112.07	1.102E+001 &		5.930E+001G		4.9E+003	13.64
			1.748E+001	1408.00	1.884E+000 %		1.043E+001G		4.9E+003	21.00
BI-212	N	1	1.686E+001	727.33	1.686E+001 %	(	3.789E+001G		7.0E+002	11.82
			1.686E+001	785.51	1.085E+002 &		4.595E+002G		7.0E+002	1.10
I-131	T F I	1	-1.607E-002	364.48	-1.607E-002 %	(	4.391E+000G		8.0E+000	81.70
			-1.607E-002	284.30	-1.220E+000 &		4.506E+001G		8.0E+000	6.14
			-1.607E-002	636.97	1.832E+001 %		5.933E+001G		8.0E+000	7.17
PB-210	N	1	1.530E+004	46.54	1.530E+004 *	(P	2.600E+002G		8.1E+003	4.25

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TL-208	F	N	1	1.320E+000	583.02	1.320E+000	&	(	P	5.205E+000G		7.0E+002		84.50
				1.320E+000	277.28	-1.026E+001	%			4.738E+001G		7.0E+002		6.31
				1.320E+000	860.56	-6.893E+000	&			5.401E+001G		7.0E+002		12.42
AM-241	T		1	1.313E+003	59.54	1.313E+003	*	(		1.588E+001G		1.6E+005		35.90
				1.191E+001	123.10	1.184E+000	%			5.404E+000G		3.1E+003		40.79
				1.191E+001	1274.54	1.738E+000	&			7.759E+000G		3.1E+003		35.19
				1.191E+001	723.36	-3.919E-001	%			2.402E+001G		3.1E+003		20.22
				1.191E+001	1004.77	-5.468E+000	&			4.127E+001G		3.1E+003		18.01
				1.191E+001	996.33	-1.248E+001	%			7.058E+001G		3.1E+003		10.60
EU-154	T F I		1	1.191E+001	873.23	1.191E+001	%	(		5.129E+001G		3.1E+003		12.27
CS-134	T F I		1	1.180E+000	604.71	1.180E+000	&	(		4.171E+000G		7.5E+002		97.62
				1.180E+000	795.87	1.244E-001	%			6.870E+000G		7.5E+002		85.53
				1.180E+000	569.32	0.000E+000	&			2.733E+001G		7.5E+002		15.38
				1.180E+000	801.95	1.490E+001	&			5.943E+001G		7.5E+002		8.69
				1.180E+000	563.24	1.049E+001	%			3.560E+001G		7.5E+002		8.35
BE-7		N P C	1	-1.071E+000	477.60	-1.071E+000	%	(		4.399E+001G		5.3E+001		10.52
PB-212		N	1	1.025E+001	238.63	1.025E+001	*	(	P	5.832E+000G		7.0E+002		43.30
				1.025E+001	300.03	-9.744E-001	%			9.456E+001G		7.0E+002		3.28
PA-234M		N	1	-1.016E+002	1001.00	-1.016E+002	&	(		8.772E+002G		1.6E+012		.84
				-1.016E+002	766.41	3.783E+002	%		E	1.754E+003G		1.6E+012		.29
AC-228		N	1	1.010E+001	911.16	1.010E+001	%	(		2.567E+001G		2.1E+003		29.00
				1.010E+001	968.97	-1.264E+001	&			4.389E+001G		2.1E+003		17.46
				1.010E+001	338.32	9.589E+000	%			2.728E+001G		2.1E+003		12.01
				1.010E+001	93.35	0.000E+000	&	}	E	3.947E+001G	A	2.1E+003		5.56
U-235		N	1	0.000E+000	143.79	0.000E+000	&	(		1.886E+001G		2.6E+011		10.96
				0.000E+000	205.33	1.233E+001	%			5.062E+001G		2.6E+011		5.01
				0.000E+000	163.38	1.708E-001	%			3.773E+001G		2.6E+011		5.08
				0.000E+000	93.35	0.000E+000	&		E	3.778E+001X		2.6E+011		5.81

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-1.071E+000		1,225.24	1,225.24	4.399E+001
K-40	#	5.851E+000	5.851E+000	99.19	99.24	1.987E+001
CO-60		5.125E+002	8.366E+002	0.92	2.99	1.616E+000
I-131	#	-1.607E-002		8,144.07	8,144.07	4.391E+000
CS-134	#	1.180E+000	4.123E+000	106.15	106.19	4.171E+000
CS-137		5.132E+002	5.593E+002	1.19	3.13	5.906E+000
EU-155	#	1.820E-001	3.064E-001	1,772.73	1,772.73	1.077E+001
BI-212	#	1.686E+001	6.520E+001	68.03	68.09	3.789E+001
BI-214	#	2.289E+000	2.293E+000	125.18	125.21	9.562E+000
TH-234	#	-9.012E+001	-9.012E+001	28.34	28.58	7.237E+001
PA-234M	#	-1.016E+002	-1.016E+002	257.80	257.82	8.772E+002
EU-152	#	1.748E+001	2.116E+001	7.58	8.11	1.302E+001
EU-154	#	1.191E+001	1.609E+001	129.13	129.16	5.129E+001
TL-208	#	1.320E+000	5.106E+000	118.25	118.29	5.205E+000
PB-210	#	1.530E+004	1.718E+004	1.01	4.03	2.600E+002
PB-212	#	1.025E+001	3.965E+001	25.60	25.77	5.832E+000
PB-214	#	3.773E+000	3.779E+000	72.61	72.66	9.059E+000
RA-224	#	-2.872E+001	-1.111E+002	74.78	74.84	7.097E+001
AC-228	#	1.010E+001	1.584E+001	76.80	76.85	2.567E+001
Pa-234	#	6.614E-001	6.614E-001	550.07	550.08	1.214E+001
U-235	#			5,284.71	5,284.71	1.886E+001
AM-241	#	1.313E+003	1.320E+003	0.80	3.95	1.588E+001

= All peaks for activity calculation had bad shape

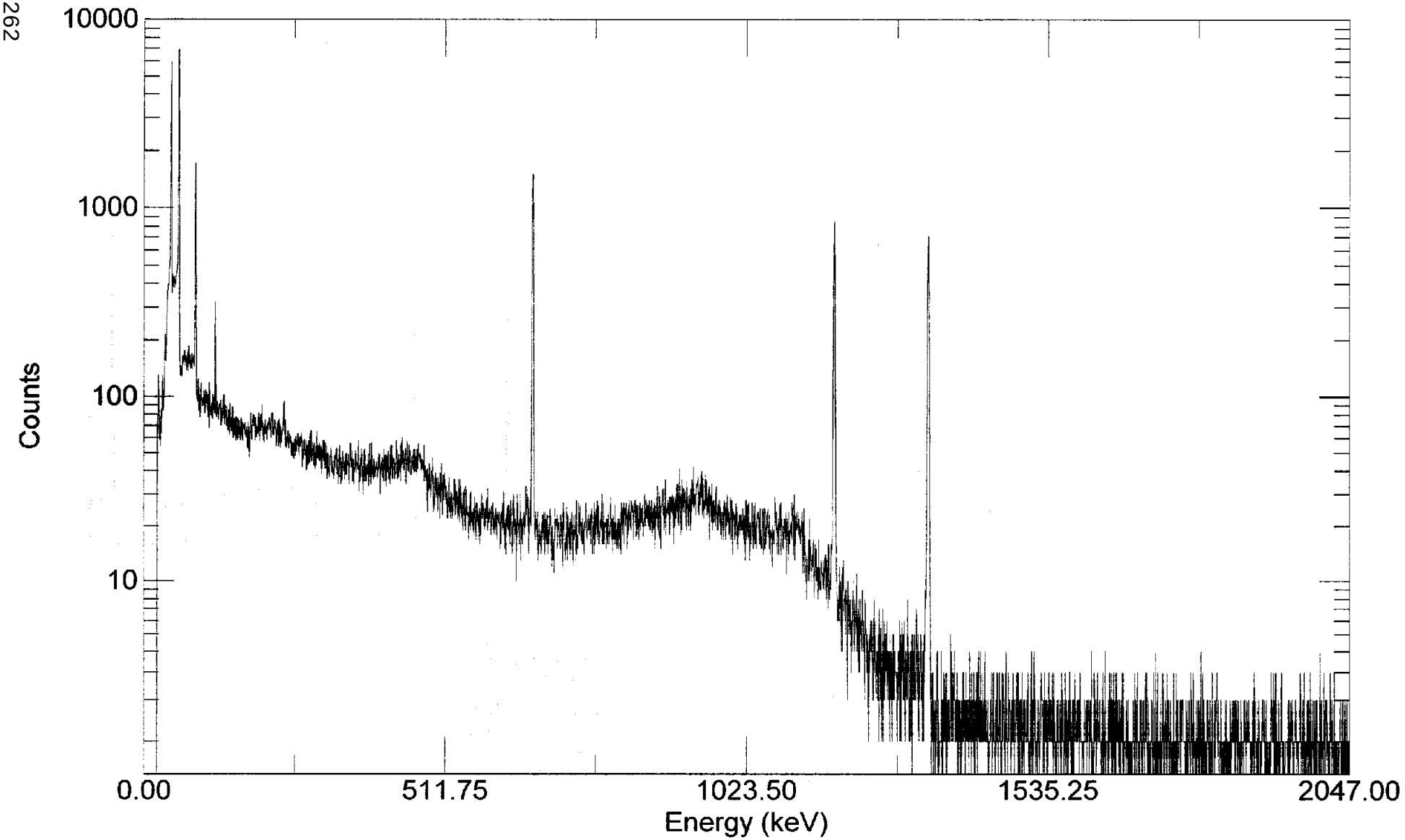
Total Activity (37.72 to 2,000.15 keV) 17,647.80 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEQKC1AC

7356122_KEQKC1AC_F7L220000-122C



Acquired: 23-Dec-2007 5:04:42 PM
File: C:\User\spectra\KEQKC1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1831.14 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

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TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

PROJECT NO. 03-3040.30/TA

Great Lakes NS Remediation

Lot #: F7L200271

John Eberline
Cabrera Services Inc
633 Stablestone Dr
Chesterfield, MO 63017

TESTAMERICA LABORATORIES, INC.

Ivan Vania
Project Manager

December 27, 2007

13715 Rider Trail North Earth City, MO 63045 **tel** 314.298.8566 **fax** 314.298.8757 **www.testamericainc.com**

Case Narrative
LOT NUMBER: F7L200271

This report contains the analytical results for the 17 samples received under chain of custody by TestAmerica St. Louis on December 20, 2007. These samples are associated with your Great Lakes NS Remediation project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of this report.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Observations/Nonconformances

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Gamma Spectroscopy - Cesium-137 & Hits (EML GA-01-R MOD)
The reporting limit for Actinium-228 was not met. There is activity in the samples above the MDA.
Affected Samples:
F7L200271 (1): SU1-14-PR
F7L200271 (2): SU2-25-PR
F7L200271 (4): SU3-43-1
F7L200271 (5): SU3-52-2
F7L200271 (6): SU3-55-1
F7L200271 (7): SU3B-049 PR
F7L200271 (8): SU4-64-2
F7L200271 (9): SU4-65-1
F7L200271 (10): SU4-67-2
F7L200271 (11): SU4-76-1
F7L200271 (13): SU5-88-1
F7L200271 (14): SU5-93-1
F7L200271 (15): SU5-93-2
F7L200271 (16): SU5B-054 PR
F7L200271 (17): SU4-79-3

There were no other nonconformances or observations noted with any analysis on this lot.

F7L200271 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Project Manager: IV
Quote #: 77996
SDG:
Project: 03-3040.30/TA
Great Lakes NS Remediation
PO#:
Report to:
Client: 1352406 Cabrera Services, Inc.
#SMPS in LOT: 17

Date Received: 2007-12-20
Analytical Due Date: 2008-01-04
Report Due Date: 2008-01-07
Report Type: W
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	SU1-14-PR			2007-12-03 / 1038	KEKG2	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	SU2-25-PR			2007-12-03 / 1408	KEKHM	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	SU2-31-PR			2007-12-03 / 1345	KEKHQ	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	SU3-43-1			2007-07-30 / 1553	KEKHR	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	SU3-52-2			2007-07-30 / 910	KEKHV	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	SU3-55-1			2007-07-30 / 1248	KEKHX	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	SU3B-049 PR			2007-11-30 / 1100	KEKH1	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

F7L200271 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20
Analytical Due Date: 2008-01-04
Report Due Date: 2008-01-07

Project Manager: IV
Quote #: 77996
SDG:
Project: 03-3040.30/TA
Great Lakes NS Remediation
PO#:
Report to:
Client: 1352406 Cabrera Services, Inc.
#SMPS in LOT: 17
Report Type: W
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	SU4-64-2			2007-07-31 / 1140	KEKH3	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	SU4-65-1			2007-07-26 / 950	KEKH4	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	SU4-67-2			2007-07-31 / 1240	KEKH5	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	SU4-76-1			2007-07-26 / 1425	KEKH6	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	SU5-103-1			2007-07-31 / 1230	KEKH9	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	SU5-88-1			2007-07-31 / 1320	KEKJC	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	SU5-93-1			2007-07-31 / 1200	KEKJE	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F7L200271

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2007-12-20

Analytical Due Date: 2008-01-04

Report Due Date: 2008-01-07

Report Type: W

EDD Code: 00

Project Manager: IV

Quote #: 77996

SDG:

Project: 03-3040.30/TA

Great Lakes NS Remediation

PO#:

Report to:

Client: 1352406 Cabrera Services, Inc.

#SMPS in LOT: 17

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
15	SU5-93-2			2007-07-31 / 1200	KEKJG	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
16	SU5B-054 PR			2007-11-30 / 1355	KEKJJ	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
17	SU4-79-3			2007-07-26 / 1305	KEKLC	SOLID

SAMPLE COMMENTS:

XX	ZV		RAD SCREEN	RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0A	EML	GA-01-R MOD	Gamma Cs-137 & Hits by DOE GA-01-R MOD.	G6	Dry, Grind, and Fill Geometry	01	STANDARD TEST SET	PROT: B	WRK LOC	06

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 1
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 1 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ___W___			
(314) 703-6784 Phone	TAT if different from Below __15days___			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Training Center	☐ 1 week			
Site:	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU1-14-PR	12/3/07	1038	Grab	Soil	1		X	
SU2-25-PR	12/3/07	1408	Grab	Soil	1		X	
SU2-31-PR	12/3/07	1345	Grab	Soil	1		X	
SU3-43-1	7/30/07	1553	Grab	Soil	1		X	
SU3-52-2	7/30/07	0810	Grab	Soil	1		X	
SU3-55-1	7/30/07	1248	Grab	Soil	1		X	
SU3B-049 PR	11/30/07	1100	Grab	Soil	1		X	
SU4-64-2	7/31/07	1140	Grab	Soil	1		X	
SU4-65-1	7/26/07	0950	Grab	Soil	1		X	
SU4-67-2	7/31/07	1240	Grab	Soil	1		X	
SU4-76-1	7/26/07	1425	Grab	Soil	1		X	
SU4-79-3	7/26/07	1305	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature], K. AUDLEUS	CABRERA	12/13/07, 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: John Eberlin	Site Contact: Wade Fillingame	Date: 12/13/07	COC No: 1
Cabrera Services Inc	Tel/Fax:	Lab Contact:	Carrier: Courier	pg 2 of 2 COCs
633 Stablestone Dr	Analysis Turnaround Time			Job No. 03-3040.30/260
Chesterfield, MO 63017	Calendar (C) or Work Days (W) ____W_____			
(314) 703-6784 Phone	TAT if different from Below ____15days_____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Great Lakes Naval Training Center	☐ 1 week			
Site:	☐ 2 days			
P O # 08-3111	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Spec (Ac-228)	Sample Specific Notes:
SU5-103-1	7/31/07	1230	Grab	Soil	1		X	
SU5-88-1	7/31/07	1320	Grab	Soil	1		X	
SU5-93-1	7/31/07	1200	Grab	Soil	1		X	
SU5-93-2	7/31/07	1200	Grab	Soil	1		X	
SU5B-054 PR	11/30/07	1355	Grab	Soil	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	CABRERA	12/13/07, 1230	[signature]	TA	12-20-07 0830
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

- 1412 -

Lot #(s): F7L200251
260
~~262~~
271

Condition Upon Receipt Form

Client: Cabrera
Quote No: 77996
COC/RFA No: 2,3,4,1
Initiated By:
Date: 12-20-07
Time: 0830

Shipping Information

Shipper Name: Client
Shipping # (s):*

1.	N/A	6.	
2.		7.	
3.		8.	
4.		9.	
5.		10.	

*Numbered shipping lines correspond to Numbered Sample Temp lines

Multiple Packages (Y) N
Sample Temperature (s):**

1.	Ambient	6.	
2.		7.	
3.		8.	
4.		9.	
5.		10.	

**Sample must be received at 4°C ± 2°C- If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid or Rad tests- Liquid or Solids

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y (N)	Are there custody seals present on the cooler?	8.	Y (N)	Are there custody seals present on bottles?
2.	Y N (N/A)	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	Do custody seals on bottles appear to be tampered with?
3.	(Y) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N (N/A)	Was sample received with proper pH[1]? (If not, make note below)
4.	(Y) N	Sample received with Chain of Custody?	11.	Y N	If N/A- Was pH taken by original TestAmerica lab?
5.	(Y) N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	(Y) N	Sample received in proper containers?
6.	Y (N)	Was sample received broken?	13.	Y N (N/A)	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	(Y) N	Is sample volume sufficient for analysis?	14.	Y N	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX and soils.

Notes:

Corrective Action:
- ☐ Client Contact Name: Informed by:
- ☐ Sample(s) processed "as is"
- ☐ Sample(s) on hold until: If released, notify:

Project Management Review: Cheryl A Adler Date: 12-21-07

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

Revision 2

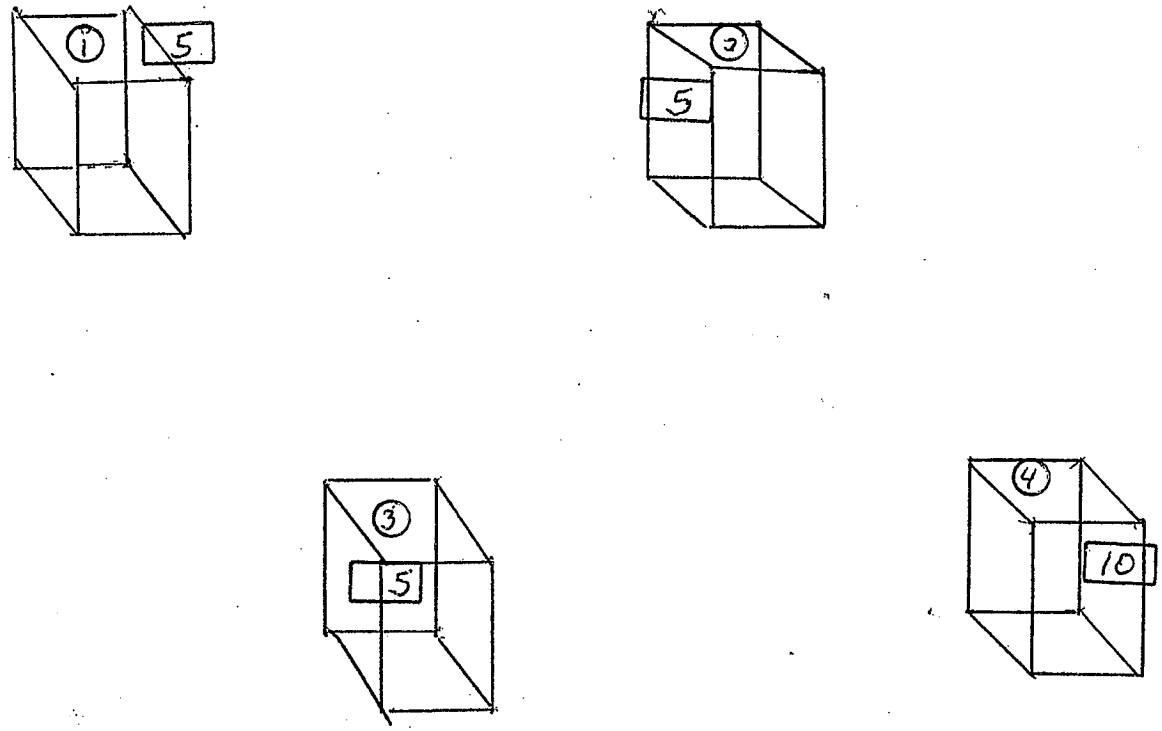
OP-001-02 Radiological Survey Sheet

Radiological Surveys

Location: Sample Containers Site: GLN.TC PPV Areas	RWP# 003	Survey # 03-3040, 30-272	Survey Type:	pg. 1 of 1

Smear (CPM/100 cm²) / Direct Count (CPM/Direct Frisk)	circle one

No.	α	β	No.	α	β
1	0	62	26		
2	0	65	27		
3	1	49	28		
4	1	53	29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35	N	
11			36		
12	N		37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19		NA	44		
20			45		
21			46		
22			47		NA
23			48		
24			49		
25			50		



Comments	Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	γ Bkg	Cal. Due
	K. Gordon	12/13/07	Bicron	L854F	N/A	N/A	N/A	N/A	5	6/17/08
			2929	163827	.3649	.2389	.15	44.2	N/A	9/7/08

Reviewed By:	Date:
[signature]	12/13/07

Key

■	A/S Location
-	Boundary
○	Smear
□	Dose Rate μR /hr
*	Direct Reading CPM/direct frisk
△	Grab Sample

METHODS SUMMARY

F7L200271

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Cesium-137 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F7L200271

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
KEKG2	001	SU1-14-PR	12/03/07	10:38
KEKHM	002	SU2-25-PR	12/03/07	14:08
KEKHQ	003	SU2-31-PR	12/03/07	13:45
KEKHR	004	SU3-43-1	07/30/07	15:53
KEKHV	005	SU3-52-2	07/30/07	09:10
KEKHX	006	SU3-55-1	07/30/07	12:48
KEKH1	007	SU3B-049 PR	11/30/07	11:00
KEKH3	008	SU4-64-2	07/31/07	11:40
KEKH4	009	SU4-65-1	07/26/07	09:50
KEKH5	010	SU4-67-2	07/31/07	12:40
KEKH6	011	SU4-76-1	07/26/07	14:25
KEKH9	012	SU5-103-1	07/31/07	12:30
KEKJC	013	SU5-88-1	07/31/07	13:20
KEKJE	014	SU5-93-1	07/31/07	12:00
KEKJG	015	SU5-93-2	07/31/07	12:00
KEKJJ	016	SU5B-054 PR	11/30/07	13:55
KEKLC	017	SU4-79-3	07/26/07	13:05

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Cabrera Services, Inc.

Client Sample ID: SU1-14-PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-001
Work Order: KEKG2
Matrix: SOLID

Date Collected: 12/03/07 1038
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**0.80**		**0.30**	0.25	**0.35**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU1-14-PR DUP

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-001X
Work Order: KEKG2
Matrix: SOLID

Date Collected: 12/03/07 1038
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**0.77**		**0.24**	0.25	**0.43**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU2-25-PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-002
Work Order: KEKHM
Matrix: SOLID

Date Collected: 12/03/07 1408
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**0.98**		**0.22**	0.25	**0.28**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU2-31-PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-003
Work Order: KEKHQ
Matrix: SOLID

Date Collected: 12/03/07 1345
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**	**Batch # 7360294**		**Yld %**
Actinium 228	**1.0**		**0.26**	0.25	**0.20**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU3-43-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-004
Work Order: KEKHR
Matrix: SOLID

Date Collected: 07/30/07 1553
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.48**		**0.30**	0.25	**0.41**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU3-52-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-005
Work Order: KEKHV
Matrix: SOLID

Date Collected: 07/30/07 0910
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.10**		**0.32**	0.25	**0.45**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU3-55-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-006
Work Order: KEKHX
Matrix: SOLID

Date Collected: 07/30/07 1248
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.20**		**0.24**	0.25	**0.34**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU3B-049 PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-007
Work Order: KEKH1
Matrix: SOLID

Date Collected: 11/30/07 1100
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**4.60**		**0.51**	0.25	**0.26**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU4-64-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-008
Work Order: KEKH3
Matrix: SOLID

Date Collected: 07/31/07 1140
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.00**		**0.21**	0.25	**0.29**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU4-65-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-009
Work Order: KEKH4
Matrix: SOLID

Date Collected: 07/26/07 0950
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**			**Batch # 7360294**	**Yld %**
Actinium 228	**0.63**		**0.20**	0.25	**0.33**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU4-67-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-010
Work Order: KEKH5
Matrix: SOLID

Date Collected: 07/31/07 1240
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**			**Batch # 7360294**	**Yld %**
Actinium 228	**1.11**		**0.28**	0.25	**0.28**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU4-76-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-011
Work Order: KEKH6
Matrix: SOLID

Date Collected: 07/26/07 1425
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.13**		**0.26**	0.25	**0.37**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU5-103-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-012
Work Order: KEKH9
Matrix: SOLID

Date Collected: 07/31/07 1230
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.41**		**0.25**	0.25	**0.24**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU5-88-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-013
Work Order: KEKJC
Matrix: SOLID

Date Collected: 07/31/07 1320
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**0.74**		**0.24**	0.25	**0.39**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU5-93-1

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-014
Work Order: KEKJE
Matrix: SOLID

Date Collected: 07/31/07 1200
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.12**		**0.35**	0.25	**0.38**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU5-93-2

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-015
Work Order: KEKJG
Matrix: SOLID

Date Collected: 07/31/07 1200
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.11**		**0.31**	0.25	**0.41**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU5B-054 PR

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-016
Work Order: KEKJJ
Matrix: SOLID

Date Collected: 11/30/07 1355
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**3.04**		**0.44**	0.25	**0.30**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

Cabrera Services, Inc.

Client Sample ID: SU4-79-3

Severn Trent Laboratories - Radiochemistry

Lab Sample ID: F7L200271-017
Work Order: KEKLC
Matrix: SOLID

Date Collected: 07/26/07 1305
Date Received: 12/20/07 0830

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.				**pCi/g**		**Batch # 7360294**	**Yld %**
Actinium 228	**1.07**		**0.23**	0.25	**0.42**	**12/26/07**	**12/26/07**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC

METHOD BLANK REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200271
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC		Prep Date	Lab Sample ID Analysis Date
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**Batch # 7360294**		**Yld %**		**F7L260000-294B**
Actinium 228	-0.04	U	0.48	0.25	0.25		12/26/07	12/26/07

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC

U Result is less than the sample detection limit.

Laboratory Control Sample Report

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200271
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID / QC Control Limits
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**			**F7L260000-294C**
Americium 241	103	107	8.5	1.5		103	(85 - 118)
Cesium 137	40.0	41.5	2.6	0.5		104	(91 - 120)
Cobalt 60	62.7	63.9	3.9	0.4		102	(91 - 112)
	Batch #:	7360294		**Analysis Date:**	12/26/07		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Severn Trent Laboratories - Radiochemistry

Client Lot ID: F7L200271
Matrix: SOLID

Date Sampled: 12/03/07
Date Received: 12/20/07

Parameter	SAMPLE Result	Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result	Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Cs-137 & Hits by DOE GA-01-R MOD.			**pCi/g**	**GA-01-R MOD**			**F7L200271-001**	
Actinium 228	**0.80**	**0.30**		**0.77**	**0.24**		4	%RPD
	Batch #:	7360294	(Sample)	7360294	(Duplicate)			

NOTE(S)

Data are incomplete without the case narrative.
Calculations are performed before rounding to avoid round-off error in calculated results

GAMMA SPECTROSCOPY

Gamma Spectroscopy

Cesium-137

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Analysis Report for Gamma Spectroscopy

Batch: 7360294 **Operator:** 60040

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-001	KEKG21AC	345.10g	2.00	GammaVision	GV05	12 / 26 / 07 17:00	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	8.027E-001	pCi/g	2.996E-001	2.961E-001	3.452E-001	0.000E+000	2.33

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-001X	KEKG21AD	345.10g	2.00	GammaVision	GV07	12 / 26 / 07 17:46	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	7.740E-001	pCi/g	2.373E-001	2.330E-001	4.261E-001	0.000E+000	1.82

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-002	KEKHM1AC	394.00g	2.00	GammaVision	GV07	12 / 26 / 07 17:01	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	9.755E-001	pCi/g	2.162E-001	2.088E-001	2.785E-001	0.000E+000	3.50

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-003	KEKHQ1AC	373.20g	2.00	GammaVision	GV01	12 / 26 / 07 17:44	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	9.982E-001	pCi/g	2.566E-001	2.501E-001	1.972E-001	8.280E-002	5.06

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-004	KEKHR1AC	300.90g	2.00	GammaVision	GV03	12 / 26 / 07 17:45	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.485E+000	pCi/g	2.978E-001	2.853E-001	4.143E-001	1.879E-001	3.58

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-005	KEKHV1AC	303.20g	2.00	GammaVision	GV04	12 / 26 / 07 17:45	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.100E+000	pCi/g	3.198E-001	3.135E-001	4.476E-001	1.929E-001	2.46

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-006	KEKHX1AC	399.60g	2.00	GammaVision	GV05	12 / 26 / 07 17:45	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.198E+000	pCi/g	2.448E-001	2.349E-001	3.370E-001	0.000E+000	3.56

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-007	KEKH11AC	352.50g	2.00	GammaVision	GV01	12 / 26 / 07 18:22	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	4.598E+000	pCi/g	5.115E-001	4.377E-001	2.595E-001	1.130E-001	17.72

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-008	KEKH31AC	405.40g	2.00	GammaVision	GV03	12 / 26 / 07 18:23	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.001E+000	pCi/g	2.104E-001	2.023E-001	2.853E-001	1.284E-001	3.51

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-009	KEKH41AC	407.30g	2.00	GammaVision	GV04	12 / 26 / 07 18:23	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	6.297E-001	pCi/g	1.985E-001	1.951E-001	3.255E-001	1.397E-001	1.93

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-010	KEKH51AC	344.00g	2.00	GammaVision	GV05	12 / 26 / 07 18:24	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.113E+000	pCi/g	2.806E-001	2.732E-001	2.807E-001	0.000E+000	3.97

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-011	KEKH61AC	362.30g	2.00	GammaVision	GV07	12 / 26 / 07 18:24	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.134E+000	pCi/g	2.591E-001	2.507E-001	3.707E-001	0.000E+000	3.06

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-012	KEKH91AC	322.20g	2.00	GammaVision	GV01	12 / 26 / 07 19:00	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.408E+000	pCi/g	2.509E-001	2.375E-001	2.417E-001	1.025E-001	5.83

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-013	KEKJC1AC	305.20g	2.00	GammaVision	GV03	12 / 26 / 07 19:00	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	7.363E-001	pCi/g	2.375E-001	2.337E-001	3.924E-001	1.773E-001	1.88

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-014	KEKJE1AC	402.40g	2.00	GammaVision	GV04	12 / 26 / 07 19:01	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.115E+000	pCi/g	3.495E-001	3.436E-001	3.817E-001	1.676E-001	2.92

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-015	KEKJG1AC	348.50g	2.00	GammaVision	GV05	12 / 26 / 07 19:01	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.113E+000	pCi/g	3.093E-001	3.025E-001	4.093E-001	0.000E+000	2.72

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-016	KEKJJ1AC	332.10g	2.00	GammaVision	GV07	12 / 26 / 07 19:02	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	3.045E+000	pCi/g	4.419E-001	4.057E-001	2.994E-001	0.000E+000	10.17

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L200271-017	KEKLC1AC	334.60g	2.00	GammaVision	GV01	12 / 26 / 07 19:40	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	1.068E+000	pCi/g	2.324E-001	2.242E-001	4.157E-001	1.903E-001	2.57

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L260000-294B	KER4L1AA	372.80g	2.00	GammaVision	GV03	12 / 26 / 07 19:41	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AC-228	1501	-4.314E-002	pCi/g	4.777E-001	4.777E-001	2.507E-001	1.099E-001	-0.17

SampID	WRKNO	Aliquot	Sigma	Instrument	Detector	CountDateTime	CountDuration
F7L260000-294C	KER4L1AC	351.20g	2.00	GammaVision	GV04	12 / 26 / 07 19:43	30

Analyte	Cmpnd#	Activity		TotalUnc	CountUnc	MDA	MLCC	Act/MDA
AM-241	1493	1.065E+002	pCi/g	8.467E+000	1.954E+000	1.457E+000	7.223E-001	73.09
CO-60	1515	6.393E+001	pCi/g	3.865E+000	1.311E+000	3.732E-001	1.692E-001	171.31
CS-137	1518	4.155E+001	pCi/g	2.649E+000	1.098E+000	4.909E-001	2.379E-001	84.64

Laboratory Control Sample Information

Sample ID	WRKNO	Analyte	Activity		StdAdded	Recovery
F7L260000-294C	KER4L1AC	CS-137	4.155E+001	pCi/g	4.002E+001	103.83%
		CO-60	6.393E+001	pCi/g	6.272E+001	101.93%
		AM-241	1.065E+002	pCi/g	1.031E+002	103.29%

Sample Duplicate Information

Sample ID	Dup Sample ID	Analyte	Samp Activity		Dup Activity	RPD	RER	DER	Flag
F7L200271-001	F7L200271-001X	AC-228	8.027E-001	pCi/g	7.740E-001	3.63%	5.335E-002	1.499E-001	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Instrument Checks

TestAmerica **STL**

Gamma Spectroscopy Daily Check Summary

Detector: 1

Measurement Date/Time: 12/26/2007 7:43:38

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	3.250	3.500	3.693	4.250	4.500	ok
Total Activity (Bq)	1841.0	1880.0	1936.5	1996.0	2035.0	ok
Peak Shift (keV)	-0.3000	-0.2000	-0.1193	0.2000	0.2500	ok
Avg FWHM Ratio	0.9000	0.9500	0.9944	1.0500	1.1000	ok
Avg FWTM Ratio	0.9000	0.9500	1.0036	1.1000	1.1500	ok

Detector: 3

Measurement Date/Time: 12/26/2007 7:44:32

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.500	2.750	3.095	3.250	3.500	ok
Total Activity (Bq)	1835.0	1874.0	1947.2	1990.0	2029.0	ok
Peak Shift (keV)	-0.3000	-0.2500	-0.1686	0.2500	0.3000	ok
Avg FWHM Ratio	0.8500	0.9000	1.0571	1.1500	1.2500	ok
Avg FWTM Ratio	0.9000	0.9500	1.1792	1.1500	1.2500	High

Detector: 4

Measurement Date/Time: 12/26/2007 7:44:20

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.150	1.200	1.430	1.450	1.500	ok
Total Activity (Bq)	1833.7	1872.3	1939.6	1988.2	2026.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1839	0.2500	0.5000	ok
Avg FWHM Ratio	0.7000	0.8000	0.9414	1.1000	1.2500	ok
Avg FWTM Ratio	0.7000	0.8000	0.9679	1.1000	1.2500	ok

Detector: 5

Measurement Date/Time: 12/26/2007 7:46:49

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	1.250	1.500	1.865	2.000	2.250	ok
Total Activity (Bq)	1837.9	1876.6	1929.5	1992.7	2031.4	ok
Peak Shift (keV)	-0.2500	-0.1750	0.0844	0.1750	0.2500	ok
Avg FWHM Ratio	0.8500	0.9000	0.9794	1.1000	1.1500	ok
Avg FWTM Ratio	0.9000	0.9500	1.0020	1.1500	1.2000	ok

Gamma Spectroscopy Daily Check Summary

Detector: 6 **Measurement Date/Time:** 12/26/2007 7:45:40

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	2.350	2.600	2.724	3.150	3.400	ok
Total Activity (Bq)	1829.3	1867.8	1888.0	1983.3	2021.8	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.1428	0.2500	0.5000	ok
Avg FWHM Ratio	0.7500	0.9000	0.9913	1.1500	1.3000	ok
Avg FWTM Ratio	0.7500	0.9000	1.0441	1.1500	1.3000	ok

Detector: 7 **Measurement Date/Time:** 12/26/2007 7:46:09

	Minimum	Low	Current	High	Maximum	Result
Bkg Count Rate (CPS)	0.750	1.000	1.292	1.750	2.000	ok
Total Activity (Bq)	1850.0	1875.0	1913.1	1975.0	2000.0	ok
Peak Shift (keV)	-0.5000	-0.2500	-0.0172	0.2500	0.5000	ok
Avg FWHM Ratio	0.8000	0.8500	1.0381	1.1500	1.2000	ok
Avg FWTM Ratio	0.8000	0.8500	1.0748	1.2000	1.2500	ok

Notes: Low and High are 2 sigma warning limits. Minimum (<MIN) and Maximum (>MAX) are 3 sigma control limits (Fail).

Analyst SE

Date 12/26/7

GammaVision V6.01 QA Background Report 12/26/2007 6:35:19 AM

Detector: 1 Ge 1 SN/242
Measurement Number: 1281
Data Acquired On: 12/26/2007 6:15:11 AM
Real Time: 1206.34 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	3.25	3.50	3.69	4.25	4.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:31 AM

Detector: 3 Ge 3 SN/155
Measurement Number: 1210
Data Acquired On: 12/26/2007 6:15:19 AM
Real Time: 1208.62 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.50	2.75	3.10	3.25	3.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:33 AM

Detector: 4 Ge 4 SN/181
Measurement Number: 102
Data Acquired On: 12/26/2007 6:15:29 AM
Real Time: 1202.16 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.15	1.20	1.43	1.45	1.50

GammaVision V6.01 QA Background Report 12/26/2007 6:35:45 AM

Detector: 5 Ge 5 SN/157
Measurement Number: 248
Data Acquired On: 12/26/2007 6:15:41 AM
Real Time: 1200.00 Sec.
Live Time: 1143.82 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.86	2.00	2.25

GammaVision V6.01 QA Background Report 12/26/2007 6:35:55 AM

Detector: 6 Ge 6 SN/164
Measurement Number: 176
Data Acquired On: 12/26/2007 6:15:50 AM
Real Time: 1203.80 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	2.35	2.60	2.72	3.15	3.40

GammaVision V6.01 QA Background Report 12/26/2007 6:36:17 AM

Detector: 7 Ge 7 SN/154
Measurement Number: 342
Data Acquired On: 12/26/2007 6:16:00 AM
Real Time: 1213.76 Sec.
Live Time: 1200.00 Sec.
Status: OK

	Minimum	Low	Actual	High	Maximum
Background (CPS):	0.75	1.00	1.29	1.75	2.00

GammaVision V6.01 QA Background Report 12/26/2007 7:36:06 AM

Detector: 8 Ge 8 SN/174
Measurement Number: 1229
Data Acquired On: 12/26/2007 7:15:19 AM
Real Time: 1245.20 Sec.
Live Time: 1200.00 Sec.
Status: Warning (Below Low Limit)

	Minimum	Low	Actual	High	Maximum
Background (CPS):	1.25	1.50	1.44	2.00	2.25

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:43:36AM Page 1

DB Analysis ID: 32,997

Sample Description: 03-0366

Spectrum Filename: QA101260.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:12:57AM		
Live Time:	1800.00	Real Time:	1821.34
Dead Time:	1.17 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 air filter 74140-334 1_05_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\GE1 AF interp_165_quad 01_05_07.Clb		
Energy Created:	05-Jan-2007 1:55:09PM	Efficiency Created:	05-Jan-2007 1:58:17PM
Zero Offset:	0.112 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.11 keV
Stop Channel:	8,000 for an energy of 1999.43 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1856

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.343E+002	6.233E+002	1.73	5.96	1.245E+000
CS-137	3.505E+002	3.908E+002	2.07	6.41	2.868E+000
AM-241	9.154E+002	9.224E+002	1.01	9.33	4.521E+000

= All peaks for activity calculation had bad shape

Total Activity (25.11 to 1,999.43 keV) 1,600.31 Bq/SA

Analyzed by: _____

403605

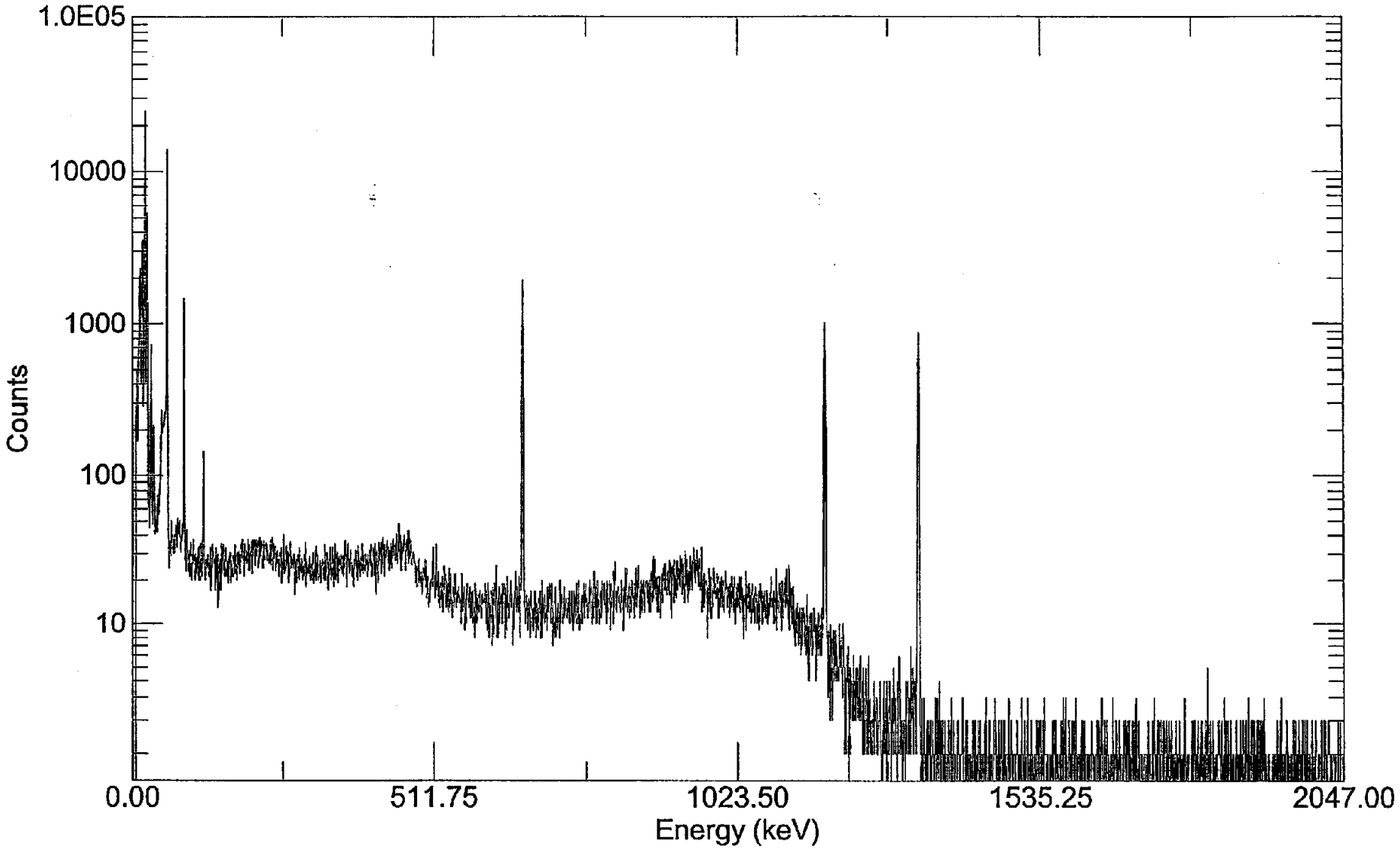
Reviewed by: _____

Supervisor

Laboratory: Test America

QA101260

03-0366



Acquired: 26-Dec-2007 7:12:57 AM
File: C:\User\spectra\QA101260.spc
Detector: #0 Ge 1 SN/242

Real Time: 1821.34 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 32,999

Sample Description: 03-0368

Spectrum Filename: QA301295.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:13:13AM		
Live Time:	1800.00	Real Time:	1827.76
Dead Time:	1.52 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 Air filter 74140_334 interp_122_quad 01_09_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Air filter interp_122_quad 01_09_07.Clb		
Energy Created:	09-Jan-2007 10:31:35AM	Efficiency Created:	09-Jan-2007 10:36:46AM
Zero Offset:	0.372 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.35 keV
Stop Channel:	8,000 for an energy of 2000.41 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2201

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60		3.378E+002	6.298E+002	1.75	5.96	2.007E+000
CS-137		3.582E+002	3.993E+002	2.04	6.21	2.940E+000
AM-241	#	9.112E+002	9.181E+002	1.00	9.33	4.742E+000

= All peaks for activity calculation had bad shape

Total Activity (25.35 to 2,000.41 keV) 1,607.20 Bq/SA

Analyzed by: _____

403605

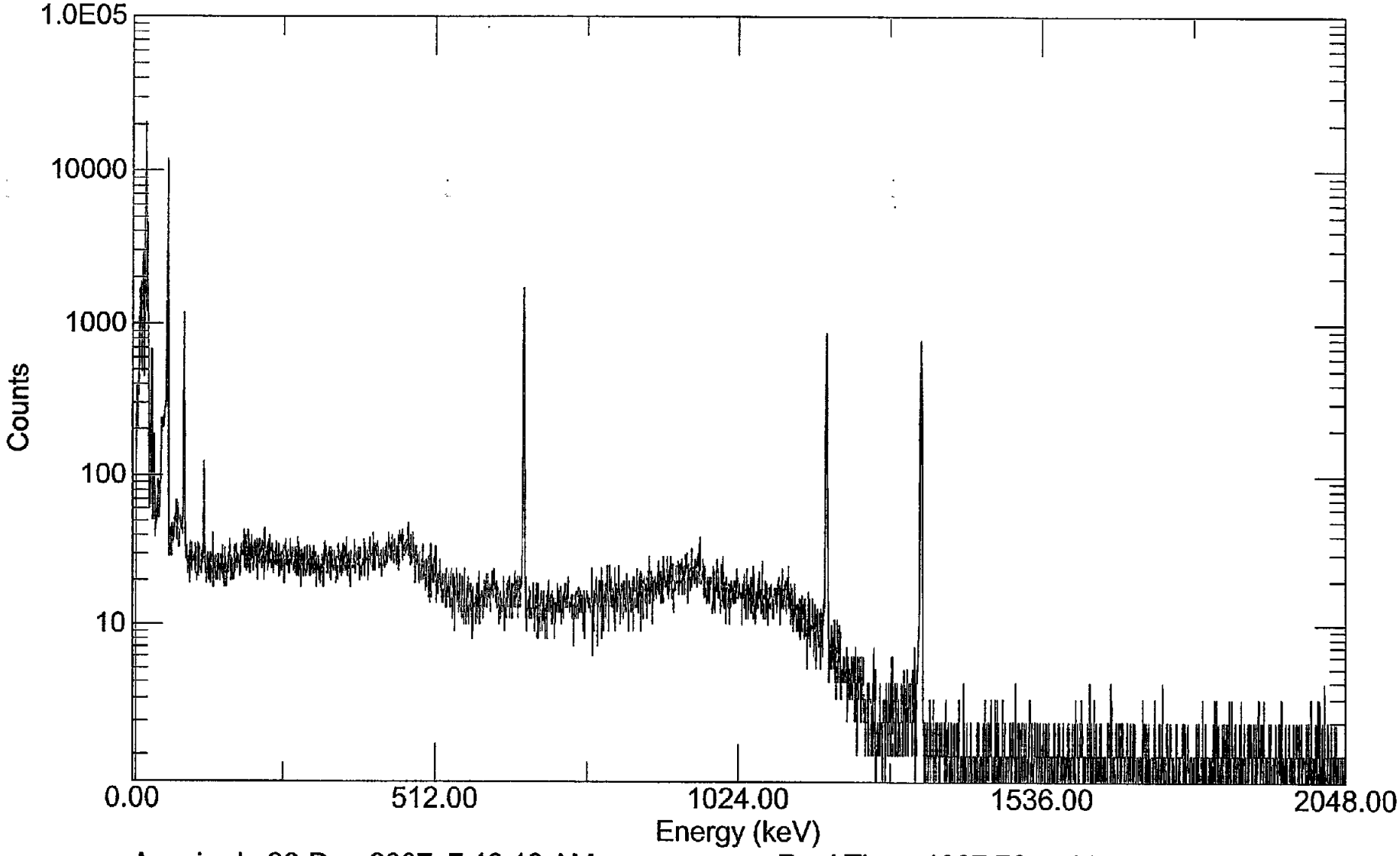
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA301295

03-0368



Acquired: 26-Dec-2007 7:13:13 AM
File: C:\User\spectra\QA301295.spc
Detector: #0 Ge 3 SN/155

Real Time: 1827.76 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:44:16AM Page 1

DB Analysis ID: 32,998

Sample Description: 03-0371

Spectrum Filename: QA400105.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:13:29AM		
Live Time:	1800.00	Real Time:	1810.98
Dead Time:	0.61 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4 AirFilterCal_74140_334_05_08_07(EE)		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4 AirFilterCal_74140_334_05_08_07		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	08-May-2007 1:39:26PM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.03 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1839

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CS-137	3.503E+002	3.906E+002	2.58	6.48	3.718E+000
AM-241	9.212E+002	9.282E+002	1.11	9.27	4.778E+000
CO-60	3.330E+002	6.208E+002	2.18	6.09	1.080E+000

= All peaks for activity calculation had bad shape

Total Activity (25.03 to 1,998.47 keV) 1,604.52 Bq/SA

Analyzed by: _____

403605

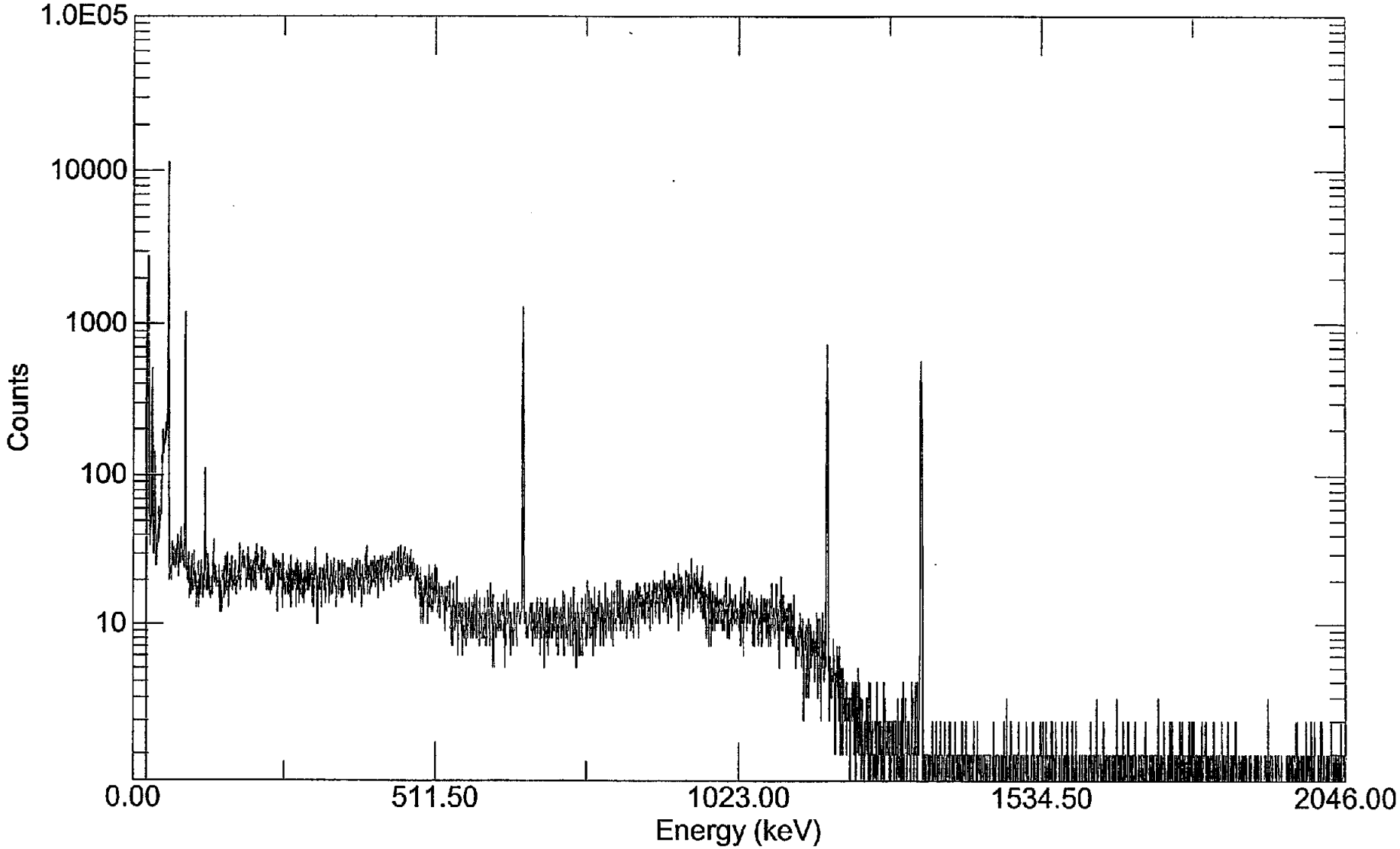
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA400105

03-0371



Acquired: 26-Dec-2007 7:13:29 AM
File: C:\User\spectra\QA400105.spc
Detector: #0 Ge 4 SN/181

Real Time: 1810.98 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:46:47AM Page 1

DB Analysis ID: 33,002

Sample Description: 03-0370

Spectrum Filename: QA500095.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:14:40AM		
Live Time:	1800.00	Real Time:	1901.16
Dead Time:	5.32 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 airfilter 74140-334_032707 interp_165_quad		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 airfilter_032707_interp165quad.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	28-Mar-2007 6:10:41PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.25 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1296

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.303E+002	6.158E+002	2.12	6.08	1.326E+000
CS-137	3.465E+002	3.864E+002	2.42	6.53	3.127E+000
AM-241	9.203E+002	9.273E+002	1.06	9.34	4.708E+000

= All peaks for activity calculation had bad shape

Total Activity (25.25 to 2,000.57 keV) 1,597.21 Bq/SA

Analyzed by: _____

403605

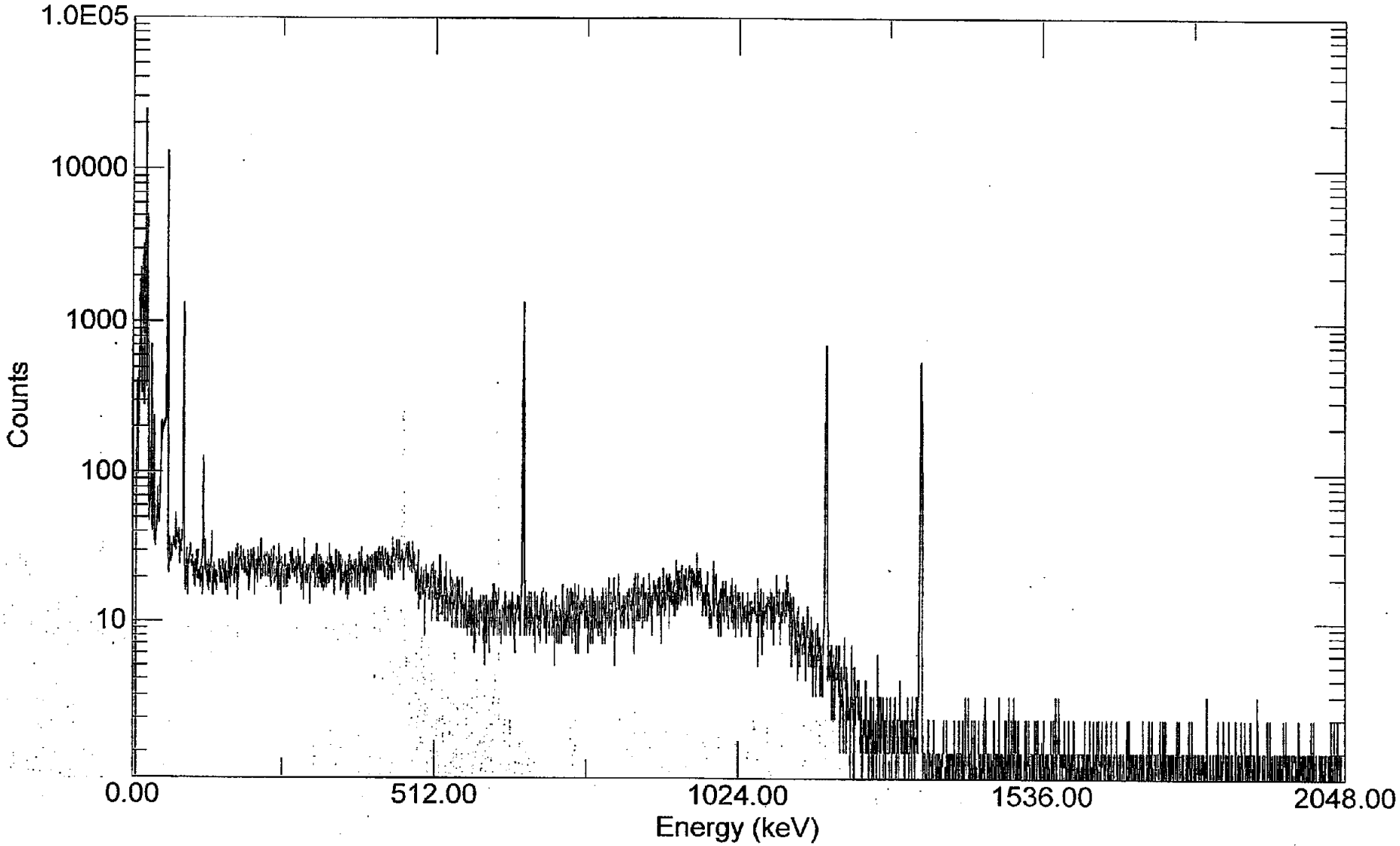
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

QA500095

03-0370



Acquired: 26-Dec-2007 7:14:40 AM
File: C:\User\spectra\QA500095.spc
Detector: #0 Ge 5 SN/157

Real Time: 1901.16 s. Live Time: 1800.00 s.
Channels: 8192

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:45:37AM Page 1

DB Analysis ID: 33,000

Sample Description: 03-0369

Spectrum Filename: QA600038.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:14:51AM		
Live Time:	1800.00	Real Time:	1812.32
Dead Time:	0.68 %		
Detector ID:	6		

Detector System: Ge 6 SN/164

Calibration

Description:	Ge6 airfilter 741470-336_12_13_07		
Filename:	C:\User\Calibrations\Ge 6 post 09_07_07\Ge6 _airfilter_12_13_07.Clb		
Energy Created:	13-Dec-2007 10:15:45AM	Efficiency Created:	13-Dec-2007 10:32:26AM
Zero Offset:	0.226 keV	Gain:	0.250 keV/Channel

Library 1 File:	STL QC.Lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	100 for an energy of 25.22 keV
Stop Channel:	8,000 for an energy of 1999.85 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1428

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.219E+002	6.000E+002	1.51	5.89	1.332E+000
CS-137	3.628E+002	4.045E+002	1.74	6.22	2.206E+000
AM-241	8.768E+002	8.835E+002	2.00	9.44	1.213E+001

= All peaks for activity calculation had bad shape

Total Activity (25.22 to 1,999.85 keV) 1,561.50 Bq/SA

Analyzed by: _____

403605

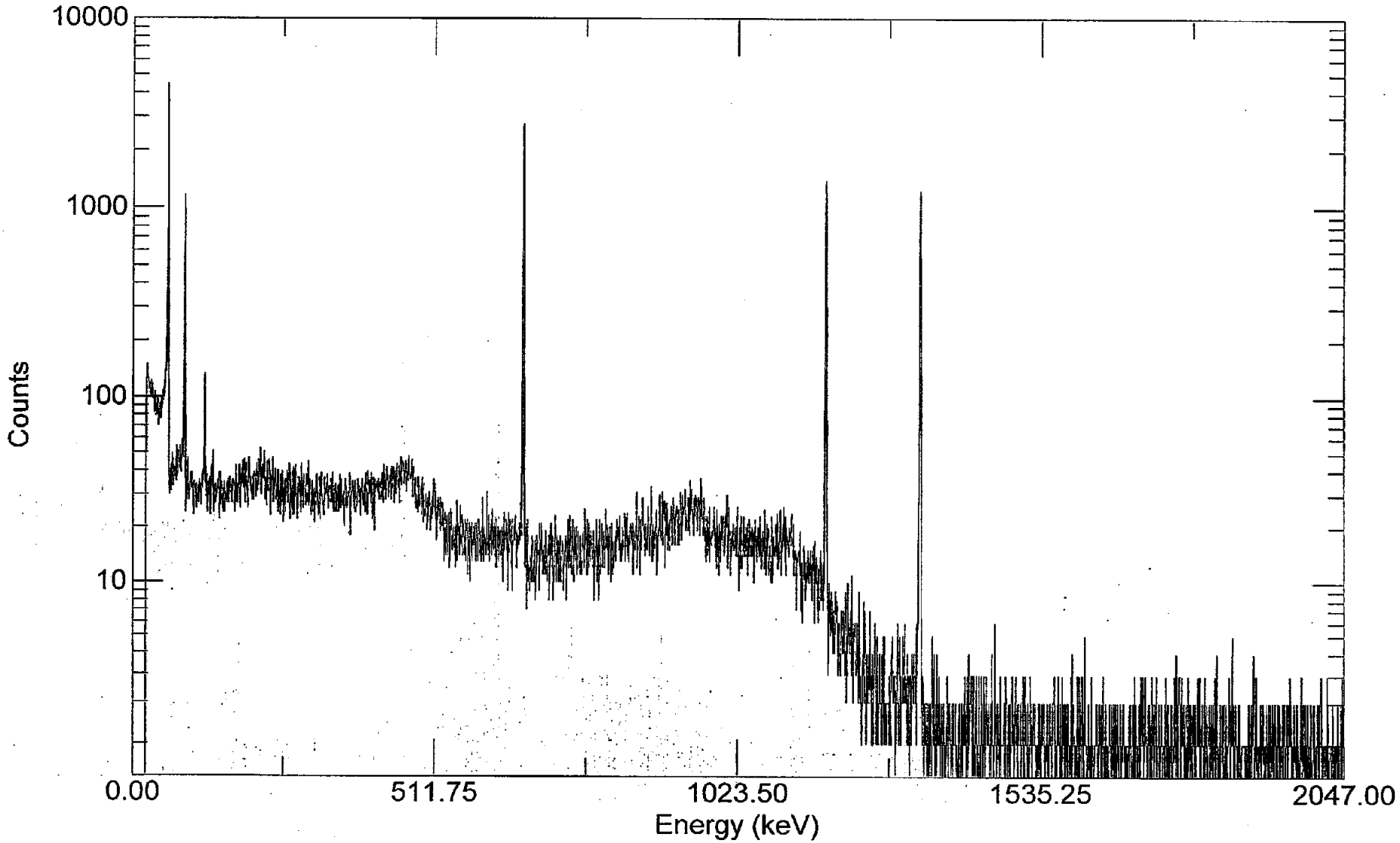
Reviewed by: _____

Supervisor

Laboratory: Test America

QA600038

03-0369



Acquired: 26-Dec-2007 7:14:51 AM
File: C:\User\spectra\QA600038.spc
Detector: #0 Ge 6 SN/164

Real Time: 1812.32 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

GammaVision Report Writer Version 2.04.0 G53W4.21 26-Dec-2007 7:46:07AM Page 1

DB Analysis ID: 33,001

Sample Description: 03-0372

Spectrum Filename: QA700212.Spc

Acquisition Information

Start Time:	26-Dec-2007 7:15:04AM		
Live Time:	1800.00	Real Time:	1831.58
Dead Time:	1.72 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 air filter 74140-334 01_04_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 air filter 01_04_07.Clb		
Energy Created:	04-Jan-2007 9:44:57AM	Efficiency Created:	04-Jan-2007 9:55:23AM
Zero Offset:	0.082 keV	Gain:	0.250 keV/Channel

Library 1 File: STL QC.Lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	100 for an energy of 25.08 keV
Stop Channel:	8,000 for an energy of 2000.16 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	01-Apr-2003 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	NO	
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0421

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide	Time of Count Activity Bq/SA	Time Corrected Activity Bq/SA	Uncertainty Counts 2 Sigma %	Uncertainty Total 2 Sigma %	Minimum Detectable Activity
CO-60	3.270E+002	6.096E+002	1.93	6.02	1.346E+000
CS-137	3.415E+002	3.808E+002	2.19	6.26	3.055E+000
AM-241	9.158E+002	9.228E+002	0.94	8.44	4.242E+000

= All peaks for activity calculation had bad shape

Total Activity (25.08 to 2,000.16 keV) 1,584.31 Bq/SA

Analyzed by: _____

403605

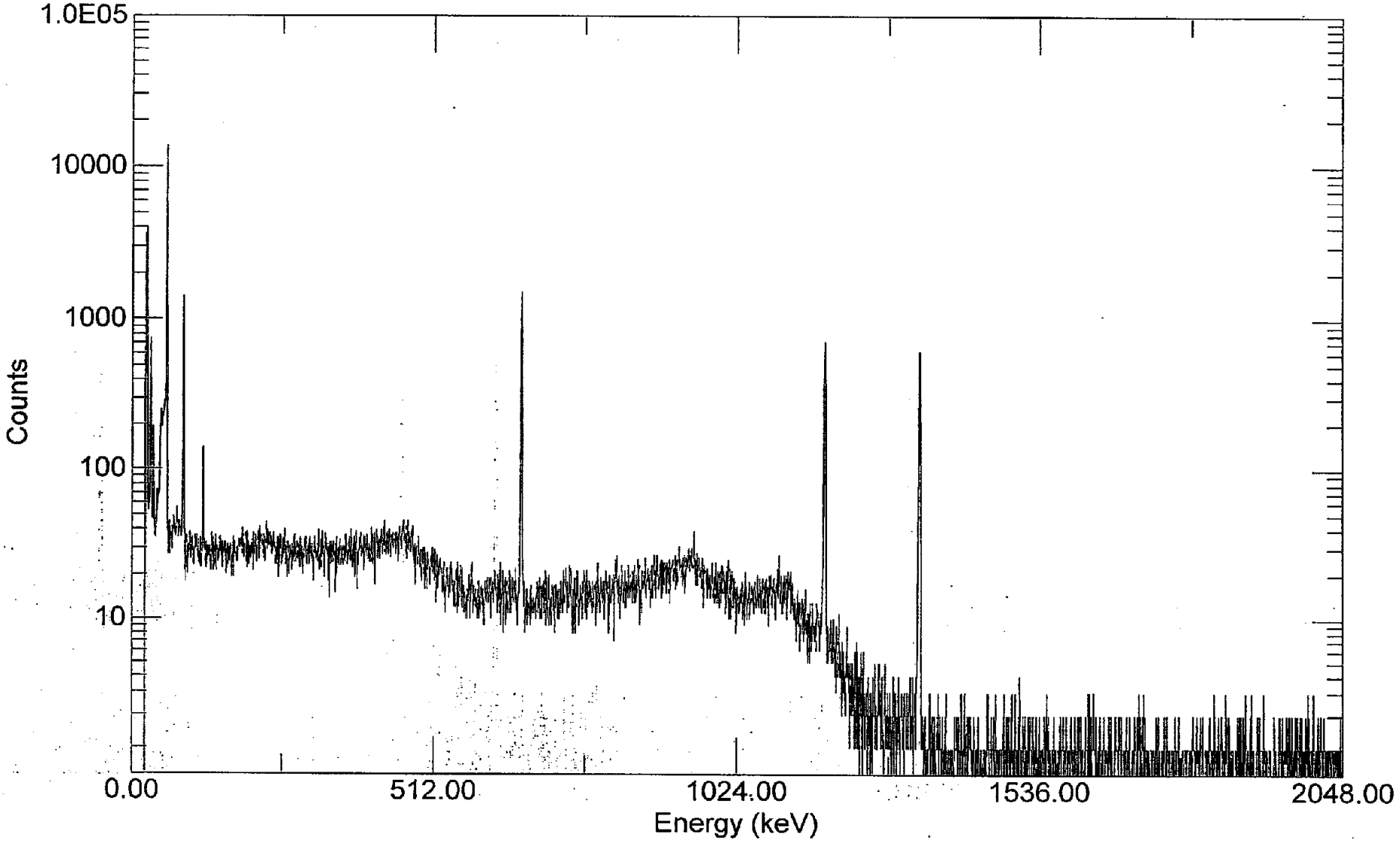
Reviewed by: _____

Supervisor

Laboratory: Test America

QA700212

03-0372



Acquired: 26-Dec-2007 7:15:04 AM
File: C:\User\spectra\QA700212.spc
Detector: #0 Ge 7 SN/154

Real Time: 1831.58 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

TestAmerica STL

Gamma Vision Long Backgrounds

November 2007

Ge1 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    1
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1

Sample description
     Ge1 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge1 bkgd\Ge1 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 20:12:47
       Live time:              43200
       Real time:              43454
       Dead time:                  0.59 %
       Detector ID:                    1

Detector system
     Ge 1 SN/242


Calibration
       Filename:                   GE1 AF interp_165_quad 01_05_07.clb
     Ge1 air filter 74140-334 1_05_07


       Energy Calibration
            Created:               05-Jan-2007 13:55:09
            Zero offset:           0.112 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -8.471E-09 keV/channel^2

       Efficiency Calibration
            Created:               05-Jan-2007 13:58:17
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.63 %
            Log(Eff):             -5.325680E-02 + (-3.688631E-01*Log(E) ) +
                                   ( -3.389960E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:            90 (    22.61keV )
       Stop channel:           8000 (  1999.43keV )
       Peak rejection level:     40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    2
STL- St Louis                    Spectrum name: Ge1 background 11_21_07.An1
                                       Page 1
```

Ge1 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 26 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1584

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.48	1145.	8.01	0.82	7.917E-02	29.46	20.350	1.645E+00	I129
					29.78	37.840	8.846E-01	I129
33.55	364.	19.14	1.08	7.930E-02	33.61	10.230	1.039E+00	I129
39.64	367.	17.70	0.72	7.948E-02	39.57	7.500	1.425E+00	I129
43.95	83.	36.93	0.77	7.961E-02				
46.49	615.	6.96	0.78	7.969E-02	46.54	4.250	4.202E+00	PB210
63.22	886.	6.96	0.78	7.996E-02	63.29	4.820	5.319E+00	TH234
74.91	250.	16.22	0.81	7.953E-02				
77.12	227.	16.57	0.81	7.945E-02				
84.26	190.	20.36	0.82	7.919E-02	83.79	25.180	2.206E-01	RA223
92.53	1212.	5.11	1.09	7.822E-02	92.59	5.570	6.442E+00	TH234
143.45	191.	27.71	1.47	6.596E-02	143.76	10.960	6.125E-01	U235
185.73	526.	9.46	0.72	5.472E-02	185.71	57.200	3.892E-01	U235
205.37	116.	29.90	0.76	5.087E-02	205.31	5.010	1.050E+00	U235
216.58	124.	37.90	0.67	4.893E-02				
238.22	550.	10.88	0.92	4.561E-02	238.63	43.300	6.455E-01	PB212
241.65	168.	26.87	0.76	4.508E-02	242.00	7.430	1.164E+00	PB214
294.87	221.	20.40	1.06	3.889E-02	295.22	19.300	6.822E-01	PB214
321.82	106.	28.71	0.51	3.640E-02				
338.11	118.	0.12	1.08	3.504E-02	338.28	2.790	1.406E+00	RA223
351.65	288.	15.45	1.27	3.402E-02	351.93	37.600	5.210E-01	PB214
510.67	1595.	4.49	2.58	2.544E-02				
558.30	154.	21.25	1.00	2.370E-02				
582.63	214.	22.14	1.61	2.290E-02	583.19	84.500	2.562E-01	TL208
609.26	279.	18.64	1.59	2.209E-02	609.31	46.090	6.342E-01	BI214
678.61	106.	27.09	0.86	2.025E-02				
910.54	225.	19.20	0.94	1.591E-02				
968.65	78.	33.31	1.64	1.511E-02	968.97	15.800	PBC<MDA	AC228
1119.75	138.	28.36	0.92	1.337E-02	1120.29	15.100	1.582E+00	BI214
1460.80	301.	11.17	1.75	1.066E-02	1460.83	10.670	6.124E+00	K40
1764.41	115.	18.86	0.40	9.048E-03	1764.49	15.400	1.916E+00	BI214

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 3
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1
Page 2

Ge1 background 11_21_07.Rpt

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
175.36	43.91	424.	83.	0.002	73.85	0.772	EU-155	lD
299.08	74.87	807.	207.	0.005	48.16	0.699	PB-214	
307.91	77.08	673.	174.	0.004	52.38	0.864	PB-214	
573.39	143.45	712.	191.	0.004	55.42	1.469	TC-99M	l
742.53	185.73	586.	526.	0.012	18.92	0.716	U-235	l
821.10	205.37	381.	116.	0.003	59.80	0.757	U-235	l
865.96	216.58	565.	124.	0.003	75.80	0.669	TB-160	s
2042.53	510.67	504.	1595.	0.037	8.97	2.583	TL-208	s
2233.07	558.30	218.	154.	0.004	42.50	0.999	Y-91M	s
2714.42	678.61	154.	106.	0.002	54.18	0.859	AG-110M	sM
3642.42	910.54	329.	109.	0.003	50.65	0.937	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.69	29.78	1412.	1845.	0.043	0.03	0.757D
I-129	133.99	33.61	705.	256.	0.006	31.86	0.761D
I-129	158.11	39.64	963.	367.	0.008	35.40	0.717s
PB-210	184.97	46.35	1060.	707.	0.016	20.60	0.662s
TH-234	252.44	63.22	832.	886.	0.020	13.92	0.776
RA-223	336.52	84.24	1308.	175.	0.004	60.22	0.815s
TH-234	369.70	92.53	789.	1212.	0.028	10.22	1.090s
RA-223	576.53	144.23	937.	32.	0.001	0.79	0.880D
Ra-226	744.47	186.21	938.	426.	0.010	22.51	0.924D
PB-212	952.51	238.22	700.	550.	0.013	21.77	0.919s
RA-224	959.36	239.93	1373.	-223.	-0.005	48.86	0.980
PB-214	966.24	241.65	538.	168.	0.004	53.74	0.758s
PB-214	1179.17	294.87	453.	221.	0.005	40.80	1.059
AC-228	1352.99	338.32	729.	118.	0.003	0.23	1.078D
PB-214	1406.31	351.65	405.	288.	0.007	30.91	1.275
TL-208	2330.44	582.63	348.	214.	0.005	44.27	1.612s
BI-214	2436.97	609.26	441.	279.	0.006	37.28	1.586s
AC-228	3644.09	910.96	250.	115.	0.003	43.01	1.596s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 4
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
AC-228	3874.95	968.65	299.	78.	0.002	66.62	1.642s
BI-214	4479.56	1119.75	190.	138.	0.003	56.71	0.922s
K-40	5844.32	1460.80	94.	301.	0.007	22.35	1.747
BI-214	7059.40	1764.41	47.	115.	0.003	37.72	0.398s

s - Peak fails shape tests.

Ge1 background 11_21_07.Rpt

D - Peak area deconvoluted.
A Derived peak area.

```
*****   S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide -  Average     ------------- Peak -------------
Name   Code  Activity    Energy   Activity Code MDA Value
             Bq/sample    keV     Bq/sample     Bq/sample      COMMENTS
-----------------------------------------------------------------------------

Be-7     C  -2.5924E-02
                          477.61-2.592E-02 %(  8.962E-01 1.02E+03 G
                             1 of   1 peaks found

K-40     N   6.1244E+00
                         1460.83 6.124E+00  (  9.744E-01 1.12E+01 G
                             1 of   1 peaks found

CO-60    F   8.3359E-03
                         1332.50 8.336E-03 &(  1.027E-01 3.57E+02 G
                         1173.24 7.132E-02 %   1.179E-01 5.06E+01 G
                             2 of   2 peaks found

I-129    I   1.4251E+00
                           29.78 1.425E+00 }   1.374E-01 1.37E-02 X
                           33.61 7.311E-01 -   3.607E-01 1.59E+01 X
                           39.57 1.425E+00 *(  5.721E-01 1.77E+01 G
                           34.61-4.163E-01 %   1.957E+00 1.41E+02 X
                             4 of   5 peaks found

CS-137   I  -6.5179E-03
                          661.66-6.518E-03 &(  1.302E-01 5.91E+02 G
                             1 of   1 peaks found

TL-208   N   2.5616E-01
                          583.19 2.562E-01 @(  1.073E-01 2.21E+01 G
                          860.56 4.219E-01 %   9.305E-01 6.68E+01 G
                             2 of   2 peaks found

PB-210   N   4.8319E+00
                           46.54 4.832E+00 *(  1.055E+00 1.03E+01 G
                             1 of   1 peaks found

PB-212   N   6.4547E-01
                          238.63 6.455E-01 @(  1.479E-01 1.09E+01 G
                          300.10 1.825E-01 %   2.408E+00 3.93E+02 G
                             2 of   2 peaks found

PB-214   N   5.7564E-01
                          351.93 5.210E-01  (  1.748E-01 1.55E+01 G
                          295.22 6.822E-01  (  3.145E-01 2.04E+01 G
                          242.00 1.164E+00 +   7.653E-01 2.69E+01 G
                             3 of   3 peaks found
```



```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

BI-214   N   6.3420E-01
                          609.31 6.342E-01 *(  2.286E-01 1.86E+01 G
                         1764.49 1.916E+00 +   5.739E-01 1.89E+01 G
```

```
                                Ge1 background 11_21_07.Rpt
                              1120.29 1.582E+00 +   7.673E-01 2.84E+01 G
                               768.36 5.845E-01 %   2.258E+00 1.16E+02 G
                                  4 of   4 peaks found

RA-223    N   3.4520E-01
                               83.79 2.037E-01 *   1.987E-01 3.01E+01 X
                              269.46 1.066E-01 &(  5.409E-01 1.52E+02 G
                              154.21 4.946E-01 %   9.325E-01 5.73E+01 G
                              144.23 3.452E-01 }   1.590E+00 3.93E-01 G
                              323.87-5.721E-01 %   2.109E+00 1.11E+02 G
                                  5 of   6 peaks found

RA-224    N  -2.7848E+00
                              240.99-2.785E+00  (  2.190E+00 2.44E+01 G
                                  1 of   1 peaks found

AC-228    N   6.9099E-01
                              911.20 6.508E-01  (  4.310E-01 2.15E+01 G
                              968.97 7.567E-01 *(  8.074E-01 3.33E+01 G
                              338.32 6.910E-01 }   7.535E-01 1.16E-01 G
                                  3 of   3 peaks found

TH-234    N   5.3187E+00
                               63.29 5.319E+00  (  8.239E-01 6.96E+00 G
                               92.59 6.442E+00 +   7.098E-01 5.11E+00 G
                                  2 of   2 peaks found

U-235     N   1.3269E-01
                              185.71 3.695E-02 }(  1.143E-01 9.33E+01 G
                              143.76 2.880E-01 }(  4.162E-01 4.42E+01 G
                              163.36 5.461E-01 }(  1.152E+00 6.40E+01 G
                              205.31 4.668E-01 }(  1.258E+00 8.14E+01 G
                                  4 of   4 peaks found

Ra-226    N   5.0340E+00
                              186.21 5.034E+00 }(  1.717E+00 1.13E+01 G
                                  1 of   1 peaks found

AM-241    T   1.7879E-02
                               59.54 1.788E-02 %(  1.230E-01 2.06E+02 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
0

  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:17:48 Page    6
 STL- St Louis                   Spectrum name: Ge1 background 11_21_07.An1

   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
                                   Page 5
```

to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	84.24	1308.	175.	0.004	60.22	2.037E-01
RA-223	144.23	937.	32.	0.001	0.79	3.452E-01
RA-224	239.93	1373.	-223.	-0.005	48.86	-2.785E+00
AC-228	910.96	250.	115.	0.003	43.01	6.508E-01
AC-228	968.65	299.	78.	0.002	66.62	7.567E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty Counting 2 Sigma	MDA Bq/sample
Be-7	#A	-2.5924E-02	2.0493E+03%	8.962E-01
K-40		6.1244E+00	2.2349E+01%	9.744E-01
CO-60	#A	8.3359E-03	7.1489E+02%	1.027E-01
I-129		1.4251E+00	3.5397E+01%	5.721E-01
CS-137	#A	-6.5179E-03	1.1826E+03%	1.302E-01
TL-208	#	2.5616E-01	4.4272E+01%	1.073E-01
PB-210	#	4.8319E+00	2.0595E+01%	1.055E+00
PB-212	#	6.4547E-01	2.1768E+01%	1.479E-01
PB-214		5.7564E-01	2.5595E+01%	1.748E-01
BI-214		6.3420E-01	3.7279E+01%	2.286E-01
RA-223	#A	3.4520E-01	7.1896E+01%	5.409E-01
RA-224	#A	-2.7848E+00	4.8862E+01%	2.190E+00
AC-228	#	6.9099E-01	3.9651E+01%	4.310E-01
TH-234		5.3187E+00	1.3922E+01%	8.239E-01

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:17:48 Page 7
STL- St Louis Spectrum name: Ge1 background 11_21_07.An1

U-235	A	1.3269E-01	8.8419E+01%	1.258E+00
Ra-226		5.0340E+00	2.5148E+01%	1.717E+00
AM-241	#A	1.7879E-02	4.1232E+02%	1.230E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.

Ge1 background 11_21_07.Rpt

F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (39.4 to 1999.4 keV) 1.981E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge2 background 11_21_07.Rpt

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 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    1
STL- St Louis                    Spectrum name: Ge2 background 11_21_07.Anl

Sample description
     Ge2 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge2 bkgd\Ge2 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:39:03
       Live time:             43200
       Real time:             43328
       Dead time:                  0.30 %
       Detector ID:                    2

Detector system
     Ge 2 SN/182


Calibration
       Filename:                   Ge2 AF w_spacer 72002 poly. 121206 no Hg
                                   .Clb
     Ge2 72002-334 Air Filter Poly no Hg 121206


       Energy Calibration
            Created:               13-Dec-2006 07:56:27
            Zero offset:           0.102 keV
            Gain:                  0.250 keV/channel
            Quadratic:             6.874E-09 keV/channel^2

       Efficiency Calibration
            Created:               13-Dec-2006 07:58:09
            Type:                  Polynomial
            Uncertainty:           1.400 %
            Coefficients:         -0.388770  -4.607021   0.563706
                                  -0.059383   0.002602  -0.000047

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.60keV )
       Stop channel:            8000 (  1999.97keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method

       Random error:              0.0000000E+00
       Systematic error:          0.0000000E+00
       Fraction Limit;            0.000%
       Background width:          average of three points.

       Half lives decay limit:   12.000
                                     Page 1
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Ge2 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 2
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 3 cutoff 20.00000 %
Energy Calibration
Normalized diff: 1.0000

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
36.01	548.	9.94	2.31	1.554E-04	34.61	2.419	0.000E+00	I129
54.77	448.	20.63	0.48	2.979E-02				
70.79	795.	10.76	0.57	4.706E-02				
82.34	140.	38.03	1.07	5.505E-02				
104.48	141.	28.68	0.56	6.052E-02				
142.56	15.	0.90	1.13	5.781E-02	144.23	3.220	PBC<MDA	RA223
151.40	922.	7.90	0.80	5.654E-02				
172.73	246.	28.01	0.59	5.240E-02				
180.30	97.	34.82	0.46	5.091E-02				
270.17	94.	30.57	0.82	3.630E-02	269.46	13.700	4.365E-01	RA223
432.95	145.	13.12	1.10	2.330E-02				
774.09	107.	14.98	1.25	1.393E-02				

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
143.68	36.01	765.	548.	0.013	16.63	2.308	CS-137	sM
218.74	54.77	1948.	448.	0.010	41.27	0.482	LU-177	sM
282.83	70.79	1564.	795.	0.018	21.52	0.570	AU-198	sM
417.63	104.48	526.	141.	0.003	57.36	0.563	U-235	sM
605.36	151.40	549.	1148.	0.027	8.26	0.797	KR-85M	sM
690.68	172.73	768.	246.	0.006	56.02	0.592	-	sM
1080.54	270.17	183.	94.	0.002	61.15	0.819	AC-228	l
1731.80	432.95	50.	145.	0.003	26.23	1.105	J-134	sM
3096.58	774.09	25.	107.	0.002	23.42	1.245	W-187	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

Ge2 background 11_21_07.Rpt
This section based on library: long bkgd_pbc.lib

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:42:59 Page 3
STL- St Louis Spectrum name: Ge2 background 11_21_07.An1

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
RA-223	329.04	82.34	1346.	140.	0.003	76.05	1.072s
RA-223	576.67	144.23	742.	15.	0.000	1.79	1.128D
RA-223	610.25	152.62	1317.	-226.	-0.005	47.36	1.137s
AC-228	1353.21	338.32	271.	-3.	0.000	-12.93	1.306D

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-4.6117E-02					
			477.61	-4.612E-02	%(	5.044E-01	3.17E+02 G
			1 of 1 peaks found				
K-40	N	-1.7222E-01					
			1460.83	-1.722E-01	%(	8.611E-01	1.44E+02 G
			1 of 1 peaks found				
CO-60	F	-8.3377E-03					
			1332.50	-8.338E-03	%(	7.747E-02	2.62E+02 G
			1173.24	6.175E-04	%	7.327E-02	3.29E+03 G
			2 of 2 peaks found				
I-129	I	-1.9497E-01					
			39.57	-1.950E-01	%(	1.419E+01	2.19E+03 G
			1 of 5 peaks found				
CS-137	I	-9.4394E-04					
			661.66	-9.439E-04	&(	6.847E-02	2.06E+03 G
			1 of 1 peaks found				
TL-208	N	-4.4122E-03					
			583.19	-4.412E-03	&(	6.480E-02	4.21E+02 G
			860.56	7.613E-04	&	4.117E-01	1.48E+04 G
			2 of 2 peaks found				
PB-210	N	-4.5169E-01					
			46.54	-4.517E-01	&(	8.363E+00	5.56E+02 G
			1 of 1 peaks found				
PB-212	N	-1.7207E-02					
			238.63	-1.721E-02	&(	1.488E-01	2.58E+02 G
			300.10	-4.113E-01	&	2.107E+00	1.53E+02 G
			2 of 2 peaks found				

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                                Ge2 background 11_21_07.Rpt
PB-214    N    7.0784E-02
                              351.93 7.078E-02 %(  1.628E-01 6.95E+01 G
                              295.22-7.852E-02 &   3.395E-01 1.29E+02 G
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 ORTEC      g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:42:59 Page    4
STL- St Louis                     Spectrum name: Ge2 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments
                              242.00 1.721E-01 &   7.907E-01 1.37E+02 G
                                 3 of   3 peaks found

BI-214    N   -3.4801E-03
                              609.31-3.480E-03 &(  1.312E-01 1.08E+03 G
                             1764.49-1.363E-02 %   5.148E-01 1.02E+03 G
                             1120.29-1.887E-02 %   4.717E-01 6.99E+02 G
                              768.36 1.538E-01 &   1.164E+00 2.17E+02 G
                                 4 of   4 peaks found

RA-223    N    1.8540E-01
                               83.79 2.337E-01 *   2.900E-01 3.80E+01 X
                              269.46 1.854E-01 %(  4.423E-01 7.21E+01 G
                              154.21-1.660E+00 +   1.263E+00 2.37E+01 G
                              144.23 1.854E-01 }   1.612E+00 8.96E-01 G
                              323.87-2.960E-01 &   1.561E+00 1.57E+02 G
                              338.28 2.760E-01 }   2.283E+00 1.90E+02 G
                                 6 of   6 peaks found

RA-224    N    2.7670E-01
                              240.99 2.767E-01 &(  1.525E+00 1.65E+02 G
                                 1 of   1 peaks found

AC-228    N   -2.2436E-02
                              911.20-2.244E-02 %(  2.287E-01 2.88E+02 G
                              338.32-2.244E-02 }   5.553E-01 ******** G
                                 2 of   3 peaks found

TH-234    N    2.5408E-01
                               63.29 2.541E-01 %(  2.384E+00 2.82E+02 G
                               92.59-6.697E-02 %   1.236E+00 5.52E+02 G
                                 2 of   2 peaks found

U-235     N    6.1680E-02
                              185.71 2.368E-03 }(  1.010E-01 1.27E+03 G
                              143.76 1.920E-02 }(  5.448E-01 8.46E+02 G
                              163.36 5.295E-01 }(  1.179E+00 6.74E+01 G
                              205.31 3.574E-01 }(  1.228E+00 1.03E+02 G
                                 4 of   4 peaks found

Ra-226    N    0.0000E+00
                                 0 of   1 peaks found

AM-241    T    0.0000E+00
                                 0 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
                                     Page 4
```

failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.

- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
RA-223	82.34	1346.	140.	0.003	76.05	2.337E-01
RA-223	152.62	1317.	-226.	-0.005	47.36	-1.660E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-4.6117E-02	6.3413E+02%	5.044E-01
K-40	#A	-1.7222E-01	2.8889E+02%	8.611E-01
CO-60	#A	-8.3377E-03	5.2415E+02%	7.747E-02
I-129	#A	-1.9497E-01	4.3718E+03%	1.419E+01
CS-137	#A	-9.4394E-04	4.1142E+03%	6.847E-02
TL-208	#A	-4.4122E-03	8.4236E+02%	6.480E-02
PB-210	#A	-4.5169E-01	1.1128E+03%	8.363E+00
PB-212	#A	-1.7207E-02	5.1525E+02%	1.488E-01
PB-214	#A	7.0784E-02	1.3902E+02%	1.628E-01
BI-214	#A	-3.4801E-03	2.1577E+03%	1.312E-01
RA-223	#A	1.8540E-01	1.4419E+02%	4.423E-01
RA-224	#A	2.7670E-01	3.2921E+02%	1.525E+00
AC-228	#A	-2.2436E-02	5.7610E+02%	2.287E-01
TH-234	#A	2.5408E-01	5.6341E+02%	2.384E+00
U-235	#A	6.1680E-02	1.3487E+02%	1.228E+00
Ra-226	#A	0.0000E+00	7.4987E+03%	1.636E+00
AM-241	#A	0.0000E+00	1.4307E+04%	4.288E-01

Ge2 background 11_21_07.Rpt

STL- St Louis

Spectrum name: Ge2 background 11_21_07.An1

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.0 keV) 0.000E+00 Bq/sample

Analyzed by: _____
402630

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge3 background 11_21_07.Rpt

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 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    1
STL- St Louis                    Spectrum name: Ge3 background 11_21_07.An1

Sample description
     Ge3 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge3 Bkd post 5_8_06\Ge3 background
                    11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 20:14:21
       Live time:             43200
       Real time:             44044
       Dead time:                  1.92 %
       Detector ID:                    3

Detector system
     Ge 3 SN/155


Calibration
       Filename:                   Ge3 Air filter interp_122_quad 01_09_07.
                                   clb
     Ge3 Air filter 74140_334 interp_122_quad 01_09_07


       Energy Calibration
            Created:               09-Jan-2007 10:31:35
            Zero offset:           0.372 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.457E-08 keV/channel^2

       Efficiency Calibration
            Created:               09-Jan-2007 10:36:46
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.42 %
            Log(Eff):             -2.114144E-01 + (-2.846233E-01*Log(E) ) +
                                   ( -4.247676E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.85keV )
       Stop channel:            8000 (  2000.41keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
```

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 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:29:30 Page    2
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Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Systematic error: 0.0000000E+00
Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.0700

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
46.63	517.	11.73	0.85	8.618E-02	46.54	4.250	3.266E+00	PB210
63.31	592.	12.93	0.85	8.723E-02	63.29	4.820	3.262E+00	TH234
72.12	210.	21.86	0.87	8.589E-02				
74.95	648.	7.63	0.87	8.546E-02				
84.56	371.	11.37	0.88	8.406E-02	83.79	25.180	4.057E-01	RA223
87.41	211.	18.65	0.88	8.364E-02				
92.67	628.	10.80	1.19	8.268E-02	92.59	5.570	3.156E+00	TH234
143.71	8.	1.77	0.94	6.882E-02	143.76	10.960	PBC<MDA	U235
185.84	362.	17.45	1.25	5.738E-02	185.71	57.200	2.556E-01	U235
					186.21	3.590	4.080E+00	Ra226
238.33	498.	13.20	1.16	4.774E-02	238.63	43.300	5.582E-01	PB212
294.85	179.	32.86	0.88	4.062E-02				
338.11	52.	0.25	1.13	3.652E-02	338.28	2.790	1.113E+00	RA223
351.95	221.	17.02	1.15	3.541E-02	351.93	37.600	3.840E-01	PB214
569.39	140.	24.12	0.46	2.406E-02				
583.08	191.	16.67	0.43	2.359E-02	583.19	84.500	2.218E-01	TL208
609.47	167.	20.68	1.40	2.275E-02	609.31	46.090	3.679E-01	BI214
675.97	198.	19.41	0.25	2.087E-02				
1460.77	269.	12.60	0.77	1.067E-02	1460.83	10.670	5.472E+00	K40
1763.99	57.	24.52	2.37	8.978E-03	1764.49	15.400	9.488E-01	BI214

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
287.30	72.26	948.	210.	0.005	43.72	0.865	W-187	1D
299.20	75.10	1479.	687.	0.016	24.09	0.945	PB-214	
347.97	87.28	676.	184.	0.004	51.12	0.891	PB-214	
1178.99	294.85	656.	179.	0.004	65.71	0.885	PB-214	1

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 3
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Ge3 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
2277.83	569.39	207.	140.	0.003	48.24	0.461	PA-234	s
2704.31	675.97	179.	198.	0.005	38.82	0.248	AU-198	sM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	116.48	29.46	1393.	-40.	-0.001	-33.03	0.821D
I-129	117.77	29.78	1360.	-75.	-0.002	-33.03	0.821D
PB-210	185.24	46.63	861.	517.	0.012	23.47	0.850
TH-234	252.02	63.31	1092.	592.	0.014	25.87	0.855s
RA-223	337.47	84.65	1341.	292.	0.007	37.32	0.877s
TH-234	369.57	92.67	882.	628.	0.015	21.59	1.192s
RA-223	576.02	144.23	823.	8.	0.000	3.54	0.939D
Ra-226	744.09	186.21	808.	362.	0.008	24.55	1.253D
PB-212	952.74	238.33	764.	498.	0.012	26.39	1.163s
RA-224	959.55	240.03	1211.	-150.	-0.003	67.51	1.037s
AC-228	1353.01	338.32	649.	52.	0.001	0.49	1.134D
PB-214	1407.56	351.95	596.	221.	0.005	34.04	1.148s
TL-208	2332.62	583.08	190.	191.	0.004	33.35	0.427s
BI-214	2438.23	609.47	511.	167.	0.004	41.37	1.396s
K-40	5843.24	1460.77	80.	269.	0.006	25.20	0.766s
BI-214	7055.28	1763.99	68.	57.	0.001	49.04	2.372s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Peak Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-1.0312E-01					
			477.61	-1.031E-01	&(	7.955E-01 2.29E+02 G	
			1 of 1 peaks found				
K-40	N	5.4719E+00					
			1460.83	5.472E+00	(	9.030E-01 1.26E+01 G	
			1 of 1 peaks found				

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 4
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CO-60	F 1.3070E-02					

```
                                Ge3 background 11_21_07.Rpt
                              1332.50 1.307E-02 &(  1.156E-01 2.59E+02 G
                              1173.24 4.078E-02 %   1.050E-01 7.74E+01 G
                                  2 of   2 peaks found

I-129     I  -5.4321E-02
                                29.78-5.432E-02 }   1.270E-01 ******** X
                                29.46-5.432E-02 }   2.391E-01 ******** X
                                33.61-2.491E-03 %   3.687E-01 4.40E+03 X
                                39.57-5.432E-02 %(  5.521E-01 3.04E+02 G
                                34.61-2.405E-01 &   1.844E+00 2.30E+02 X
                                  5 of   5 peaks found

CS-137    I   2.9708E-02
                               661.66 2.971E-02 &(  9.574E-02 9.65E+01 G
                                  1 of   1 peaks found

TL-208    N   2.2178E-01
                               583.19 2.218E-01 *(  7.773E-02 1.67E+01 G
                               860.56 3.902E-01 %   8.439E-01 6.55E+01 G
                                  2 of   2 peaks found

PB-210    N   3.2658E+00
                                46.54 3.266E+00  (  8.816E-01 1.17E+01 G
                                  1 of   1 peaks found

PB-212    N   5.5819E-01
                               238.63 5.582E-01 *(  1.474E-01 1.32E+01 G
                               300.10-8.649E-02 %   2.144E+00 7.37E+02 G
                                  2 of   2 peaks found

PB-214    N   3.8402E-01
                               351.93 3.840E-01 *(  2.025E-01 1.70E+01 G
                               295.22 2.825E-01 %   3.796E-01 4.12E+01 G
                               242.00-1.394E-01 %   8.727E-01 1.87E+02 G
                                  3 of   3 peaks found

BI-214    N   3.6794E-01
                               609.31 3.679E-01 *(  2.385E-01 2.07E+01 G
                              1764.49 9.488E-01 +   6.898E-01 2.45E+01 G
                              1120.29 5.281E-01 %   7.381E-01 4.32E+01 G
                               768.36 5.301E-01 %   1.791E+00 1.01E+02 G
                                  4 of   4 peaks found

RA-223    N   8.8424E-02
                                83.79 3.193E-01 *   1.894E-01 1.87E+01 X
                               269.46 8.842E-02 %(  5.004E-01 1.69E+02 G
                               154.21 1.288E-01 %   8.834E-01 2.05E+02 G
                               144.23 8.842E-02 }   1.424E+00 1.77E+00 G
                               323.87-1.253E-01 %   1.965E+00 4.67E+02 G
                                  5 of   6 peaks found

RA-224    N  -1.7921E+00
                               240.99-1.792E+00 &(  1.966E+00 3.38E+01 G
                                  1 of   1 peaks found
```



```
Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.8991E-01
                               911.20 2.899E-01 %(  4.109E-01 4.37E+01 G
```

```
                                Ge3 background 11_21_07.Rpt
                              968.97 2.921E-01 %   6.997E-01 7.23E+01 G
                              338.32 2.899E-01 }   6.828E-01 2.46E-01 G
                                 3 of   3 peaks found

TH-234    N   3.2051E+00
                               63.29 3.262E+00 *(  8.629E-01 1.29E+01 G
                               92.59 3.156E+00 *(  7.091E-01 1.08E+01 G
                                 2 of   2 peaks found

U-235     N   0.0000E+00
                              143.76 1.575E-01 }   4.364E-01 8.36E+01 G
                              163.36 1.070E-02 }   1.003E+00 2.79E+03 G
                              205.31 3.099E-01 }   1.189E+00 1.15E+02 G
                                 3 of   4 peaks found

Ra-226    N   4.0797E+00
                              186.21 4.080E+00 }(  1.522E+00 1.23E+01 G
                                 1 of   1 peaks found

AM-241    T   3.0063E-02
                               59.54 3.006E-02 %(  1.121E-01 1.12E+02 G
                                 1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```



```
   R - Coincidence Corrected             C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 *************** D I S C A R D E D  I S O T O P E  P E A K S ***************
 Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
           Energy   Counts     Counts     Cts/Sec  2 Sigma %
```

RA-223	84.65	1341.	292.	0.007	37.32	3.193E-01
RA-224	240.03	1211.	-150.	-0.003	67.51	-1.792E+00
PB-214	351.95	596.	221.	0.005	34.04	3.840E-01
BI-214	609.47	511.	167.	0.004	41.37	3.679E-01
BI-214	1763.99	68.	57.	0.001	49.04	9.488E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty Counting 2 Sigma	MDA Bq/sample
Be-7	#A	-1.0312E-01	4.5896E+02%	7.955E-01
K-40		5.4719E+00	2.5202E+01%	9.030E-01
CO-60	#A	1.3070E-02	5.1750E+02%	1.156E-01
I-129	#A	-5.4321E-02	6.0811E+02%	5.521E-01
CS-137	#A	2.9708E-02	1.9304E+02%	9.574E-02
TL-208	#	2.2178E-01	3.3349E+01%	7.773E-02
PB-210		3.2658E+00	2.3466E+01%	8.816E-01
PB-212	#	5.5819E-01	2.6390E+01%	1.474E-01
PB-214	#	3.8402E-01	3.4038E+01%	2.025E-01
BI-214	#	3.6794E-01	4.1367E+01%	2.385E-01
RA-223	#A	8.8424E-02	3.3888E+02%	5.004E-01
RA-224	#A	-1.7921E+00	6.7509E+01%	1.966E+00
AC-228	#A	2.8991E-01	8.7364E+01%	4.109E-01
TH-234	#	3.2051E+00	1.6848E+01%	8.629E-01
U-235	#A	0.0000E+00	2.3063E+02%	1.189E+00
Ra-226	#	4.0797E+00	2.4547E+01%	1.522E+00
AM-241	#A	3.0063E-02	2.2457E+02%	1.121E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.4 keV) 1.680E+01 Bq/sample

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:29:30 Page 7
STL- St Louis Spectrum name: Ge3 background 11_21_07.An1

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge4 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    1
STL- St Louis                    Spectrum name: Ge4 background 11_21_07.An1

Sample description
     Ge4 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge4 Bkd post 09_07\Ge4 background
                   11_21_07.An1

Acquisition information
       Start time:                 21-Nov-2007 21:20:23
       Live time:              43200
       Real time:              43294
       Dead time:                  0.22 %
       Detector ID:                    4

Detector system
     Ge 4 SN/181


Calibration
       Filename:                   Ge4 AirFilterCal_74140_334_05_08_07(EE).
                                   Clb
     Ge4 AirFilterCal_74140_334_05_08_07(EE)


       Energy Calibration
            Created:               08-May-2007 13:28:13
            Zero offset:           0.017 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.910E-08 keV/channel^2

       Efficiency Calibration
            Created:               08-May-2007 13:39:26
            Type:                  Polynomial
            Uncertainty:           0.775 %
            Coefficients:         -0.437839  -4.768164   0.564688
                                  -0.057886   0.002608  -0.000044

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.53keV )
       Stop channel:            8000 (  1998.47keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
       Fraction Limit:             0.000%
       Background width:           average of three points.
```

Ge4 background 11_21_07.Rpt

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 2
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 13 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1398

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.44	117.	0.15	0.80	5.859E-02	29.46	20.350	PBC<MDA	I129
46.39	500.	10.13	0.83	6.160E-02	46.54	4.250	4.417E+00	PB210
63.30	385.	12.06	0.82	6.390E-02	63.29	4.820	2.891E+00	TH234
74.86	126.	20.28	0.84	6.352E-02				
77.23	163.	16.49	0.85	6.347E-02				
92.41	578.	13.01	1.06	6.276E-02	92.59	5.570	3.825E+00	TH234
144.26	17.	0.88	0.90	5.339E-02	143.76	10.960	PBC<MDA	U235
185.83	266.	18.20	1.03	4.428E-02	185.71	57.200	2.430E-01	U235
					186.21	3.590	3.880E+00	Ra226
238.37	223.	16.36	1.06	3.532E-02	238.63	43.300	3.379E-01	PB212
294.99	85.	32.83	1.03	2.863E-02	295.22	19.300	PBC<MDA	PB214
338.12	34.	0.42	1.07	2.500E-02	338.28	2.790	1.109E+00	RA223
351.60	126.	21.13	1.08	2.404E-02	351.93	37.600	3.223E-01	PB214
510.71	983.	5.17	2.12	1.675E-02				
582.75	103.	27.40	0.89	1.482E-02	583.19	84.500	1.899E-01	TL208
608.54	126.	15.99	1.63	1.422E-02	609.31	46.090	4.449E-01	BI214
1024.06	31.	31.88	0.48	8.934E-03				
1119.29	112.	21.18	1.36	8.239E-03	1120.29	15.100	2.075E+00	BI214
1460.75	68.	19.15	1.89	6.425E-03	1460.83	10.670	2.293E+00	K40

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

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
299.14	74.83	277.	115.	0.003	50.65	0.818	PB-214	
308.62	77.21	295.	148.	0.003	42.44	0.888	PB-214	
2042.44	510.71	228.	983.	0.023	10.33	2.116	TL-208	s
4096.82	1024.06	19.	31.	0.001	63.76	0.479	SR-91	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 3
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Ge4 background 11_21_07.Rpt

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.01	29.78	664.	117.	0.003	0.29	0.804D
PB-210	185.42	46.39	458.	500.	0.012	20.27	0.834s
TH-234	253.01	63.30	424.	385.	0.009	24.12	0.816
TH-234	369.42	92.41	822.	578.	0.013	26.02	1.057s
RA-223	576.64	144.23	522.	17.	0.000	1.75	0.905D
Ra-226	744.51	186.21	462.	266.	0.006	25.94	1.035D
PB-212	953.09	238.37	289.	223.	0.005	32.72	1.055
PB-214	1179.54	294.99	347.	85.	0.002	65.66	1.034s
AC-228	1352.85	338.32	320.	34.	0.001	0.85	1.071D
PB-214	1405.98	351.60	291.	126.	0.003	42.26	1.082s
TL-208	2331.16	582.87	184.	52.	0.001	78.17	1.269s
BI-214	2433.85	608.54	80.	126.	0.003	31.98	1.627s
BI-214	4478.11	1119.29	52.	112.	0.003	42.36	1.355s
K-40	5845.49	1460.75	51.	68.	0.002	38.29	1.887

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	2.5364E-01					
			477.61	2.536E-01	&(	7.571E-01 8.94E+01 G	
			1 of 1 peaks found				
K-40	N	2.2933E+00					
			1460.83	2.293E+00	(	1.211E+00 1.91E+01 G	
			1 of 1 peaks found				
CO-60	F	3.0919E-02					
			1332.50	3.092E-02	%(	1.270E-01 1.20E+02 G	
			1173.24	-1.824E-03	%	1.272E-01 1.99E+03 G	
			2 of 2 peaks found				

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 4
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
I-129	I 1.2169E-01					
		29.78	1.217E-01	}	1.282E-01 1.45E-01 X	
		33.61	9.651E-03	%	3.713E-01 1.14E+03 X	
		39.57	1.217E-01	%(	5.647E-01 1.39E+02 G	

Page 3

```
                                Ge4 background 11_21_07.Rpt
                                34.61 5.812E-01 %   1.700E+00 8.81E+01 X
                                  4 of   5 peaks found

CS-137    I    6.1529E-02
                                661.66 6.153E-02 &(  1.199E-01 5.93E+01 G
                                  1 of   1 peaks found

TL-208    N    9.7012E-02
                                583.19 9.701E-02 ?(  1.219E-01 3.91E+01 G
                                860.56 5.068E-02 %   8.374E-01 4.76E+02 G
                                  2 of   2 peaks found

PB-210    N    4.4166E+00
                                 46.54 4.417E+00 @(  9.062E-01 1.01E+01 G
                                  1 of   1 peaks found

PB-212    N    3.3787E-01
                                238.63 3.379E-01  (  1.241E-01 1.64E+01 G
                                300.10 4.578E-01 %   2.233E+00 1.45E+02 G
                                  2 of   2 peaks found

PB-214    N    3.3387E-01
                                351.93 3.223E-01  (  2.104E-01 2.11E+01 G
                                295.22 3.563E-01 *(  3.752E-01 3.28E+01 G
                                242.00-8.994E-02 %   9.155E-01 3.02E+02 G
                                  3 of   3 peaks found

BI-214    N    4.4492E-01
                                609.31 4.449E-01  (  1.567E-01 1.60E+01 G
                               1764.49 3.905E-01 %   9.161E-01 7.06E+01 G
                               1120.29 2.075E+00 +   6.787E-01 2.12E+01 G
                                768.36 3.163E-02 %   2.265E+00 2.07E+03 G
                                  4 of   4 peaks found

RA-223    N    2.3215E-01
                                 83.79-2.020E-04 %   1.551E-01 2.27E+04 X
                                269.46 2.321E-01 &(  4.980E-01 6.50E+01 G
                                154.21-5.419E-02 %   8.607E-01 4.71E+02 G
                                144.23 2.321E-01 }   1.470E+00 8.75E-01 G
                                323.87 1.302E-01 &   2.085E+00 4.74E+02 G
                                  5 of   6 peaks found

RA-224    N   -3.8759E-01
                                240.99-3.876E-01 %(  1.566E+00 1.21E+02 G
                                  1 of   1 peaks found

AC-228    N    2.7907E-01
                                911.20 2.791E-01 &(  4.692E-01 5.16E+01 G
                                968.97 2.956E-01 %   7.776E-01 7.89E+01 G
                                338.32 2.791E-01 }   7.075E-01 4.24E-01 G
                                  3 of   3 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 09:23:11 Page    5
STL- St Louis                   Spectrum name: Ge4 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

TH-234    N    3.3918E+00
                                 63.29 2.891E+00  (  7.418E-01 1.21E+01 G
                                 92.59 3.825E+00  (  9.027E-01 1.30E+01 G
                                  2 of   2 peaks found
```

Ge4 background 11_21_07.Rpt

```
U-235     N    0.0000E+00
                          143.76 1.399E-01 }   4.508E-01 9.69E+01 G
                          163.36 3.179E-01 }   9.891E-01 9.36E+01 G
                          205.31 9.367E-02 }   9.329E-01 2.94E+02 G
                             3 of   4 peaks found

Ra-226    N    3.8798E+00
                          186.21 3.880E+00 }(  1.500E+00 1.30E+01 G
                             1 of   1 peaks found

AM-241    T    1.6676E-02
                           59.54 1.668E-02 %(  1.068E-01 1.91E+02 G
                             1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
   R - Coincidence Corrected               C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 6
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
PB-214	294.99	347.	85.	0.002	65.66	3.563E-01
PB-214	351.60	291.	126.	0.003	42.26	3.223E-01
K-40	1460.75	51.	68.	0.002	38.29	2.293E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity	Uncertainty Counting 2 Sigma	MDA

Page 5

Ge4 background 11_21_07.Rpt

		Bq/sample		Bq/sample
Be-7	#A	2.5364E-01	1.7871E+02%	7.571E-01
K-40	#	2.2933E+00	3.8293E+01%	1.211E+00
CO-60	#A	3.0919E-02	2.4072E+02%	1.270E-01
I-129	#A	1.2169E-01	2.7780E+02%	5.647E-01
CS-137	#A	6.1529E-02	1.1860E+02%	1.199E-01
TL-208	#A	9.7012E-02	7.8165E+01%	1.219E-01
PB-210	#	4.4166E+00	2.0270E+01%	9.062E-01
PB-212		3.3787E-01	3.2718E+01%	1.241E-01
PB-214	#	3.3387E-01	3.9044E+01%	2.104E-01
BI-214	#	4.4492E-01	3.1983E+01%	1.567E-01
RA-223	#A	2.3215E-01	1.3001E+02%	4.980E-01
RA-224	#A	-3.8759E-01	2.4185E+02%	1.566E+00
AC-228	#A	2.7907E-01	1.0319E+02%	4.692E-01
TH-234		3.3918E+00	1.7740E+01%	7.418E-01
U-235	#A	0.0000E+00	5.8869E+02%	9.329E-01
Ra-226	#	3.8798E+00	2.5937E+01%	1.500E+00
AM-241	#A	1.6676E-02	3.8177E+02%	1.068E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 1998.5 keV) 1.257E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 09:23:11 Page 7
STL- St Louis Spectrum name: Ge4 background 11_21_07.An1

Laboratory: STL- St Louis

Ge5 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    1
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1

Sample description
     Ge5 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge5 bkgd\Ge5 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:23:41
       Live time:              43200
       Real time:              44675
       Dead time:                  3.30 %
       Detector ID:                    5

Detector system
     Ge 5 SN/157


Calibration
       Filename:                   Ge5 airfilter_032707_interp165quad.Clb
     Ge5 airfilter 74140-334_032707 interp_165_quad


       Energy Calibration
            Created:               28-Mar-2007 18:08:23
            Zero offset:           0.272 keV
            Gain:                  0.250 keV/channel
            Quadratic:             3.070E-08 keV/channel^2

       Efficiency Calibration
            Created:               28-Mar-2007 18:10:41
            Knee Energy:         165.85 keV
            Above the Knee:        Quadratic        Uncertainty =   1.34 %
            Log(Eff):              1.077627E+00 + (-7.017228E-01*Log(E) ) +
                                   ( -1.776439E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.75keV )
       Stop channel:            8000 (  2000.57keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:   3
       Sample Size:               1.0000E+00
       Activity scaling factor:   1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                  1.0000E+00
       Detection limit method:    Reg. Guide 4.16 Method

       Random error:              0.0000000E+00
       Systematic error:          0.0000000E+00
D

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    2
STL- St Louis                    Spectrum name: Ge5 background 11_21_07.An1
                                       Page 1
```

Ge5 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 15 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1877

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
29.93	102.	0.14	0.75	7.146E-02	29.46	20.350	PBC<MDA	I129
46.66	414.	12.87	0.65	7.098E-02	46.54	4.250	3.179E+00	PB210
59.65	80.	33.94	0.71	7.060E-02	59.54	35.700	7.300E-02	AM241
63.18	340.	14.64	0.84	7.034E-02	63.29	4.820	2.322E+00	TH234
74.83	114.	25.18	0.78	6.946E-02				
77.10	91.	30.11	0.78	6.929E-02				
84.34	74.	32.20	0.44	6.875E-02				
92.62	549.	10.31	1.09	6.772E-02	92.59	5.570	3.367E+00	TH234
185.73	327.	15.49	0.92	4.627E-02	185.71	57.200	2.861E-01	U235
					186.21	3.590	4.570E+00	Ra226
238.72	164.	27.40	0.69	3.699E-02	238.63	43.300	2.362E-01	PB212
338.06	31.	0.43	1.04	2.700E-02	338.28	2.790	PBC<MDA	RA223
351.81	195.	22.22	0.90	2.606E-02				
511.11	1014.	5.24	2.08	1.851E-02				
583.25	90.	23.25	0.78	1.638E-02	583.19	84.500	1.505E-01	TL208
609.47	162.	20.78	1.01	1.572E-02	609.31	46.090	5.158E-01	BI214
662.05	150.	19.17	1.43	1.456E-02	661.66	85.210	2.798E-01	CS137
1173.48	41.	36.79	1.77	8.488E-03	1173.24	99.900	PBC<MDA	CO60
1332.05	125.	20.63	1.02	7.518E-03				
1461.10	43.	27.61	1.99	6.882E-03	1460.83	10.670	1.351E+00	K40
1764.57	44.	23.86	0.33	5.736E-03	1764.49	15.400	1.162E+00	BI214

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
298.47	74.83	392.	106.	0.002	67.56	0.809	PB-214	s
307.56	77.10	307.	79.	0.002	75.51	0.760	PB-214	
1407.10	351.81	306.	195.	0.005	44.45	0.904	PB-214	l
2044.52	511.11	240.	1014.	0.023	10.47	2.077	TL-208	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 3
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1
Page 2

Ge5 background 11_21_07.Rpt

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected
5328.04	1332.05	79.	100.	0.002	32.20	1.021	CO-60 s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.14	29.78	830.	102.	0.002	0.28	0.749D
PB-210	185.71	46.66	583.	414.	0.010	25.73	0.654s
AM-241	237.70	59.65	260.	80.	0.002	67.89	0.710
TH-234	251.85	63.18	534.	340.	0.008	29.27	0.841s
TH-234	369.69	92.62	568.	549.	0.013	20.62	1.088s
RA-223	576.28	144.23	424.	-4.	0.000	-30.17	0.847D
Ra-226	744.31	186.21	464.	327.	0.008	21.65	0.916D
PB-212	954.48	238.72	410.	164.	0.004	54.79	0.693s
RA-223	1352.94	338.28	354.	-2.	0.000	-30.17	1.040D
AC-228	1353.09	338.32	340.	31.	0.001	0.85	1.040D
PB-214	1407.50	351.92	329.	125.	0.003	44.77	1.053s
TL-208	2333.17	583.25	87.	90.	0.002	46.51	0.781s
BI-214	2438.11	609.47	176.	162.	0.004	41.57	1.012
CS-137	2648.46	662.05	116.	150.	0.003	38.34	1.432s
CO-60	4694.02	1173.48	96.	41.	0.001	73.58	1.772s
K-40	5843.97	1461.10	49.	43.	0.001	55.23	1.988
BI-214	7056.93	1764.57	11.	44.	0.001	47.72	0.329s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	2.9643E-03					
			477.61	2.964E-03	%(	9.373E-01	9.29E+03 G
			1 of 1 peaks found				
K-40	N	1.3513E+00					
			1460.83	1.351E+00	?(	1.110E+00	2.76E+01 G
			1 of 1 peaks found				

▯

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 4
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CO-60	F 9.5390E-02						
		1332.50	7.761E-02	%(	1.333E-01	5.28E+01	G
		1173.24	1.132E-01	(	1.318E-01	3.68E+01	G

Page 3

```
                                Ge5 background 11_21_07.Rpt
                                  2 of   2 peaks found

I-129     I   8.6894E-02
                                29.78 8.689E-02 }   1.172E-01 1.40E-01 X
                                33.61-3.808E-02 &   3.942E-01 3.09E+02 X
                                39.57 8.689E-02 %(  4.761E-01 1.64E+02 G
                                34.61-1.386E-01 %   1.664E+00 3.58E+02 X
                                  4 of   5 peaks found

CS-137    I   2.7980E-01
                               661.66 2.798E-01 @(  9.868E-02 1.92E+01 G
                                  1 of   1 peaks found

TL-208    N   1.5053E-01
                               583.19 1.505E-01 *(  7.723E-02 2.33E+01 G
                               860.56 1.989E-01 %   9.708E-01 1.44E+02 G
                                  2 of   2 peaks found

PB-210    N   3.1792E+00
                                46.54 3.179E+00  (  8.839E-01 1.29E+01 G
                                  1 of   1 peaks found

PB-212    N   2.3621E-01
                               238.63 2.362E-01  (  1.402E-01 2.74E+01 G
                               300.10 3.484E-01 %   2.091E+00 1.79E+02 G
                                  2 of   2 peaks found

PB-214    N   2.9533E-01
                               351.93 2.953E-01  (  2.061E-01 2.24E+01 G
                               295.22 2.432E-01 %   3.647E-01 4.60E+01 G
                               242.00 1.720E-01 &   8.469E-01 1.47E+02 G
                                  3 of   3 peaks found

BI-214    N   5.1580E-01
                               609.31 5.158E-01  (  2.058E-01 2.08E+01 G
                              1764.49 1.162E+00 +   4.698E-01 2.39E+01 G
                              1120.29 2.913E-01 &   7.470E-01 7.69E+01 G
                               768.36 7.370E-01 %   2.029E+00 8.25E+01 G
                                  4 of   4 peaks found

RA-223    N  -5.2038E-02
                                83.79-4.616E-02 %   1.480E-01 9.64E+01 X
                               269.46-5.204E-02 &(  5.080E-01 2.90E+02 G
                               154.21-7.645E-02 %   7.471E-01 2.90E+02 G
                               144.23-5.204E-02 }   1.255E+00 ******** G
                               323.87-8.898E-02 %   1.870E+00 6.20E+02 G
                               338.28-5.204E-02 }   2.778E+00 ******** G
                                  6 of   6 peaks found

RA-224    N  -7.1857E-01
                               240.99-7.186E-01 %(  1.725E+00 7.26E+01 G
                                  1 of   1 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    5
 STL- St Louis                   Spectrum name: Ge5 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

AC-228    N   2.3763E-01
                               911.20 2.376E-01 %(  4.360E-01 5.60E+01 G
                               968.97 2.100E-01 %   7.716E-01 1.09E+02 G
                               338.32 2.376E-01 }   6.746E-01 4.26E-01 G
```

```
                                Ge5 background 11_21_07.Rpt
                                  3 of   3 peaks found

TH-234    N   2.3217E+00
                                63.29 2.322E+00 @(  7.538E-01 1.46E+01 G
                                92.59 3.367E+00 +   6.983E-01 1.03E+01 G
                                  2 of   2 peaks found

U-235     N   0.0000E+00
                               143.76 2.214E-01 }   3.882E-01 5.34E+01 G
                               163.36 4.277E-01 }   8.636E-01 6.13E+01 G
                               205.31 3.536E-01 }   1.095E+00 9.31E+01 G
                                  3 of   4 peaks found

Ra-226    N   4.5696E+00
                               186.21 4.570E+00 }(  1.440E+00 1.08E+01 G
                                  1 of   1 peaks found

AM-241    T   7.3002E-02
                                59.54 7.300E-02  (  7.142E-02 3.39E+01 G
                                  1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                        Peak Codes:
   T - Thermal Neutron Activation        G - Gamma Ray
   F - Fast Neutron Activation           X - X-Ray
   I - Fission Product                   P - Positron Decay
   N - Naturally Occurring Isotope       S - Single-Escape
   P - Photon Reaction                   D - Double-Escape
   C - Charged Particle Reaction         K - Key Line
   M - No MDA Calculation                A - Not in Average
```

```
  ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 07:48:45 Page    6
 STL- St Louis                   Spectrum name: Ge5 background 11_21_07.An1

   R - Coincidence Corrected            C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy   Counts     Counts     Cts/Sec  2 Sigma %
```

PB-214	351.92	329.	125.	0.003	44.77	2.953E-01

Ge5 background 11_21_07.Rpt

CO-60	1173.48	96.	41.	0.001	73.58	1.132E-01

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	2.9643E-03	1.8576E+04%	9.373E-01
K-40	#	1.3513E+00	5.5227E+01%	1.110E+00
CO-60	#A	9.5390E-02	6.4328E+01%	1.333E-01
I-129	#A	8.6894E-02	3.2744E+02%	4.761E-01
CS-137	#	2.7980E-01	3.8336E+01%	9.868E-02
TL-208	#	1.5053E-01	4.6508E+01%	7.723E-02
PB-210	#	3.1792E+00	2.5734E+01%	8.839E-01
PB-212		2.3621E-01	5.4790E+01%	1.402E-01
PB-214	#	2.9533E-01	4.4766E+01%	2.061E-01
BI-214		5.1580E-01	4.1569E+01%	2.058E-01
RA-223	#A	-5.2038E-02	5.7978E+02%	5.080E-01
RA-224	#A	-7.1857E-01	1.4516E+02%	1.725E+00
AC-228	#A	2.3763E-01	1.1204E+02%	4.360E-01
TH-234	#	2.3217E+00	2.9270E+01%	7.538E-01
U-235	#A	0.0000E+00	1.8625E+02%	1.095E+00
Ra-226		4.5696E+00	2.1655E+01%	1.440E+00
AM-241		7.3002E-02	6.7890E+01%	7.142E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.8 to 2000.6 keV) 1.268E+01 Bq/sample

Analyzed by: _____
403293

Reviewed by: _____
Supervisor

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 07:48:45 Page 7
STL- St Louis Spectrum name: Ge5 background 11_21_07.An1

Laboratory: STL- St Louis

Ge7 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    1
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1

Sample description
     Ge7 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge7 bkgd\Ge7 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:50:18
       Live time:              43200
       Real time:              44220
       Dead time:                  2.31 %
       Detector ID:                    7

Detector system
     Ge 7 SN/154


Calibration
       Filename:                   Ge7 air filter 01_04_07.Clb
     Ge7 air filter 74140-334 01_04_07


       Energy Calibration
            Created:               04-Jan-2007 09:44:57
            Zero offset:           0.082 keV
            Gain:                  0.250 keV/channel
            Quadratic:             5.157E-09 keV/channel^2

       Efficiency Calibration
            Created:               04-Jan-2007 09:55:23
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.37 %
            Log(Eff):              6.564924E-01 + (-4.575726E-01*Log(E) ) +
                                   ( -3.880790E-02*Log(E)^2 )
            Below the Knee:        Quadratic        Uncertainty =   0.19 %
            Log(Eff):             -6.453588E+00 + ( 1.933612E+00*Log(E) ) +
                                   ( -2.285762E-01*Log(E)^2 )

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:            90 (    22.58keV )
       Stop channel:           8000 (  2000.15keV )
       Peak rejection level:     40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

▯

 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:07:45 Page    2
STL- St Louis                    Spectrum name: Ge7 background 11_21_07.An1
                                       Page 1
```

Ge7 background 11_21_07.Rpt

Random error:	0.0000000E+00
Systematic error:	0.0000000E+00
Fraction Limit:	0.000%
Background width:	average of three points.

Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000
Multiplet shift channel	2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 10 cutoff 20.00000 %

Energy Calibration

Normalized diff: 0.2579

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
23.39	188.	17.26	0.62	7.211E-02				
29.55	453.	11.10	0.94	7.991E-02	29.46	20.350	6.457E-01	I129
33.20	135.	27.90	0.47	8.331E-02				
40.27	166.	27.61	0.76	8.808E-02				
46.28	578.	11.03	0.77	9.072E-02	46.54	4.250	3.470E+00	PB210
63.10	498.	9.75	0.76	9.386E-02	63.29	4.820	2.548E+00	TH234
74.41	97.	24.75	0.88	9.388E-02				
77.06	125.	20.92	0.88	9.373E-02				
92.57	671.	8.34	0.99	9.212E-02	92.59	5.570	3.027E+00	TH234
143.96	102.	30.64	0.61	7.609E-02	143.76	10.960	2.842E-01	U235
145.13	1.	10.64	0.95	7.597E-02	144.23	3.220	PBC<MDA	RA223
185.59	330.	10.26	1.07	6.127E-02	185.71	57.200	2.178E-01	U235
197.70	154.	31.14	0.41	5.800E-02				
239.12	229.	23.87	1.02	4.911E-02	238.63	43.300	2.488E-01	PB212
337.98	32.	0.33	1.16	3.598E-02	338.28	2.790	PBC<MDA	RA223
346.03	83.	27.40	0.53	3.525E-02				
351.88	69.	36.45	1.18	3.471E-02	351.93	37.600	PBC<MDA	PB214
583.49	58.	39.50	1.42	2.168E-02	583.19	84.500	PBC<MDA	TL208

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
93.24	23.39	273.	188.	0.004	34.51	0.619	SN-113	s
117.91	29.55	519.	453.	0.010	22.20	0.936	TE-132	l
132.50	33.20	385.	135.	0.003	55.79	0.465	BA-139	l
160.78	40.27	527.	101.	0.002	67.63	0.756	EU-152	s
297.58	74.47	297.	91.	0.002	67.11	0.693	PB-214	
308.21	77.12	258.	104.	0.002	55.87	0.612	PB-214	s

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Ge7 background 11_21_07.Rpt
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	Suspected	
575.58	143.96	252.	102.	0.002	61.28	0.606	U-235	l
742.11	185.59	232.	330.	0.008	20.52	1.073	U-235	l
790.56	197.70	412.	154.	0.004	62.28	0.414	KR-89	sM
1383.93	346.03	117.	83.	0.002	54.79	0.534	HF-181	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	118.81	29.78	642.	281.	0.007	24.80	0.827D
I-129	133.40	33.43	566.	89.	0.002	78.15	0.831s
PB-210	184.80	46.28	634.	578.	0.013	22.05	0.767
TH-234	252.09	63.10	413.	498.	0.012	19.50	0.762s
TH-234	370.01	92.57	492.	671.	0.016	16.68	0.985s
RA-223	576.67	144.23	412.	1.	0.000	21.28	0.954D
Ra-226	744.60	186.21	407.	266.	0.006	24.76	1.000D
PB-212	956.25	239.12	460.	229.	0.005	47.75	1.021s
AC-228	1353.09	338.32	350.	32.	0.001	0.67	1.164D
PB-214	1407.31	351.88	284.	69.	0.002	72.91	1.179s
TL-208	2333.81	583.49	232.	58.	0.001	79.01	1.417s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	MDA Value Bq/sample	COMMENTS
Be-7	C	-2.6217E-01					
			477.61	-2.622E-01	%(	6.113E-01 7.04E+01	G
			1 of 1 peaks found				
K-40	N	-7.6775E-02					
			1460.83	-7.677E-02	%(	1.012E+00 3.78E+02	G
			1 of 1 peaks found				
CO-60	F	1.6295E-03					
			1332.50	1.630E-03	%(	9.943E-02 1.73E+03	G
			1173.24	3.709E-02	%	9.526E-02 7.70E+01	G
			2 of 2 peaks found				

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STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Nuclide Ave activity Energy Activity Code Peak MDA Comments
Page 3

Ge7 background 11_21_07.Rpt

```
I-129     I   2.2928E-01
                          29.78 2.147E-01 }   9.218E-02 1.24E+01 X
                          29.46 7.217E-02 }   1.816E-01 7.51E+01 X
                          33.61 2.419E-01     3.072E-01 3.91E+01 X
                          39.57 2.293E-01 %(  4.135E-01 5.49E+01 G
                          34.61-2.853E-01 &   1.439E+00 1.51E+02 X
                            5 of   5 peaks found

CS-137    I   2.5282E-02
                         661.66 2.528E-02 %(  9.732E-02 1.15E+02 G
                            1 of   1 peaks found

TL-208    N   7.3008E-02
                         583.19 7.301E-02 *(  9.303E-02 3.95E+01 G
                         860.56 4.559E-01 %   6.885E-01 4.66E+01 G
                            2 of   2 peaks found

PB-210    N   3.4696E+00
                          46.54 3.470E+00  (  7.203E-01 1.10E+01 G
                            1 of   1 peaks found

PB-212    N   2.4885E-01
                         238.63 2.488E-01 *(  1.116E-01 2.39E+01 G
                         300.10 4.881E-01 %   1.607E+00 9.88E+01 G
                            2 of   2 peaks found

PB-214    N   1.2280E-01
                         351.93 1.228E-01 @(  1.441E-01 3.65E+01 G
                         295.22 1.042E-01 &   2.667E-01 7.72E+01 G
                         242.00-7.215E-02 %   6.071E-01 2.50E+02 G
                            3 of   3 peaks found

BI-214    N   1.2372E-01
                         609.31 1.237E-01 %(  1.679E-01 4.20E+01 G
                        1764.49 3.233E-01 &   7.856E-01 7.30E+01 G
                        1120.29 1.921E-03 &   6.110E-01 9.08E+03 G
                         768.36-1.636E-02 &   1.410E+00 2.48E+03 G
                            4 of   4 peaks found

RA-223    N   5.2717E-03
                          83.79 6.497E-02 %   1.154E-01 5.41E+01 X
                         269.46 5.272E-03 &(  3.606E-01 2.02E+03 G
                         154.21 6.698E-02 &   5.727E-01 2.54E+02 G
                         144.23 5.272E-03 }   9.207E-01 1.06E+01 G
                         323.87 3.705E-01 &   1.454E+00 1.17E+02 G
                            5 of   6 peaks found

RA-224    N  -1.4485E-01
                         240.99-1.448E-01 %(  1.279E+00 2.63E+02 G
                            1 of   1 peaks found

AC-228    N   1.8327E-01
                         911.20 1.833E-01 %(  3.531E-01 5.87E+01 G
                         968.97 2.459E-01 %   5.187E-01 6.39E+01 G
                         338.32 1.833E-01 }   5.128E-01 3.35E-01 G
                            3 of   3 peaks found
```


Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments

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Ge7 background 11_21_07.Rpt

```
TH-234    N   2.8048E+00
                          63.29 2.548E+00 @(  4.984E-01 9.75E+00 G
                          92.59 3.027E+00 @(  4.785E-01 8.34E+00 G
                            2 of   2 peaks found

U-235     N   3.7275E-02
                         185.71 2.114E-02 }(  7.270E-02 1.03E+02 G
                         163.36 2.303E-01 }(  6.865E-01 8.97E+01 G
                         205.31 2.573E-02 }(  8.217E-01 9.44E+02 G
                            3 of   4 peaks found

Ra-226    N   2.8025E+00
                         186.21 2.803E+00 }(  1.021E+00 1.24E+01 G
                            1 of   1 peaks found

AM-241    T   1.4071E-02
                          59.54 1.407E-02 %(  6.420E-02 1.36E+02 G
                            1 of   1 peaks found
   ( - This peak used in the nuclide activity average.

   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                      Peak Codes:
   T - Thermal Neutron Activation      G - Gamma Ray
   F - Fast Neutron Activation         X - X-Ray
   I - Fission Product                 P - Positron Decay
   N - Naturally Occurring Isotope     S - Single-Escape
   P - Photon Reaction                 D - Double-Escape
   C - Charged Particle Reaction       K - Key Line
   M - No MDA Calculation              A - Not in Average
   R - Coincidence Corrected           C - Coincidence Peak
   H - Halflife limit exceeded

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0

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STL- St Louis                   Spectrum name: Ge7 background 11_21_07.An1


*************** D I S C A R D E D  I S O T O P E  P E A K S ***************
Nuclide Centroid  Background  Net Area   Intensity   Uncert   Activity
          Energy    Counts     Counts     Cts/Sec  2 Sigma %

I-129      29.78      642.       281.      0.007     24.80   2.147E-01
I-129      33.43      566.        89.      0.002     78.15   2.419E-01
```

Ge7 background 11_21_07.Rpt

PB-214	351.88	284.	69.	0.002	72.91	1.228E-01
TL-208	583.49	232.	58.	0.001	79.01	7.301E-02

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Activity Bq/sample	Time of Count Uncertainty 2 Sigma Counting	MDA Bq/sample
Be-7	#A	-2.6217E-01	1.4087E+02%	6.113E-01
K-40	#A	-7.6775E-02	7.5553E+02%	1.012E+00
CO-60	#A	1.6295E-03	3.4689E+03%	9.943E-02
I-129	#A	2.2928E-01	1.0977E+02%	4.135E-01
CS-137	#A	2.5282E-02	2.2936E+02%	9.732E-02
TL-208	#A	7.3008E-02	7.9007E+01%	9.303E-02
PB-210		3.4696E+00	2.2051E+01%	7.203E-01
PB-212	#	2.4885E-01	4.7748E+01%	1.116E-01
PB-214	#A	1.2280E-01	7.2905E+01%	1.441E-01
BI-214	#A	1.2372E-01	8.3934E+01%	1.679E-01
RA-223	#A	5.2717E-03	4.0366E+03%	3.606E-01
RA-224	#A	-1.4485E-01	5.2575E+02%	1.279E+00
AC-228	#A	1.8327E-01	1.1731E+02%	3.531E-01
TH-234	#	2.8048E+00	1.2828E+01%	4.984E-01
U-235	A	3.7275E-02	1.7944E+02%	8.217E-01
Ra-226		2.8025E+00	2.7743E+01%	1.021E+00
AM-241	#A	1.4071E-02	2.7247E+02%	6.420E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.6 to 2000.2 keV) 9.363E+00 Bq/sample

Analyzed by: _____
403605

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:07:45 Page 7
STL- St Louis Spectrum name: Ge7 background 11_21_07.An1

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

Ge8 background 11_21_07.Rpt

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    1
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1

Sample description
     Ge8 background 11_21_07


Spectrum Filename: C:\User\spectra\Ge8 bkgd\Ge8 background 11_21_07.A

Acquisition information
       Start time:                 21-Nov-2007 19:52:01
       Live time:              43200
       Real time:              44857
       Dead time:                  3.69 %
       Detector ID:                    8

Detector system
     Ge 8 SN/174


Calibration
       Filename:                   Ge8 air filter interp_122_quad.Clb
     Ge8  air filter_interp>122<quad


       Energy Calibration
            Created:               06-Nov-2006 15:12:36
            Zero offset:           0.014 keV
            Gain:                  0.250 keV/channel
            Quadratic:            -3.050E-09 keV/channel^2

       Efficiency Calibration
            Created:               06-Nov-2006 15:14:26
            Knee Energy:         122.07 keV
            Above the Knee:        Quadratic        Uncertainty =   1.61 %
            Log(Eff):              5.381757E-01 + (-5.615420E-01*Log(E) ) +
                                   ( -2.515438E-02*Log(E)^2 )
            Below the Knee:        Interpolative    Uncertainty =   0.00 %

Library Files
       Main analysis library:      long bkgd_pbc.lib
       Library Match Width:        0.750
       Peak stripping:             Library based

Analysis parameters
       Analysis engine:            Env32   G53W4.21
       Start channel:             90 (    22.52keV )
       Stop channel:            8000 (  2000.35keV )
       Peak rejection level:      40.000%
       Peak search sensitivity:    3
       Sample Size:                1.0000E+00
       Activity scaling factor:    1.0000E+00/(  1.0000E+00*  1.0000E+00) =
                                   1.0000E+00
       Detection limit method:     Reg. Guide 4.16 Method

       Random error:               0.0000000E+00
       Systematic error:           0.0000000E+00
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    2
STL- St Louis                    Spectrum name: Ge8 background 11_21_07.An1
                                       Page 1
```

Ge8 background 11_21_07.Rpt

Fraction Limit: 0.000%
Background width: average of three points.

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000
Multiplet shift channel 2.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	NO	
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc. 12 cutoff 20.00000 %
Energy Calibration
Normalized diff: 0.1437

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. Bq/sampl	Nuc
25.85	439.	17.91	0.98	7.362E-02				
29.52	518.	9.97	1.11	7.364E-02	29.46	20.350	7.999E-01	I129
63.12	715.	5.42	0.88	7.330E-02	63.29	4.820	4.686E+00	TH234
84.28	175.	21.65	0.90	7.044E-02	83.79	25.180	2.282E-01	RA223
92.47	1398.	5.34	1.10	6.915E-02	92.59	5.570	8.402E+00	TH234
143.63	200.	22.54	1.08	5.660E-02	143.76	10.960	7.488E-01	U235
185.64	683.	7.50	1.00	4.588E-02	185.71	57.200	6.026E-01	U235
238.54	182.	14.96	1.31	3.726E-02	238.63	43.300	2.605E-01	PB212
295.25	68.	38.42	1.04	3.113E-02	295.22	19.300	PBC<MDA	PB214
338.25	38.	0.33	1.07	2.772E-02	338.28	2.790	1.569E+00	RA223
511.02	945.	5.33	2.38	1.941E-02				
598.49	154.	25.28	0.27	1.689E-02				
609.45	64.	35.63	1.28	1.662E-02	609.31	46.090	PBC<MDA	BI214
898.43	68.	24.98	0.28	1.175E-02				
1461.18	53.	25.04	1.84	7.527E-03	1460.83	10.670	1.526E+00	K40

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

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
103.30	25.85	1327.	439.	0.010	25.33	0.977	CD-109	s
117.99	29.52	678.	518.	0.012	19.94	1.107	TE-132	l
742.34	185.64	388.	683.	0.016	15.00	0.995	U-235	l
2043.55	511.02	222.	945.	0.022	10.66	2.376	TL-208	s
2393.36	598.49	198.	154.	0.004	50.56	0.267	-	sM
3592.89	898.43	49.	68.	0.002	49.96	0.284	PA-234	s

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 3
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

s - Peak fails shape tests.
D - Peak area deconvoluted.

Ge8 background 11_21_07.Rpt

L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: long bkgd_pbc.lib

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

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
I-129	119.04	29.78	1112.	348.	0.008	0.09	0.812D
TH-234	252.37	63.12	262.	715.	0.017	10.84	0.876
RA-223	337.73	84.47	568.	111.	0.003	63.59	0.858s
TH-234	369.72	92.47	715.	1398.	0.032	10.68	1.100s
U-235	574.85	143.76	431.	140.	0.003	45.31	1.085D
RA-223	576.73	144.23	414.	22.	0.001	0.55	0.910D
Ra-226	744.60	186.21	403.	563.	0.013	13.14	0.946D
PB-212	953.86	238.54	176.	182.	0.004	29.92	1.309s
PB-214	1180.65	295.25	305.	68.	0.002	76.83	1.036s
AC-228	1352.89	338.32	315.	38.	0.001	0.67	1.071D
BI-214	2437.17	609.45	229.	64.	0.001	71.27	1.282s
K-40	5843.55	1461.18	61.	53.	0.001	50.07	1.843s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity Bq/sample	Peak Energy keV	Peak Activity Bq/sample	Code	Peak MDA Value Bq/sample	COMMENTS
Be-7	C	-2.4489E-01					
			477.61	-2.449E-01	%(	7.495E-01 9.17E+01	G
			1 of 1 peaks found				
K-40	N	1.5256E+00					
			1460.83	1.526E+00	@(	1.130E+00 2.50E+01	G
			1 of 1 peaks found				
CO-60	F	-1.7283E-03					
			1332.50	-1.728E-03	&(	1.225E-01 2.02E+03	G
			1173.24	-2.257E-02	%	1.247E-01 1.62E+02	G
			2 of 2 peaks found				
I-129	I	2.8897E-01					
			29.78	2.890E-01	}	1.314E-01 4.30E-02	X
			33.61	1.305E-01	%	4.324E-01 9.98E+01	X

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 4
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		39.57	2.890E-01	%(	4.905E-01 5.17E+01	G
		34.61	6.433E-01	&	1.630E+00 7.66E+01	X
		4 of 5 peaks found				
CS-137	I	3.6626E-02				

```
                                Ge8 background 11_21_07.Rpt
                               661.66 3.663E-02 &(  1.022E-01 8.37E+01 G
                                  1 of   1 peaks found

TL-208    N   4.6043E-02
                               583.19 4.604E-02 &(  1.122E-01 7.35E+01 G
                               860.56 1.757E-01 %   7.705E-01 1.29E+02 G
                                  2 of   2 peaks found

PB-210    N   4.2338E-01
                                46.54 4.234E-01 %(  8.404E-01 6.03E+01 G
                                  1 of   1 peaks found

PB-212    N   2.6051E-01
                               238.63 2.605E-01  (  9.250E-02 1.50E+01 G
                               300.10 5.416E-01 %   1.886E+00 1.04E+02 G
                                  2 of   2 peaks found

PB-214    N   1.5095E-01
                               351.93 9.453E-02 %(  1.895E-01 6.09E+01 G
                               295.22 2.609E-01 *(  3.237E-01 3.84E+01 G
                               242.00 2.345E-01 %   7.541E-01 9.65E+01 G
                                  3 of   3 peaks found

BI-214    N   1.9362E-01
                               609.31 1.936E-01 *(  2.211E-01 3.56E+01 G
                              1764.49 4.167E-01 %   7.719E-01 5.68E+01 G
                              1120.29 1.241E-01 %   7.957E-01 1.88E+02 G
                               768.36-3.096E-01 &   1.899E+00 1.80E+02 G
                                  4 of   4 peaks found

RA-223    N   2.7553E-01
                                83.79 1.448E-01 *   1.483E-01 3.18E+01 X
                               269.46-8.982E-02 &(  4.789E-01 1.59E+02 G
                               154.21 2.897E-02 &   7.497E-01 7.65E+02 G
                               144.23 2.755E-01 }   1.244E+00 2.77E-01 G
                               323.87 1.690E-02 %   1.742E+00 3.03E+03 G
                                  5 of   6 peaks found

RA-224    N  -7.0362E-02
                               240.99-7.036E-02 &(  1.628E+00 6.86E+02 G
                                  1 of   1 peaks found

AC-228    N   2.7845E-01
                               911.20 2.784E-01 %(  4.056E-01 4.51E+01 G
                               968.97 3.615E-01 %   6.834E-01 5.76E+01 G
                               338.32 2.784E-01 }   6.330E-01 3.34E-01 G
                                  3 of   3 peaks found

TH-234    N   4.6861E+00
                                63.29 4.686E+00  (  5.121E-01 5.42E+00 G
                                92.59 8.402E+00 +   7.655E-01 5.34E+00 G
                                  2 of   2 peaks found
```

```
 ORTEC     g v - i (3135) Env32  G53W4.21  22-NOV-2007 08:20:03 Page    5
 STL- St Louis                   Spectrum name: Ge8 background 11_21_07.An1

 Nuclide  Ave activity   Energy    Activity  Code Peak MDA  Comments

U-235     N   1.2819E-01
                               185.71 5.276E-02 }(  1.331E-01 7.63E+01 G
                               143.76 5.218E-01 }(  3.715E-01 2.27E+01 G
                                  2 of   4 peaks found
```

Ge8 background 11_21_07.Rpt

Ra-226 N 7.9373E+00
186.21 7.937E+00 }(1.356E+00 6.57E+00 G
1 of 1 peaks found

AM-241 T -7.7932E-03
59.54-7.793E-03 &(9.695E-02 3.70E+02 G
1 of 1 peaks found

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

********** D I S C A R D E D I S O T O P E P E A K S **********

Nuclide	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	Activity
I-129	29.78	1112.	348.	0.008	0.09	2.890E-01
RA-223	84.47	568.	111.	0.003	63.59	1.448E-01
RA-223	144.23	414.	22.	0.001	0.55	2.755E-01
PB-214	295.25	305.	68.	0.002	76.83	2.609E-01
BI-214	609.45	229.	64.	0.001	71.27	1.936E-01

0

ORTEC g v - i (3135) Env32 G53W4.21 22-NOV-2007 08:20:03 Page 6
STL- St Louis Spectrum name: Ge8 background 11_21_07.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
K-40		1461.18	61.	53.	0.001	50.07	1.526E+00

P - Peakbackground subtraction

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity Bq/sample	Uncertainty 2 Sigma Counting	MDA Bq/sample

Ge8 background 11_21_07.Rpt

Be-7	#A	-2.4489E-01	1.8340E+02%	7.495E-01
K-40	#	1.5256E+00	5.0072E+01%	1.130E+00
CO-60	#A	-1.7283E-03	4.0408E+03%	1.225E-01
I-129	#A	2.8897E-01	1.0349E+02%	4.905E-01
CS-137	#A	3.6626E-02	1.6736E+02%	1.022E-01
TL-208	#A	4.6043E-02	1.4698E+02%	1.122E-01
PB-210	#A	4.2338E-01	1.2054E+02%	8.404E-01
PB-212		2.6051E-01	2.9920E+01%	9.250E-02
PB-214	#A	1.5095E-01	7.1988E+01%	1.895E-01
BI-214	#A	1.9362E-01	7.1268E+01%	2.211E-01
RA-223	#A	2.7553E-01	4.3437E+01%	4.789E-01
RA-224	#A	-7.0362E-02	1.3722E+03%	1.628E+00
AC-228	#A	2.7845E-01	9.0216E+01%	4.056E-01
TH-234		4.6861E+00	1.0837E+01%	5.121E-01
U-235	#A	1.2819E-01	4.5306E+01%	1.021E+00
Ra-226		7.9373E+00	1.4531E+01%	1.356E+00
AM-241	#A	-7.7932E-03	7.3956E+02%	9.695E-02

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (22.5 to 2000.3 keV) 1.301E+01 Bq/sample

Analyzed by: _____
403605

Reviewed by: _____
Supervisor

Laboratory: STL- St Louis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Run Log

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/23/7	7356122	KSIKF5IAD	1	30min	tumacan	[illegible]
		KSIKFPIAC	3			
		KSIKFTIAC	4			
		KSIKFVIAC	5			
		KSIKFOIAC	7			
		KSIKF1IAC	1			
		KSIKF5IAC	3			
		KSIKF7IAC	4			
		KSIKF8IAC	5			
		KSIKF9IAC	7			
		KSIKGDIAC	1			
		KSIKGFIAC	3			
		KSIKGGIAC	4			
		KSQKCIAA	5			
		KSQKCIAC	7			
12/20/7	Daily	Pshg + Source	1,3-8	20+30min	QA	SE
	7337395	KC6QE1AD	1	30min	tumacan	
		KC6QL1AD	3			
		KDCLL1AA	4			
		KDCLL1AC	5			
	M070859	1L2307-1	7			
		-2	1			
		-3	3			
		-4	4			
		-5	5			
	7337395	KC6QE1AE	7			
	M070858	2L1207-6	7			

Reviewed By: SE Date: 12/20/7

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/26/17	7353500	KEFØW1AG	5	1.5 hrs	1L Mann	SE
	M070859	1L7307-6	1	30 min	tuna can	
		-7	3			
		-8	4			
12/26/17	7355392	KEGTX1AA	7	2 hrs	Solid 25mL	KW
	7346346	KDWLR1AH	1	30 min	Tuna can	
		KDWL81AH	3			
		KDWL91AH	4			
		KDOWQ1AA	1			
		KDWLR1CK	3			
		DDOWQ1AC	4			
	7353500	KEGTE1AA	5	1.5 hrs	1L Mann	
	M070858	2L1707-3	1	30 min	Tuna can	
		-4	3			
		-7	4			
		-8	1			
		2L1807-5	4			
		-6	5			
		-8	7			
	7355392	KENWG1AA	3	2 hrs	25mL solid	
	7360292	KEKC31AC	1	30 min	tuna can	
		KEKC71AC	4			
		KEKDC1AC	5			
		KEKDE1AC	7			
		KEKC31AD	4			
		KEKDK1AC	1			
		KEKDR1AC	5			

Reviewed By: [signature] Date: 12/26/17

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/26/7	7360292	KEKDx1AC	7	30 min	turn in	e
		KEKD41AC	1			W
		KEKD61AC	3			
		KEKEC1AC	4			
		KEKE61AC	5			
		KEKEM1AC	7			
		KEKEW1AC	1			e
		KEKE11AC	3			
		KEKE21AC	4			
		KEKE41AC	5			
		KEKE51AC	7			
		KERG61AC	1			
	—	KERG61AC	3			
	7337325	KDCL1AC-PC	4			
	7360274	KEKG21AC	5			
		KEKH+M1AC	7			
		KEKH+Q1AC	1			
		KEKH+R1AC	3			
		KEKHU1AC	4			
		KEKH+X1AC	5			
		KEKG21AD	7			
		KEKH11AC	1			
		KEKH31AC	3			
		KEKH41AC	4			
		KEKH51AC	5			
		KEKH61AC	7			
		KEKH91AC	1			

Reviewed By: [signature] Date: 12/26/7

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06
QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

Logbook No.: 3021

TESTAMERICA
St. Louis

Gamma Counting Runlog

Date	Batch #	Sample #	Detector	Count Time	Geometry	Initials
12/21/7	7360254	KE1KJC1AC	3	30 min	tuna can	E
		KE1KJE1AC	4			
		KE1KJG1AC	5			
		KE1KJJ1AC	7			
		KE1KLC1AC	1			
		KERYL1AA	3			
		KERYL1AC	4			
	7357015	KEKAJ1AG	7	2hrs	1L Mariner	
	↓	KEQK01AC	5		↓	
10/07/7	Daily	Bkg & Source	1,3-8	30+30min	QA	SE
	7340388	KDHPX1AC	1	30min	tunacan	
		KDHP31AC	3			
		KDHP41AC	4			
		KDHP61AC	5			
		KDHP71AC	7			
		KDHPX4AE	4			
		KDLDN1AA	5			
		KDLDN1AC	7			
	7340390	KDD041AE	1			
		KDD081AE	3			
		KDG5C1AE	1			
		KDD041AF	3			
		KDLD01AA	4			
	7357015	KEKAJ1AF	5	3hrs	1L Mariner	
	↓	KEQK01AA	7	3hrs	↓	
	7340390	KDLD01AC	1	30min	tuna can	

Reviewed By:_____ Date:_____

SOP Reference: STL-RD-0101 Rev 9 07/12/07
Form No.: SL-RAD-0026, Revised 7/20/06

QC Type Suffixes: B=Blank; C=Laboratory Control Sample; L=Laboratory Control Sample Duplicate; S=Matrix Spike; D=Matrix Spike Duplicate; X=Sample Duplicate.

CS137 1/4/08

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Prep Report for Gamma Spectroscopy

Batch: 7360294 **Prep Analyst:** 403135

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200271-001	KEKG21AC	3.4510E+002 g	1.00	3.4510E+002 g	Tuna Can
F7L200271-001X	KEKG21AD	3.4510E+002 g	1.00	3.4510E+002 g	Tuna Can
F7L200271-002	KEKHM1AC	3.9400E+002 g	1.00	3.9400E+002 g	Tuna Can
F7L200271-003	KEKHQ1AC	3.7320E+002 g	1.00	3.7320E+002 g	Tuna Can
F7L200271-004	KEKHR1AC	3.0090E+002 g	1.00	3.0090E+002 g	Tuna Can
F7L200271-005	KEKHV1AC	3.0320E+002 g	1.00	3.0320E+002 g	Tuna Can
F7L200271-006	KEKHX1AC	3.9960E+002 g	1.00	3.9960E+002 g	Tuna Can
F7L200271-007	KEKH11AC	3.5250E+002 g	1.00	3.5250E+002 g	Tuna Can
F7L200271-008	KEKH31AC	4.0540E+002 g	1.00	4.0540E+002 g	Tuna Can
F7L200271-009	KEKH41AC	4.0730E+002 g	1.00	4.0730E+002 g	Tuna Can
F7L200271-010	KEKH51AC	3.4400E+002 g	1.00	3.4400E+002 g	Tuna Can
F7L200271-011	KEKH61AC	3.6230E+002 g	1.00	3.6230E+002 g	Tuna Can
F7L200271-012	KEKH91AC	3.2220E+002 g	1.00	3.2220E+002 g	Tuna Can
F7L200271-013	KEKJC1AC	3.0520E+002 g	1.00	3.0520E+002 g	Tuna Can
F7L200271-014	KEKJE1AC	4.0240E+002 g	1.00	4.0240E+002 g	Tuna Can
F7L200271-015	KEKJG1AC	3.4850E+002 g	1.00	3.4850E+002 g	Tuna Can
F7L200271-016	KEKJJ1AC	3.3210E+002 g	1.00	3.3210E+002 g	Tuna Can

SampID	WRKNO	Aliquot	Dilution	Adjusted Aliquot	GeometryDesc
F7L200271-017	KEKLC1AC	3.3460E+002 g	1.00	3.3460E+002 g	Tuna Can
F7L260000-294B	KER4L1AA	3.7280E+002 g	1.00	3.7280E+002 g	Tuna Can
F7L260000-294C	KER4L1AC	3.5120E+002 g	1.00	3.5120E+002 g	Tuna Can

Spike Information

Sample ID	Standard ID	Analyte	Std Conc	Aliquot	Ref Date	StdAdded
F7L260000-294C	GV Tuna Can	AM-241	2.289E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	1.031E+002 pCi/g
F7L260000-294C	GV Tuna Can	CO-60	1.392E+002 dpm/g	351.20 g	4/1/2004 12:00:00AM	6.272E+001 pCi/g
F7L260000-294C	GV Tuna Can	CS-137	8.884E+001 dpm/g	351.20 g	4/1/2004 12:00:00AM	4.002E+001 pCi/g

Spiked By | Spike Verified By | Spike Date

Standard Operating Procedures

SOPNumber	Title	Revision
☐ STL-RC-0025	Preparation Of Samples For Gamma Spectroscopy	4.00
☐ STL-RD-0101	Daily Operations Of A Germanium Spectroscopy System	6.00
☐ STL-RD-0103	Maintenance Of The Germanium Spectroscopy System	0.00

Reviewed By: DR — Review Date: 12-27-07

Analyst/Relenquished By: [illegible] — Release Date: 12/26/07

Received By: [illegible] — Receipt Date: 12/26/07

DB Analysis ID: 33,063

Sample Description: 7360294_KEKG21AC_F7L200271-001

Spectrum Filename: KEKG21AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:00:29PM		
Live Time:	1800.00	Real Time:	1854.36
Dead Time:	2.93 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2134

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.02	74.72	173.33	118.67	0.066	23.14	0.628	PB-214	
307.57	77.10	165.00	225.00	0.125	13.22	0.633	PB-214	
348.04	87.21	89.94	80.06	0.044	20.14	0.922	PB-214	
358.79	89.90	60.00	39.00	0.022	35.25	0.836	PB-214	M
743.09	185.91	84.33	113.67	0.063	20.09	0.949	RA-226	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.74	46.42	84.93	34.07	0.019	32.42	0.450	s
AM-241	1	237.49	59.60	140.33	11.32	0.006	116.12	0.761	s
TH-234	1	251.15	63.01	170.17	64.83	0.036	33.56	0.731	s
EU-155	1	345.35	86.54	167.54	1.12	0.001	1637.50	0.788	
TH-234	1	371.33	93.03	119.53	149.47	0.083	14.11	1.371	s
U-235	1	372.61	93.35	138.10	-0.67	0.000	-740.51	0.795	s D
AC-228	1	372.61	93.35	138.10	35.25	0.020	5.36	0.795	s D
EU-155	1	422.41	105.79	65.47	9.79	0.005	121.16	0.808	s
EU-152	1	484.77	121.37	101.39	8.99	0.005	161.88	0.824	s
EU-154	1	493.10	123.45	110.76	0.79	0.000	1892.95	0.826	s
Pa-234	1	523.81	131.12	111.02	-5.21	-0.003	289.36	0.834	s
U-235	1	574.49	143.79	132.17	-1.27	-0.001	1342.34	0.847	s
U-235	1	652.92	163.38	90.96	0.46	0.000	545.67	0.867	s
U-235	1	820.44	205.23	63.68	3.77	0.002	303.73	0.909	s
PB-212	1	954.86	238.82	75.81	313.19	0.174	7.99	1.172	s
RA-224	1	959.97	240.09	316.15	-77.95	-0.043	34.19	0.944	
PB-214	1	966.94	241.84	63.33	72.67	0.040	25.64	0.539	s
TL-208	1	1109.77	277.52	48.37	22.25	0.012	49.02	0.980	
I-131	1	1140.15	285.11	47.56	-8.03	-0.004	126.51	0.987	s
PB-214	1	1180.62	295.22	22.58	115.42	0.064	11.62	1.105	
PB-212	1	1199.96	300.06	16.33	24.67	0.014	36.06	0.796	s
AC-228	1	1353.87	338.52	54.14	36.52	0.020	32.95	1.040	s
EU-152	1	1376.97	344.29	45.17	0.00	0.000	950.53	1.045	s
PB-214	1	1407.23	351.85	25.21	233.79	0.130	7.93	1.215	s
I-131	1	1456.77	364.23	36.99	-5.84	-0.003	153.02	1.065	s
BE-7	1	1910.43	477.59	46.47	0.00	0.000	964.05	1.173	s
CS-134	1	2250.64	562.62	20.21	1.31	0.001	492.95	1.252	s
CS-134	1	2277.45	569.32	37.03	-0.02	0.000	-32.84	1.258	s D
Pa-234	1	2278.05	569.47	25.58	-0.78	0.000	-132.02	1.258	s D
TL-208	1	2334.31	583.53	13.75	82.25	0.046	13.22	1.051	
CS-134	1	2429.65	607.36	20.20	-0.10	0.000	6643.88	1.290	s
BI-214	1	2438.21	609.50	11.23	133.77	0.074	9.15	1.193	
I-131	1	2549.01	637.19	23.11	4.62	0.003	154.32	1.319	s
CS-137	1	2646.99	661.68	28.41	7.03	0.004	57.14	1.342	s
EU-154	1	2894.20	723.48	31.30	-6.24	-0.003	133.01	1.397	s
BI-212	1	2910.61	727.58	14.42	13.93	0.008	46.93	1.400	s
PA-234M	1	3063.37	765.77	38.03	-3.46	-0.002	257.49	1.434	s
EU-152	1	3115.99	778.92	59.51	0.00	0.000	1090.99	1.445	s
BI-212	1	3140.62	785.08	26.45	3.63	0.002	206.95	1.451	s
CS-134	1	3183.78	795.87	44.31	0.00	0.000	941.40	1.460	s
CS-134	1	3207.92	801.90	28.48	-2.77	-0.002	279.46	1.465	s
TL-208	1	3443.53	860.80	26.02	6.88	0.004	111.50	1.516	s
EU-154	1	3502.56	875.56	17.25	-0.23	0.000	2558.73	1.527	s
Pa-234	1	3521.36	880.26	15.47	3.01	0.002	193.70	1.533	s
Pa-234	1	3534.39	883.52	23.22	-1.17	-0.001	587.69	1.535	s
AC-228	1	3646.30	911.50	10.80	43.87	0.024	18.44	1.559	s

Pa-234	1	3773.48	943.30	18.11	-0.84	0.000	727.36	1.588	s
EU-152	1	3859.51	964.80	27.15	10.55	0.006	76.31	1.603	s
AC-228	1	3877.17	969.22	26.47	19.62	0.011	43.41	1.607	s
EU-154	1	3986.48	996.55	27.62	-2.50	-0.001	303.81	1.630	s
PA-234M	1	4003.83	1000.89	19.20	5.54	0.003	119.66	1.633	s
EU-154	1	4020.75	1005.12	23.92	2.03	0.001	347.25	1.637	s
EU-152	1	4443.61	1110.86	23.32	-3.58	-0.002	197.99	1.723	s
BI-214	1	4461.07	1115.22	18.72	-0.29	0.000	2112.66	1.730	s
CO-60	1	4693.23	1173.28	19.90	3.46	0.002	190.22	1.772	s
EU-154	1	5085.02	1271.26	12.01	-1.04	-0.001	482.66	1.850	s
CO-60	1	5332.43	1333.14	7.94	5.04	0.003	90.81	1.894	s
EU-152	1	5631.70	1408.00	26.69	0.00	0.000	730.57	1.950	s
K-40	1	5844.70	1461.28	0.00	292.00	0.162	5.85	2.105	
BI-214	1	7059.04	1765.10	8.20	16.68	0.009	30.17	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code	Peak MDA Value Becquerels		Peak Code	Peak Comments	
EU-155	T F I	1	7.258E-001	105.31	7.258E-001	*	(	2.996E+000G			1.8E+003	21.20
			7.258E-001	86.54	6.056E-002	&		3.409E+000G		A	1.8E+003	30.70
BI-212	N	1	6.947E+000	727.33	6.947E+000	%	(	1.017E+001G			7.0E+002	11.82
			6.947E+000	785.51	2.075E+001	%		1.523E+002G			7.0E+002	1.10
AM-241	T	1	6.440E-001	59.54	6.440E-001	%	(	P 3.295E+000G			1.6E+005	35.90
PA-234M	N	1	5.066E+001	1001.00	5.066E+001	%	(	2.115E+002G			1.6E+012	.84
			5.066E+001	766.41	-7.251E+001	%		6.584E+002G			1.6E+012	.29
CS-134	T F I	1	-4.944E-003	604.71	-4.944E-003	%	(	1.221E+000G			7.5E+002	97.62
			-4.944E-003	795.87	0.000E+000	%		2.504E+000G			7.5E+002	85.53
			-4.944E-003	569.32	-4.944E-003	%		9.660E+000G			7.5E+002	15.38
			-4.944E-003	801.95	-2.033E+000	%		2.028E+001G			7.5E+002	8.69
			-4.944E-003	563.24	7.435E-001	&		1.342E+001G			7.5E+002	8.35
CO-60	T F	1	4.866E-001	1332.50	4.866E-001	%	(	1.531E+000G			1.9E+003	99.98
			4.866E-001	1173.24	3.013E-001	&		2.048E+000G			1.9E+003	99.90
TL-208	F N	1	4.752E+000	583.02	4.752E+000		(	P 1.155E+000G			7.0E+002	84.50
			4.752E+000	277.28	8.805E+000	%		1.390E+001G			7.0E+002	6.31
			4.752E+000	860.56	3.753E+000	%		1.443E+001G			7.0E+002	12.42
			-4.563E-001	883.24	-8.457E-001	%		1.813E+001G			1.6E+012	9.60
			-4.563E-001	880.53	3.457E+000	&		2.418E+001G			1.6E+012	6.00
Pa-234	N	1	-4.563E-001	131.29	-4.563E-001	%	(	4.538E+000G			1.6E+012	18.00
			-4.563E-001	569.47	-4.563E-001	%		1.533E+001G			1.6E+012	8.20
			-4.563E-001	946.02	-4.567E-001	%		1.230E+001G			1.6E+012	13.40
CS-137	T F I	1	4.492E-001	661.66	4.492E-001	%	(	P 1.760E+000G			1.1E+004	85.21
RA-224	N	1	-4.209E+001	240.99	-4.209E+001		(	4.620E+001G			7.0E+002	4.10
TH-234	N	1	3.545E+001	63.29	2.626E+001	*	(	P 2.572E+001G			1.6E+012	4.82
			3.545E+001	92.59	4.339E+001	*	(	P 1.557E+001G			1.6E+012	5.58
K-40	N	1	2.854E+002	1460.83	2.854E+002		(	7.204E+000G			4.7E+011	10.67
PB-210	N	1	2.502E+001	46.54	2.502E+001	%	(	P 3.352E+001G			8.1E+003	4.25
I-131	T F I	1	-2.287E-001	364.48	-2.287E-001	%	(	1.216E+000G			8.0E+000	81.70
			-2.287E-001	284.30	-3.337E+000	&		1.449E+001G			8.0E+000	6.14
			-2.287E-001	636.97	3.395E+000	&		1.845E+001G			8.0E+000	7.17
			1.967E+001	242.00	2.173E+001		(	1.190E+001G			5.8E+005	7.43

PB-214	N	1	1.967E+001	351.93	1.927E+001	@	(	P		2.151E+000G		5.8E+005	37.60
			1.967E+001	295.09	1.578E+001	-		P		3.398E+000G		5.8E+005	19.30
U-235	N	1	-1.873E-001	143.79	-1.873E-001	%	(	P		8.283E+000G		2.6E+011	10.96
			-1.873E-001	205.33	1.471E+000	%				1.556E+001G		2.6E+011	5.01
			-1.873E-001	163.38	1.552E-001	%		P		1.577E+001G		2.6E+011	5.08
			-1.873E-001	93.35	-1.873E-001	!			E	1.599E+001X		2.6E+011	5.81
PB-212	N	1	1.588E+001	238.63	1.588E+001		(	P		2.195E+000G		7.0E+002	43.30
			1.588E+001	300.03	2.014E+001	*				1.759E+001G		7.0E+002	3.28
BI-214	N	1	1.436E+001	609.31	1.472E+001		(	P		2.017E+000G		5.8E+005	46.09
			1.436E+001	1120.29	-1.614E-001	%				1.270E+001G		5.8E+005	15.10
			1.436E+001	1764.49	1.330E+001	?	(	P		1.280E+001G		5.8E+005	15.40
EU-154 T F I		1	-1.286E-001	873.23	-1.286E-001	%	(			1.232E+001G		3.1E+003	12.27
			-1.286E-001	123.10	3.018E-002	%				1.983E+000G		3.1E+003	40.79
			-1.286E-001	1274.54	-2.745E-001	%				4.992E+000G		3.1E+003	35.19
			-1.286E-001	723.36	-1.810E+000	%				8.349E+000G		3.1E+003	20.22
			-1.286E-001	1004.77	8.670E-001	%				1.087E+001G		3.1E+003	18.01
			-1.286E-001	996.33	-1.799E+000	%				1.956E+001G		3.1E+003	10.60
AC-228	N	1	1.025E+001	911.16	1.073E+001	?	(			4.408E+000G		2.1E+003	29.00
			1.025E+001	968.97	8.378E+000	%				1.139E+001G		2.1E+003	17.46
			1.025E+001	338.32	9.087E+000	@	(			9.205E+000G		2.1E+003	12.01
			1.025E+001	93.35	1.025E+001	+			E	1.671E+001G	A	2.1E+003	5.56
BE-7	N P C	1	0.000E+000	477.60	0.000E+000	&	(			1.342E+001G		5.3E+001	10.52
			0.000E+000	121.78	4.912E-001	%				2.712E+000G		4.9E+003	28.58
			0.000E+000	778.92	0.000E+000	%				1.864E+001G		4.9E+003	12.94
			0.000E+000	964.11	5.365E+000	%				1.372E+001G		4.9E+003	14.61
			0.000E+000	1112.07	-2.186E+000	%				1.540E+001G		4.9E+003	13.64
			0.000E+000	1408.00	0.000E+000	%				1.289E+001G		4.9E+003	21.00
EU-152 T F		1	0.000E+000	344.29	0.000E+000	%	(			3.899E+000G		4.9E+003	26.50

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#			964.05	964.05	1.342E+001
K-40		2.854E+002	2.854E+002	5.85	6.54	7.204E+000
CO-60	#	4.866E-001	4.867E-001	90.81	90.85	1.531E+000
I-131	#	-2.287E-001	-2.328E-001	153.02	153.04	1.216E+000
EU-154	#	-1.286E-001	-1.286E-001	2,558.73	2,558.73	1.232E+001
CS-134	#	-4.944E-003	-4.945E-003	6,643.88	6,643.88	1.221E+000
CS-137	#	4.492E-001	4.492E-001	107.92	107.96	1.760E+000
EU-152	#			950.53	950.53	3.899E+000
EU-155	#	7.258E-001	7.258E-001	121.16	121.21	2.996E+000
TL-208		4.752E+000	4.753E+000	13.83	14.12	1.155E+000
BI-212	#	6.947E+000	6.949E+000	46.93	47.02	1.017E+001
BI-214		1.436E+001	1.436E+001	9.61	10.04	2.017E+000
RA-224	#	-4.209E+001	-4.209E+001	34.19	34.32	4.620E+001
TH-234	#	3.545E+001	3.545E+001	16.27	16.68	2.572E+001
PA-234M	#	5.066E+001	5.066E+001	119.66	119.69	2.115E+002
U-235	#	-1.873E-001	-1.873E-001	3,952.70	3,952.70	8.283E+000
PB-210		2.502E+001	2.502E+001	48.84	49.00	3.352E+001
PB-212		1.588E+001	1.589E+001	8.16	8.69	2.195E+000
PB-214		1.967E+001	1.967E+001	8.10	8.60	2.151E+000
AC-228	#	1.025E+001	1.025E+001	18.44	18.67	4.408E+000
Pa-234	#	-4.563E-001	-4.563E-001	289.36	289.38	4.538E+000
AM-241	#	6.440E-001	6.440E-001	150.11	150.16	3.295E+000

= All peaks for activity calculation had bad shape

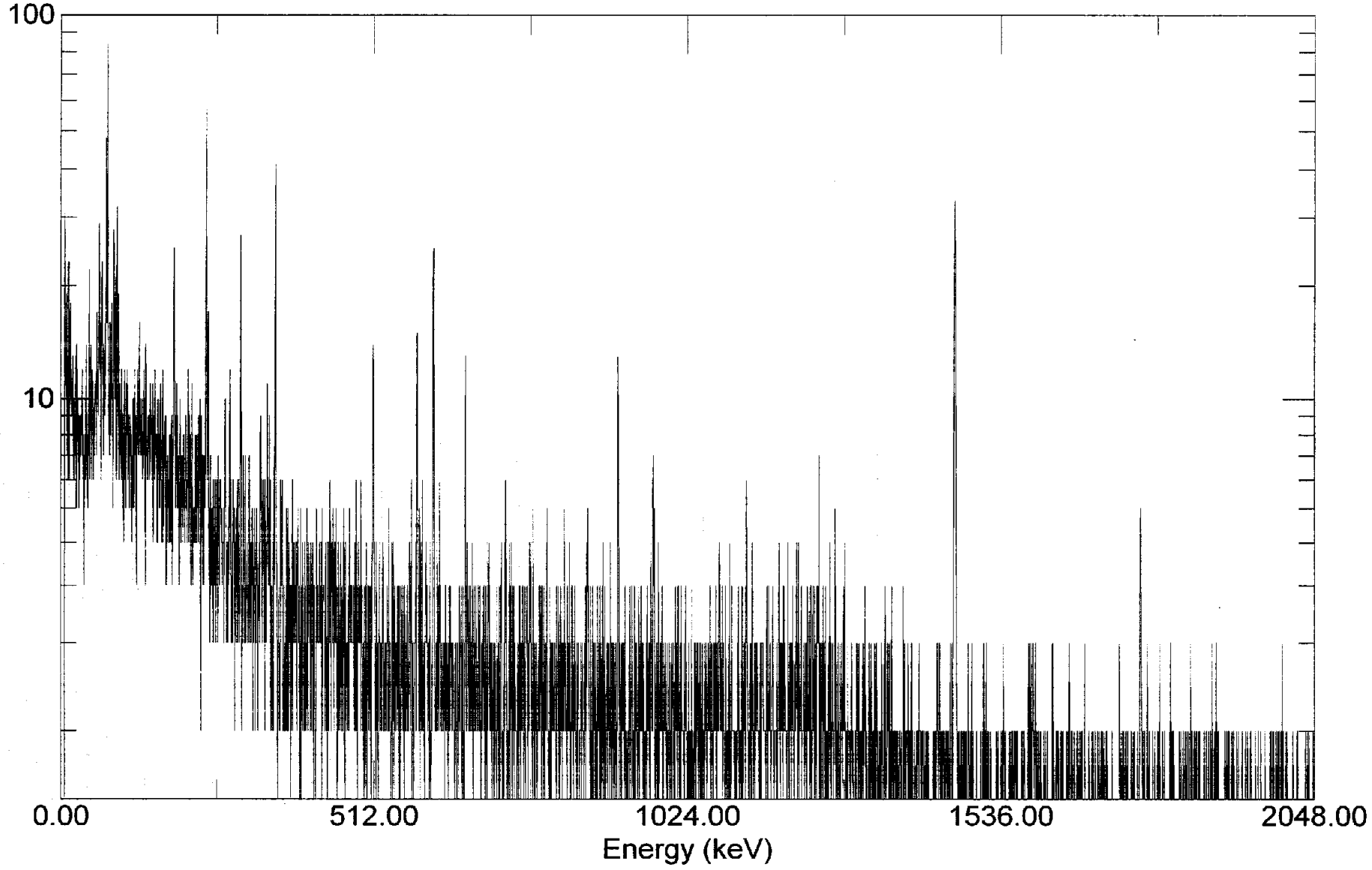
Total Activity (37.74 to 2,000.57 keV) 375.55 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKG21AC

7360294_KEKG21AC_F7L200271-001



Acquired: 26-Dec-2007 5:00:30 PM
File: C:\User\spectra\KEKG21AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1854.36 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,069

Sample Description: 7360294_KEKG21AD_F7L200271-001X

Spectrum Filename: KEKG21AD.An1

Acquisition Information

Start Time:	26-Dec-2007 5:46:19PM		
Live Time:	1800.00	Real Time:	1823.94
Dead Time:	1.31 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File:	mmr06 short.lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1662

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.72	74.65	282.67	126.33	0.070	26.99	0.668	PB-214	
307.71	77.14	198.00	210.00	0.117	13.50	1.085	PB-214	s
1313.86	328.63	25.50	39.50	0.022	29.66	0.676	LA-140	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.74	46.65	173.09	8.71	0.005	55.43	0.832	
AM-241	1	236.80	59.42	200.35	-0.43	0.000	4704.74	0.846	s
TH-234	1	252.61	63.37	294.44	9.67	0.005	79.03	0.850	s
EU-155	1	345.32	86.54	267.83	-2.48	-0.001	934.43	0.874	s
TH-234	1	370.29	92.78	315.01	28.67	0.016	44.35	0.881	s
AC-228	1	372.56	93.35	218.93	47.14	0.026	3.16	0.882	s D
U-235	1	372.56	93.35	276.26	0.00	0.000	2107.13	0.882	s D
EU-155	1	414.96	103.95	102.84	21.02	0.012	71.62	0.894	s
EU-152	1	488.78	122.40	124.96	17.68	0.010	92.55	0.912	s
EU-154	1	493.79	123.65	174.32	-16.77	-0.009	113.99	0.913	s
Pa-234	1	522.77	130.90	166.13	-6.27	-0.003	293.29	0.922	s
U-235	1	572.22	143.26	128.97	17.29	0.010	95.96	0.935	s
U-235	1	650.61	162.85	127.23	-10.02	-0.006	162.31	0.955	s
U-235	1	818.38	204.78	101.23	9.01	0.005	161.38	0.999	s
PB-212	1	955.87	239.15	136.04	468.96	0.261	7.54	0.893	s
RA-224	1	961.09	240.45	512.18	-91.14	-0.051	36.65	1.036	
PB-214	1	975.38	244.03	142.47	-14.91	-0.008	116.15	1.037	
TL-208	1	1109.89	277.65	86.54	11.03	0.006	123.04	1.074	s
I-131	1	1134.39	283.77	62.45	-3.72	-0.002	304.69	1.081	s
PB-214	1	1179.75	295.11	39.00	151.00	0.084	11.60	1.283	s
PB-212	1	1198.08	299.69	40.00	43.00	0.024	34.21	0.513	s
AC-228	1	1352.81	338.37	65.89	55.60	0.031	24.62	1.136	s
EU-152	1	1380.62	345.32	62.04	0.11	0.000	9864.14	1.142	s
PB-214	1	1407.41	352.02	31.88	257.12	0.143	7.97	1.300	s
I-131	1	1453.90	363.63	32.64	0.05	0.000	14759.70	1.163	s
BE-7	1	1915.32	478.97	23.86	0.41	0.000	1674.81	1.277	s
CS-134	1	2257.16	564.42	33.50	0.17	0.000	4762.65	1.363	s
CS-134	1	2276.76	569.32	38.26	-2.07	-0.001	-43.72	1.369	s D
Pa-234	1	2277.35	569.47	37.53	-0.92	-0.001	-116.55	1.369	s D
TL-208	1	2332.83	583.34	47.91	78.59	0.044	16.19	1.382	
CS-134	1	2425.56	606.52	59.70	-12.44	-0.007	92.27	1.403	s
BI-214	1	2436.84	609.34	39.08	136.64	0.076	10.51	1.408	s
I-131	1	2547.96	637.11	28.11	2.67	0.001	286.98	1.435	s
CS-137	1	2646.65	661.78	34.92	21.28	0.012	43.16	1.459	s
EU-154	1	2891.17	722.91	31.93	-3.60	-0.002	228.40	1.519	s
BI-212	1	2908.67	727.28	23.41	11.10	0.006	68.58	1.523	s
PA-234M	1	3065.29	766.43	22.97	7.28	0.004	100.16	1.561	s
EU-152	1	3096.92	774.34	12.81	-0.05	0.000	9308.02	1.573	s
BI-212	1	3143.02	785.86	32.99	-0.32	0.000	2517.17	1.579	s
CS-134	1	3181.42	795.46	26.02	5.18	0.003	145.98	1.589	s
CS-134	1	3206.52	801.74	37.87	-6.25	-0.003	144.97	1.595	s
TL-208	1	3442.22	860.66	22.68	4.98	0.003	142.54	1.650	s
EU-154	1	3490.17	872.65	32.16	-4.55	-0.003	182.31	1.662	s
Pa-234	1	3519.22	879.91	26.46	0.36	0.000	2000.22	1.669	s
Pa-234	1	3530.67	882.77	27.15	-2.69	-0.001	280.91	1.672	s
AC-228	1	3644.48	911.22	33.78	53.02	0.029	20.71	1.698	s

Pa-234	1	3779.27	944.92	34.47	3.37	0.002	252.18	1.731	s
EU-152	1	3853.49	963.47	44.54	-2.92	-0.002	328.62	1.748	s
AC-228	1	3876.30	969.17	33.82	31.40	0.017	31.70	1.752	s
EU-154	1	3984.60	996.25	21.16	-3.94	-0.002	172.74	1.778	s
PA-234M	1	4004.24	1001.16	18.51	1.81	0.001	345.10	1.782	s
EU-154	1	4020.63	1005.26	11.66	5.47	0.003	98.09	1.785	s
EU-152	1	4447.92	1112.07	73.49	0.00	0.000	1212.35	1.884	s
BI-214	1	4482.72	1120.77	23.76	27.87	0.015	31.15	1.891	s
CO-60	1	4699.03	1174.85	20.55	9.82	0.005	72.67	1.939	s
EU-154	1	5097.80	1274.54	63.68	0.00	0.000	1128.58	2.030	s
CO-60	1	5316.20	1329.14	15.83	0.40	0.000	1420.37	2.081	s
EU-152	1	5631.98	1408.09	15.69	4.67	0.003	128.55	2.147	s
K-40	1	5843.13	1460.88	0.00	390.00	0.217	5.06	1.642	s
BI-214	1	7058.89	1764.85	12.01	12.05	0.007	49.86	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Comments	
AC-228	N	1	9.882E+000	911.16	9.681E+000 *	(	5.441E+000G		2.1E+003	29.00
			9.882E+000	968.97	1.004E+001 *	(	9.530E+000G		2.1E+003	17.46
			9.882E+000	338.32	1.014E+001	(	7.395E+000G		2.1E+003	12.01
			9.882E+000	93.35	9.882E+000 !	E	1.502E+001G	A	2.1E+003	5.56
EU-152	T F	1	9.492E-003	344.29	9.492E-003 %	(	3.312E+000G		4.9E+003	26.50
			9.492E-003	121.78	6.974E-001 %		2.162E+000G		4.9E+003	28.58
			9.492E-003	778.92	-1.948E-002 %		6.938E+000G		4.9E+003	12.94
			9.492E-003	964.11	-1.111E+000 %		1.287E+001G		4.9E+003	14.61
			9.492E-003	1112.07	0.000E+000 %		1.965E+001G		4.9E+003	13.64
			9.492E-003	1408.00	1.723E+000 %		7.808E+000G		4.9E+003	21.00
PB-210	N	1	5.198E+000	46.54	5.198E+000 %	(P	3.822E+001G		8.1E+003	4.25
CS-134	T F I	1	-4.738E-001	604.71	-4.738E-001 %	(	1.474E+000G		7.5E+002	97.62
			-4.738E-001	795.87	2.858E-001 &		1.460E+000G		7.5E+002	85.53
			-4.738E-001	569.32	-4.738E-001 %		7.225E+000G		7.5E+002	15.38
			-4.738E-001	801.95	-3.413E+000 %		1.715E+001G		7.5E+002	8.69
			-4.738E-001	563.24	7.193E-002 &		1.241E+001G		7.5E+002	8.35
BI-212	N	1	4.099E+000	727.33	4.099E+000 %	(	9.328E+000G		7.0E+002	11.82
			4.099E+000	785.51	-1.372E+000 &		1.250E+002G		7.0E+002	1.10
Pa-234	N	1	-3.974E-001	131.29	-3.974E-001 %	(	3.976E+000G		1.6E+012	18.00
			-3.974E-001	569.47	-3.974E-001 %		1.344E+001G		1.6E+012	8.20
			-3.974E-001	946.02	1.376E+000 %		1.227E+001G		1.6E+012	13.40
			-3.974E-001	883.24	-1.444E+000 %		1.450E+001G		1.6E+012	9.60
			-3.974E-001	880.53	3.128E-001 %		2.287E+001G		1.6E+012	6.00
RA-224	N	1	-3.599E+001	240.99	-3.599E+001	(	4.272E+001G		7.0E+002	4.10
TL-208	F N	1	3.347E+000	583.02	3.347E+000	(P	1.489E+000G		7.0E+002	84.50
			3.347E+000	277.28	3.195E+000 %		1.335E+001G		7.0E+002	6.31
			3.347E+000	860.56	2.021E+000 %		1.011E+001G		7.0E+002	12.42
CO-60	T F	1	2.939E-002	1332.50	2.939E-002 %	(	1.567E+000G		1.9E+003	99.98
			2.939E-002	1173.24	6.472E-001 &		1.571E+000G		1.9E+003	99.90
TH-234	N	1	2.934E+000	63.29	2.934E+000 *	(P	2.509E+001G		1.6E+012	4.82
			2.934E+000	92.59	6.001E+000 %	P	1.788E+001G		1.6E+012	5.58
K-40	N	1	2.929E+002	1460.83	2.929E+002	(	5.536E+000G		4.7E+011	10.67

EU-154	T F I		1	-1.895E+000	873.23	-1.895E+000	%	(		1.213E+001G		3.1E+003	12.27
				-1.895E+000	123.10	-4.641E-001	%			1.778E+000G		3.1E+003	40.79
				-1.895E+000	1274.54	0.000E+000	&			8.031E+000G		3.1E+003	35.19
				-1.895E+000	723.36	-7.727E-001	%			6.241E+000G		3.1E+003	20.22
				-1.895E+000	1004.77	1.749E+000	%			5.953E+000G		3.1E+003	18.01
				-1.895E+000	996.33	-2.123E+000	%			1.302E+001G		3.1E+003	10.60
U-235		N	1	1.844E+000	143.79	1.844E+000	*	(		5.934E+000G		2.6E+011	10.96
				1.844E+000	205.33	2.566E+000	&			1.412E+001G		2.6E+011	5.01
				1.844E+000	163.38	-2.436E+000	&			1.344E+001G		2.6E+011	5.08
				1.844E+000	93.35	0.000E+000	%	}	E	1.438E+001X		2.6E+011	5.81
AM-241	T		1	-1.839E-002	59.54	-1.839E-002	%	(		2.967E+000G		1.6E+005	35.90
PB-212		N	1	1.739E+001	238.63	1.739E+001	*	(	P	2.117E+000G		7.0E+002	43.30
				1.739E+001	300.03	2.573E+001	+			1.926E+001G		7.0E+002	3.28
I-131	T F I		1	1.573E-003	364.48	1.573E-003	%	(		8.427E-001G		8.0E+000	81.70
				1.573E-003	284.30	-1.133E+000	&			1.204E+001G		8.0E+000	6.14
				1.573E-003	636.97	1.451E+000	&			1.488E+001G		8.0E+000	7.17
PB-214		N	1	1.540E+001	351.93	1.554E+001	@	(	P	1.754E+000G		5.8E+005	37.60
				1.540E+001	295.09	1.513E+001		(		3.187E+000G		5.8E+005	19.30
				1.540E+001	242.00	-3.261E+000	%			1.276E+001G		5.8E+005	7.43
PA-234M		N	1	1.238E+001	1001.00	1.238E+001	%	(		1.561E+002G		1.6E+012	.84
				1.238E+001	766.41	1.131E+002	&			3.890E+002G		1.6E+012	.29
BE-7		N P C	1	1.185E-001	477.60	1.185E-001	%	(		7.286E+000G		5.3E+001	10.52
				1.124E+001	1120.29	1.168E+001		(		1.065E+001G		5.8E+005	15.10
				1.124E+001	1764.49	7.511E+000	%			1.176E+001G		5.8E+005	15.40
BI-214		N	1	1.124E+001	609.31	1.109E+001	*	(	P	2.585E+000G		5.8E+005	46.09
EU-155	T F I		1	1.123E+000	105.31	1.123E+000	&	(		2.669E+000G		1.8E+003	21.20
				1.123E+000	86.54	-9.706E-002	%			3.087E+000G	A	1.8E+003	30.70
CS-137	T F I		1	1.004E+000	661.66	1.004E+000	%	(	P	1.428E+000G		1.1E+004	85.21

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	#	1.573E-003	1.606E-003	14,759.70	14,759.70	8.427E-001
CS-134	#	-4.738E-001	-4.739E-001	92.27	92.32	1.474E+000
BE-7	#	1.185E-001	1.189E-001	1,674.81	1,674.81	7.286E+000
K-40		2.929E+002	2.929E+002	5.06	5.85	5.536E+000
CO-60	#	2.939E-002	2.939E-002	1,420.37	1,420.37	1.567E+000
CS-137	#	1.004E+000	1.004E+000	44.68	44.77	1.428E+000
EU-152	#	9.492E-003	9.492E-003	9,864.14	9,864.14	3.312E+000
EU-155	#	1.123E+000	1.123E+000	71.62	71.70	2.669E+000
TL-208	#	3.347E+000	3.348E+000	16.69	16.94	1.489E+000
PB-210	#	5.198E+000	5.198E+000	208.92	208.96	3.822E+001
PB-212		1.739E+001	1.740E+001	7.69	8.25	2.117E+000
RA-224	#	-3.599E+001	-3.600E+001	36.65	36.77	4.272E+001
AC-228	#	9.882E+000	9.883E+000	15.05	15.33	5.441E+000
PA-234M	#	1.238E+001	1.238E+001	345.10	345.11	1.561E+002
U-235	#	1.844E+000	1.844E+000	95.96	96.00	5.934E+000
AM-241	#	-1.839E-002	-1.839E-002	4,704.74	4,704.74	2.967E+000
EU-154	#	-1.895E+000	-1.895E+000	182.31	182.34	1.213E+001
PB-214	#	1.540E+001	1.540E+001	7.06	7.62	1.754E+000
BI-212	#	4.099E+000	4.099E+000	68.58	68.64	9.328E+000
BI-214	#	1.124E+001	1.124E+001	10.67	11.06	2.585E+000
Pa-234	#	-3.974E-001	-3.974E-001	293.29	293.31	3.976E+000
TH-234	#	2.934E+000	2.934E+000	248.68	248.70	2.509E+001

= All peaks for activity calculation had bad shape

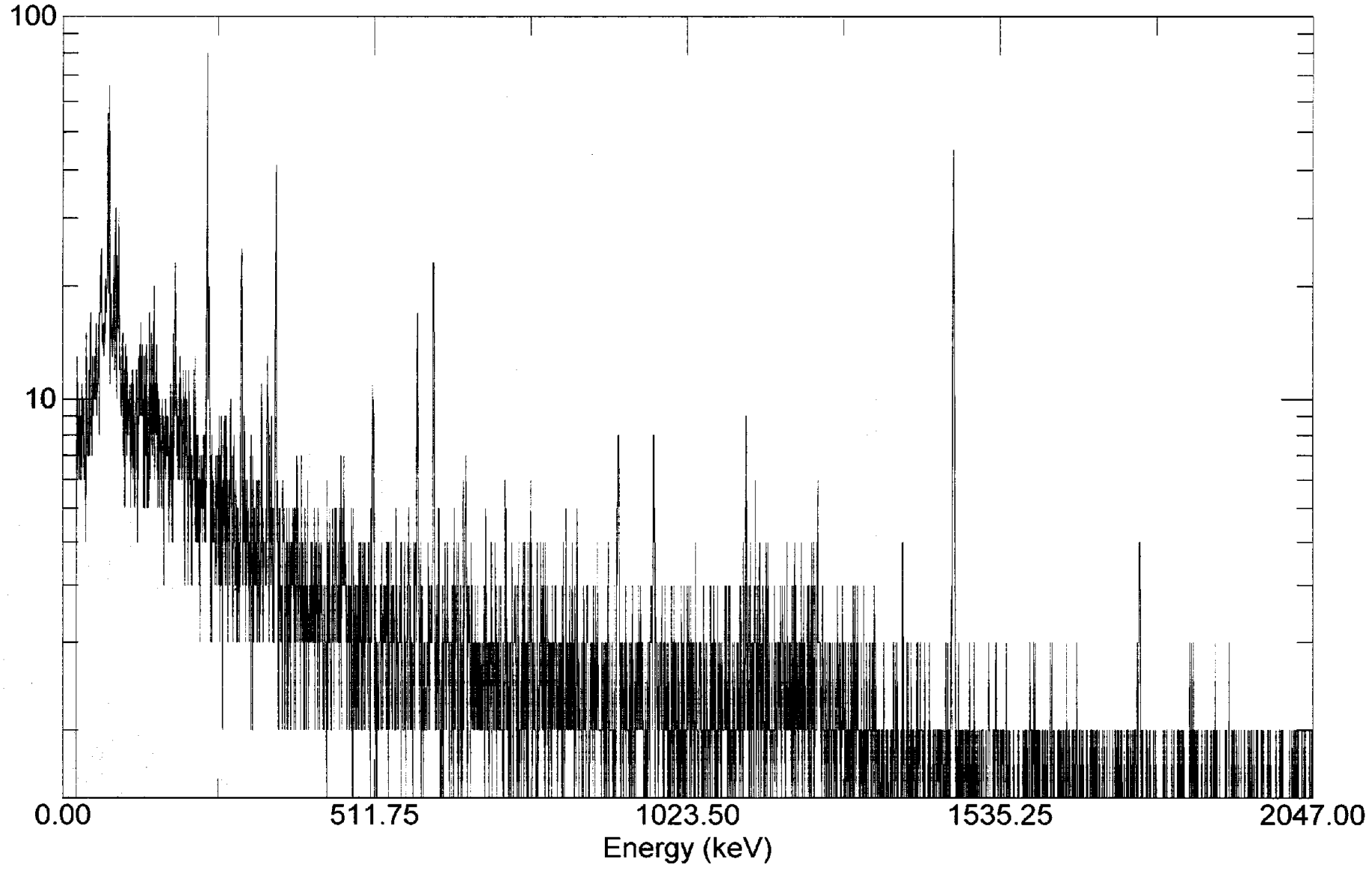
Total Activity (37.72 to 2,000.15 keV) 325.72 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKG21AD

7360294_KEKG21AD_F7L200271-001X



Acquired: 26-Dec-2007 5:46:19 PM
File: C:\User\spectra\KEKG21AD.spc
Detector: #0 Ge 7 SN/154

Real Time: 1823.94 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,060

Sample Description: 7360294_KEKHM1AC_F7L200271-002

Spectrum Filename: KEKHM1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:01:17PM		
Live Time:	1800.00	Real Time:	1820.66
Dead Time:	1.13 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0875

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.03	74.72	208.00	154.00	0.086	19.66	0.834	PB-214	
307.87	77.18	138.00	222.00	0.123	11.36	0.970	PB-214	s
1180.61	295.32	82.90	25.10	0.014	55.04	0.551		s
1407.41	352.02	147.35	10.65	0.006	164.03	0.856		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.31	46.55	127.60	5.04	0.003	52.73	0.832	s
AM-241	1	233.68	58.64	152.17	5.89	0.003	299.27	0.846	s
TH-234	1	252.36	63.31	199.08	26.64	0.015	42.42	0.850	s
EU-155	1	345.32	86.54	287.94	0.00	0.000	2399.73	0.874	s
TH-234	1	370.97	92.95	242.90	33.28	0.018	36.19	0.881	s
U-235	1	372.56	93.35	168.00	8.63	0.005	20.97	0.882	s D
AC-228	1	372.56	93.35	168.00	67.83	0.038	2.24	0.882	s D
EU-155	1	418.04	104.72	138.23	8.15	0.005	206.92	0.894	s
EU-154	1	491.58	123.10	218.86	1.30	0.001	1616.65	0.913	s
EU-152	1	493.75	123.64	111.78	-13.72	-0.008	112.30	0.912	s
Pa-234	1	519.45	130.07	130.55	6.04	0.003	270.51	0.922	s
U-235	1	574.18	143.74	135.99	16.24	0.009	104.52	0.935	s
U-235	1	654.37	163.79	151.73	-7.36	-0.004	239.39	0.955	s
U-235	1	822.56	205.83	108.53	-0.63	0.000	2348.54	0.999	s
PB-212	1	953.97	238.67	126.88	593.13	0.330	6.09	1.169	s
RA-224	1	960.16	240.22	521.81	-111.66	-0.062	30.44	1.036	s
PB-214	1	970.76	242.87	170.87	-16.18	-0.009	116.96	1.037	s
TL-208	1	1109.10	277.45	55.22	25.49	0.014	45.73	1.074	s
I-131	1	1138.46	284.79	66.79	0.79	0.000	1462.62	1.081	s
PB-214	1	1180.88	295.39	42.61	64.90	0.036	18.88	1.092	s
PB-212	1	1202.57	300.81	43.50	68.50	0.038	26.21	0.733	s
AC-228	1	1352.75	338.35	42.36	76.97	0.043	16.52	1.136	s
EU-152	1	1374.64	343.82	29.68	4.29	0.002	185.96	1.142	s
PB-214	1	1407.47	352.03	40.86	129.46	0.072	10.90	1.150	s
I-131	1	1461.26	365.48	42.88	-6.50	-0.004	147.85	1.163	s
BE-7	1	1909.36	477.48	25.91	1.61	0.001	454.39	1.277	s
CS-134	1	2250.34	562.72	25.34	7.61	0.004	100.33	1.363	s
CS-134	1	2276.76	569.32	74.03	0.00	0.000	632.46	1.369	s D
Pa-234	1	2277.35	569.47	61.42	0.89	0.000	103.53	1.369	s D
TL-208	1	2332.02	583.13	11.74	162.26	0.090	8.96	0.796	s
CS-134	1	2408.16	602.17	25.54	2.51	0.001	291.44	1.403	s
BI-214	1	2436.29	609.20	6.63	129.37	0.072	9.51	1.295	s
I-131	1	2548.93	637.36	32.28	-2.71	-0.002	303.10	1.435	s
CS-137	1	2647.96	662.11	40.03	3.18	0.002	231.50	1.459	s
EU-154	1	2890.12	722.65	37.03	-3.34	-0.002	263.53	1.519	s
BI-212	1	2908.96	727.35	26.53	33.67	0.019	27.66	1.523	s
PA-234M	1	3065.06	766.38	35.11	-1.07	-0.001	792.56	1.561	s
EU-152	1	3114.84	778.82	31.62	-3.61	-0.002	226.62	1.573	s
BI-212	1	3126.04	781.62	15.83	5.20	0.003	116.84	1.579	s
CS-134	1	3181.54	795.49	22.06	9.68	0.005	75.80	1.589	s
CS-134	1	3207.37	801.95	38.00	0.00	0.000	871.78	1.595	s
TL-208	1	3440.82	860.31	0.00	33.00	0.018	17.41	0.531	s
EU-154	1	3495.68	874.02	15.92	-1.74	-0.001	332.76	1.662	s
Pa-234	1	3527.07	881.87	21.74	0.28	0.000	2369.52	1.669	s
Pa-234	1	3530.57	882.74	19.20	2.57	0.001	248.63	1.672	s
AC-228	1	3644.88	911.32	17.55	78.27	0.043	13.60	1.698	

Pa-234	1	3777.40	944.45	17.30	-0.15	0.000	4010.46	1.731	s
EU-152	1	3857.10	964.37	56.19	2.00	0.001	533.84	1.748	s
AC-228	1	3875.51	968.97	41.21	26.55	0.015	39.32	1.752	s
EU-154	1	3981.93	995.58	10.65	3.01	0.002	163.77	1.778	s
PA-234M	1	3997.05	999.36	13.51	-1.39	-0.001	384.45	1.782	s
EU-154	1	4014.09	1003.62	8.60	1.71	0.001	254.56	1.785	s
EU-152	1	4447.92	1112.07	2.27	0.00	0.000	212.86	1.884	s
BI-214	1	4481.11	1120.37	16.15	14.20	0.008	48.03	1.891	s
CO-60	1	4692.58	1173.24	14.98	0.00	0.000	547.42	1.939	s
EU-154	1	5097.80	1274.54	0.00	0.00	0.000	100.00	2.030	s
CO-60	1	5335.72	1334.02	18.89	-0.20	0.000	3140.56	2.081	s
EU-152	1	5632.10	1408.12	18.92	0.16	0.000	3772.48	2.147	s
K-40	1	5843.11	1460.88	0.00	201.00	0.112	7.05	1.525	s
BI-214	1	7058.62	1764.78	9.46	11.06	0.006	49.49	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		MDA Value Becquerels		Code	Comments	
CS-134	T F I	1	9.564E-002	604.71	9.564E-002	%	(		9.999E-001	G		7.5E+002	97.62
			9.564E-002	795.87	5.337E-001	%			1.357E+000	G		7.5E+002	85.53
			9.564E-002	569.32	0.000E+000	&		}	8.809E+000	G		7.5E+002	15.38
			9.564E-002	801.95	0.000E+000	&			1.718E+001	G		7.5E+002	8.69
			9.564E-002	563.24	3.181E+000	%			1.094E+001	G		7.5E+002	8.35
PA-234M	N	1	-9.505E+000	1001.00	-9.505E+000	%	(		1.360E+002	G		1.6E+012	.84
			-9.505E+000	766.41	-1.655E+001	%			4.710E+002	G		1.6E+012	.29
TH-234	N	1	8.085E+000	63.29	8.085E+000	*	(	P	2.078E+001	G		1.6E+012	4.82
			8.085E+000	92.59	6.968E+000	%		P	1.577E+001	G		1.6E+012	5.58
PB-214	N	1	7.375E+000	351.93	7.824E+000		(	P	1.964E+000	G		5.8E+005	37.60
			7.375E+000	295.09	6.501E+000	*	(		3.319E+000	G		5.8E+005	19.30
			7.375E+000	242.00	-3.538E+000	%			1.391E+001	G		5.8E+005	7.43
EU-154	T F I	1	-7.248E-001	873.23	-7.248E-001	%	(		8.866E+000	G		3.1E+003	12.27
			-7.248E-001	123.10	3.587E-002	&			1.983E+000	G		3.1E+003	40.79
			-7.248E-001	1274.54	0.000E+000	%			1.483E+000	G		3.1E+003	35.19
			-7.248E-001	723.36	-7.174E-001	%			6.676E+000	G		3.1E+003	20.22
			-7.248E-001	1004.77	5.461E-001	&			5.236E+000	G		3.1E+003	18.01
			-7.248E-001	996.33	1.624E+000	%			9.663E+000	G		3.1E+003	10.60
TL-208	F N	1	6.911E+000	583.02	6.911E+000	*	(	P	7.955E-001	G		7.0E+002	84.50
			6.911E+000	277.28	7.387E+000	&			1.082E+001	G		7.0E+002	6.31
			6.911E+000	860.56	1.340E+001	+			2.993E+000	G		7.0E+002	12.42
BE-7	N P C	1	4.601E-001	477.60	4.601E-001	&	(		7.560E+000	G		5.3E+001	10.52
RA-224	N	1	-4.410E+001	240.99	-4.410E+001		(		4.311E+001	G		7.0E+002	4.10
EU-155	T F I	1	4.355E-001	105.31	4.355E-001	&	(		3.072E+000	G		1.8E+003	21.20
			4.355E-001	86.54	0.000E+000	%			3.197E+000	G	A	1.8E+003	30.70
			3.827E-001	569.47	3.827E-001	&			1.686E+001	G		1.6E+012	8.20
			3.827E-001	946.02	-5.998E-002	%			9.016E+000	G		1.6E+012	13.40
			3.827E-001	883.24	1.383E+000	%			1.242E+001	G		1.6E+012	9.60
			3.827E-001	880.53	2.393E-001	%			2.095E+001	G		1.6E+012	6.00
Pa-234	N	1	3.827E-001	131.29	3.827E-001	&	(		3.544E+000	G		1.6E+012	18.00
EU-152	T F	1	3.605E-001	344.29	3.605E-001	&	(		2.361E+000	G		4.9E+003	26.50
			3.605E-001	121.78	-5.412E-001	%			2.051E+000	G		4.9E+003	28.58

				3.605E-001	778.92	-1.291E+000	%			1.035E+001G		4.9E+003	12.94
				3.605E-001	964.11	7.624E-001	%			1.432E+001G		4.9E+003	14.61
				3.605E-001	1112.07	0.000E+000	%			4.479E+000G		4.9E+003	13.64
				3.605E-001	1408.00	6.027E-002	%			8.476E+000G		4.9E+003	21.00
PB-210		N	1	3.007E+000	46.54	3.007E+000	*	(	P	3.305E+001G		8.1E+003	4.25
AM-241	T		1	2.543E-001	59.54	2.543E-001	&	(		2.601E+000G		1.6E+005	35.90
PB-212		N	1	2.200E+001	238.63	2.200E+001	*	(	P	2.047E+000G		7.0E+002	43.30
				2.200E+001	300.03	4.099E+001	+			2.001E+001G		7.0E+002	3.28
I-131	T F I		1	-1.866E-001	364.48	-1.866E-001	%	(		9.545E-001G		8.0E+000	81.70
				-1.866E-001	284.30	2.413E-001	&			1.242E+001G		8.0E+000	6.14
				-1.866E-001	636.97	-1.468E+000	%			1.584E+001G		8.0E+000	7.17
U-235		N	1	1.733E+000	143.79	1.733E+000	%	(		6.086E+000G		2.6E+011	10.96
				1.733E+000	205.33	-1.789E-001	&			1.460E+001G		2.6E+011	5.01
				1.733E+000	163.38	-1.790E+000	%			1.461E+001G		2.6E+011	5.08
				1.733E+000	93.35	1.733E+000	!		E	1.266E+001X		2.6E+011	5.81
K-40		N	1	1.510E+002	1460.83	1.510E+002		(		5.536E+000G		4.7E+011	10.67
CS-137	T F I		1	1.500E-001	661.66	1.500E-001	%	(	P	1.520E+000G		1.1E+004	85.21
CO-60	T F		1	-1.446E-002	1332.50	-1.446E-002	%	(		1.693E+000G		1.9E+003	99.98
				-1.446E-002	1173.24	0.000E+000	&			1.367E+000G		1.9E+003	99.90
AC-228		N	1	1.422E+001	911.16	1.429E+001		(		4.060E+000G		2.1E+003	29.00
				1.422E+001	968.97	8.488E+000	-			1.043E+001G		2.1E+003	17.46
				1.422E+001	338.32	1.404E+001		(		6.027E+000G		2.1E+003	12.01
				1.422E+001	93.35	1.422E+001	!		E	1.323E+001G	A	2.1E+003	5.56
BI-212		N	1	1.244E+001	727.33	1.244E+001	@	(		9.865E+000G		7.0E+002	11.82
				1.244E+001	785.51	2.203E+001	&			9.010E+001G		7.0E+002	1.10
BI-214		N	1	1.050E+001	609.31	1.050E+001	@	(	P	1.194E+000G		5.8E+005	46.09
				1.050E+001	1120.29	5.947E+000	%			8.980E+000G		5.8E+005	15.10
				1.050E+001	1764.49	6.898E+000	%			1.062E+001G		5.8E+005	15.40

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	4.601E-001	4.614E-001	454.39	454.40	7.560E+000
K-40		1.510E+002	1.510E+002	7.05	7.64	5.536E+000
CO-60	#	-1.446E-002	-1.447E-002	3,140.56	3,140.56	1.693E+000
I-131	#	-1.866E-001	-1.900E-001	147.85	147.88	9.545E-001
CS-134	#	9.564E-002	9.566E-002	291.44	291.45	9.999E-001
EU-154	#	-7.248E-001	-7.248E-001	332.76	332.77	8.866E+000
EU-155	#	4.355E-001	4.356E-001	206.92	206.95	3.072E+000
PB-214	#	7.375E+000	7.375E+000	10.96	11.33	1.964E+000
BI-212	#	1.244E+001	1.244E+001	27.66	27.81	9.865E+000
BI-214	#	1.050E+001	1.050E+001	9.66	10.09	1.194E+000
TH-234	#	8.085E+000	8.085E+000	75.46	75.55	2.078E+001
PA-234M	#	-9.505E+000	-9.505E+000	384.45	384.46	1.360E+002
CS-137	#	1.500E-001	1.500E-001	285.75	285.76	1.520E+000
EU-152	#	3.605E-001	3.605E-001	185.96	185.99	2.361E+000
TL-208		6.911E+000	6.912E+000	9.09	9.54	7.955E-001
PB-210	#	3.007E+000	3.007E+000	305.15	305.17	3.305E+001
PB-212	#	2.200E+001	2.200E+001	6.19	6.87	2.047E+000
RA-224	#	-4.410E+001	-4.411E+001	30.44	30.59	4.311E+001
AC-228	#	1.422E+001	1.422E+001	10.70	11.08	4.060E+000
Pa-234	#	3.827E-001	3.827E-001	270.51	270.52	3.544E+000
U-235	#	1.733E+000	1.733E+000	104.52	104.56	6.086E+000
AM-241	#	2.543E-001	2.543E-001	299.27	299.29	2.601E+000

= All peaks for activity calculation had bad shape

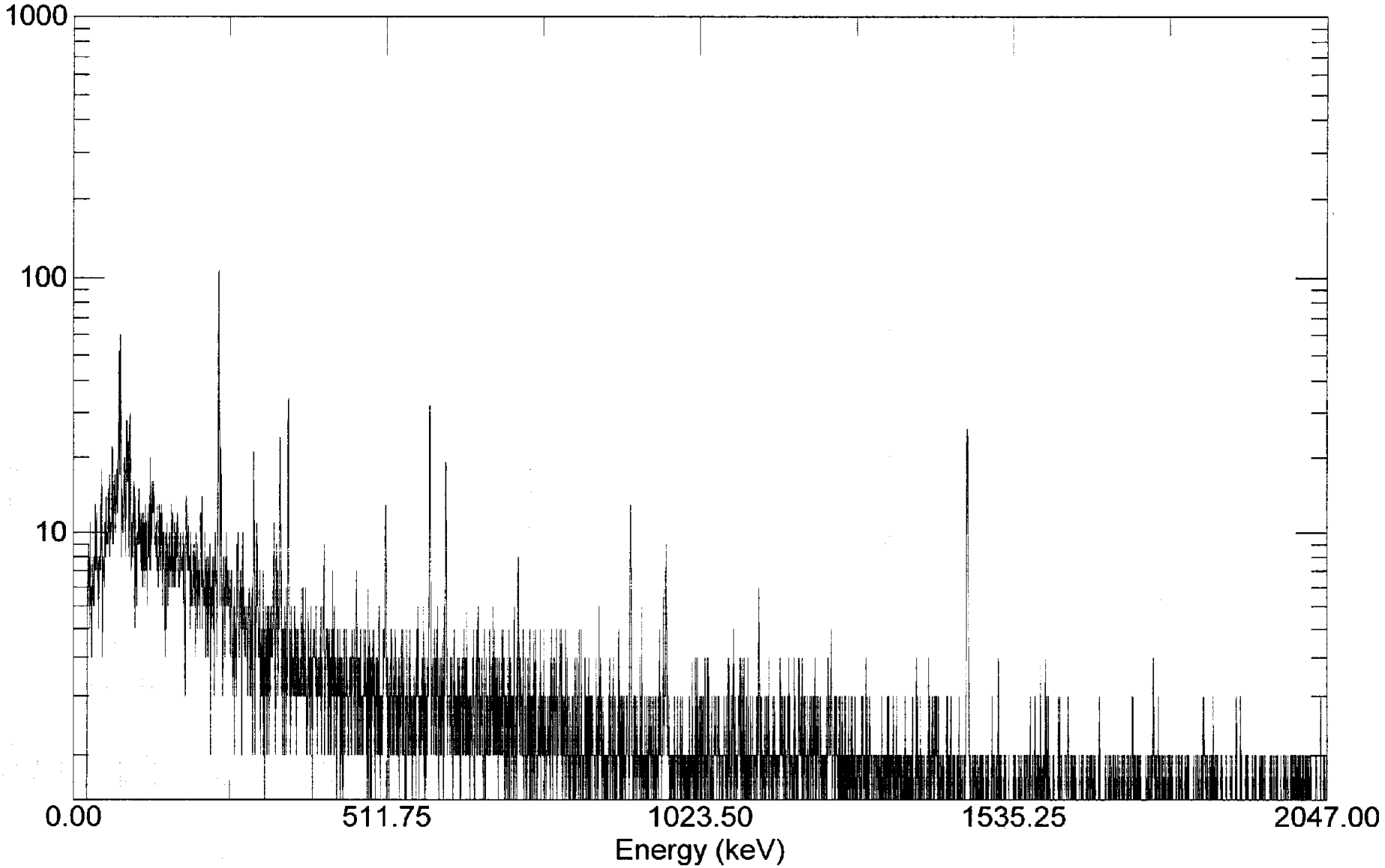
Total Activity (37.72 to 2,000.15 keV) 190.38 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKHM1AC

7360294_KEKHM1AC_F7L200271-002



Acquired: 26-Dec-2007 5:01:17 PM
File: C:\User\spectra\KEKHM1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.66 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,066

Sample Description: 7360294_KEKHQ1AC_F7L200271-003

Spectrum Filename: KEKHQ1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:44:40PM		
Live Time:	1800.00	Real Time:	1810.48
Dead Time:	0.58 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1743

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.24	74.77	229.50	174.50	0.097	18.61	0.658	PB-214	
307.76	77.16	141.17	187.83	0.104	12.91	0.846	PB-214	
742.25	185.78	104.50	104.50	0.058	22.24	0.513	U-235	s
1179.83	295.17	142.46	13.54	0.008	127.64	1.035		s
1406.29	351.79	229.48	19.52	0.011	112.06	1.058		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.89	46.44	142.79	43.21	0.024	32.68	0.535	s
AM-241	1	235.51	59.09	166.89	17.83	0.010	105.15	0.824	s
TH-234	1	252.19	63.26	286.80	-5.84	-0.003	74.18	0.828	s
EU-155	1	345.31	86.54	218.97	-1.21	-0.001	1739.03	0.849	s
TH-234	1	370.40	92.82	228.97	68.82	0.038	18.29	0.855	s
AC-228	1	372.54	93.35	157.67	57.34	0.032	3.01	1.176	s D
U-235	1	372.54	93.35	137.37	1.02	0.001	185.72	0.855	s D
EU-155	1	420.63	105.37	159.64	5.92	0.003	304.64	0.866	s
EU-152	1	488.27	122.28	103.85	8.47	0.005	173.60	0.881	s
EU-154	1	493.55	123.60	156.28	-12.53	-0.007	143.94	0.882	s
Pa-234	1	520.42	130.32	152.98	-19.03	-0.011	94.75	0.890	
U-235	1	574.18	143.76	116.30	1.88	0.001	270.07	0.901	s
U-235	1	652.61	163.37	125.22	-9.10	-0.005	258.54	0.919	s
U-235	1	826.73	206.90	90.26	-0.71	0.000	933.65	0.957	s
PB-212	1	953.62	238.62	110.92	506.08	0.281	6.27	0.929	
RA-224	1	958.65	239.88	462.11	-111.31	-0.062	28.91	0.989	s
PB-214	1	965.00	241.47	105.61	38.39	0.021	34.30	0.990	s
TL-208	1	1109.76	277.66	45.89	26.70	0.015	40.77	1.021	s
I-131	1	1135.83	284.17	53.38	3.20	0.002	328.15	1.028	s
PB-214	1	1179.56	295.11	65.06	93.59	0.052	14.25	1.037	s
PB-212	1	1199.57	300.11	44.00	63.00	0.035	26.00	0.747	s
AC-228	1	1352.13	338.25	33.41	100.59	0.056	14.19	1.444	s
EU-152	1	1377.96	344.70	47.68	5.33	0.003	188.11	1.081	s
PB-214	1	1406.16	351.76	42.35	199.49	0.111	7.80	1.088	
I-131	1	1456.92	364.44	43.16	3.39	0.002	279.78	1.099	s
BE-7	1	1915.68	479.13	35.62	5.64	0.003	155.58	1.198	s
CS-134	1	2242.41	560.81	19.74	1.70	0.001	377.74	1.273	s
CS-134	1	2276.47	569.32	36.61	0.31	0.000	798.09	1.278	s D
Pa-234	1	2277.07	569.47	30.00	-3.44	-0.002	-133.44	1.278	s D
TL-208	1	2331.17	582.99	40.31	92.84	0.052	12.61	1.290	s
CS-134	1	2418.04	604.71	326.60	1.86	0.001	1377.61	1.309	s
BI-214	1	2435.96	609.19	56.42	142.18	0.079	10.14	1.313	s
I-131	1	2548.03	637.20	25.29	1.66	0.001	434.87	1.337	s
CS-137	1	2646.82	661.90	24.57	3.38	0.002	214.36	1.358	s
EU-154	1	2882.93	720.92	23.72	-1.27	-0.001	548.33	1.411	
BI-212	1	2910.10	727.71	32.16	6.69	0.004	126.04	1.414	s
PA-234M	1	3064.67	766.35	36.26	-4.59	-0.003	191.43	1.447	s
EU-152	1	3113.23	778.49	22.83	0.00	0.000	50827.73	1.458	s
BI-212	1	3142.16	785.72	26.68	9.76	0.005	81.37	1.463	s
CS-134	1	3182.04	795.69	26.14	5.12	0.003	148.06	1.472	s
CS-134	1	3207.86	802.14	40.00	-6.66	-0.004	139.84	1.477	s
TL-208	1	3438.97	859.91	6.17	42.83	0.024	21.78	0.403	s
EU-154	1	3492.25	873.23	41.93	0.00	0.000	915.71	1.537	s
Pa-234	1	3520.49	880.29	27.16	-0.31	0.000	2395.61	1.543	s
Pa-234	1	3535.35	884.00	28.70	-3.23	-0.002	241.05	1.546	s

AC-228	1	3643.82	911.12	9.31	85.69	0.048	11.86	1.173	s
Pa-234	1	3783.35	945.99	23.32	-3.13	-0.002	225.58	1.598	s
EU-152	1	3856.89	964.37	42.08	12.52	0.007	78.55	1.613	s
AC-228	1	3870.47	967.77	13.58	75.42	0.042	15.17	1.000	s
EU-154	1	3984.21	996.20	23.54	3.39	0.002	209.41	1.640	s
PA-234M	1	4000.56	1000.29	29.46	0.50	0.000	1542.02	1.643	s
EU-154	1	4020.08	1005.16	32.83	1.62	0.001	505.18	1.647	s
EU-152	1	4445.20	1111.42	28.13	-1.47	-0.001	517.27	1.735	s
BI-214	1	4480.54	1120.26	37.94	11.47	0.006	52.47	1.741	s
CO-60	1	4692.40	1173.21	21.36	2.40	0.001	279.39	1.784	s
EU-154	1	5089.99	1272.58	13.93	4.15	0.002	136.46	1.866	s
CO-60	1	5326.58	1331.72	22.15	1.42	0.001	476.59	1.912	s
EU-152	1	5628.77	1407.24	16.78	2.75	0.002	218.82	1.972	s
K-40	1	5842.62	1460.69	12.54	330.46	0.184	5.40	1.914	
BI-214	1	7058.21	1764.49	12.08	21.30	0.012	24.43	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Analysis Code	MDA Value Becquerels	Code	Comments	
CO-60	T F	1	8.708E-002	1332.50	8.708E-002	% (	1.512E+000G		1.9E+003	99.98
			8.708E-002	1173.24	1.344E-001	%	1.355E+000G		1.9E+003	99.90
AM-241	T	1	8.621E-001	59.54	8.621E-001	& (	3.041E+000G		1.6E+005	35.90
TH-234	N	1	7.940E+000	63.29	-1.985E+000	* (P	2.776E+001G		1.6E+012	4.82
			7.940E+000	92.59	1.651E+001	(P	1.757E+001G		1.6E+012	5.58
CS-134	T F I	1	6.667E-002	604.71	6.667E-002	% (	3.119E+000G		7.5E+002	97.62
			6.667E-002	795.87	2.540E-001	%	1.317E+000G		7.5E+002	85.53
			6.667E-002	569.32	6.667E-002	%	6.745E+000G		7.5E+002	15.38
			6.667E-002	801.95	-3.269E+000	%	1.580E+001G		7.5E+002	8.69
			6.667E-002	563.24	6.776E-001	&	9.339E+000G		7.5E+002	8.35
RA-224	N	1	-4.888E+001	240.99	-4.888E+001	(	4.518E+001G		7.0E+002	4.10
			4.684E-001	964.11	4.160E+000	%	1.095E+001G		4.9E+003	14.61
			4.684E-001	1112.07	-5.782E-001	%	1.080E+001G		4.9E+003	18.64
			4.684E-001	1408.00	8.390E-001	%	6.642E+000G		4.9E+003	21.00
EU-152	T F	1	4.684E-001	344.29	4.684E-001	& (	3.064E+000G		4.9E+003	26.50
			4.684E-001	121.78	3.899E-001	%	2.311E+000G		4.9E+003	28.58
			4.684E-001	778.92	8.710E-004	%	8.071E+000G		4.9E+003	12.94
TL-208	F N	1	3.751E+000	583.02	3.751E+000	? (P	1.305E+000G		7.0E+002	84.50
			3.751E+000	277.28	8.405E+000	&	1.079E+001G		7.0E+002	6.31
			3.751E+000	860.56	1.546E+001	+	5.154E+000G		7.0E+002	12.42
EU-155	T F I	1	3.661E-001	105.31	3.661E-001	% (	3.809E+000G		1.8E+003	21.20
			3.661E-001	86.54	-5.367E-002	%	3.192E+000G		1.8E+003	30.70
PA-234	N	1	2.976E+000	1001.00	2.976E+000	& (	1.667E+002G		1.6E+012	.84
			2.976E+000	766.41	-6.452E+001	%	4.328E+002G		1.6E+012	.29
PB-210	N	1	2.729E+001	46.54	2.729E+001	% (P	3.688E+001G		8.1E+003	4.25
U-235	N	1	2.345E-001	143.79	2.345E-001	% (P	6.599E+000G		2.6E+011	10.96
			2.345E-001	205.33	-2.312E-001	& P	1.521E+001G		2.6E+011	5.01
			2.345E-001	163.38	-2.571E+000	& P	1.549E+001G		2.6E+011	5.08
			2.345E-001	93.35	2.345E-001	%	1.319E+001X	E	2.6E+011	5.81
BI-212	N	1	2.255E+000	727.33	2.255E+000	% (	9.828E+000G		7.0E+002	11.82
			2.255E+000	785.51	3.734E+001	%	1.024E+002G		7.0E+002	1.10
PB-212	N	1	2.090E+001	238.63	2.090E+001	(P	2.139E+000G		7.0E+002	43.30
			2.090E+001	300.03	4.040E+001	+	2.156E+001G		7.0E+002	3.28
K-40	N	1	2.039E+002	1460.83	2.039E+002	(P	1.186E+001G		4.7E+011	10.67
BE-7	N P C	1	1.585E+000	477.60	1.585E+000	% (	8.584E+000G		5.3E+001	10.52
CS-137	T F I	1	1.481E-001	661.66	1.481E-001	& (	1.130E+000G		1.1E+004	85.21
Pa-234	N	1	-1.408E+000	131.29	-1.408E+000	& (	4.467E+000G		1.6E+012	18.00
			-1.408E+000	569.47	-1.408E+000	%	1.156E+001G		1.6E+012	8.20
			-1.408E+000	946.02	-1.118E+000	%	9.011E+000G		1.6E+012	13.40
			-1.408E+000	883.24	-1.536E+000	%	1.316E+001G		1.6E+012	9.60
			-1.408E+000	880.53	-2.342E-001	%	2.049E+001G		1.6E+012	6.00
AC-228	N	1	1.378E+001	911.07	1.378E+001	(P	2.722E+000G		2.1E+003	29.00
			1.378E+001	968.97	2.104E+001	+ P	5.547E+000G		2.1E+003	17.46
			1.378E+001	338.32	1.924E+001	+ P	5.671E+000G		2.1E+003	12.01

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			1.378E+001	93.35	1.378E+001	+		E	1.472E+001X	A	2.1E+003	5.56
PB-214	N	1	1.255E+001	351.93	1.255E+001		(P		2.078E+000G		5.8E+005	37.60
			1.255E+001	295.09	1.008E+001	-	P		4.339E+000G		5.8E+005	19.30
			1.255E+001	242.00	9.328E+000	%	P		1.230E+001G		5.8E+005	7.43
BI-214	N	1	1.080E+001	609.31	1.086E+001		(P		2.882E+000G		5.8E+005	46.09
			1.080E+001	1120.29	4.100E+000	%	P		1.123E+001G		5.8E+005	15.10
			1.080E+001	1764.49	1.062E+001	?	(P		9.429E+000G		5.8E+005	15.40
I-131	T F I	1	1.006E-001	364.48	1.006E-001	&	(		9.900E-001G		8.0E+000	81.70
			1.006E-001	284.30	1.053E+000	%			1.211E+001G		8.0E+000	6.14
			1.006E-001	636.97	8.423E-001	&			1.325E+001G		8.0E+000	7.17
EU-154	T F I	1	0.000E+000	873.23	0.000E+000	%	(		1.214E+001G		3.1E+003	12.27
			0.000E+000	123.10	-4.045E-001	%			1.969E+000G		3.1E+003	40.79
			0.000E+000	1274.54	6.992E-001	&			3.390E+000G		3.1E+003	35.19
			0.000E+000	723.36	-2.500E-001	&			4.990E+000G		3.1E+003	20.22
			0.000E+000	1004.77	4.505E-001	%			8.160E+000G		3.1E+003	18.01
			0.000E+000	996.33	1.590E+000	%			1.186E+001G		3.1E+003	10.60

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.585E+000	1.590E+000	155.58	155.61	8.584E+000
K-40		2.039E+002	2.039E+002	5.60	6.32	1.186E+001
CO-60	<	8.708E-002	8.708E-002	476.59	476.60	1.512E+000
I-131	<	1.006E-001	1.027E-001	279.78	279.80	9.900E-001
CS-134	<	6.667E-002	6.668E-002	1,377.61	1,377.61	3.119E+000
EU-154	<			915.71	915.71	1.214E+001
CS-137	<	1.481E-001	1.481E-001	214.36	214.38	1.130E+000
EU-152	<	4.684E-001	4.684E-001	188.11	188.13	3.064E+000
EU-155	<	3.661E-001	3.661E-001	304.64	304.66	3.809E+000
TL-208	#	3.751E+000	3.751E+000	13.82	14.11	1.305E+000
BI-212	<	2.255E+000	2.256E+000	126.04	126.08	9.828E+000
BI-214	<	1.080E+001	1.080E+001	10.97	11.35	2.882E+000
AC-228		1.378E+001	1.378E+001	12.53	12.85	2.722E+000
TH-234	<	7.940E+000	7.940E+000	31.71	31.93	2.776E+001
PA-234M	<	2.976E+000	2.976E+000	1,542.02	1,542.02	1.667E+002
U-235	<	2.345E-001	2.345E-001	807.16	807.17	6.599E+000
AM-241	<	8.621E-001	8.621E-001	105.15	105.22	3.041E+000
RA-224	<	-4.888E+001	-4.889E+001	28.91	29.06	4.518E+001
PB-210		2.729E+001	2.729E+001	54.95	55.09	3.688E+001
PB-212		2.090E+001	2.091E+001	6.56	7.21	2.139E+000
PB-214	<	1.255E+001	1.255E+001	8.27	8.75	2.078E+000
Pa-234	<	-1.408E+000	-1.408E+000	94.75	94.80	4.467E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 242.37 Bq/sample

Analyzed by: _____

403605

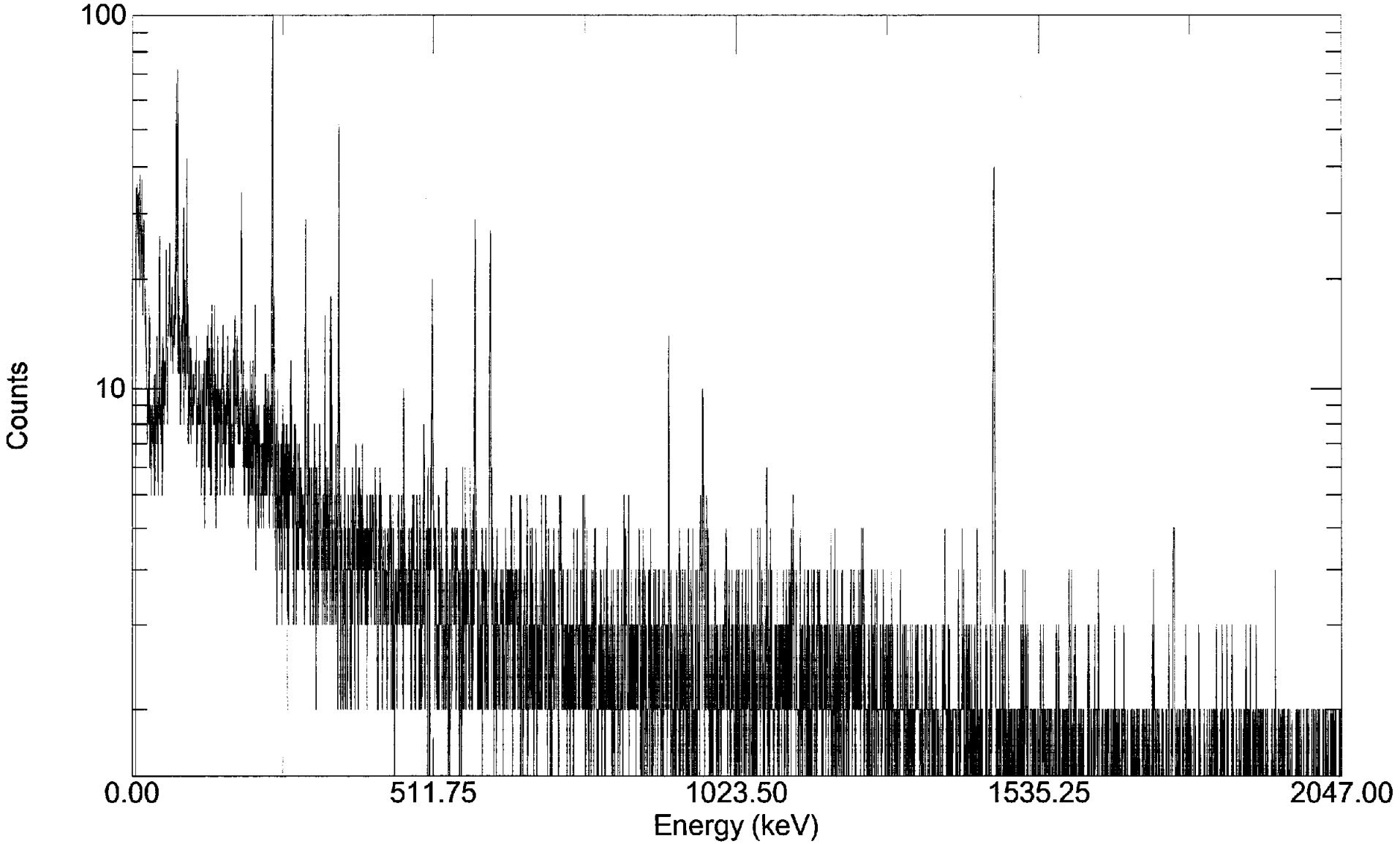
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKHQ1AC

7360294_KEKHQ1AC_F7L200271-003



Acquired: 26-Dec-2007 5:44:41 PM
File: C:\User\spectra\KEKHQ1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.48 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,068

Sample Description: 7360294_KEKHR1AC_F7L200271-004

Spectrum Filename: KEKHR1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:45:05PM		
Live Time:	1800.00	Real Time:	1815.40
Dead Time:	0.85 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2471

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
251.91	63.32	206.48	9.52	0.005	215.82	0.629		s
297.57	74.73	264.00	169.00	0.094	18.34	0.714	PB-214	
306.93	77.06	300.00	267.00	0.148	13.59	1.100	BI-207	s
335.05	84.09	165.68	92.32	0.051	22.30	0.616	TA-182	s
347.17	87.11	277.68	21.32	0.012	112.61	1.165		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.33	46.45	194.86	112.14	0.062	24.34	0.897	s
AM-241	1	238.74	60.03	244.13	23.76	0.013	95.25	0.878	s
TH-234	1	251.52	63.23	280.75	27.97	0.016	45.13	0.882	s
EU-155	1	347.07	87.09	311.47	105.01	0.058	25.69	0.906	s
TH-234	1	368.29	92.39	351.37	-28.86	-0.016	950.41	0.912	s
U-235	1	372.14	93.35	219.18	-3.20	-0.002	-447.97	0.913	s D
AC-228	1	372.14	93.35	161.47	132.15	0.073	13.62	0.913	s D
EU-155	1	428.03	107.31	118.56	20.58	0.011	78.00	0.925	s
EU-152	1	481.97	120.78	115.42	-0.41	0.000	3678.24	0.942	s
EU-154	1	490.08	122.80	163.79	-12.08	-0.007	152.57	0.943	s
Pa-234	1	517.76	129.72	120.11	0.72	0.000	2141.69	0.952	s
U-235	1	571.95	143.25	162.22	-5.88	-0.003	481.87	0.964	s
U-235	1	651.62	163.15	152.52	-7.02	-0.004	251.47	0.984	s
U-235	1	829.40	207.56	107.26	-1.44	-0.001	1018.10	1.027	s
PB-212	1	953.82	238.63	137.36	508.64	0.283	5.22	1.060	D
RA-224	1	963.24	240.99	248.64	65.36	0.036	36.29	1.062	D
PB-214	1	967.29	242.00	123.83	78.17	0.043	23.09	1.063	D
TL-208	1	1108.32	277.23	39.67	41.33	0.023	31.87	1.071	
I-131	1	1135.59	284.04	79.33	0.60	0.000	2107.80	1.105	s
PB-214	1	1180.31	295.21	67.32	178.68	0.099	11.70	0.859	s
PB-212	1	1199.48	300.00	101.38	15.92	0.009	92.87	1.121	s
AC-228	1	1352.31	338.18	63.25	103.76	0.058	14.26	1.158	s
EU-152	1	1375.56	343.98	66.11	-8.30	-0.005	142.80	1.164	s
PB-214	1	1407.62	351.99	52.70	274.30	0.152	8.18	1.259	s
I-131	1	1458.15	364.62	51.73	2.61	0.001	394.81	1.184	s
BE-7	1	1913.57	478.40	50.83	-4.26	-0.002	241.54	1.292	s
CS-134	1	2237.62	559.37	12.51	2.13	0.001	244.64	1.372	s
CS-134	1	2277.45	569.32	46.48	0.00	0.000	824.62	1.378	s D
Pa-234	1	2278.04	569.47	47.20	0.13	0.000	106.71	1.378	s D
TL-208	1	2331.58	582.85	30.46	221.54	0.123	8.94	1.389	
CS-134	1	2419.07	604.71	434.35	2.00	0.001	1473.58	1.410	s
BI-214	1	2436.99	609.19	31.78	138.67	0.077	9.60	1.415	
I-131	1	2545.03	636.19	41.43	-4.06	-0.002	229.50	1.440	s
CS-137	1	2647.22	661.73	11.33	70.67	0.039	17.11	0.791	s
EU-154	1	2895.82	723.86	58.75	-1.39	-0.001	785.47	1.518	s
BI-212	1	2907.81	726.85	36.52	21.73	0.012	44.80	1.521	s
PA-234M	1	3079.63	769.80	37.64	-2.36	-0.001	373.64	1.556	s
EU-152	1	3109.23	777.20	28.56	-4.97	-0.003	158.51	1.567	s
BI-212	1	3136.85	784.10	34.01	-3.36	-0.002	251.36	1.572	s
CS-134	1	3191.32	797.71	22.32	2.14	0.001	319.57	1.582	s
CS-134	1	3209.74	802.32	30.03	3.40	0.002	234.28	1.587	s
TL-208	1	3439.59	859.77	24.17	12.27	0.007	63.45	1.638	s
EU-154	1	3491.15	872.66	20.19	1.07	0.001	604.05	1.649	s
Pa-234	1	3519.76	879.81	24.22	2.48	0.001	287.31	1.655	s
Pa-234	1	3532.90	883.10	26.84	2.05	0.001	364.20	1.657	s

AC-228	1	3643.63	910.78	32.40	103.19	0.057	12.22	1.681	s
Pa-234	1	3782.44	945.48	31.93	-2.76	-0.002	295.47	1.710	s
EU-152	1	3859.28	964.69	93.40	-0.18	0.000	7781.92	1.726	s
AC-228	1	3875.77	968.81	44.54	55.99	0.031	21.51	1.730	s
EU-154	1	3985.85	996.33	53.26	0.00	0.000	1032.10	1.753	s
PA-234M	1	4006.07	1001.38	35.57	0.26	0.000	3272.60	1.756	s
EU-154	1	4013.53	1003.25	20.45	7.30	0.004	95.09	1.760	s
EU-152	1	4446.50	1111.50	27.07	4.97	0.003	154.63	1.847	s
BI-214	1	4478.67	1119.55	31.58	35.07	0.019	26.52	1.854	s
CO-60	1	4688.91	1172.12	18.66	2.58	0.001	244.48	1.896	s
EU-154	1	5097.66	1274.34	22.37	0.22	0.000	2998.86	1.975	s
CO-60	1	5326.86	1331.66	19.90	-0.08	0.000	7516.35	2.019	s
EU-152	1	5623.86	1405.95	14.76	-1.38	-0.001	402.67	2.076	s
K-40	1	5840.65	1460.18	11.21	381.79	0.212	5.04	1.946	
BI-214	1	7054.34	1763.83	12.93	19.32	0.011	30.18	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
TH-234	N	1	8.710E+000	63.29	8.710E+000	%	(P	2.516E+001G		1.6E+012	4.82
			8.710E+000	92.59	-6.394E+000	%	P	1.996E+001G		1.6E+012	5.58
TL-208	F N	1	8.642E+000	583.02	8.642E+000		(P	1.109E+000G		7.0E+002	84.50
			8.642E+000	277.28	1.229E+001	+		9.531E+000G		7.0E+002	6.31
			8.642E+000	860.56	4.334E+000	&		9.049E+000G		7.0E+002	12.42
I-131	T F I	1	7.375E-002	364.48	7.375E-002	%	(	1.024E+000G		8.0E+000	81.70
			7.375E-002	284.30	1.864E-001	%		1.376E+001G		8.0E+000	6.14
			7.375E-002	636.97	-1.994E+000	&		1.605E+001G		8.0E+000	7.17
BI-212	N	1	7.131E+000	727.33	7.131E+000	%	(	1.013E+001G		7.0E+002	11.82
			7.131E+000	785.51	-1.254E+001	&		1.115E+002G		7.0E+002	1.10
CS-134	T F I	1	6.947E-002	604.71	6.947E-002	%	(	3.463E+000G		7.5E+002	97.62
			6.947E-002	795.87	1.037E-001	%		1.198E+000G		7.5E+002	85.53
			6.947E-002	569.32	0.000E+000	&		7.261E+000G		7.5E+002	15.38
			6.947E-002	801.95	1.630E+000	%		1.354E+001G		7.5E+002	8.69
			6.947E-002	563.24	8.196E-001	%		7.385E+000G		7.5E+002	8.35
EU-152	T F	1	-6.926E-001	344.29	-6.926E-001	%	(	3.387E+000G		4.9E+003	26.50
			-6.926E-001	121.78	-1.765E-002	%		2.253E+000G		4.9E+003	28.58
			-6.926E-001	778.92	-1.567E+000	&		8.703E+000G		4.9E+003	12.94
			-6.926E-001	964.11	-5.740E-002	%		1.560E+001G		4.9E+003	14.61
			-6.926E-001	1112.07	1.935E+000	%		1.049E+001G		4.9E+003	13.64
			-6.926E-001	1408.00	-4.202E-001	%		6.275E+000G		4.9E+003	21.00
U-235	N	1	-6.812E-001	143.79	-6.812E-001	&	(P	7.192E+000G		2.6E+011	10.96
			-6.812E-001	205.33	-4.380E-001	&		1.547E+001G		2.6E+011	5.01
			-6.812E-001	163.38	-1.850E+000	&		1.587E+001G		2.6E+011	5.08
			-6.812E-001	93.35	-6.812E-001	!			E 1.524E+001X	2.6E+011	5.81
PB-210	N	1	6.497E+001	46.54	6.497E+001	*	(P	3.926E+001G		8.1E+003	4.25
CO-60	T F	1	-5.139E-003	1332.50	-5.139E-003	%	(	1.437E+000G		1.9E+003	99.98
			-5.139E-003	1173.24	1.431E-001	%		1.265E+000G		1.9E+003	99.90
			4.982E-002	880.53	1.847E+000	%		1.907E+001G		1.6E+012	6.00
Pa-234	N	1	4.982E-002	131.29	4.982E-002	%	(	3.697E+000G		1.6E+012	18.00
			4.982E-002	569.47	4.982E-002	&		1.372E+001G		1.6E+012	8.20
			4.982E-002	946.02	-9.698E-001	%		1.020E+001G		1.6E+012	13.40
			4.982E-002	883.24	9.548E-001	%		1.251E+001G		1.6E+012	9.60
			3.852E-001	723.36	-2.652E-001	%		7.342E+000G		3.1E+003	20.22
			3.852E-001	1004.77	1.994E+000	%		6.497E+000G		3.1E+003	18.01
			3.852E-001	996.33	0.000E+000	%		1.693E+001G		3.1E+003	10.60
EU-154	T F I	1	3.852E-001	873.23	3.852E-001	%	(	8.547E+000G		3.1E+003	12.27
			3.852E-001	123.10	-3.620E-001	%		1.868E+000G		3.1E+003	40.79
			3.852E-001	1274.54	3.750E-002	%		4.151E+000G		3.1E+003	35.19
EU-155	T F I	1	3.034E+000	105.31	1.178E+000	%	(	3.060E+000G		1.8E+003	21.20
			3.034E+000	86.54	4.315E+000		(	3.491E+000G		1.8E+003	30.70
CS-137	T F I	1	3.001E+000	661.66	3.001E+000		(	7.814E-001G		1.1E+004	85.21
RA-224	N	1	2.700E+001	240.99	2.700E+001		(	3.147E+001G		7.0E+002	4.10
K-40	N	1	2.359E+002	1460.83	2.359E+002		(P	1.131E+001G		4.7E+011	10.67

PB-212	N	1	1.976E+001	238.63	1.976E+001		(	P	2.227E+000G		7.0E+002	43.30
			1.976E+001	300.03	9.663E+000	%			3.012E+001G		7.0E+002	3.28
			1.711E+001	242.00	1.787E+001		(		1.248E+001G		5.8E+005	7.43
PB-214	N	1	1.711E+001	351.93	1.640E+001	*	(	P	2.185E+000G		5.8E+005	37.60
			1.711E+001	295.09	1.820E+001	@	(	P	4.170E+000G		5.8E+005	19.30
AC-228	N	1	1.653E+001	911.07	1.628E+001	*	(	P	4.612E+000G		2.1E+003	29.00
			1.653E+001	968.97	1.535E+001		(		9.272E+000G		2.1E+003	17.46
			1.653E+001	338.32	1.885E+001	*	(	P	7.224E+000G		2.1E+003	12.01
			1.653E+001	93.35	2.935E+001	!		} E	1.592E+001X	A	2.1E+003	5.56
PA-234	N	1	1.513E+000	1001.00	1.513E+000	%	(		1.788E+002G		1.6E+012	.84
			1.513E+000	766.41	-3.233E+001	%			4.290E+002G		1.6E+012	.29
BE-7	N P C	1	-1.150E+000	477.60	-1.150E+000	%	(		9.698E+000G		5.3E+001	10.52
BI-214	N	1	1.057E+001	609.31	1.025E+001		(	P	2.141E+000G		5.8E+005	46.09
			1.057E+001	1120.29	1.240E+001		(	P	1.022E+001G		5.8E+005	15.10
			1.057E+001	1764.49	9.741E+000	?	(	P	9.816E+000G		5.8E+005	15.40
AM-241 T		1	1.050E+000	59.54	1.050E+000	%	(		3.338E+000G		1.6E+005	35.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.150E+000	-1.154E+000	241.54	241.55	9.698E+000
K-40		2.359E+002	2.359E+002	5.19	5.96	1.131E+001
CO-60	<	-5.139E-003	-5.139E-003	7,516.35	7,516.35	1.437E+000
I-131	<	7.375E-002	7.529E-002	394.81	394.83	1.024E+000
CS-134	<	6.947E-002	6.949E-002	1,473.58	1,473.59	3.463E+000
CS-137		3.001E+000	3.001E+000	17.11	17.36	7.814E-001
EU-152	<	-6.926E-001	-6.926E-001	142.80	142.83	3.387E+000
EU-155	<	3.034E+000	3.034E+000	25.69	25.91	3.060E+000
TL-208		8.642E+000	8.644E+000	9.26	9.70	1.109E+000
BI-212	<	7.131E+000	7.132E+000	44.80	44.89	1.013E+001
BI-214	<	1.057E+001	1.057E+001	10.08	10.48	2.141E+000
AC-228	<	1.653E+001	1.653E+001	9.61	10.03	4.612E+000
TH-234	<	8.710E+000	8.710E+000	84.96	85.04	2.516E+001
PA-234M	<	1.513E+000	1.513E+000	3,272.60	3,272.60	1.788E+002
U-235	<	-6.812E-001	-6.812E-001	657.60	657.61	7.192E+000
EU-154	<	3.852E-001	3.852E-001	604.05	604.06	8.547E+000
RA-224		2.700E+001	2.701E+001	36.29	36.41	3.147E+001
PB-210	#	6.497E+001	6.497E+001	29.01	29.27	3.926E+001
PB-212		1.976E+001	1.976E+001	5.43	6.20	2.227E+000
PB-214		1.711E+001	1.711E+001	8.45	8.92	2.185E+000
Pa-234	<	4.982E-002	4.982E-002	2,141.69	2,141.69	3.697E+000
AM-241	<	1.050E+000	1.050E+000	95.25	95.33	3.338E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 376.34 Bq/sample

Analyzed by: _____

403605

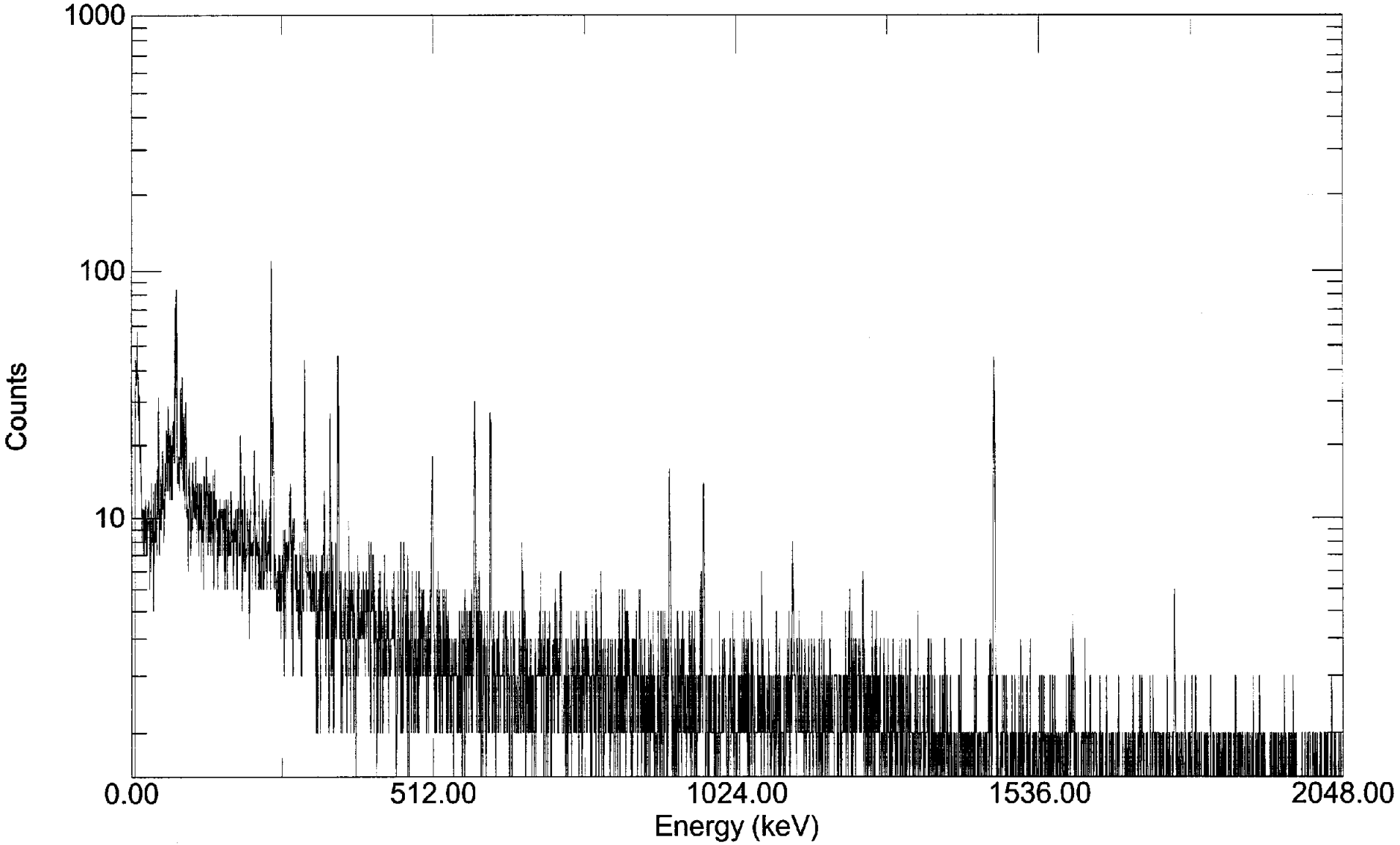
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKHR1AC

7360294_KEKHR1AC_F7L200271-004



Acquired: 26-Dec-2007 5:45:05 PM
File: C:\User\spectra\KEKHR1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1815.40 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,067

Sample Description: 7360294_KEKHV1AC_F7L200271-005

Spectrum Filename: KEKHV1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:45:28PM		
Live Time:	1800.00	Real Time:	1804.30
Dead Time:	0.24 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2300

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
299.08	74.82	178.67	127.33	0.071	21.97	0.747	PB-214	
308.18	77.09	176.00	168.00	0.093	16.98	0.780	PB-214	
348.77	87.25	91.75	73.25	0.041	21.87	0.713	PB-214	

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	186.02	46.54	121.37	6.04	0.003	56.24	0.819	s
AM-241	1	237.73	59.47	131.02	-5.87	-0.003	278.94	0.830	s
TH-234	1	253.86	63.51	188.56	17.70	0.010	57.70	0.834	s
EU-155	1	340.47	85.17	150.53	-15.04	-0.008	118.22	0.854	
TH-234	1	371.66	92.97	178.58	26.53	0.015	37.48	0.859	s
U-235	1	373.18	93.35	150.45	7.31	0.004	28.54	0.860	s D
AC-228	1	373.18	93.35	203.51	0.00	0.000	1794.44	0.860	s D
EU-155	1	421.69	105.48	62.33	56.67	0.031	30.34	0.900	s
EU-152	1	487.26	121.88	103.52	-6.15	-0.003	237.38	0.885	s
EU-154	1	492.40	123.17	94.84	2.33	0.001	593.70	0.886	s
Pa-234	1	525.18	131.36	131.65	7.13	0.004	230.75	0.894	
U-235	1	574.83	143.78	87.04	13.80	0.008	99.34	0.904	
U-235	1	653.68	163.50	60.99	22.06	0.012	54.40	0.922	s
U-235	1	818.91	204.82	46.25	2.00	0.001	485.38	0.958	s
PB-212	1	953.49	238.47	58.29	236.71	0.132	8.22	1.180	
RA-224	1	959.43	239.95	360.38	-88.67	-0.049	32.08	0.988	
PB-214	1	966.35	241.68	45.33	81.67	0.045	19.28	0.990	s
TL-208	1	1107.47	276.97	48.39	8.95	0.005	114.85	1.019	s
I-131	1	1136.79	284.30	75.99	0.00	0.000	1232.78	1.025	s
PB-214	1	1179.24	294.91	42.04	93.96	0.052	16.88	1.091	
PB-212	1	1196.73	299.29	30.41	10.80	0.006	78.39	1.039	s
AC-228	1	1351.65	338.02	32.90	48.27	0.027	22.13	1.071	s
EU-152	1	1376.96	344.35	33.15	-1.97	-0.001	419.96	1.076	s
PB-214	1	1406.29	351.68	13.24	158.76	0.088	8.48	1.083	
I-131	1	1456.07	364.13	24.12	-1.16	-0.001	606.79	1.092	s
BE-7	1	1903.95	476.09	18.98	3.07	0.002	208.84	1.185	s
CS-134	1	2253.65	563.50	28.61	-0.93	-0.001	820.55	1.254	s
CS-134	1	2276.94	569.32	21.94	-0.30	0.000	-118.66	1.259	s D
Pa-234	1	2277.54	569.47	20.92	1.06	0.001	140.16	1.259	s D
TL-208	1	2333.08	583.35	7.68	119.32	0.066	10.32	0.874	s
CS-134	1	2418.53	604.71	242.69	-1.83	-0.001	1208.60	1.286	s
BI-214	1	2435.26	608.89	9.25	128.75	0.072	9.26	1.200	
I-131	1	2560.69	640.24	10.48	0.28	0.000	1628.02	1.312	s
CS-137	1	2643.72	660.99	20.10	1.34	0.001	481.82	1.331	s
EU-154	1	2900.00	725.04	41.66	-8.21	-0.005	116.48	1.378	s
BI-212	1	2907.62	726.94	16.36	21.28	0.012	34.53	1.381	s
PA-234M	1	3064.04	766.02	29.97	-0.43	0.000	1787.57	1.411	s
EU-152	1	3115.64	778.92	15.32	0.00	0.000	553.62	1.420	s
BI-212	1	3141.43	785.36	17.03	3.20	0.002	190.93	1.425	s
CS-134	1	3177.99	794.50	13.37	12.02	0.007	51.80	1.433	s
CS-134	1	3207.74	801.93	17.99	3.47	0.002	181.15	1.437	s
TL-208	1	3441.49	860.34	21.88	10.38	0.006	70.90	1.481	s
EU-154	1	3492.38	873.05	10.05	3.78	0.002	129.29	1.490	s
Pa-234	1	3522.31	880.53	10.56	0.00	0.000	459.47	1.495	s
Pa-234	1	3542.31	885.53	15.67	0.93	0.001	609.34	1.497	s

AC-228	1	3643.32	910.76	13.18	47.95	0.027	17.98	1.518	s
Pa-234	1	3781.87	945.38	20.67	-3.17	-0.002	210.61	1.543	s
EU-152	1	3858.95	964.63	33.49	1.05	0.001	783.80	1.556	s
AC-228	1	3874.84	968.60	26.46	9.16	0.005	86.05	1.559	s
EU-154	1	3985.54	996.26	16.29	-2.38	-0.001	248.69	1.579	s
PA-234M	1	4006.54	1001.50	12.02	1.48	0.001	340.74	1.582	s
EU-154	1	4015.58	1003.76	15.70	-2.95	-0.002	198.48	1.585	s
EU-152	1	4453.49	1113.15	13.20	4.28	0.002	129.40	1.659	s
BI-214	1	4481.29	1120.09	26.95	11.06	0.006	49.44	1.665	s
CO-60	1	4694.91	1173.44	14.75	6.10	0.003	97.87	1.701	s
EU-154	1	5099.57	1274.50	10.88	2.94	0.002	168.92	1.768	s
CO-60	1	5323.52	1330.43	11.75	-1.27	-0.001	391.93	1.806	s
EU-152	1	5634.21	1408.00	0.00	0.00	0.000	100.00	1.854	s
K-40	1	5843.89	1460.35	2.83	212.17	0.118	6.82	0.733	s
BI-214	1	7058.31	1763.49	4.88	16.19	0.009	31.47	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Analysis Code	MDA Value Becquerels	Code	Comments	
CS-134	T F I	1	-9.818E-002	604.71	-9.818E-002	% (	4.048E+000G		7.5E+002	97.62
			-9.818E-002	795.87	9.316E-001	%	1.531E+000G		7.5E+002	85.53
			-9.818E-002	569.32	-9.818E-002	%	7.944E+000G		7.5E+002	15.38
			-9.818E-002	801.95	2.662E+000	%	1.725E+001G		7.5E+002	8.69
			-9.818E-002	563.24	-5.490E-001	%	1.633E+001G		7.5E+002	8.35
CS-137	T F I	1	8.902E-002	661.66	8.902E-002	& (	1.571E+000G		1.1E+004	85.21
TH-234	N	1	7.658E+000	63.29	7.658E+000	% (P	2.885E+001G		1.6E+012	4.82
			7.658E+000	92.59	7.954E+000	% P	1.948E+001G		1.6E+012	5.58
TL-208	F N	1	7.179E+000	583.02	7.179E+000	@ (P	9.403E-001G		7.0E+002	84.50
			7.179E+000	277.28	3.686E+000	%	1.446E+001G		7.0E+002	6.31
			7.179E+000	860.56	5.912E+000	%	1.396E+001G		7.0E+002	12.42
Pa-234	N	1	6.446E-001	131.29	6.446E-001	% (	5.082E+000G		1.6E+012	18.00
			6.446E-001	569.47	6.446E-001	%	1.459E+001G		1.6E+012	8.20
			6.446E-001	946.02	-1.809E+000	%	1.365E+001G		1.6E+012	13.40
			6.446E-001	883.24	7.021E-001	&	1.593E+001G		1.6E+012	9.60
			6.446E-001	880.53	0.000E+000	&	2.145E+001G		1.6E+012	6.00
PB-210	N	1	5.001E+000	46.54	5.001E+000	% (P	4.479E+001G		8.1E+003	4.25
RA-224	N	1	-4.980E+001	240.99	-4.980E+001	(	5.120E+001G		7.0E+002	4.10
I-131	T F I	1	-4.721E-002	364.48	-4.721E-002	% (	1.043E+000G		8.0E+000	81.70
			-4.721E-002	284.30	0.000E+000	&	1.875E+001G		8.0E+000	6.14
			-4.721E-002	636.97	2.167E-001	%	1.362E+001G		8.0E+000	7.17
EU-155	T F I	1	4.332E+000	105.31	4.332E+000	* (	3.019E+000G		1.8E+003	21.20
			4.332E+000	86.54	-8.422E-001	%	3.354E+000G		1.8E+003	30.70
AM-241	T	1	-3.603E-001	59.54	-3.603E-001	% (	3.441E+000G		1.6E+005	35.90
EU-152	T F	1	-2.346E-001	344.29	-2.346E-001	% (	3.523E+000G		4.9E+003	26.50
			-2.346E-001	121.78	-3.468E-001	&	2.826E+000G		4.9E+003	28.58
			-2.346E-001	778.92	0.000E+000	&	1.054E+001G		4.9E+003	12.94
			-2.346E-001	964.11	5.602E-001	%	1.580E+001G		4.9E+003	14.61
			-2.346E-001	1112.07	2.747E+000	&	1.261E+001G		4.9E+003	13.64
			-2.346E-001	1408.00	0.000E+000	%	3.755E+000G		4.9E+003	21.00
EU-154	T F I	1	2.207E+000	873.23	2.207E+000	& (	1.021E+001G		3.1E+003	12.27
			2.207E+000	123.10	9.229E-002	%	1.902E+000G		3.1E+003	40.79
			2.207E+000	1274.54	8.213E-001	%	5.047E+000G		3.1E+003	35.19
			2.207E+000	723.36	-2.485E+000	%	9.920E+000G		3.1E+003	20.22
			2.207E+000	1004.77	-1.320E+000	%	9.462E+000G		3.1E+003	18.01
			2.207E+000	996.33	-1.792E+000	%	1.622E+001G		3.1E+003	10.60
K-40	N	1	2.198E+002	1460.83	2.198E+002	(P	1.093E+001G		4.7E+011	10.67
U-235	N	1	2.100E+000	143.79	2.100E+000	% (	7.029E+000G		2.6E+011	10.96
			2.100E+000	205.33	8.118E-001	%	1.394E+001G		2.6E+011	5.01
			2.100E+000	163.38	7.645E+000	&	1.355E+001G		2.6E+011	5.08
			2.100E+000	93.35	2.100E+000	% E	1.720E+001X		2.6E+011	5.81
			1.452E+001	1120.29	6.455E+000	% P	1.570E+001G		5.8E+005	15.10
			1.452E+001	1764.49	1.380E+001	? (	1.108E+001G		5.8E+005	15.40
BI-214	N	1	1.452E+001	609.31	1.476E+001	(P	1.935E+000G		5.8E+005	46.09

			1.421E+001	766.41	-9.496E+000	%			6.165E+002G		1.6E+012	.29
PA-234	N	1	1.421E+001	1001.00	1.421E+001	%	(		1.808E+002G		1.6E+012	.84
PB-214	N	1	1.353E+001	351.93	1.362E+001		(	P	1.687E+000G		5.8E+005	37.60
			1.353E+001	295.09	1.337E+001		(	P	4.685E+000G		5.8E+005	19.30
			1.353E+001	242.00	2.540E+001	*			1.060E+001G		5.8E+005	7.43
CO-60	T F	1	-1.296E-001	1332.50	-1.296E-001	%	(		1.907E+000G		1.9E+003	99.98
			-1.296E-001	1173.24	5.588E-001	%			1.889E+000G		1.9E+003	99.90
PB-212	N	1	1.249E+001	238.63	1.249E+001		(	P	2.020E+000G		7.0E+002	43.30
			1.249E+001	300.03	9.175E+000	%			2.415E+001G		7.0E+002	3.28
BE-7	N P C	1	1.242E+000	477.60	1.242E+000	&	(		9.319E+000G		5.3E+001	10.52
AC-228	N	1	1.234E+001	911.07	1.227E+001		(		5.021E+000G		2.1E+003	29.00
			1.234E+001	968.97	4.094E+000	%			1.193E+001G		2.1E+003	17.46
			1.234E+001	338.32	1.250E+001	*	(		7.624E+000G		2.1E+003	12.01
			1.234E+001	93.35	0.000E+000	%		} E	1.797E+001X	A	2.1E+003	5.56
BI-212	N	1	1.106E+001	727.33	1.106E+001		(		1.121E+001G		7.0E+002	11.82
			1.106E+001	785.51	1.906E+001	%			1.308E+002G		7.0E+002	1.10

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.242E+000	1.246E+000	208.84	208.86	9.319E+000
K-40		2.198E+002	2.198E+002	6.91	7.51	1.093E+001
CO-60	<	-1.296E-001	-1.296E-001	391.93	391.94	1.907E+000
I-131	<	-4.721E-002	-4.820E-002	606.79	606.80	1.043E+000
CS-134	<	-9.818E-002	-9.820E-002	1,208.60	1,208.60	4.048E+000
EU-154	<	2.207E+000	2.207E+000	129.29	129.33	1.021E+001
EU-155	#	4.332E+000	4.332E+000	30.34	30.53	3.019E+000
CS-137	<	8.902E-002	8.902E-002	481.82	481.83	1.571E+000
EU-152	<	-2.346E-001	-2.346E-001	419.96	419.97	3.523E+000
TL-208	#	7.179E+000	7.180E+000	10.51	10.90	9.403E-001
RA-224	<	-4.980E+001	-4.981E+001	32.08	32.22	5.120E+001
PB-210	<	5.001E+000	5.001E+000	250.16	250.19	4.479E+001
PB-212		1.249E+001	1.249E+001	8.55	9.05	2.020E+000
AC-228	<	1.234E+001	1.234E+001	14.25	14.54	5.021E+000
Pa-234	<	6.446E-001	6.446E-001	230.75	230.77	5.082E+000
U-235	<	2.100E+000	2.100E+000	99.34	99.38	7.029E+000
AM-241	<	-3.603E-001	-3.603E-001	278.94	278.96	3.441E+000
PB-214		1.353E+001	1.353E+001	8.76	9.22	1.687E+000
BI-212	<	1.106E+001	1.107E+001	34.53	34.65	1.121E+001
BI-214		1.452E+001	1.452E+001	9.64	10.06	1.935E+000
TH-234	<	7.658E+000	7.658E+000	109.95	110.01	2.885E+001
PA-234M	<	1.421E+001	1.421E+001	340.74	340.75	1.808E+002

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 271.85 Bq/sample

Analyzed by: _____

403605

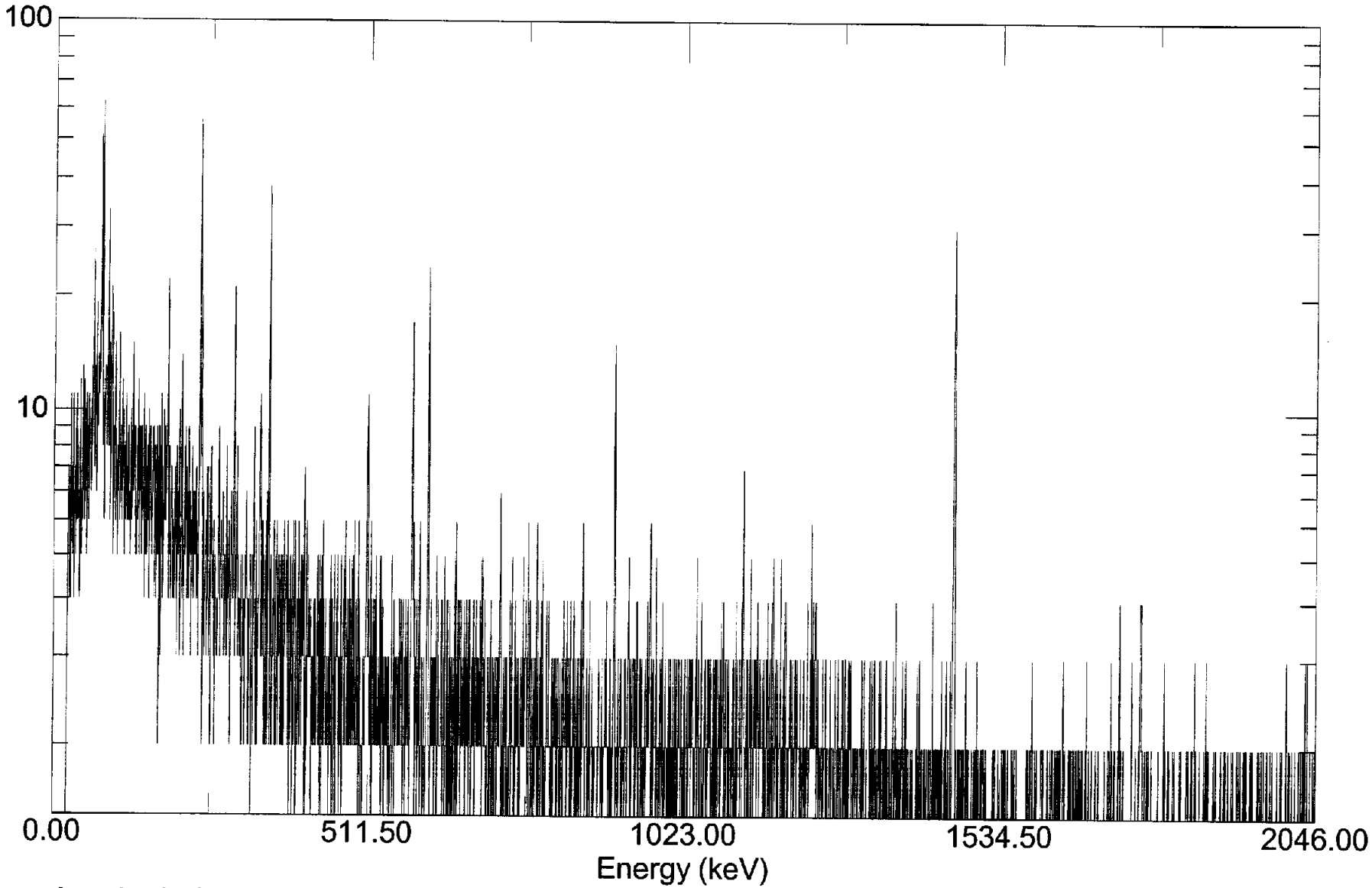
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKHV1AC

7360294_KEKHV1AC_F7L200271-005



Acquired: 26-Dec-2007 5:45:28 PM
File: C:\User\spectra\KEKHV1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.30 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,070

Sample Description: 7360294_KEKHX1AC_F7L200271-006

Spectrum Filename: KEKHX1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 5:45:48PM		
Live Time:	1800.00	Real Time:	1854.50
Dead Time:	2.94 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2148

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.38	74.56	213.00	165.00	0.092	19.33	0.819	PB-214	s
307.19	77.01	209.00	254.00	0.141	13.20	0.816	PB-214	
346.96	86.94	90.16	89.84	0.050	18.30	0.692	TB-160	s
1180.57	295.21	127.71	44.29	0.025	39.08	0.671	PB-214	s
1354.00	338.55	105.09	27.91	0.016	55.28	0.550		s
1407.32	351.87	152.74	49.26	0.027	38.24	1.123	PB-214	s
3645.83	911.38	65.44	31.56	0.018	40.38	0.408		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.21	46.29	98.26	42.74	0.024	32.66	0.594	s
AM-241	1	238.45	59.84	150.69	16.28	0.009	90.48	0.761	s
TH-234	1	252.29	63.29	175.85	26.58	0.015	46.83	0.764	s
EU-155	1	345.35	86.54	197.98	-7.84	-0.004	256.37	0.788	s
TH-234	1	370.72	92.88	221.82	27.38	0.015	42.13	0.795	s
U-235	1	372.61	93.35	163.76	-0.67	0.000	-760.92	0.795	s D
AC-228	1	372.61	93.35	163.76	60.92	0.034	2.85	0.795	s D
EU-155	1	423.34	106.02	122.66	0.12	0.000	13351.63	0.808	s
EU-152	1	483.90	121.15	128.27	-18.82	-0.010	88.17	0.824	s
EU-154	1	495.91	124.15	100.79	20.12	0.011	74.00	0.826	s
Pa-234	1	521.34	130.51	107.68	-8.84	-0.005	169.45	0.834	
U-235	1	574.49	143.79	139.45	-1.27	-0.001	1379.34	0.847	s
U-235	1	651.30	162.98	77.26	1.86	0.001	322.46	0.867	s
U-235	1	819.41	204.98	96.40	-13.74	-0.008	104.61	0.909	s
PB-212	1	954.41	238.70	51.15	415.85	0.231	5.65	0.961	
RA-224	1	960.21	240.15	369.90	-100.98	-0.056	28.72	0.944	s
PB-214	1	966.89	241.82	59.23	33.92	0.019	36.40	0.945	s
TL-208	1	1109.67	277.50	56.44	11.94	0.007	93.57	0.980	s
I-131	1	1134.60	283.73	28.85	13.61	0.008	62.05	0.987	s
PB-214	1	1180.51	295.20	54.07	80.12	0.045	16.48	0.998	s
PB-212	1	1202.12	300.60	47.67	41.33	0.023	39.29	0.404	s
AC-228	1	1353.67	338.46	37.16	78.32	0.044	15.77	1.040	s
EU-152	1	1376.06	344.06	33.00	10.98	0.006	79.90	1.045	s
PB-214	1	1407.98	352.04	51.42	112.54	0.063	12.31	1.053	s
I-131	1	1454.22	363.59	32.60	0.03	0.000	24501.49	1.065	s
BE-7	1	1910.20	477.54	28.62	0.33	0.000	2285.35	1.173	s
CS-134	1	2249.73	562.39	25.00	3.17	0.002	230.22	1.252	s
CS-134	1	2277.45	569.32	22.26	-0.25	0.000	-38.07	1.258	s D
Pa-234	1	2278.05	569.47	23.72	-1.33	-0.001	-131.13	1.258	s D
TL-208	1	2333.71	583.38	20.25	143.75	0.080	10.82	0.982	
CS-134	1	2419.46	604.81	26.44	-1.52	-0.001	485.52	1.290	s
BI-214	1	2438.39	609.55	26.93	71.49	0.040	13.92	1.294	
I-131	1	2548.36	637.03	31.01	-3.27	-0.002	247.20	1.319	s
CS-137	1	2648.71	662.12	28.74	19.21	0.011	32.96	1.342	s
EU-154	1	2901.25	725.24	34.42	-3.74	-0.002	227.87	1.397	s
BI-212	1	2911.57	727.82	27.96	22.26	0.012	39.72	1.400	s
PA-234M	1	3065.61	766.33	20.48	-1.79	-0.001	365.46	1.434	s
EU-152	1	3116.46	779.04	17.01	-1.79	-0.001	334.49	1.445	s
BI-212	1	3143.76	785.86	12.82	6.06	0.003	92.85	1.451	s
CS-134	1	3180.97	795.16	20.42	8.53	0.005	82.39	1.460	s
CS-134	1	3206.97	801.66	18.51	3.19	0.002	198.60	1.465	s
TL-208	1	3440.86	860.14	4.00	39.00	0.022	19.70	0.458	s
EU-154	1	3491.10	872.69	23.86	-0.90	-0.001	774.71	1.527	s
Pa-234	1	3527.21	881.72	17.96	-0.05	0.000	11097.00	1.533	s
Pa-234	1	3532.54	883.06	18.45	-0.41	0.000	1476.03	1.535	s
AC-228	1	3645.89	911.39	14.36	65.44	0.036	14.83	1.559	s

Pa-234	1	3781.70	945.35	19.31	-1.43	-0.001	443.96	1.588	s
EU-152	1	3847.73	961.86	16.59	-3.34	-0.002	180.72	1.603	s
AC-228	1	3878.16	969.47	17.98	45.25	0.025	19.92	1.607	s
PA-234M	1	3994.57	998.57	13.80	-4.49	-0.002	126.19	1.633	s
EU-154	1	4002.66	1000.60	11.22	0.74	0.000	647.04	1.630	s
EU-154	1	4025.17	1006.22	15.36	-3.80	-0.002	154.60	1.637	s
EU-152	1	4448.48	1112.07	28.20	0.00	0.000	751.03	1.723	s
BI-214	1	4483.35	1120.80	15.60	17.31	0.010	40.24	1.730	s
CO-60	1	4694.45	1173.59	21.99	1.53	0.001	440.17	1.772	s
EU-154	1	5097.45	1274.37	9.44	1.81	0.001	251.49	1.850	s
CO-60	1	5329.86	1332.50	17.18	0.00	0.000	586.26	1.894	s
EU-152	1	5630.59	1407.72	9.86	-0.16	0.000	2836.01	1.950	s
K-40	1	5844.66	1461.27	11.33	147.21	0.082	8.85	1.988	
BI-214	1	7060.46	1765.45	4.91	10.79	0.006	34.27	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code	Peak MDA Value Becquerels		Peak Code	Peak Comments	
PB-214	N	1	9.878E+000	351.93	9.273E+000		(P	2.977E+000G			5.8E+005	37.60
			9.878E+000	295.09	1.096E+001		(P	5.056E+000G			5.8E+005	19.30
			9.878E+000	242.00	1.014E+001	*	(	1.153E+001G			5.8E+005	7.43
AM-241	T	1	9.264E-001	59.54	9.264E-001	*	(P	3.409E+000G			1.6E+005	35.90
EU-155	T F I	1	8.698E-003	105.31	8.698E-003	&	(	4.027E+000G			1.8E+003	21.20
			8.698E-003	86.54	-4.239E-001	%		3.693E+000G		A	1.8E+003	30.70
			8.306E+000	277.28	4.724E+000	&		1.492E+001G			7.0E+002	6.31
			8.306E+000	860.56	2.126E+001	+		6.557E+000G			7.0E+002	12.42
TL-208	F N	1	8.306E+000	583.02	8.306E+000		(P	1.368E+000G			7.0E+002	84.50
BI-214	N	1	7.868E+000	609.31	7.868E+000		(P	2.959E+000G			5.8E+005	46.09
			7.868E+000	1120.29	9.610E+000	%		1.172E+001G			5.8E+005	15.10
			7.868E+000	1764.49	8.606E+000	%	P	1.039E+001G			5.8E+005	15.40
CS-134	T F I	1	-7.841E-002	604.71	-7.841E-002	%	(	1.377E+000G			7.5E+002	97.62
			-7.841E-002	795.87	6.330E-001	%		1.764E+000G			7.5E+002	85.53
			-7.841E-002	569.32	-7.841E-002	%		7.679E+000G			7.5E+002	15.38
			-7.841E-002	801.95	2.348E+000	%		1.674E+001G			7.5E+002	8.69
			-7.841E-002	563.24	1.797E+000	%		1.476E+001G			7.5E+002	8.35
Pa-234	N	1	-7.739E-001	131.29	-7.739E-001	%	(	4.472E+000G			1.6E+012	18.00
			-7.739E-001	569.47	-7.739E-001	%		1.482E+001G			1.6E+012	8.20
			-7.739E-001	946.02	-7.777E-001	%		1.265E+001G			1.6E+012	13.40
			-7.739E-001	883.24	-2.981E-001	%		1.637E+001G			1.6E+012	9.60
			-7.739E-001	880.53	-6.214E-002	%		2.582E+001G			1.6E+012	6.00
RA-224	N	1	-5.452E+001	240.99	-5.452E+001	*	(	4.986E+001G			7.0E+002	4.10
EU-154	T F I	1	-5.026E-001	873.23	-5.026E-001	&	(	1.422E+001G			3.1E+003	12.27
			-5.026E-001	123.10	7.710E-001	%		1.896E+000G			3.1E+003	40.79
			-5.026E-001	1274.54	4.787E-001	%		4.507E+000G			3.1E+003	35.19
			-5.026E-001	723.36	-1.085E+000	%		8.718E+000G			3.1E+003	20.22
			-5.026E-001	1004.77	-1.620E+000	%		8.941E+000G			3.1E+003	18.01
			-5.026E-001	996.33	5.354E-001	%		1.318E+001G			3.1E+003	10.60
PA-234M	N	1	-4.105E+001	1001.00	-4.105E+001	%	(	1.831E+002G			1.6E+012	.84
			-4.105E+001	766.41	-3.746E+001	%		4.983E+002G			1.6E+012	.29
PB-210	N	1	3.138E+001	46.54	3.138E+001	%	(P	3.591E+001G			8.1E+003	4.25

PB-212		N	1	2.109E+001	238.63	2.109E+001		(	P		1.828E+000G	7.0E+002	43.30
				2.109E+001	300.03	3.376E+001	+				2.849E+001G	7.0E+002	3.28
				-1.873E-001	205.33	-5.359E+000	%				1.891E+001G	2.6E+011	5.01
				-1.873E-001	163.38	6.205E-001	%		P		1.460E+001G	2.6E+011	5.08
				-1.873E-001	93.35	-1.873E-001	!			E	1.735E+001X	2.6E+011	5.81
U-235		N	1	-1.873E-001	143.79	-1.873E-001	%	(	P		8.497E+000G	2.6E+011	10.96
AC-228		N	1	1.771E+001	911.16	1.600E+001		(			4.982E+000G	2.1E+003	29.00
				1.771E+001	968.97	1.932E+001		(			9.595E+000G	2.1E+003	17.46
				1.771E+001	338.32	1.949E+001		(			7.742E+000G	2.1E+003	12.01
				1.771E+001	93.35	1.771E+001	!			E	1.812E+001G	A 2.1E+003	5.56
K-40		N	1	1.439E+002	1460.83	1.439E+002		(			1.798E+001G	4.7E+011	10.67
BE-7		N P C	1	1.292E-001	477.60	1.292E-001	%	(			1.076E+001G	5.3E+001	10.52
I-131	T F I		1	1.291E-003	364.48	1.291E-003	%	(			1.148E+000G	8.0E+000	81.70
				1.291E-003	284.30	5.658E+000	%				1.153E+001G	8.0E+000	6.14
				1.291E-003	636.97	-2.402E+000	&				2.106E+001G	8.0E+000	7.17
				1.258E+000	121.78	-1.028E+000	%				3.032E+000G	4.9E+003	28.58
				1.258E+000	778.92	-8.625E-001	%				1.057E+001G	4.9E+003	12.94
				1.258E+000	964.11	-1.700E+000	%				1.103E+001G	4.9E+003	14.61
				1.258E+000	1112.07	0.000E+000	%				1.677E+001G	4.9E+003	13.64
				1.258E+000	1408.00	-7.568E-002	%				8.349E+000G	4.9E+003	21.00
EU-152	T F		1	1.258E+000	344.29	1.258E+000	*	(			3.378E+000G	4.9E+003	26.50
CS-137	T F I		1	1.227E+000	661.66	1.227E+000	%	(	P		1.768E+000G	1.1E+004	85.21
BI-212		N	1	1.110E+001	727.33	1.110E+001		(			1.364E+001G	7.0E+002	11.82
				1.110E+001	785.51	3.463E+001	&				1.107E+002G	7.0E+002	1.10
TH-234		N	1	1.077E+001	63.29	1.077E+001	*	(	P		2.613E+001G	1.6E+012	4.82
				1.077E+001	92.59	7.949E+000	%		P		2.093E+001G	1.6E+012	5.58
CO-60	T F		1	0.000E+000	1332.50	0.000E+000	%	(			2.128E+000G	1.9E+003	99.98
				0.000E+000	1173.24	1.335E-001	&				2.140E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T	= Thermal Neutron Activation	F	= Fast Neutron Activation	I	= Fission Product
P	= Photon Reaction	N	= Naturally Occurring Isotope	C	= Charged Particle Reaction
M	= No MDA Calculation				

Peak Codes:

G	= Gamma Ray	X	= X-Ray	P	= Positron Decay
S	= Single - Escape	D	= Double - Escape	K	= Key Line
A	= Not in Average				

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	1.292E-001	1.296E-001	2,285.35	2,285.35	1.076E+001
K-40	#	1.439E+002	1.439E+002	8.85	9.33	1.798E+001
CO-60	#			586.26	586.26	2.128E+000
I-131	#	1.291E-003	1.318E-003	24,501.49	24,501.49	1.148E+000
EU-154	#	-5.026E-001	-5.026E-001	774.71	774.72	1.422E+001
PB-210	#	3.138E+001	3.138E+001	45.85	46.02	3.591E+001
PB-212		2.109E+001	2.109E+001	5.74	6.47	1.828E+000
PB-214	#	9.878E+000	9.878E+000	12.88	13.20	2.977E+000
AC-228	#	1.771E+001	1.771E+001	9.81	10.22	4.982E+000
Pa-234	#	-7.739E-001	-7.739E-001	169.45	169.48	4.472E+000
AM-241	#	9.264E-001	9.264E-001	108.88	108.95	3.409E+000
CS-134	#	-7.841E-002	-7.843E-002	485.52	485.53	1.377E+000
CS-137	#	1.227E+000	1.227E+000	43.68	43.78	1.768E+000
EU-152	#	1.258E+000	1.258E+000	79.90	79.95	3.378E+000
EU-155	#	8.698E-003	8.699E-003	13,351.63	13,351.63	4.027E+000
TL-208		8.306E+000	8.308E+000	11.10	11.47	1.368E+000
BI-212	#	1.110E+001	1.110E+001	39.72	39.82	1.364E+001
BI-214	#	7.868E+000	7.868E+000	15.23	15.51	2.959E+000
RA-224	#	-5.452E+001	-5.453E+001	28.72	28.87	4.986E+001
TH-234	#	1.077E+001	1.077E+001	71.79	71.89	2.613E+001
PA-234M	#	-4.105E+001	-4.105E+001	126.19	126.22	1.831E+002
U-235	#	-1.873E-001	-1.873E-001	4,061.65	4,061.65	8.497E+000

= All peaks for activity calculation had bad shape

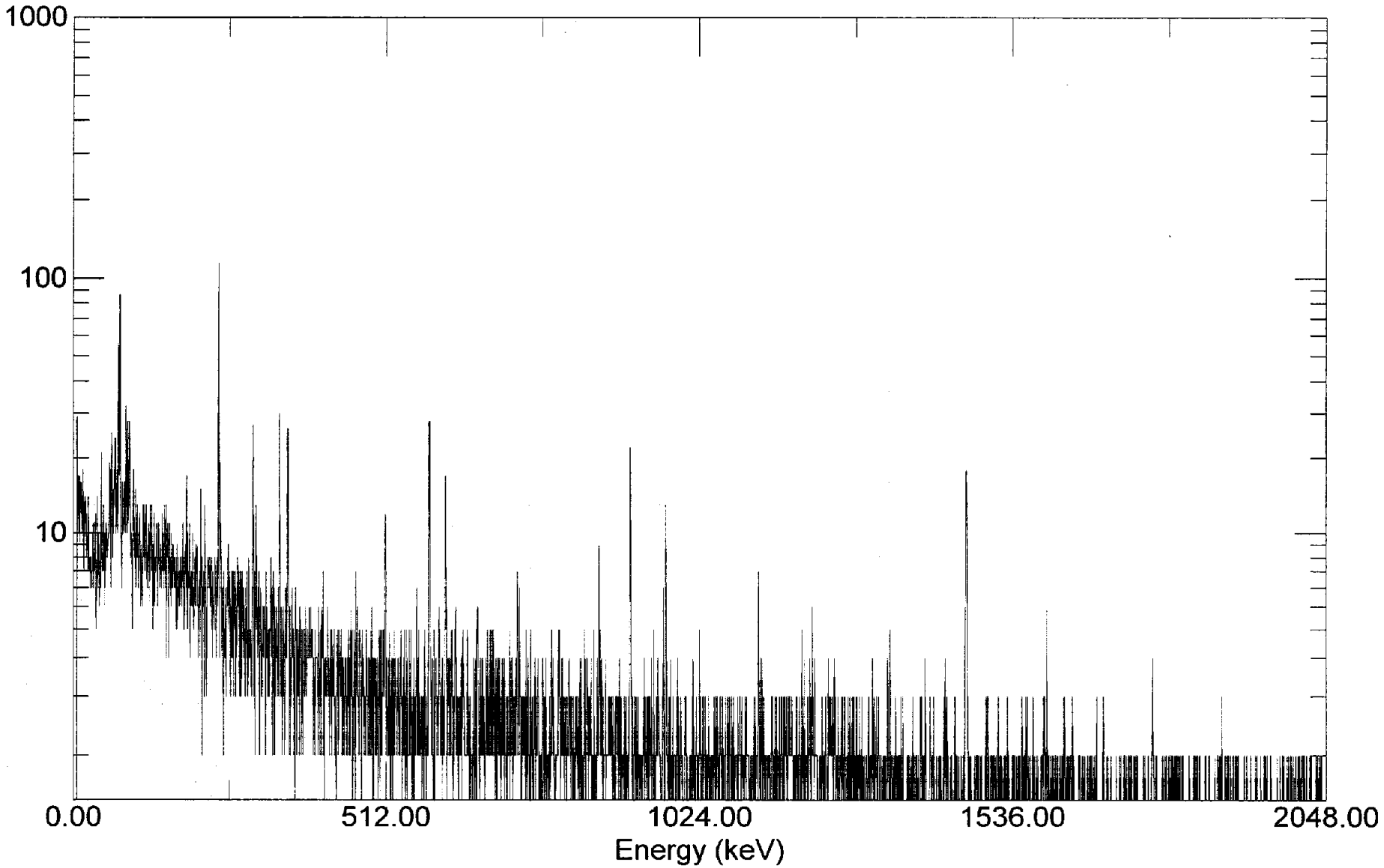
Total Activity (37.74 to 2,000.57 keV) 29.40 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKHX1AC

7360294_KEKHX1AC_F7L200271-006



Acquired: 26-Dec-2007 5:45:48 PM
File: C:\User\spectra\KEKHX1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1854.50 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,071

Sample Description: 7360294_KEKH11AC_F7L200271-007

Spectrum Filename: KEKH11AC.An1

Acquisition Information

Start Time:	26-Dec-2007 6:22:22PM		
Live Time:	1800.00	Real Time:	1811.68
Dead Time:	0.64 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1150

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.32	74.80	480.00	437.00	0.243	10.73	0.804	PB-214	
307.53	77.10	291.50	686.50	0.381	5.66	0.825	PB-214	
335.12	83.99	319.15	104.85	0.058	26.00	0.707	TA-182	
347.98	87.21	257.89	318.11	0.177	9.08	0.939	PB-214	s
358.81	89.92	218.33	139.67	0.078	19.24	0.790	PB-214	M
514.82	128.92	142.11	160.89	0.089	13.11	0.764	AC-228	
595.52	149.10	81.33	40.67	0.023	37.33	0.733	TE-131	
835.40	209.07	159.00	193.00	0.107	14.92	1.003	AC-228	s
1851.02	462.96	53.17	149.83	0.083	14.31	1.247	AC-228	
2042.11	510.73	84.00	318.00	0.177	9.89	1.285	TL-208	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

Test America St. Louis

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.92	46.44	202.79	52.21	0.029	32.79	0.696	
AM-241	1	238.11	59.74	428.76	0.06	0.000	45355.14	0.824	s
TH-234	1	251.26	63.03	488.40	119.60	0.066	29.89	0.923	s
EU-155	1	345.31	86.54	606.24	-21.69	-0.012	161.96	0.849	s
TH-234	1	369.50	92.59	417.01	56.99	0.032	26.97	0.855	D
AC-228	1	372.54	93.35	417.20	135.43	0.075	21.25	0.855	D
U-235	1	372.54	93.35	384.08	4.03	0.002	81.41	0.855	s D
EU-155	1	420.17	105.26	315.26	67.12	0.037	39.35	0.866	s
EU-152	1	485.65	121.63	307.77	22.23	0.012	113.59	0.881	s
EU-154	1	491.80	123.17	373.57	-31.44	-0.017	88.75	0.882	s
Pa-234	1	519.92	130.20	413.19	-54.18	-0.030	54.76	0.890	s
U-235	1	573.49	143.59	345.72	7.45	0.004	235.53	0.901	s
U-235	1	652.11	163.24	303.74	0.72	0.000	664.12	0.919	s
U-235	1	814.54	203.85	193.16	15.55	0.009	113.02	0.957	s
PB-212	1	953.66	238.63	139.92	1449.33	0.805	2.81	0.987	D
RA-224	1	963.07	240.99	229.97	158.03	0.088	15.73	0.989	D
PB-214	1	967.12	242.00	234.36	82.64	0.046	26.02	0.990	D
TL-208	1	1106.84	276.93	126.67	76.33	0.042	32.20	0.686	s
I-131	1	1138.26	284.78	138.56	7.44	0.004	226.59	1.028	s
PB-214	1	1178.86	294.93	114.21	189.79	0.105	13.02	1.534	s
PB-212	1	1198.36	299.81	69.67	129.33	0.072	16.48	0.784	s
AC-228	1	1351.80	338.16	70.08	309.92	0.172	7.55	1.118	
EU-152	1	1380.06	345.23	77.58	16.80	0.009	78.04	1.081	s
PB-214	1	1406.39	351.81	53.99	344.01	0.191	6.26	1.074	
I-131	1	1458.17	364.76	89.41	2.75	0.002	490.62	1.099	s
BE-7	1	1908.56	477.35	66.19	-0.98	-0.001	1173.34	1.198	s
CS-134	1	2249.07	562.47	53.25	16.60	0.009	66.83	1.273	s
CS-134	1	2276.47	569.32	53.69	-1.72	-0.001	-3.59	1.278	s D
Pa-234	1	2277.07	569.47	51.69	-9.80	-0.005	-219.65	1.278	s D
TL-208	1	2331.42	583.06	51.08	479.92	0.267	5.38	1.099	
CS-134	1	2402.83	600.91	-18.85	-10.47	-0.006	9.56	1.309	s
BI-214	1	2436.37	609.29	46.29	249.71	0.139	8.08	1.381	
I-131	1	2545.92	636.68	57.10	-3.47	-0.002	312.94	1.337	s
CS-137	1	2645.86	661.66	92.31	0.00	0.000	1358.77	1.358	s
EU-154	1	2899.53	725.07	105.13	-23.00	-0.013	66.41	1.411	s
BI-212	1	2909.10	727.46	28.00	136.00	0.076	12.22	0.735	s
PA-234M	1	3065.10	766.46	65.57	4.25	0.002	273.77	1.447	s
EU-152	1	3113.80	778.63	64.43	-5.35	-0.003	216.73	1.458	s
BI-212	1	3141.15	785.47	17.50	74.50	0.041	18.70	1.205	s
CS-134	1	3177.21	794.48	41.37	61.71	0.034	19.48	1.472	s
CS-134	1	3206.47	801.79	52.72	-4.19	-0.002	250.01	1.477	s
TL-208	1	3441.78	860.61	41.49	41.45	0.023	26.91	1.527	s
EU-154	1	3493.76	873.61	33.61	1.60	0.001	518.11	1.537	s
Pa-234	1	3520.47	880.28	28.57	1.67	0.001	458.50	1.543	s
Pa-234	1	3530.17	882.71	28.05	0.62	0.000	1208.97	1.546	s

AC-228	1	3643.66	911.08	15.47	374.53	0.208	5.57	0.921	s
Pa-234	1	3784.10	946.18	50.84	-6.97	-0.004	149.64	1.598	s
AC-228	1	3873.09	968.42	36.58	299.42	0.166	8.19	1.293	
EU-152	1	3874.20	968.70	79.21	36.39	0.020	38.35	1.613	
EU-154	1	3976.77	994.34	22.17	-0.48	0.000	1406.55	1.640	s
PA-234M	1	4002.85	1000.86	31.32	9.58	0.005	88.74	1.643	s
EU-154	1	4020.93	1005.38	41.20	3.59	0.002	258.52	1.647	s
EU-152	1	4447.80	1112.07	27.41	0.00	0.000	740.36	1.735	s
BI-214	1	4478.94	1119.86	5.75	83.25	0.046	10.60	0.844	s
CO-60	1	4689.17	1172.40	35.04	-1.70	-0.001	498.49	1.784	s
EU-154	1	5097.83	1274.54	10.93	0.00	0.000	467.50	1.866	s
CO-60	1	5312.81	1328.27	8.82	2.37	0.001	189.07	1.912	s
EU-152	1	5631.33	1407.88	22.59	5.87	0.003	121.65	1.972	s
K-40	1	5841.92	1460.52	12.54	443.46	0.246	4.68	1.930	
BI-214	1	7058.16	1764.48	15.82	25.49	0.014	23.88	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels	Peak Code	Peak Comments	
U-235	N	1	9.283E-001	143.79	9.283E-001	%	(P		1.113E+001G		2.6E+011	10.96
			9.283E-001	205.33	5.035E+000	%	P		2.185E+001G		2.6E+011	5.01
			9.283E-001	163.38	2.046E-001	&	P		2.370E+001G		2.6E+011	5.08
			9.283E-001	93.35	9.283E-001	%		E	2.164E+001X		2.6E+011	5.81
I-131	T F I	1	8.159E-002	364.48	8.159E-002	&	(		1.390E+000G		8.0E+000	81.70
			8.159E-002	284.30	2.453E+000	&			1.896E+001G		8.0E+000	6.14
			8.159E-002	636.97	-1.757E+000	%			1.922E+001G		8.0E+000	7.17
RA-224	N	1	6.940E+001	240.99	6.940E+001		(		3.222E+001G		7.0E+002	4.10
			5.996E+001	93.35	3.256E+001	-	}	E	2.016E+001X	A	2.1E+003	5.56
AC-228	N	1	5.996E+001	911.07	6.024E+001		(P		3.384E+000G		2.1E+003	29.00
			5.996E+001	968.97	8.352E+001	+	P		8.618E+000G		2.1E+003	17.46
			5.996E+001	338.32	5.928E+001		(P		7.980E+000G		2.1E+003	12.01
PB-212	N	1	5.986E+001	238.63	5.986E+001		(P		2.389E+000G		7.0E+002	43.30
			5.986E+001	300.03	8.294E+001	+			2.668E+001G		7.0E+002	3.28
EU-154	T F I	1	5.909E-001	873.23	5.909E-001	%	(		1.097E+001G		3.1E+003	12.27
			5.909E-001	123.10	-1.015E+000	%			2.996E+000G		3.1E+003	40.79
			5.909E-001	1274.54	0.000E+000	&			3.055E+000G		3.1E+003	35.19
			5.909E-001	723.36	-4.517E+000	%			9.918E+000G		3.1E+003	26.22
			5.909E-001	1004.77	9.951E-001	%			9.050E+000G		3.1E+003	18.01
			5.909E-001	996.33	-2.230E-001	%			1.155E+001G		3.1E+003	10.60
PA-234	N	1	5.702E+001	1001.00	5.702E+001	%	(		1.714E+002G		1.6E+012	.84
			5.702E+001	766.41	5.978E+001	&			5.688E+002G		1.6E+012	.29
			5.248E+000	1112.07	0.000E+000	%			1.067E+001G		4.9E+003	13.64
			5.248E+000	1408.00	1.790E+000	%			7.574E+000G		4.9E+003	21.00
EU-152	T F	1	5.248E+000	344.29	1.476E+000	&	(		3.842E+000G		4.9E+003	26.50
			5.248E+000	121.78	1.023E+000	&			3.888E+000G		4.9E+003	28.58
			5.248E+000	778.92	-1.727E+000	&			1.296E+001G		4.9E+003	12.94
			5.248E+000	964.11	1.209E+001	?	(		1.468E+001G		4.9E+003	14.61
BI-212	N	1	4.587E+001	727.33	4.587E+001		(		9.231E+000G		7.0E+002	11.82
			4.587E+001	785.51	2.849E+002	*			8.491E+001G		7.0E+002	1.10
EU-155	T F I	1	4.151E+000	105.31	4.151E+000	*	(		5.285E+000G		1.8E+003	21.20
			4.151E+000	86.54	-9.661E-001	&			5.231E+000G		1.8E+003	30.70
TH-234	N	1	4.067E+001	63.29	4.067E+001	@	(P		3.594E+001G		1.6E+012	4.82
			4.067E+001	92.59	1.367E+001	%	P		2.348E+001G		1.6E+012	5.58
Pa-234	N	1	-4.011E+000	131.29	-4.011E+000	*	(		7.212E+000G		1.6E+012	18.00
			-4.011E+000	569.47	-4.011E+000	%			1.483E+001G		1.6E+012	8.20
			-4.011E+000	946.02	-2.489E+000	%			1.284E+001G		1.6E+012	13.40
			-4.011E+000	883.24	2.962E-001	%			1.302E+001G		1.6E+012	9.60
			-4.011E+000	880.53	1.270E+000	&			2.096E+001G		1.6E+012	6.00
CS-134	T F I	1	-3.755E-001	604.71	-3.755E-001		(		2.645E-001G		7.5E+002	97.62
			-3.755E-001	795.87	3.063E+000	+			1.622E+000G		7.5E+002	85.53
			-3.755E-001	569.32	-3.755E-001	%			8.043E+000G		7.5E+002	15.38
			-3.755E-001	801.95	-2.057E+000	%			1.795E+001G		7.5E+002	8.69
			-3.755E-001	563.24	6.623E+000	&			1.465E+001G		7.5E+002	8.35

PB-210		N	1	3.298E+001	46.54	3.298E+001	%	(	P	4.363E+001G	8.1E+003	4.25
AM-241	T		1	3.121E-003	59.54	3.121E-003	%	(		4.795E+000G	1.6E+005	35.90
BE-7		N P C	1	-2.768E-001	477.60	-2.768E-001	%	(		1.143E+001G	5.3E+001	10.52
K-40		N	1	2.737E+002	1460.83	2.737E+002		(	P	1.186E+001G	4.7E+011	10.67
PB-214		N	1	2.110E+001	351.93	2.164E+001		(	P	2.324E+000G	5.8E+005	37.60
				2.110E+001	295.09	2.044E+001		(	P	5.654E+000G	5.8E+005	19.30
				2.110E+001	242.00	2.008E+001		(	P	1.799E+001G	5.8E+005	7.43
TL-208	F	N	1	1.939E+001	583.02	1.939E+001		(	P	1.455E+000G	7.0E+002	84.50
				1.939E+001	277.28	2.403E+001	+			1.737E+001G	7.0E+002	6.31
				1.939E+001	860.56	1.496E+001	-			1.181E+001G	7.0E+002	12.42
BI-214		N	1	1.908E+001	609.31	1.908E+001		(	P	2.630E+000G	5.8E+005	46.09
				1.908E+001	1120.29	2.977E+001	+		P	4.965E+000G	5.8E+005	15.10
				1.908E+001	1764.49	1.271E+001	-		P	1.060E+001G	5.8E+005	15.40
CO-60	T F		1	1.452E-001	1332.50	1.452E-001	%	(		1.016E+000G	1.9E+003	99.98
				1.452E-001	1173.24	-9.499E-002	%			1.693E+000G	1.9E+003	99.90
CS-137	T F I		1	0.000E+000	661.66	0.000E+000	%	(		2.080E+000G	1.1E+004	85.21

Analysis Codes:

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- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-2.768E-001	-2.778E-001	1,173.34	1,173.34	1.143E+001
K-40		2.737E+002	2.737E+002	4.82	5.64	1.186E+001
CO-60	<	1.452E-001	1.452E-001	189.07	189.09	1.016E+000
I-131	<	8.159E-002	8.348E-002	490.62	490.63	1.390E+000
CS-134	<	-3.755E-001	-3.756E-001	9.56	9.98	2.645E-001
EU-154	<	5.909E-001	5.910E-001	518.11	518.12	1.097E+001
PB-210		3.298E+001	3.298E+001	51.30	51.44	4.363E+001
PB-212		5.986E+001	5.988E+001	2.85	4.13	2.389E+000
PB-214		2.110E+001	2.110E+001	6.47	7.08	2.324E+000
BI-212		4.587E+001	4.589E+001	12.22	12.56	9.231E+000
Pa-234	<	-4.011E+000	-4.011E+000	54.76	54.85	7.212E+000
TH-234	#	4.067E+001	4.067E+001	39.11	39.29	3.594E+001
CS-137	<			1,358.77	1,358.77	2.080E+000
EU-152	<	5.248E+000	5.248E+000	38.35	38.46	3.842E+000
EU-155	<	4.151E+000	4.151E+000	39.35	39.50	5.285E+000
TL-208		1.939E+001	1.939E+001	5.48	6.20	1.455E+000
RA-224		6.940E+001	6.941E+001	15.73	16.01	3.222E+001
BI-214		1.908E+001	1.908E+001	8.46	8.94	2.630E+000
AC-228		5.996E+001	5.996E+001	4.76	5.56	3.384E+000
PA-234M	<	5.702E+001	5.702E+001	88.74	88.79	1.714E+002
U-235	<	9.283E-001	9.283E-001	353.83	353.84	1.113E+001
AM-241	<	3.121E-003	3.121E-003	45,355.14	45,355.14	4.795E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 609.00 Bq/sample

Analyzed by: _____

403605

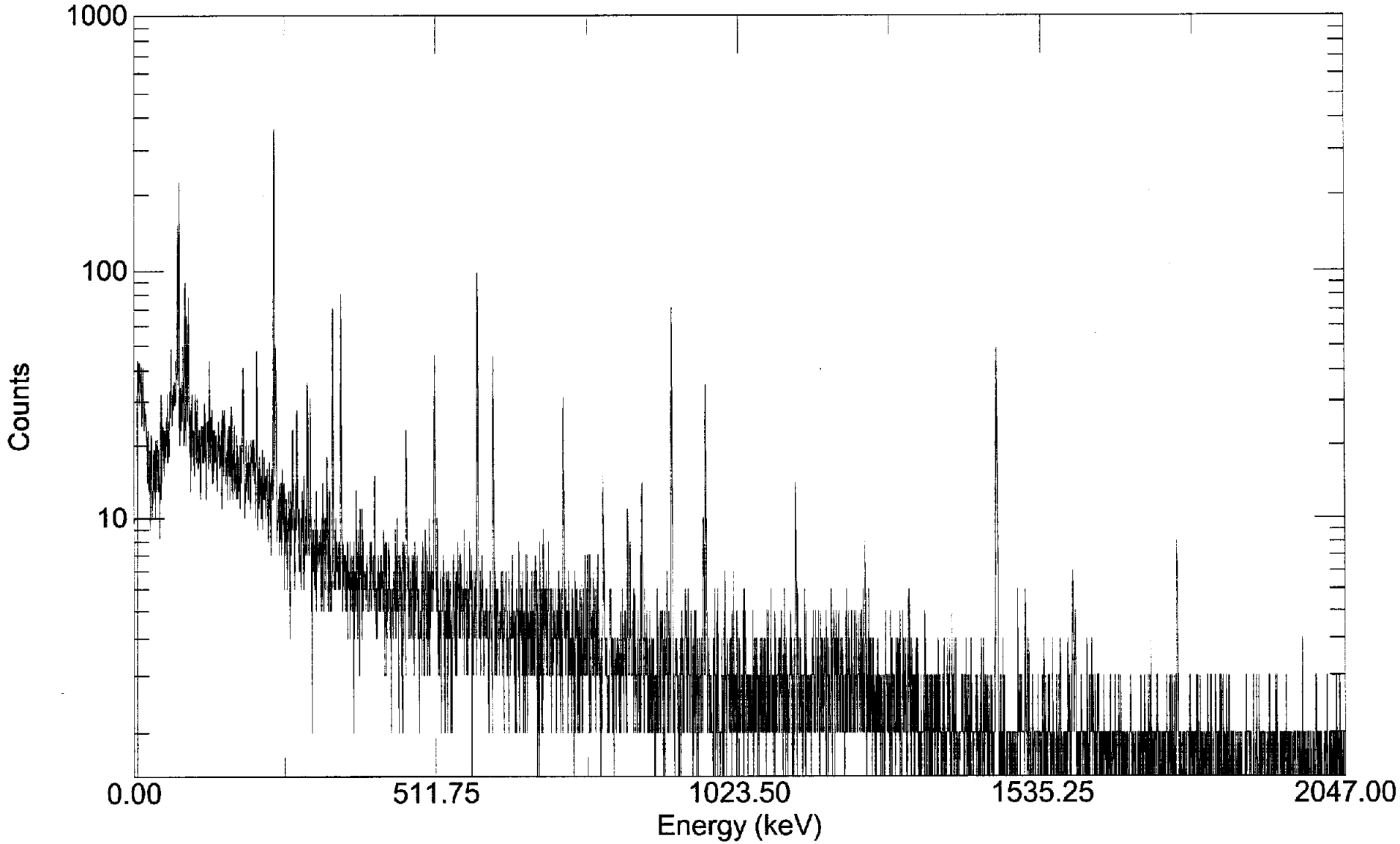
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKH11AC

7360294_KEKH11AC_F7L200271-007



Acquired: 26-Dec-2007 6:22:22 PM
File: C:\User\spectra\KEKH11AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1811.68 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,072

Sample Description: 7360294_KEKH31AC_F7L200271-008

Spectrum Filename: KEKH31AC.An1

Acquisition Information

Start Time:	26-Dec-2007 6:23:08PM		
Live Time:	1800.00	Real Time:	1816.04
Dead Time:	0.88 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.3225

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.95	74.82	314.67	146.33	0.081	24.64	0.860	PB-214	
306.94	77.07	261.33	216.67	0.120	15.82	1.009	PB-214	
347.19	87.12	120.00	102.00	0.057	18.13	1.140	PB-214	s
1081.58	270.55	69.33	83.67	0.046	25.45	0.412	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.87	46.58	176.94	15.81	0.009	49.97	0.864	s
AM-241	1	242.51	60.98	213.42	-4.88	-0.003	425.69	0.878	s
TH-234	1	252.46	63.46	268.94	7.73	0.004	70.40	0.882	s
EU-155	1	335.69	84.25	171.59	34.57	0.019	56.23	0.906	s
TH-234	1	370.87	93.03	217.83	123.17	0.068	21.96	0.999	s
U-235	1	372.14	93.35	231.29	-4.58	-0.003	-363.89	0.913	s D
AC-228	1	372.14	93.35	231.29	67.64	0.038	2.24	0.913	s D
EU-155	1	415.50	104.18	154.57	0.21	0.000	8380.21	0.925	s
EU-152	1	485.97	121.78	200.53	-19.60	-0.011	104.64	0.942	s
EU-154	1	490.68	122.96	139.22	29.13	0.016	60.21	0.943	s
Pa-234	1	522.23	130.83	172.38	-0.82	0.000	2261.17	0.952	s
U-235	1	573.41	143.62	172.78	-8.41	-0.005	297.58	0.964	s
U-235	1	652.17	163.29	161.56	12.80	0.007	143.17	0.984	s
U-235	1	825.53	206.59	118.93	3.31	0.002	469.16	1.027	s
PB-212	1	954.26	238.74	156.08	632.92	0.352	5.81	1.113	s
RA-224	1	960.34	240.26	615.11	-114.96	-0.064	31.91	1.062	s
PB-214	1	973.95	243.66	150.47	-5.04	-0.003	346.79	1.063	s
TL-208	1	1107.91	277.12	48.00	81.00	0.045	22.12	0.765	s
I-131	1	1136.64	284.30	96.16	0.00	0.000	1386.76	1.105	s
PB-214	1	1179.78	295.08	88.31	45.46	0.025	29.87	1.116	s
PB-212	1	1200.79	300.33	72.33	75.67	0.042	30.19	0.884	s
AC-228	1	1352.63	338.26	99.57	98.57	0.055	17.07	1.158	s
EU-152	1	1377.92	344.57	53.08	5.93	0.003	178.49	1.164	s
PB-214	1	1406.45	351.70	72.73	97.92	0.054	14.28	1.171	s
I-131	1	1458.13	364.61	48.55	2.75	0.002	362.91	1.184	s
BE-7	1	1908.69	477.18	51.54	-8.69	-0.005	121.69	1.292	s
CS-134	1	2258.21	564.51	46.11	-9.54	-0.005	105.76	1.372	s
CS-134	1	2277.45	569.32	46.15	-1.89	-0.001	-43.70	1.378	s D
Pa-234	1	2278.04	569.47	46.05	-0.14	0.000	-127.80	1.378	s D
TL-208	1	2333.01	583.20	29.29	203.71	0.113	8.80	1.187	
CS-134	1	2425.95	606.43	73.60	-11.46	-0.006	109.96	1.410	
BI-214	1	2437.62	609.35	50.74	104.99	0.058	12.62	1.415	s
I-131	1	2550.13	637.46	30.50	6.07	0.003	134.93	1.440	s
CS-137	1	2647.42	661.78	37.25	5.75	0.003	155.69	1.462	s
EU-154	1	2899.92	724.88	75.51	-14.55	-0.008	88.45	1.518	s
BI-212	1	2908.78	727.09	32.01	44.13	0.025	23.56	1.521	s
PA-234M	1	3065.39	766.24	38.71	-3.28	-0.002	273.97	1.556	s
EU-152	1	3116.13	778.92	18.15	0.00	0.000	602.44	1.567	s
BI-212	1	3143.19	785.68	22.47	5.63	0.003	126.22	1.572	s
CS-134	1	3180.58	795.03	22.77	16.27	0.009	48.32	1.582	s
CS-134	1	3208.17	801.92	27.88	2.35	0.001	325.02	1.587	s
TL-208	1	3439.42	859.73	5.33	46.67	0.026	19.22	0.576	s
EU-154	1	3492.50	873.00	18.55	0.59	0.000	1041.13	1.649	s
Pa-234	1	3522.93	880.60	20.96	-1.30	-0.001	506.27	1.655	s
Pa-234	1	3534.22	883.43	22.27	-1.88	-0.001	362.19	1.657	s

AC-228	1	3643.99	910.87	27.45	86.10	0.048	13.35	1.681	s
Pa-234	1	3782.84	945.58	26.03	0.15	0.000	4717.70	1.710	s
EU-152	1	3855.55	963.75	65.26	-3.55	-0.002	326.46	1.726	s
AC-228	1	3875.33	968.70	39.38	56.25	0.031	20.66	1.730	s
EU-154	1	3986.69	996.54	29.14	-1.79	-0.001	432.83	1.753	s
PA-234M	1	4004.14	1000.90	24.76	3.89	0.002	187.86	1.756	s
EU-154	1	4022.22	1005.42	27.73	-1.41	-0.001	536.35	1.760	s
EU-152	1	4453.83	1113.34	29.90	-6.20	-0.003	130.95	1.847	s
BI-214	1	4480.76	1120.07	25.44	13.74	0.008	50.50	1.854	s
CO-60	1	4692.73	1173.08	18.10	4.47	0.002	142.63	1.896	s
EU-154	1	5098.47	1274.54	30.78	0.00	0.000	784.66	1.975	s
CO-60	1	5322.57	1330.59	13.33	2.70	0.002	200.54	2.019	s
EU-152	1	5632.07	1408.00	-8.57	0.00	0.000	100.00	2.076	s
K-40	1	5840.52	1460.14	11.21	230.79	0.128	6.43	2.022	
BI-214	1	7053.90	1763.72	12.23	13.72	0.008	37.22	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments		
U-235	N	1	-9.744E-001	143.79	-9.744E-001	% (P	7.412E+000G		2.6E+011	10.96
			-9.744E-001	205.33	1.004E+000	%	1.624E+001G		2.6E+011	5.01
			-9.744E-001	163.38	3.371E+000	&	1.631E+001G		2.6E+011	5.08
			-9.744E-001	93.35	-9.744E-001	! E	1.564E+001X		2.6E+011	5.81
PB-210	N	1	9.162E+000	46.54	9.162E+000	* (P	3.748E+001G		8.1E+003	4.25
TL-208	F N	1	7.947E+000	583.02	7.947E+000	(P	1.090E+000G		7.0E+002	84.50
			7.947E+000	277.28	2.408E+001	*	1.040E+001G		7.0E+002	6.31
			7.947E+000	860.56	1.648E+001	+	4.759E+000G		7.0E+002	12.42
			7.785E-002	636.97	2.979E+000	%	1.396E+001G		8.0E+000	7.17
I-131	T F I	1	7.785E-002	364.48	7.785E-002	& (	9.946E-001G		8.0E+000	81.70
			7.785E-002	284.30	0.000E+000	%	1.507E+001G		8.0E+000	6.14
BI-214	N	1	7.758E+000	609.31	7.758E+000	@ (P	2.653E+000G		5.8E+005	46.09
			7.758E+000	1120.29	4.858E+000	% P	9.271E+000G		5.8E+005	15.10
			7.758E+000	1764.49	6.918E+000	% P	9.585E+000G		5.8E+005	15.40
			-5.652E-002	946.02	5.377E-002	%	9.298E+000G		1.6E+012	13.40
			-5.652E-002	883.24	-8.762E-001	%	1.151E+001G		1.6E+012	9.60
			-5.652E-002	880.53	-9.656E-001	%	1.788E+001G		1.6E+012	6.00
Pa-234	N	1	-5.652E-002	131.29	-5.652E-002	% (	4.392E+000G		1.6E+012	18.00
			-5.652E-002	569.47	-5.652E-002	%	1.356E+001G		1.6E+012	8.20
PB-214	N	1	5.440E+000	351.93	5.856E+000	* (P	2.539E+000G		5.8E+005	37.60
			5.440E+000	295.09	4.630E+000	@ (P	4.736E+000G		5.8E+005	19.30
			5.440E+000	242.00	-1.153E+000	%	1.369E+001G		5.8E+005	7.43
EU-152	T F	1	4.949E-001	344.29	4.949E-001	% (	3.059E+000G		4.9E+003	26.50
			4.949E-001	121.78	-8.369E-001	%	2.933E+000G		4.9E+003	28.58
			4.949E-001	778.92	0.000E+000	%	7.110E+000G		4.9E+003	12.94
			4.949E-001	964.11	-1.159E+000	&	1.318E+001G		4.9E+003	14.61
			4.949E-001	1112.07	-2.415E+000	%	1.097E+001G		4.9E+003	13.64
			4.949E-001	1408.00	0.000E+000	&	2.244E+000G		4.9E+003	21.00
RA-224	N	1	-4.749E+001	240.99	-4.749E+001	(	4.886E+001G		7.0E+002	4.10
CS-134	T F I	1	-3.974E-001	604.71	-3.974E-001	% (	1.481E+000G		7.5E+002	97.62
			-3.974E-001	795.87	7.881E-001	%	1.208E+000G		7.5E+002	85.53
			-3.974E-001	569.32	-3.974E-001	&	7.237E+000G		7.5E+002	15.38
			-3.974E-001	801.95	1.124E+000	%	1.310E+001G		7.5E+002	8.69
			-3.974E-001	563.24	-3.670E+000	&	1.322E+001G		7.5E+002	8.35
PB-212	N	1	2.459E+001	238.63	2.459E+001	@ (P	2.367E+000G		7.0E+002	43.30
			2.459E+001	300.03	4.592E+001	*	2.570E+001G		7.0E+002	3.28
CS-137	T F I	1	2.444E-001	661.66	2.444E-001	& (	1.323E+000G		1.1E+004	85.21
BE-7	N P C	1	-2.345E+000	477.60	-2.345E+000	% (	9.760E+000G		5.3E+001	10.52
PA-234	N	1	2.280E+001	1001.00	2.280E+001	% (	1.518E+002G		1.6E+012	.84
			2.280E+001	766.41	-4.495E+001	%	4.346E+002G		1.6E+012	.29
AM-241	T	1	-2.157E-001	59.54	-2.157E-001	% (	3.129E+000G		1.6E+005	35.90
			2.131E-001	123.10	8.727E-001	%	1.729E+000G		3.1E+003	40.79
			2.131E-001	1274.54	0.000E+000	%	4.791E+000G		3.1E+003	35.19
			2.131E-001	723.36	-2.779E+000	%	8.255E+000G		3.1E+003	20.22

				2.131E-001	1004.77	-3.840E-001	%			7.443E+000G		3.1E+003	18.01
				2.131E-001	996.33	-8.259E-001	&			1.285E+001G		3.1E+003	10.60
EU-154	T F I		1	2.131E-001	873.23	2.131E-001	%	(		8.234E+000G		3.1E+003	12.27
CO-60	T F		1	1.652E-001	1332.50	1.652E-001	%	(		1.206E+000G		1.9E+003	99.98
				1.652E-001	1173.24	2.476E-001	%			1.248E+000G		1.9E+003	99.90
TH-234		N	1	1.576E+001	63.29	2.408E+000	%	(	P	2.464E+001G		1.6E+012	4.82
				1.576E+001	92.59	2.729E+001		(	P	1.584E+001G		1.6E+012	5.58
AC-228		N	1	1.502E+001	911.07	1.358E+001	*	(	P	4.279E+000G		2.1E+003	29.00
				1.502E+001	968.97	1.543E+001		(		8.763E+000G		2.1E+003	17.46
				1.502E+001	338.32	1.790E+001	*	(	P	8.938E+000G		2.1E+003	12.01
				1.502E+001	93.35	1.502E+001	!		E	1.634E+001X	A	2.1E+003	5.56
BI-212		N	1	1.448E+001	727.33	1.448E+001	*	(		9.541E+000G		7.0E+002	11.82
				1.448E+001	785.51	2.102E+001	%			9.252E+001G		7.0E+002	1.10
K-40		N	1	1.426E+002	1460.83	1.426E+002		(	P	1.131E+001G		4.7E+011	10.67
EU-155	T F I		1	1.201E-002	105.31	1.201E-002	&	(		3.471E+000G		1.8E+003	21.20
				1.201E-002	86.54	1.420E+000	%			2.620E+000G		1.8E+003	30.70

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
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G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	-3.974E-001	-3.975E-001	109.96	109.99	1.481E+000
CS-137	<	2.444E-001	2.444E-001	155.69	155.72	1.323E+000
EU-155	<	1.201E-002	1.202E-002	8,380.21	8,380.21	3.471E+000
PB-214	<	5.440E+000	5.440E+000	15.63	15.89	2.539E+000
BI-212	<	1.448E+001	1.449E+001	23.56	23.74	9.541E+000
BI-214	<	7.758E+000	7.758E+000	13.45	13.76	2.653E+000
TH-234	<	1.576E+001	1.576E+001	26.63	26.88	2.464E+001
PA-234M	<	2.280E+001	2.280E+001	187.86	187.88	1.518E+002
BE-7	<	-2.345E+000	-2.353E+000	121.69	121.73	9.760E+000
K-40		1.426E+002	1.426E+002	6.74	7.35	1.131E+001
CO-60	<	1.652E-001	1.652E-001	200.54	200.56	1.206E+000
I-131	<	7.785E-002	7.966E-002	362.91	362.93	9.946E-001
EU-152	<	4.949E-001	4.949E-001	178.49	178.51	3.059E+000
EU-154	<	2.131E-001	2.131E-001	1,041.13	1,041.14	8.234E+000
TL-208		7.947E+000	7.949E+000	9.14	9.59	1.090E+000
RA-224	<	-4.749E+001	-4.750E+001	31.91	32.04	4.886E+001
PB-210	<	9.162E+000	9.162E+000	117.99	118.05	3.748E+001
PB-212	#	2.459E+001	2.459E+001	6.00	6.70	2.367E+000
AC-228	<	1.502E+001	1.502E+001	10.10	10.50	4.279E+000
Pa-234	<	-5.652E-002	-5.652E-002	2,261.17	2,261.17	4.392E+000
U-235	<	-9.744E-001	-9.744E-001	373.45	373.46	7.412E+000
AM-241	<	-2.157E-001	-2.157E-001	425.69	425.71	3.129E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 175.11 Bq/sample

Analyzed by: _____

403605

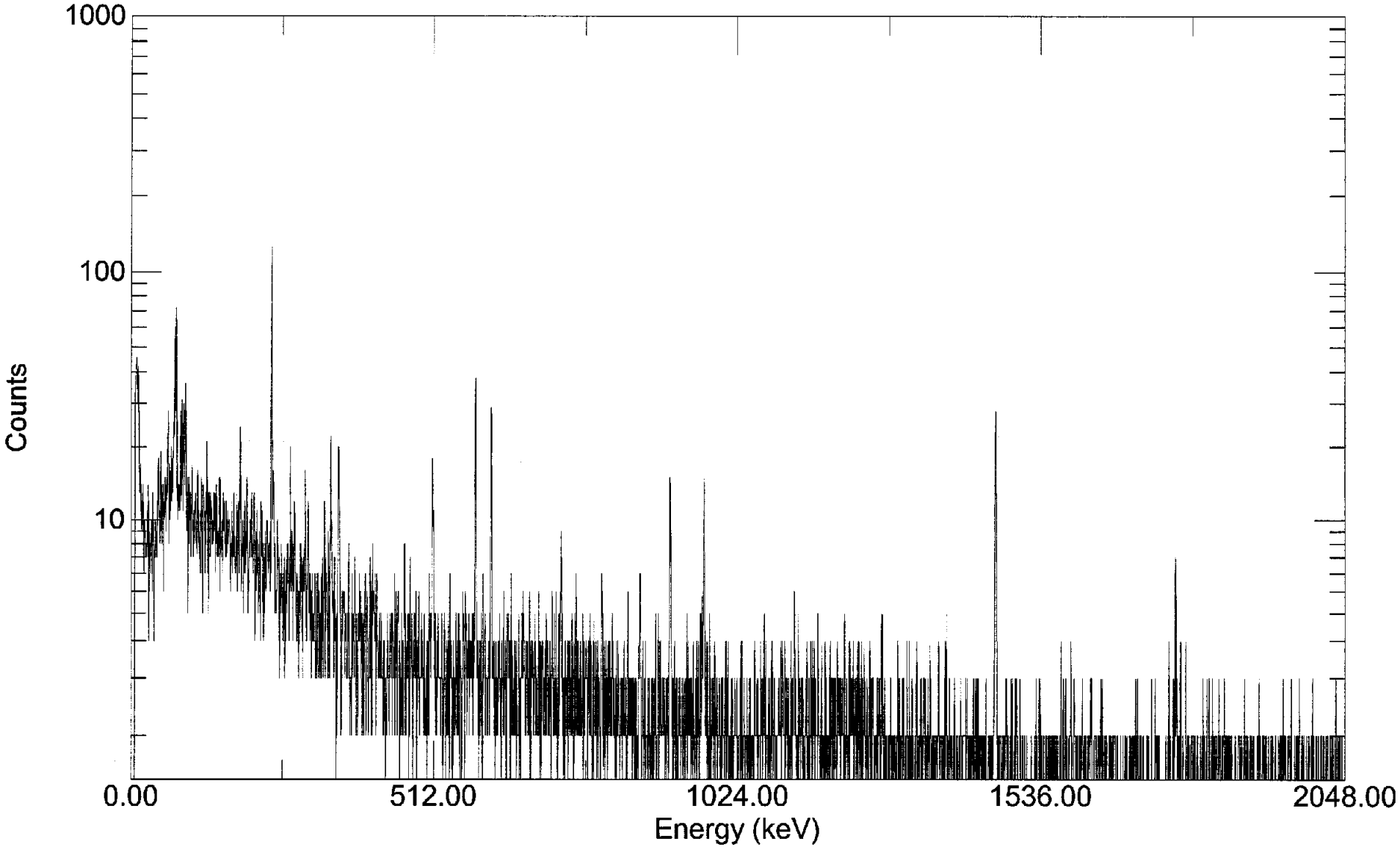
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKH31AC

7360294_KEKH31AC_F7L200271-008



Acquired: 26-Dec-2007 6:23:08 PM
File: C:\User\spectra\KEKH31AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1816.04 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,073

Sample Description: 7360294_KEKH41AC_F7L200271-009

Spectrum Filename: KEKH41AC.An1

Acquisition Information

Start Time:	26-Dec-2007 6:23:38PM		
Live Time:	1800.00	Real Time:	1804.10
Dead Time:	0.23 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_(		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2099

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.51	74.68	122.50	102.50	0.057	22.49	0.831	PB-214	
308.51	77.18	100.00	138.00	0.077	16.01	0.945	PB-214	
350.25	87.62	178.96	55.04	0.031	36.92	0.907	PB-214	s
835.34	208.92	32.47	45.53	0.025	23.08	0.517	AC-228	s
1406.01	351.61	104.66	29.34	0.016	52.66	1.052		

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.73	46.47	72.71	8.89	0.005	38.90	0.819	s
AM-241	1	232.42	58.15	74.95	-1.27	-0.001	964.46	0.830	s
TH-234	1	253.52	63.42	85.36	50.64	0.028	26.87	0.900	s
EU-155	1	348.77	87.25	100.88	72.63	0.040	22.81	0.854	s
TH-234	1	371.57	92.95	112.06	92.94	0.052	19.63	1.254	s
AC-228	1	373.18	93.35	303.02	0.00	0.000	1714.64	0.860	s D
U-235	1	373.18	93.35	117.14	6.14	0.003	26.76	0.860	s D
EU-155	1	419.64	104.97	64.06	11.99	0.007	98.69	0.871	s
EU-152	1	487.15	121.85	58.92	10.38	0.006	109.07	0.885	s
EU-154	1	493.89	123.54	89.22	-7.80	-0.004	175.02	0.886	s
Pa-234	1	522.18	130.61	96.31	-14.74	-0.008	97.68	0.894	s
U-235	1	572.46	143.19	52.44	11.59	0.006	93.13	0.904	s
U-235	1	652.48	163.20	40.33	5.35	0.003	173.33	0.922	s
U-235	1	824.06	206.10	53.67	-8.28	-0.005	129.92	0.958	s
PB-212	1	953.65	238.51	86.29	253.71	0.141	10.51	1.166	
RA-224	1	958.50	239.72	278.84	-76.06	-0.042	33.10	0.988	s
PB-214	1	966.66	241.76	73.89	15.82	0.009	80.84	0.989	s
TL-208	1	1108.55	277.24	12.83	27.17	0.015	29.34	1.028	
I-131	1	1137.73	284.53	34.65	-0.22	0.000	3706.82	1.025	s
PB-214	1	1180.04	295.11	43.13	44.19	0.025	23.60	1.034	s
PB-212	1	1200.29	300.18	38.44	2.58	0.001	345.53	1.039	s
AC-228	1	1351.61	338.01	23.09	40.59	0.023	22.95	1.071	s
EU-152	1	1376.49	344.23	24.36	-1.67	-0.001	424.92	1.076	s
PB-214	1	1406.36	351.70	27.01	85.92	0.048	12.73	1.082	
I-131	1	1459.52	364.99	20.70	3.84	0.002	175.33	1.092	s
BE-7	1	1907.00	476.85	21.76	0.31	0.000	2150.29	1.185	s
CS-134	1	2253.98	563.58	18.62	3.01	0.002	211.11	1.254	s
CS-134	1	2276.94	569.32	14.15	-0.55	0.000	-40.00	1.259	s D
Pa-234	1	2277.54	569.47	12.12	-2.20	-0.001	-130.26	1.259	s D
TL-208	1	2330.28	582.65	8.52	72.48	0.040	13.46	1.756	s
CS-134	1	2420.27	605.14	26.03	-3.29	-0.002	225.94	1.286	s
BI-214	1	2436.24	609.13	9.25	78.75	0.044	12.14	0.771	s
I-131	1	2547.63	636.97	37.01	0.00	0.000	860.40	1.312	s
CS-137	1	2645.35	661.40	18.20	12.16	0.007	57.29	1.331	s
EU-154	1	2888.57	722.18	18.39	0.01	0.000	50745.58	1.378	s
BI-212	1	2909.74	727.47	16.90	9.47	0.005	69.43	1.381	s
PA-234M	1	3067.54	766.90	20.61	-1.33	-0.001	491.13	1.411	s
EU-152	1	3119.54	779.89	13.31	-1.27	-0.001	416.72	1.420	s
BI-212	1	3141.12	785.29	12.56	6.55	0.004	85.91	1.425	s
CS-134	1	3182.17	795.54	17.14	-0.61	0.000	973.01	1.433	s
CS-134	1	3207.81	801.95	9.04	0.00	0.000	425.15	1.437	s
TL-208	1	3443.83	860.92	19.99	6.66	0.004	102.51	1.481	s
EU-154	1	3495.24	873.77	14.45	-0.11	0.000	5064.89	1.490	s
Pa-234	1	3524.63	881.11	11.97	-0.30	0.000	1660.85	1.495	s
Pa-234	1	3533.16	883.24	0.00	0.00	0.000	100.00	1.497	s

AC-228	1	3644.55	911.07	12.48	33.00	0.018	23.07	1.518	s
Pa-234	1	3784.44	946.02	49.55	0.00	0.000	995.48	1.543	s
EU-152	1	3862.63	965.55	44.73	-1.23	-0.001	776.16	1.556	s
AC-228	1	3876.09	968.92	18.74	23.53	0.013	33.20	1.559	s
EU-154	1	3985.62	996.28	16.92	-3.71	-0.002	165.08	1.579	s
PA-234M	1	4002.58	1000.51	9.35	4.50	0.002	107.06	1.582	s
EU-154	1	4025.70	1006.29	7.38	2.21	0.001	186.12	1.585	s
EU-152	1	4450.41	1112.38	11.36	-2.15	-0.001	231.76	1.659	s
BI-214	1	4479.57	1119.66	4.65	23.35	0.013	18.90	0.337	s
CO-60	1	4693.22	1173.02	12.78	0.96	0.001	535.58	1.701	s
EU-154	1	5110.28	1277.18	10.41	-1.18	-0.001	396.51	1.768	s
CO-60	1	5331.84	1332.50	0.00	0.00	0.000	100.00	1.806	s
EU-152	1	5634.21	1408.00	37.19	0.00	0.000	862.43	1.854	s
K-40	1	5844.21	1460.43	2.83	121.17	0.067	8.98	0.607	s
BI-214	1	7058.88	1763.63	4.84	8.19	0.005	51.64	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Analysis Code			MDA Value Becquerels	Code	Comments	
AC-228	N	1	9.488E+000	911.07	8.442E+000		(		4.905E+000G		2.1E+003	29.00
			9.488E+000	968.97	1.052E+001	?	(		1.023E+001G		2.1E+003	17.46
			9.488E+000	338.32	1.051E+001	@	(		6.500E+000G		2.1E+003	12.01
			9.488E+000	93.35	0.000E+000	%	}	E	1.596E+001X	A	2.1E+003	5.56
BI-214	N	1	9.026E+000	609.31	9.026E+000		(	P	1.935E+000G		5.8E+005	46.09
			9.026E+000	1120.29	1.363E+001	+		P	7.441E+000G		5.8E+005	15.10
			9.026E+000	1764.49	6.977E+000	%			1.105E+001G		5.8E+005	15.40
CS-137	T F I	1	8.095E-001	661.66	8.095E-001	%	(		1.503E+000G		1.1E+004	85.21
AM-241	T	1	-7.827E-002	59.54	-7.827E-002	%	(		2.643E+000G		1.6E+005	35.90
PB-210	N	1	7.367E+000	46.54	7.367E+000	*	(	P	3.517E+001G		8.1E+003	4.25
PB-214	N	1	7.002E+000	351.93	7.368E+000		(	P	2.309E+000G		5.8E+005	37.60
			7.002E+000	295.09	6.289E+000		(	P	4.740E+000G		5.8E+005	19.30
			7.002E+000	242.00	4.920E+000	%			1.330E+001G		5.8E+005	7.43
EU-154	T F I	1	-6.207E-002	873.23	-6.207E-002	%	(		1.192E+001G		3.1E+003	12.27
			-6.207E-002	123.10	-3.083E-001	&			1.848E+000G		3.1E+003	40.79
			-6.207E-002	1274.54	-3.303E-001	%			4.954E+000G		3.1E+003	35.19
			-6.207E-002	723.36	3.617E-003	&			6.866E+000G		3.1E+003	20.22
			-6.207E-002	1004.77	9.891E-001	%			6.867E+000G		3.1E+003	18.01
			-6.207E-002	996.33	-2.799E+000	%			1.649E+001G		3.1E+003	10.60
BI-212	N	1	4.926E+000	727.33	4.926E+000	%	(		1.137E+001G		7.0E+002	11.82
			4.926E+000	785.51	3.904E+001	&			1.146E+002G		7.0E+002	1.10
TL-208	F N	1	4.361E+000	583.02	4.361E+000		(	P	9.813E-001G		7.0E+002	84.50
			4.361E+000	277.28	1.119E+001	+			7.989E+000G		7.0E+002	6.31
			4.361E+000	860.56	3.795E+000	%			1.341E+001G		7.0E+002	12.42
PA-234	N	1	4.312E+001	1001.00	4.312E+001	%	(		1.626E+002G		1.6E+012	.84
			4.312E+001	766.41	-2.901E+001	%			5.213E+002G		1.6E+012	.29
RA-224	N	1	-4.271E+001	240.99	-4.271E+001		(		4.522E+001G		7.0E+002	4.10
EU-155	T F I	1	2.780E+000	105.31	9.168E-001	%	(		3.058E+000G		1.8E+003	21.20
			2.780E+000	86.54	4.067E+000	*	(		2.773E+000G		1.8E+003	30.70
TH-234	N	1	2.510E+001	63.29	2.191E+001	*	(	P	1.980E+001G		1.6E+012	4.82
			2.510E+001	92.59	2.786E+001	*	(	P	1.560E+001G		1.6E+012	5.58
			-1.992E-001	964.11	-6.532E-001	%			1.804E+001G		4.9E+003	14.61
			-1.992E-001	1112.07	-1.381E+000	%			1.182E+001G		4.9E+003	13.64
			-1.992E-001	1408.00	0.000E+000	%			1.586E+001G		4.9E+003	21.00
EU-152	T F	1	-1.992E-001	344.29	-1.992E-001	%	(		3.066E+000G		4.9E+003	26.50
			-1.992E-001	121.78	5.854E-001	&			2.170E+000G		4.9E+003	28.58
			-1.992E-001	778.92	-6.375E-001	%			9.917E+000G		4.9E+003	12.94
CS-134	T F I	1	-1.770E-001	604.71	-1.770E-001	%	(		1.424E+000G		7.5E+002	97.62
			-1.770E-001	795.87	-4.705E-002	%			1.705E+000G		7.5E+002	85.53
			-1.770E-001	569.32	-1.770E-001	%			6.552E+000G		7.5E+002	15.38
			-1.770E-001	801.95	0.000E+000	%			1.284E+001G		7.5E+002	8.69
			-1.770E-001	563.24	1.775E+000	%			1.348E+001G		7.5E+002	8.35
U-235	N	1	1.764E+000	143.79	1.764E+000	%	(		5.549E+000G		2.6E+011	10.96
			1.764E+000	205.33	-3.355E+000	&			1.494E+001G		2.6E+011	5.01

			1.764E+000	163.38	1.854E+000	%			1.119E+001G	2.6E+011	5.08
			1.764E+000	93.35	1.764E+000	!		E	1.527E+001X	2.6E+011	5.81
I-131	T F I	1	1.564E-001	364.48	1.564E-001	%	(		9.747E-001G	8.0E+000	81.70
			1.564E-001	284.30	-9.732E-002	&			1.304E+001G	8.0E+000	6.14
			1.564E-001	636.97	0.000E+000	%			2.378E+001G	8.0E+000	7.17
PB-212	N	1	1.338E+001	238.63	1.338E+001		(	P	2.426E+000G	7.0E+002	43.30
			1.338E+001	300.03	2.193E+000	&			2.686E+001G	7.0E+002	3.28
Pa-234	N	1	-1.333E+000	131.29	-1.333E+000	%	(		4.382E+000G	1.6E+012	18.00
			-1.333E+000	569.47	-1.333E+000	&			1.150E+001G	1.6E+012	8.20
			-1.333E+000	946.02	0.000E+000	%			2.028E+001G	1.6E+012	13.40
			-1.333E+000	883.24	0.000E+000	%			5.551E+000G	1.6E+012	9.60
			-1.333E+000	880.53	-3.563E-001	%			2.264E+001G	1.6E+012	6.00
K-40	N	1	1.255E+002	1460.83	1.255E+002		(	P	1.093E+001G	4.7E+011	10.67
BE-7	N P C	1	1.247E-001	477.60	1.247E-001	%	(		9.900E+000G	5.3E+001	10.52
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		7.522E-001G	1.9E+003	99.98
			0.000E+000	1173.24	8.814E-002	%			1.775E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	1.247E-001	1.251E-001	2,150.29	2,150.29	9.900E+000
K-40		1.255E+002	1.255E+002	9.19	9.65	1.093E+001
CO-60	<			100.00	100.04	7.522E-001
I-131	<	1.564E-001	1.600E-001	175.33	175.35	9.747E-001
CS-134	<	-1.770E-001	-1.771E-001	225.94	225.96	1.424E+000
EU-154	<	-6.207E-002	-6.208E-002	5,064.89	5,064.89	1.192E+001
RA-224	<	-4.271E+001	-4.273E+001	33.10	33.23	4.522E+001
PB-210	<	7.367E+000	7.368E+000	129.95	130.01	3.517E+001
PB-212		1.338E+001	1.339E+001	10.89	11.29	2.426E+000
PB-214	<	7.002E+000	7.002E+000	13.51	13.81	2.309E+000
CS-137	<	8.095E-001	8.095E-001	57.29	57.36	1.503E+000
EU-152	<	-1.992E-001	-1.992E-001	424.92	424.93	3.066E+000
EU-155	<	2.780E+000	2.781E+000	22.81	23.05	3.058E+000
TL-208		4.361E+000	4.362E+000	13.87	14.17	9.813E-001
BI-212	<	4.926E+000	4.927E+000	69.43	69.50	1.137E+001
BI-214		9.026E+000	9.026E+000	12.95	13.27	1.935E+000
AC-228	<	9.488E+000	9.489E+000	15.50	15.76	4.905E+000
TH-234	#	2.510E+001	2.510E+001	21.58	21.89	1.980E+001
PA-234M	<	4.312E+001	4.312E+001	107.06	107.09	1.626E+002
U-235	<	1.764E+000	1.764E+000	93.13	93.18	5.549E+000
Pa-234	<	-1.333E+000	-1.333E+000	97.68	97.73	4.382E+000
AM-241	<	-7.827E-002	-7.827E-002	964.46	964.47	2.643E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 177.41 Bq/sample

Analyzed by: _____

403605

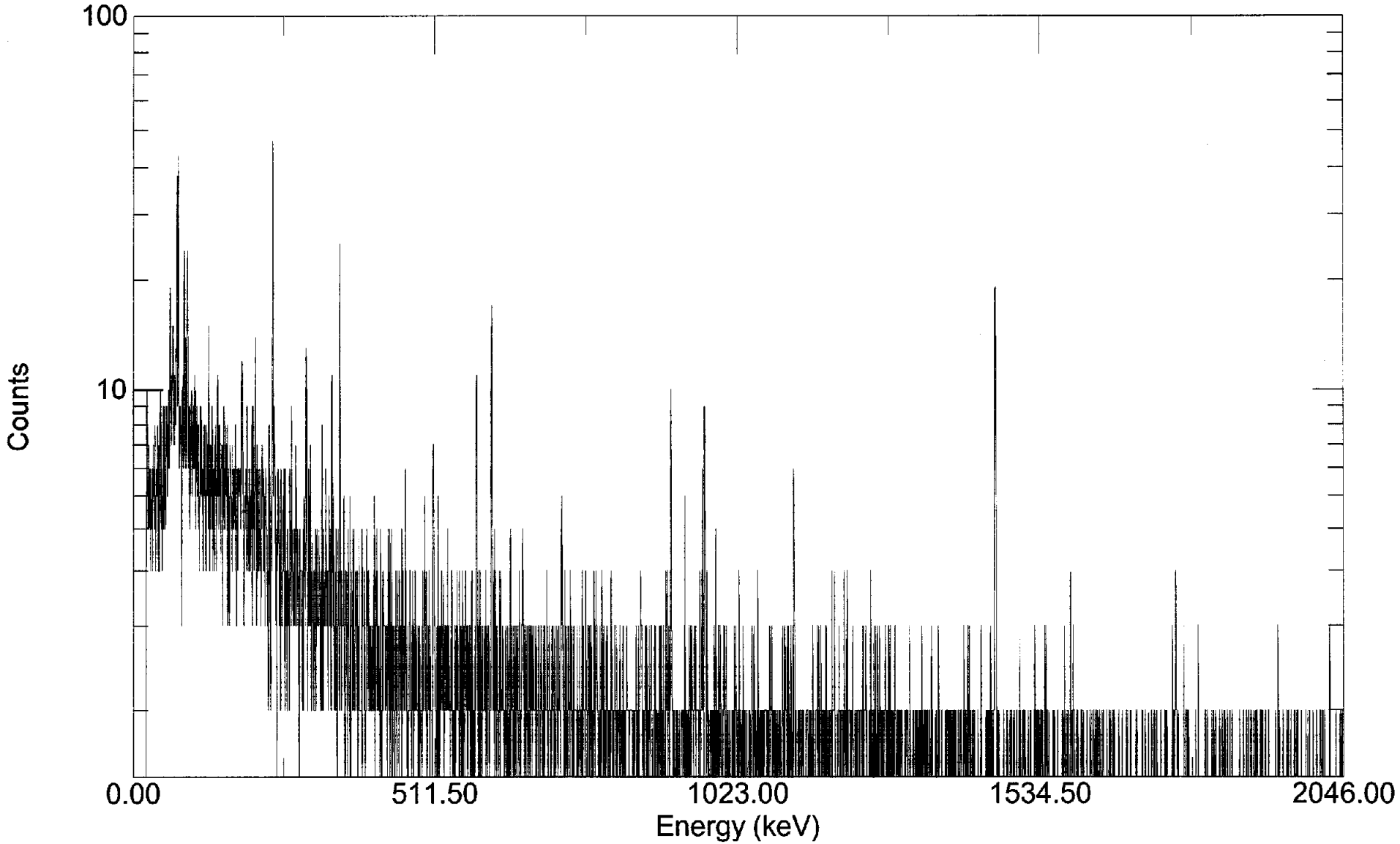
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKH41AC

7360294_KEKH41AC_F7L200271-009



Acquired: 26-Dec-2007 6:23:38 PM
File: C:\User\spectra\KEKH41AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.10 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,075

Sample Description: 7360294_KEKH51AC_F7L200271-010

Spectrum Filename: KEKH51AC.An1

Acquisition Information

Start Time:	26-Dec-2007 6:24:04PM		
Live Time:	1800.00	Real Time:	1855.46
Dead Time:	2.99 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1965

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.23	74.52	184.33	131.67	0.073	20.75	0.703	PB-214	s
307.38	77.06	154.00	264.00	0.147	10.21	0.754	PB-214	
516.60	129.32	116.70	81.30	0.045	21.82	0.635	AC-228	s
742.55	185.77	66.67	85.33	0.047	21.28	0.836	U-235	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.13	46.52	119.47	18.69	0.010	43.12	0.749	s
AM-241	1	235.16	59.01	156.84	12.27	0.007	115.25	0.761	s
TH-234	1	252.75	63.41	142.50	61.50	0.034	29.65	0.540	s
EU-155	1	347.50	87.08	158.16	76.76	0.043	25.83	0.788	s
TH-234	1	369.56	92.59	150.02	43.98	0.024	26.81	0.795	D
U-235	1	372.61	93.35	151.30	11.67	0.006	16.16	0.795	s D
AC-228	1	372.61	93.35	-17.49	48.72	0.027	3.57	0.795	D
EU-155	1	419.13	104.97	124.37	12.34	0.007	130.93	0.808	s
EU-152	1	483.09	120.95	84.39	-6.60	-0.004	200.54	0.824	s
EU-154	1	499.50	125.05	72.95	7.35	0.004	168.54	0.826	s
Pa-234	1	523.99	131.17	179.42	1.20	0.001	1582.17	0.834	s
U-235	1	575.15	143.95	72.31	22.07	0.012	52.21	0.847	s
U-235	1	653.23	163.46	102.57	11.96	0.007	105.07	0.867	s
U-235	1	821.77	205.57	76.16	8.19	0.005	154.68	0.909	s
PB-212	1	954.20	238.65	94.81	309.19	0.172	8.53	0.699	s
RA-224	1	959.62	240.01	412.91	-113.02	-0.063	27.11	0.944	
PB-214	1	967.00	241.85	61.33	99.67	0.055	18.08	0.727	s
TL-208	1	1108.70	277.25	46.69	25.55	0.014	42.68	0.980	s
I-131	1	1143.03	285.83	53.80	-0.27	0.000	3837.45	0.987	s
PB-214	1	1181.41	295.42	48.58	139.42	0.077	13.44	0.992	s
PB-212	1	1201.65	300.48	19.83	44.17	0.025	24.82	1.009	s
AC-228	1	1353.66	338.46	29.33	69.67	0.039	19.11	0.619	s
EU-152	1	1375.50	343.92	50.51	-3.84	-0.002	266.93	1.045	s
PB-214	1	1408.13	352.07	42.54	227.46	0.126	9.06	1.117	s
I-131	1	1457.72	364.46	38.17	0.73	0.000	1198.55	1.065	s
BE-7	1	1910.23	477.54	30.35	-1.63	-0.001	485.65	1.173	s
CS-134	1	2246.17	561.50	21.16	-3.48	-0.002	194.46	1.252	s
CS-134	1	2277.45	569.32	34.39	0.00	0.000	0.00	1.258	s D
Pa-234	1	2278.05	569.47	33.28	0.18	0.000	166.18	1.258	s D
TL-208	1	2334.16	583.49	13.08	116.92	0.065	10.92	0.978	
CS-134	1	2419.04	604.71	74.54	0.00	0.000	1220.97	1.290	s
BI-214	1	2438.85	609.66	9.90	139.10	0.077	8.65	0.621	s
I-131	1	2545.26	636.26	20.94	-0.31	0.000	2081.23	1.319	s
CS-137	1	2648.53	662.07	33.39	5.79	0.003	67.63	1.342	s
EU-154	1	2893.71	723.36	116.79	0.00	0.000	1528.33	1.397	s
BI-212	1	2908.97	727.17	21.88	17.96	0.010	43.74	1.400	
PA-234M	1	3062.75	765.61	34.08	-2.68	-0.001	314.54	1.434	s
EU-152	1	3114.41	778.53	20.23	3.49	0.002	190.11	1.445	s
BI-212	1	3147.29	786.74	22.66	11.20	0.006	67.13	1.451	s
CS-134	1	3185.20	796.22	28.63	-2.44	-0.001	317.00	1.460	s
CS-134	1	3211.43	802.78	18.40	3.53	0.002	179.77	1.465	s
TL-208	1	3444.00	860.92	0.00	38.00	0.021	16.22	0.500	s
EU-154	1	3497.52	874.30	21.75	0.46	0.000	1452.76	1.527	s
Pa-234	1	3517.84	879.38	11.21	-1.32	-0.001	368.74	1.535	s
Pa-234	1	3523.06	880.68	17.26	2.18	0.001	277.76	1.533	s
AC-228	1	3645.50	911.30	6.52	52.54	0.029	15.41	1.559	s

Pa-234	1	3786.84	946.64	24.69	-0.26	0.000	2731.75	1.588	s
EU-152	1	3855.19	963.72	35.63	-3.59	-0.002	241.01	1.603	s
AC-228	1	3877.89	969.40	0.00	62.00	0.034	12.70	0.646	s
EU-154	1	3986.46	996.55	21.28	5.73	0.003	121.29	1.630	s
PA-234M	1	4000.03	999.94	29.50	-2.25	-0.001	348.40	1.633	s
EU-154	1	4017.45	1004.30	19.36	2.75	0.002	233.83	1.637	s
EU-152	1	4452.64	1113.11	22.50	-2.65	-0.001	260.66	1.723	s
BI-214	1	4481.66	1120.37	28.60	10.23	0.006	80.30	1.730	s
CO-60	1	4688.05	1171.98	24.34	3.13	0.002	230.06	1.772	s
EU-154	1	5098.13	1274.54	27.41	0.00	0.000	740.47	1.850	s
CO-60	1	5329.85	1332.50	21.74	-3.23	-0.002	211.68	1.894	s
EU-152	1	5627.68	1407.00	12.39	-1.82	-0.001	283.44	1.950	s
K-40	1	5844.38	1461.20	0.00	322.00	0.179	5.57	1.526	s
BI-214	1	7058.58	1764.98	5.29	19.42	0.011	24.95	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
EU-155	T F I	1	9.148E-001	105.31	9.148E-001	% (	4.053E+000G		1.8E+003	21.20
			9.148E-001	86.54	4.152E+000	&	3.316E+000G	A	1.8E+003	30.70
BI-212	N	1	8.955E+000	727.33	8.955E+000	% (	1.222E+001G		7.0E+002	11.82
			8.955E+000	785.51	6.395E+001	%	1.421E+002G		7.0E+002	1.10
AM-241	T	1	6.983E-001	59.54	6.983E-001	& (P	3.475E+000G		1.6E+005	35.90
TL-208	F N	1	6.755E+000	583.02	6.755E+000	(P	1.130E+000G		7.0E+002	84.50
			6.755E+000	277.28	1.011E+001	&	1.367E+001G		7.0E+002	6.31
			6.755E+000	860.56	2.071E+001	+	4.017E+000G		7.0E+002	12.42
BE-7	N P C	1	-6.326E-001	477.60	-6.326E-001	% (	1.104E+001G		5.3E+001	10.52
RA-224	N	1	-6.103E+001	240.99	-6.103E+001	(	5.259E+001G		7.0E+002	4.10
			-4.395E-001	778.92	1.681E+000	&	1.141E+001G		4.9E+003	12.94
			-4.395E-001	964.11	-1.825E+000	%	1.552E+001G		4.9E+003	14.61
			-4.395E-001	1112.07	-1.618E+000	%	1.516E+001G		4.9E+003	13.64
			-4.395E-001	1408.00	-8.759E-001	%	9.200E+000G		4.9E+003	21.00
EU-152	T F	1	-4.395E-001	344.29	-4.395E-001	% (	4.105E+000G		4.9E+003	26.50
			-4.395E-001	121.78	-3.608E-001	&	2.487E+000G		4.9E+003	28.58
CS-137	T F I	1	3.698E-001	661.66	3.698E-001	% (P	1.893E+000G		1.1E+004	85.21
U-235	N	1	3.248E+000	143.79	3.248E+000	* (P	6.230E+000G		2.6E+011	10.96
			3.248E+000	205.33	3.195E+000	%	1.692E+001G		2.6E+011	5.01
			3.248E+000	163.38	4.000E+000	& P	1.669E+001G		2.6E+011	5.08
			3.248E+000	93.35	3.248E+000	! E	1.670E+001X		2.6E+011	5.81
K-40	N	1	3.147E+002	1460.83	3.147E+002	(	7.204E+000G		4.7E+011	10.67
CO-60	T F	1	-3.120E-001	1332.50	-3.120E-001	% (	2.361E+000G		1.9E+003	99.98
			-3.120E-001	1173.24	2.726E-001	%	2.239E+000G		1.9E+003	99.90
I-131	T F I	1	2.869E-002	364.48	2.869E-002	% (	1.234E+000G		8.0E+000	81.70
			2.869E-002	284.30	-1.125E-001	%	1.534E+001G		8.0E+000	6.14
			2.869E-002	636.97	-2.293E-001	%	1.766E+001G		8.0E+000	7.17
EU-154	T F I	1	2.548E-001	873.23	2.548E-001	% (	1.365E+001G		3.1E+003	12.27
			2.548E-001	123.10	2.814E-001	%	1.629E+000G		3.1E+003	40.79
			2.548E-001	1274.54	0.000E+000	%	7.175E+000G		3.1E+003	35.19
			2.548E-001	723.36	0.000E+000	%	1.540E+001G		3.1E+003	20.22
			2.548E-001	1004.77	1.174E+000	%	9.896E+000G		3.1E+003	18.01

			2.548E-001	996.33	4.122E+000	%			1.741E+001G		3.1E+003	10.60
TH-234	N	1	2.491E+001	63.29	2.491E+001		(	P	2.363E+001G		1.6E+012	4.82
			2.491E+001	92.59	1.277E+001	%		P	1.735E+001G		1.6E+012	5.58
PA-234M	N	1	-2.054E+001	1001.00	-2.054E+001	%	(		2.562E+002G		1.6E+012	.84
			-2.054E+001	766.41	-5.602E+001	%			6.263E+002G		1.6E+012	.29
PB-214	N	1	1.885E+001	351.93	1.874E+001		(	P	2.728E+000G		5.8E+005	37.60
			1.885E+001	295.09	1.906E+001	*	(	P	4.812E+000G		5.8E+005	19.30
			1.885E+001	242.00	2.980E+001	*			1.172E+001G		5.8E+005	7.43
PB-212	N	1	1.568E+001	238.63	1.568E+001		(	P	2.439E+000G		7.0E+002	43.30
			1.568E+001	300.03	3.607E+001	+			1.916E+001G		7.0E+002	3.28
BI-214	N	1	1.535E+001	609.31	1.531E+001	@	(	P	1.911E+000G		5.8E+005	46.09
			1.535E+001	1120.29	5.678E+000	%			1.534E+001G		5.8E+005	15.10
			1.535E+001	1764.49	1.549E+001	?	(	P	1.071E+001G		5.8E+005	15.40
AC-228	N	1	1.416E+001	911.16	1.285E+001	?	(		3.572E+000G		2.1E+003	29.00
			1.416E+001	968.97	2.647E+001	+			3.147E+000G		2.1E+003	17.46
			1.416E+001	338.32	1.733E+001		(		6.954E+000G		2.1E+003	12.01
			1.416E+001	93.35	1.416E+001	-		E	2.142E+000G	A	2.1E+003	5.56
PB-210	N	1	1.372E+001	46.54	1.372E+001	*	(	P	3.939E+001G		8.1E+003	4.25
			1.050E-001	880.53	2.508E+000	%			2.537E+001G		1.6E+012	6.00
Pa-234	N	1	1.050E-001	131.29	1.050E-001	&	(		5.704E+000G		1.6E+012	18.00
			1.050E-001	569.47	1.050E-001	%			1.726E+001G		1.6E+012	8.20
			1.050E-001	946.02	-1.407E-001	%			1.411E+001G		1.6E+012	13.40
			1.050E-001	883.24	-9.519E-001	&			1.319E+001G		1.6E+012	9.60
CS-134	T F I	1	0.000E+000	604.71	0.000E+000	&	(		2.217E+000G		7.5E+002	97.62
			0.000E+000	795.87	-1.810E-001	%			2.052E+000G		7.5E+002	85.53
			0.000E+000	569.32	0.000E+000	%			9.340E+000G		7.5E+002	15.38
			0.000E+000	801.95	2.598E+000	&			1.669E+001G		7.5E+002	8.69
			0.000E+000	563.24	-1.975E+000	%			1.370E+001G		7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-6.326E-001	-6.348E-001	485.65	485.66	1.104E+001
K-40		3.147E+002	3.147E+002	5.57	6.30	7.204E+000
CO-60	#	-3.120E-001	-3.120E-001	211.68	211.70	2.361E+000
I-131	#	2.869E-002	2.936E-002	1,198.55	1,198.55	1.234E+000
CS-134	#			1,220.97	1,220.98	2.217E+000
EU-154	#	2.548E-001	2.549E-001	1,452.76	1,452.77	1.365E+001
CS-137	#	3.698E-001	3.698E-001	140.63	140.66	1.893E+000
EU-152	#	-4.395E-001	-4.396E-001	266.93	266.95	4.105E+000
EU-155	#	9.148E-001	9.149E-001	130.93	130.98	4.053E+000
TL-208		6.755E+000	6.757E+000	11.27	11.63	1.130E+000
BI-212	#	8.955E+000	8.957E+000	43.74	43.84	1.222E+001
BI-214	#	1.535E+001	1.535E+001	9.07	9.52	1.911E+000
RA-224	#	-6.103E+001	-6.104E+001	27.11	27.27	5.259E+001
AC-228		1.416E+001	1.416E+001	12.27	12.61	3.572E+000
TH-234		2.491E+001	2.491E+001	36.48	36.67	2.363E+001
PA-234M	#	-2.054E+001	-2.054E+001	348.40	348.41	2.562E+002
U-235	#	3.248E+000	3.248E+000	58.07	58.14	6.230E+000
PB-210	#	1.372E+001	1.372E+001	82.96	83.06	3.939E+001
PB-212		1.568E+001	1.568E+001	8.72	9.22	2.439E+000
PB-214	#	1.885E+001	1.885E+001	8.27	8.75	2.728E+000
Pa-234	#	1.050E-001	1.050E-001	1,582.17	1,582.17	5.704E+000
AM-241	#	6.983E-001	6.983E-001	146.35	146.40	3.475E+000

= All peaks for activity calculation had bad shape

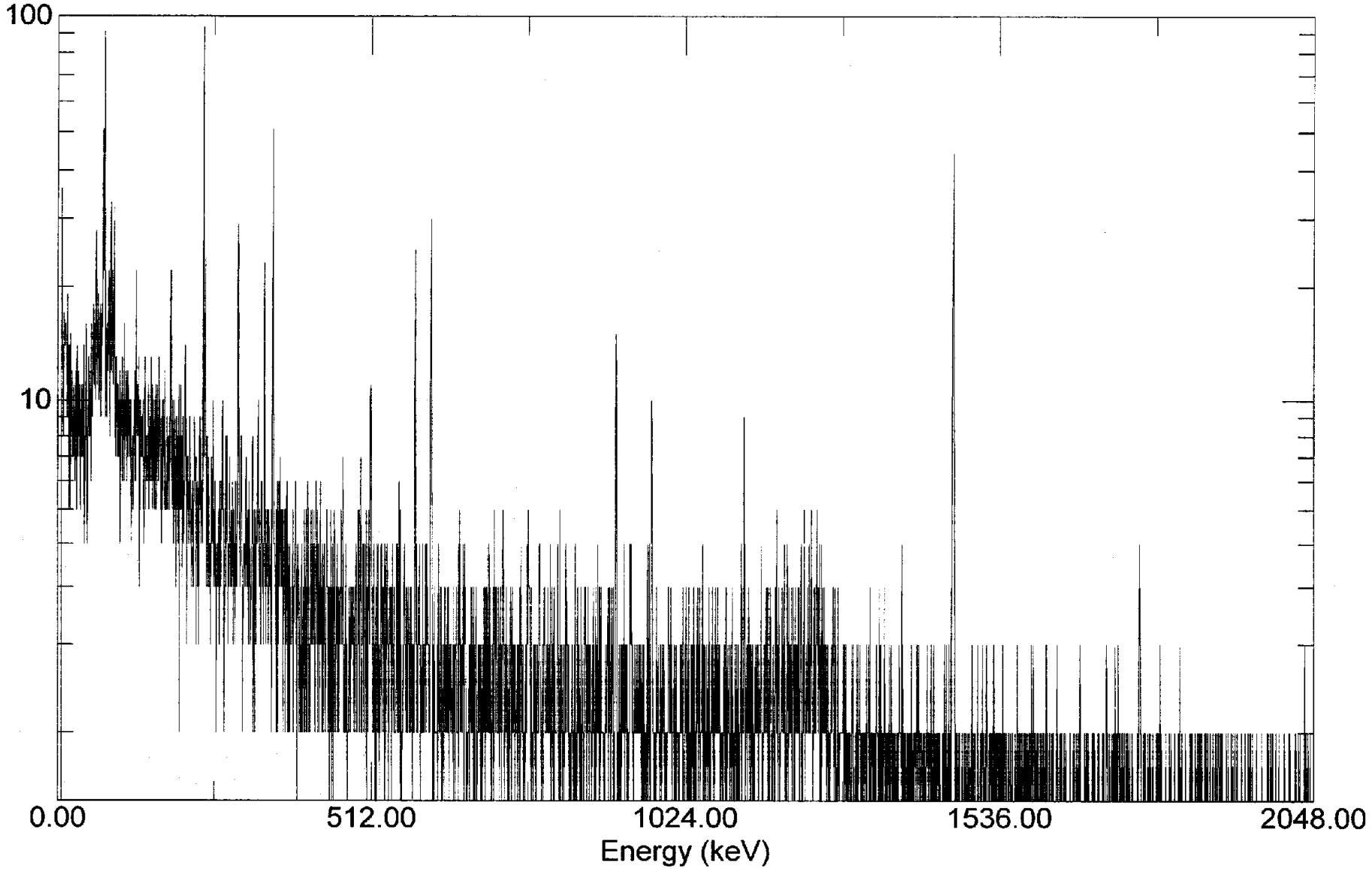
Total Activity (37.74 to 2,000.57 keV) 410.46 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKH51AC

7360294_KEKH51AC_F7L200271-010



Acquired: 26-Dec-2007 6:24:04 PM
File: C:\User\spectra\KEKH51AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1855.46 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,074

Sample Description: 7360294_KEKH61AC_F7L200271-011

Spectrum Filename: KEKH61AC.An1

Acquisition Information

Start Time:	26-Dec-2007 6:24:35PM		
Live Time:	1800.00	Real Time:	1824.84
Dead Time:	1.36 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.0345

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.19	74.76	220.00	164.00	0.091	16.71	0.909	PB-214	
307.66	77.13	333.33	271.67	0.151	14.23	1.187	PB-212	s
348.48	87.33	194.67	132.33	0.074	17.26	0.969	PB-214	s
359.92	90.19	93.34	44.66	0.025	34.06	0.333	PB-214	s
371.45	93.07	312.00	0.00	0.000	2498.00	1.124		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.83	46.68	177.85	16.66	0.009	45.78	0.832	s
AM-241	1	237.27	59.54	271.44	-1.20	-0.001	1942.78	0.846	s
TH-234	1	252.40	63.32	283.22	29.25	0.016	47.96	0.850	s
EU-155	1	335.62	84.12	185.49	30.49	0.017	65.72	0.874	s
TH-234	1	370.14	92.74	312.41	53.04	0.029	31.48	0.881	s
U-235	1	372.56	93.35	209.52	15.59	0.009	12.89	0.882	s D
AC-228	1	372.56	93.35	209.52	72.49	0.040	2.32	0.882	s D
EU-155	1	419.93	105.19	177.74	44.46	0.025	44.98	0.894	s
EU-152	1	485.77	121.65	143.77	9.88	0.005	174.51	0.912	s
EU-154	1	486.58	121.85	104.83	13.87	0.008	107.78	0.913	
Pa-234	1	527.22	132.01	196.46	-10.44	-0.006	192.40	0.922	s
U-235	1	574.06	143.71	163.01	29.33	0.016	64.26	0.935	s
U-235	1	652.83	163.40	118.68	19.75	0.011	81.19	0.955	
U-235	1	825.76	206.63	112.46	-0.23	0.000	6535.47	0.999	s
PB-212	1	953.80	238.63	124.01	448.99	0.249	5.72	1.034	D
RA-224	1	963.22	240.99	171.00	52.00	0.029	38.18	1.036	D
PB-214	1	967.26	242.00	90.40	84.60	0.047	19.26	1.037	D
TL-208	1	1107.21	276.98	58.00	92.00	0.051	22.55	0.548	s
I-131	1	1135.80	284.12	69.37	-7.71	-0.004	157.01	1.081	s
PB-214	1	1181.37	295.51	52.00	197.00	0.109	10.85	0.873	s
PB-212	1	1201.82	300.63	64.55	31.01	0.017	40.80	1.097	
AC-228	1	1352.98	338.41	75.51	76.49	0.042	19.72	1.136	s
EU-152	1	1387.56	347.05	41.87	-1.56	-0.001	590.90	1.142	s
PB-214	1	1407.19	351.96	26.22	350.78	0.195	6.40	1.108	s
I-131	1	1454.63	363.82	69.27	-11.35	-0.006	107.84	1.163	s
BE-7	1	1907.37	476.99	41.05	0.53	0.000	1708.90	1.277	s
CS-134	1	2257.77	564.58	32.68	-0.36	0.000	2240.64	1.363	s
CS-134	1	2276.76	569.32	34.60	-1.43	-0.001	-50.12	1.369	s D
Pa-234	1	2277.35	569.47	33.48	-1.54	-0.001	-127.22	1.369	s D
TL-208	1	2331.97	583.12	13.41	194.59	0.108	8.32	1.502	s
CS-134	1	2424.67	606.29	82.35	-8.59	-0.005	153.19	1.403	s
BI-214	1	2436.55	609.26	25.63	233.37	0.130	8.94	1.684	s
I-131	1	2547.69	637.05	31.19	-3.01	-0.002	268.31	1.435	s
CS-137	1	2641.84	660.58	37.53	-7.37	-0.004	135.08	1.459	s
EU-154	1	2893.33	723.45	45.58	-7.28	-0.004	136.34	1.519	s
BI-212	1	2907.72	727.05	25.30	22.72	0.013	37.69	1.523	s
PA-234M	1	3066.47	766.73	38.84	0.35	0.000	2523.12	1.561	s
EU-152	1	3113.77	778.55	25.99	-4.04	-0.002	185.08	1.573	s
BI-212	1	3141.75	785.55	25.05	6.29	0.003	119.41	1.579	s
CS-134	1	3179.88	795.08	23.37	5.92	0.003	122.64	1.589	s
CS-134	1	3208.88	802.33	26.86	-0.78	0.000	951.98	1.595	s
TL-208	1	3435.84	859.06	20.71	12.20	0.007	60.01	1.650	s
EU-154	1	3491.60	873.00	25.39	0.10	0.000	7205.52	1.662	s
Pa-234	1	3516.54	879.24	18.65	-4.61	-0.003	140.46	1.669	s
Pa-234	1	3530.69	882.78	10.48	4.10	0.002	122.24	1.672	s
AC-228	1	3646.24	911.66	27.64	83.70	0.047	14.08	1.698	s

Test Amerimap St. Louis

Pa-234	1	3784.90	946.32	33.26	3.45	0.002	242.40	1.731	s
EU-152	1	3856.05	964.11	289.61	0.00	0.000	2406.70	1.748	s
AC-228	1	3876.75	969.29	38.65	49.74	0.028	22.66	1.752	s
EU-154	1	3996.42	999.20	30.62	-4.28	-0.002	189.03	1.778	s
PA-234M	1	4005.27	1001.42	28.25	6.06	0.003	130.57	1.782	s
EU-154	1	4018.99	1004.85	24.65	2.49	0.001	289.18	1.785	s
EU-152	1	4442.04	1110.60	33.63	-5.63	-0.003	151.54	1.884	s
BI-214	1	4481.24	1120.40	3.17	52.83	0.029	15.38	0.729	s
CO-60	1	4692.58	1173.24	30.02	0.00	0.000	774.81	1.939	s
EU-154	1	5096.93	1274.33	19.29	0.09	0.000	6636.16	2.030	s
CO-60	1	5330.01	1332.60	18.94	-3.78	-0.002	170.77	2.081	s
EU-152	1	5639.80	1410.05	21.21	-0.59	0.000	1115.85	2.147	s
K-40	1	5843.00	1460.85	0.00	300.00	0.167	5.77	1.728	
BI-214	1	7059.02	1764.88	6.59	21.42	0.012	27.46	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code		Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code	MDA Value Becquerels	Code	Comments	
PB-210		N	1	9.945E+000	46.54	9.945E+000	%	(P	3.872E+001G		8.1E+003	4.25
TH-234		N	1	8.877E+000	63.29	8.877E+000	*	(P	2.462E+001G		1.6E+012	4.82
				8.877E+000	92.59	1.110E+001	%	P	1.781E+001G		1.6E+012	5.58
BI-212		N	1	8.390E+000	727.33	8.390E+000	*	(	9.657E+000G		7.0E+002	11.82
				8.390E+000	785.51	2.667E+001	&		1.104E+002G		7.0E+002	1.10
TL-208	F	N	1	8.288E+000	583.02	8.288E+000	@	(P	8.422E-001G		7.0E+002	84.50
				8.288E+000	277.28	2.666E+001	+		1.107E+001G		7.0E+002	6.31
				8.288E+000	860.56	4.955E+000	%		9.712E+000G		7.0E+002	12.42
				-6.612E-001	569.47	-6.612E-001	&		1.276E+001G		1.6E+012	8.20
				-6.612E-001	946.02	1.408E+000	%		1.207E+001G		1.6E+012	13.40
				-6.612E-001	883.24	2.200E+000	%		9.560E+000G		1.6E+012	9.60
				-6.612E-001	880.53	-3.951E+000	%		1.957E+001G		1.6E+012	6.00
Pa-234		N	1	-6.612E-001	131.29	-6.612E-001	%	(	4.309E+000G		1.6E+012	18.00
AM-241	T		1	-5.187E-002	59.54	-5.187E-002	%	(	3.434E+000G		1.6E+005	35.90
PA-234M		N	1	4.154E+001	1001.00	4.154E+001	%	(	1.884E+002G		1.6E+012	.84
				4.154E+001	766.41	5.439E+000	%		4.932E+002G		1.6E+012	.29
EU-154	T F I		1	4.120E-002	873.23	4.120E-002	%	(	1.090E+001G		3.1E+003	12.27
				4.120E-002	123.10	3.839E-001	%		1.395E+000G		3.1E+003	40.79
				4.120E-002	1274.54	1.886E-002	%		4.665E+000G		3.1E+003	35.19
				4.120E-002	723.36	-1.564E+000	&		7.343E+000G		3.1E+003	20.22
				4.120E-002	1004.77	7.957E-001	%		8.264E+000G		3.1E+003	18.01
				4.120E-002	996.33	-2.310E+000	%		1.537E+001G		3.1E+003	10.60
CS-137	T F I		1	-3.481E-001	661.66	-3.481E-001	%	(P	1.475E+000G		1.1E+004	85.21
CS-134	T F I		1	-3.272E-001	604.71	-3.272E-001	%	(	1.713E+000G		7.5E+002	97.62
				-3.272E-001	795.87	3.263E-001	%		1.392E+000G		7.5E+002	85.53
				-3.272E-001	569.32	-3.272E-001	&		6.901E+000G		7.5E+002	15.38
				-3.272E-001	801.95	-4.237E-001	%		1.468E+001G		7.5E+002	8.69
				-3.272E-001	563.24	-1.513E-001	%		1.227E+001G		7.5E+002	8.35
				-3.261E-001	284.30	-2.347E+000	%		1.264E+001G		8.0E+000	6.14
				-3.261E-001	636.97	-1.635E+000	%		1.559E+001G		8.0E+000	7.17
I-131	T F I		1	-3.261E-001	364.48	-3.261E-001	&	(	1.192E+000G		8.0E+000	81.70
U-235		N	1	3.129E+000	143.79	3.129E+000	%	(	6.635E+000G		2.6E+011	10.96

				3.129E+000	205.33	-6.539E-002	%			1.485E+001G		2.6E+011	5.01
				3.129E+000	163.38	4.801E+000	%			1.300E+001G		2.6E+011	5.08
				3.129E+000	93.35	3.129E+000	!		E	1.408E+001X		2.6E+011	5.81
CO-60	T F		1	-2.786E-001	1332.50	-2.786E-001	%	(		1.695E+000G		1.9E+003	99.98
				-2.786E-001	1173.24	0.000E+000	%			1.861E+000G		1.9E+003	99.90
EU-155	T F I		1	2.375E+000	105.31	2.375E+000	*	(		3.464E+000G		1.8E+003	21.20
				2.375E+000	86.54	1.192E+000	&			2.587E+000G	A	1.8E+003	30.70
K-40		N	1	2.253E+002	1460.83	2.253E+002		(		5.536E+000G		4.7E+011	10.67
RA-224		N	1	2.054E+001	240.99	2.054E+001		(		2.514E+001G		7.0E+002	4.10
PB-214		N	1	2.045E+001	351.93	2.120E+001	*	(	P	1.606E+000G		5.8E+005	37.60
				2.045E+001	295.09	1.973E+001	*	(		3.638E+000G		5.8E+005	19.30
				2.045E+001	242.00	1.850E+001		(		1.028E+001G		5.8E+005	7.43
BI-214		N	1	1.973E+001	609.31	1.895E+001	*	(	P	2.135E+000G		5.8E+005	46.09
				1.973E+001	1120.29	2.213E+001		(		4.608E+000G		5.8E+005	15.10
				1.973E+001	1764.49	1.336E+001	-			9.149E+000G		5.8E+005	15.40
PB-212		N	1	1.665E+001	238.63	1.665E+001		(	P	2.025E+000G		7.0E+002	43.30
				1.665E+001	300.03	1.856E+001	%			2.402E+001G		7.0E+002	3.28
BE-7		N P C	1	1.522E-001	477.60	1.522E-001	%	(		9.316E+000G		5.3E+001	10.52
AC-228		N	1	1.520E+001	911.16	1.529E+001	*	(		4.968E+000G		2.1E+003	29.00
				1.520E+001	968.97	1.590E+001		(		1.013E+001G		2.1E+003	17.46
				1.520E+001	338.32	1.395E+001		(		7.882E+000G		2.1E+003	12.01
				1.520E+001	93.35	1.520E+001	!		E	1.471E+001G	A	2.1E+003	5.56
EU-152	T F		1	-1.313E-001	344.29	-1.313E-001	%	(		2.761E+000G		4.9E+003	26.50
				-1.313E-001	121.78	3.899E-001	%			2.311E+000G		4.9E+003	28.58
				-1.313E-001	778.92	-1.447E+000	%			9.471E+000G		4.9E+003	12.94
				-1.313E-001	964.11	0.000E+000	%			3.121E+001G		4.9E+003	14.61
				-1.313E-001	1112.07	-2.595E+000	%			1.370E+001G		4.9E+003	13.64
				-1.313E-001	1408.00	-2.168E-001	%			8.915E+000G		4.9E+003	21.00

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	#	-3.272E-001	-3.273E-001	153.19	153.22	1.713E+000
EU-154	#	4.120E-002	4.120E-002	7,205.52	7,205.52	1.090E+001
EU-155	#	2.375E+000	2.375E+000	44.98	45.11	3.464E+000
PB-214		2.045E+001	2.045E+001	6.46	7.07	1.606E+000
BI-212	#	8.390E+000	8.392E+000	37.69	37.80	9.657E+000
BI-214		1.973E+001	1.973E+001	8.91	9.37	2.135E+000
TH-234	#	8.877E+000	8.877E+000	81.98	82.07	2.462E+001
PA-234M	#	4.154E+001	4.154E+001	130.57	130.60	1.884E+002
BE-7	#	1.522E-001	1.527E-001	1,708.90	1,708.90	9.316E+000
K-40		2.253E+002	2.253E+002	5.77	6.47	5.536E+000
CO-60	#	-2.786E-001	-2.786E-001	170.77	170.79	1.695E+000
I-131	#	-3.261E-001	-3.338E-001	107.84	107.88	1.192E+000
CS-137	#	-3.481E-001	-3.481E-001	148.72	148.75	1.475E+000
EU-152	#	-1.313E-001	-1.313E-001	590.90	590.91	2.761E+000
TL-208	#	8.288E+000	8.290E+000	8.42	8.90	8.422E-001
PB-210	#	9.945E+000	9.946E+000	112.04	112.10	3.872E+001
PB-212		1.665E+001	1.666E+001	5.84	6.56	2.025E+000
RA-224		2.054E+001	2.054E+001	38.18	38.29	2.514E+001
AC-228	#	1.520E+001	1.520E+001	11.06	11.43	4.968E+000
Pa-234	#	-6.612E-001	-6.612E-001	192.40	192.42	4.309E+000
U-235	#	3.129E+000	3.129E+000	64.26	64.33	6.635E+000
AM-241	#	-5.187E-002	-5.187E-002	1,942.78	1,942.78	3.434E+000

= All peaks for activity calculation had bad shape

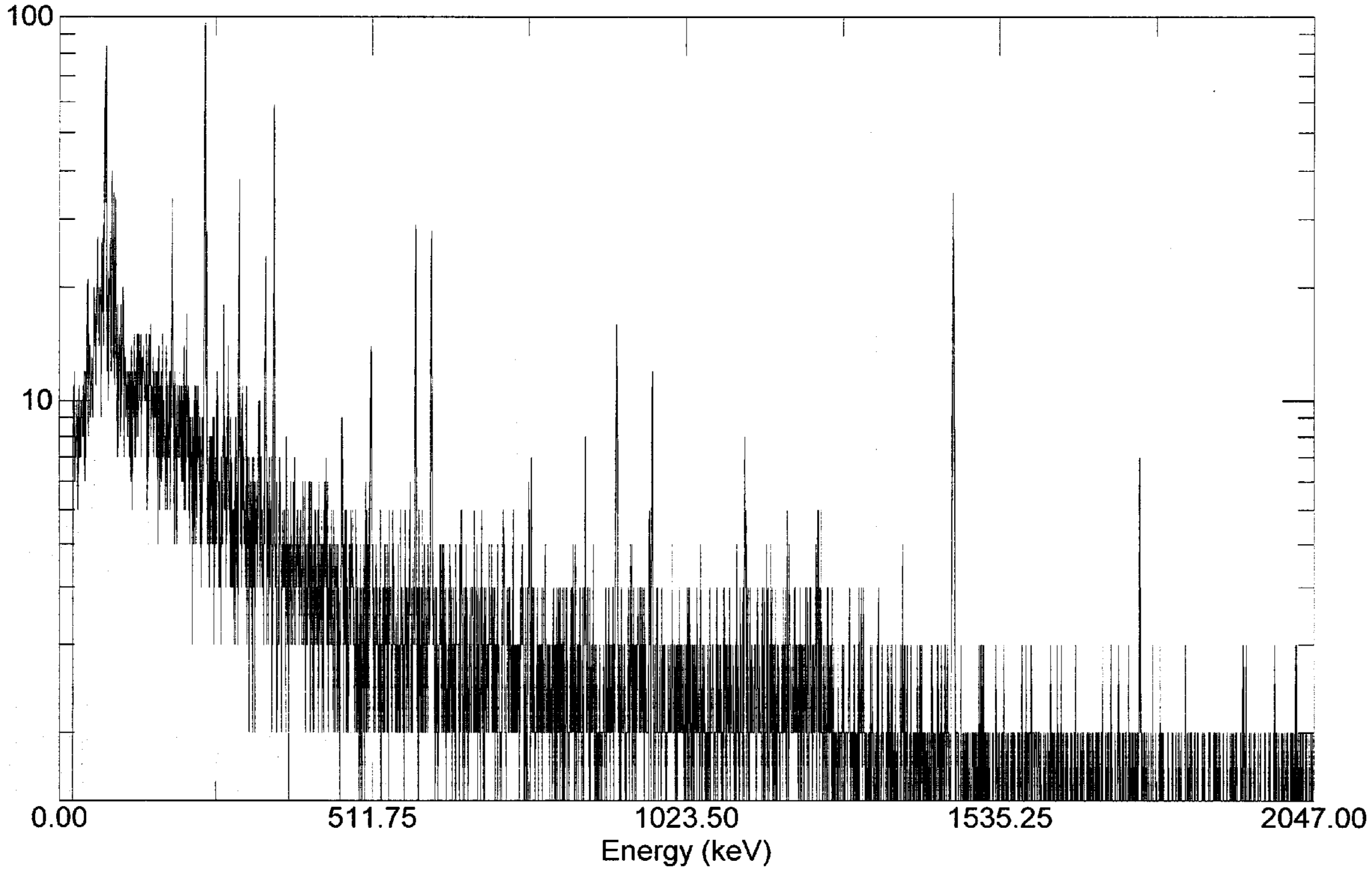
Total Activity (37.72 to 2,000.15 keV) 310.99 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKH61AC

7360294_KEKH61AC_F7L200271-011



Acquired: 26-Dec-2007 6:24:36 PM
File: C:\User\spectra\KEKH61AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1824.84 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,076

Sample Description: 7360294_KEKH91AC_F7L200271-012

Spectrum Filename: KEKH91AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:00:24PM		
Live Time:	1800.00	Real Time:	1810.82
Dead Time:	0.60 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1482

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
252.59	63.36	253.90	58.10	0.032	40.94	0.626		s
298.52	74.85	150.00	182.00	0.101	13.26	0.836	PB-214	
307.66	77.13	216.00	273.00	0.152	11.95	0.860	PB-214	
347.81	87.17	255.71	38.29	0.021	61.24	1.186		s
741.38	185.56	108.00	151.00	0.084	17.41	0.614	U-235	s
835.54	209.10	91.83	104.17	0.058	16.29	0.781	AC-228	s
2435.97	609.19	190.11	50.89	0.028	40.80	1.225		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.68	46.63	170.44	37.89	0.021	27.75	0.813	
AM-241	1	236.57	59.36	178.39	14.51	0.008	132.77	0.824	s
TH-234	1	251.84	63.17	239.50	28.00	0.016	33.41	0.828	s
EU-155	1	347.46	87.08	257.61	97.05	0.054	25.50	0.849	s
TH-234	1	370.30	92.79	297.34	31.51	0.018	29.25	0.855	s
U-235	1	372.54	93.35	214.17	-5.44	-0.003	-513.31	0.855	s D
AC-228	1	372.54	93.35	148.83	69.81	0.039	2.03	1.312	s D
EU-155	1	415.04	103.97	113.93	12.76	0.007	121.60	0.866	s
EU-152	1	483.98	121.21	110.76	11.14	0.006	136.91	0.881	s
EU-154	1	489.62	122.62	150.92	-8.86	-0.005	198.95	0.882	s
Pa-234	1	522.41	130.82	177.09	-0.62	0.000	3022.47	0.890	s
U-235	1	575.39	144.06	178.02	-10.05	-0.006	298.77	0.901	s
U-235	1	656.27	164.28	129.54	0.15	0.000	511.19	0.919	s
U-235	1	812.21	203.27	50.18	16.47	0.009	57.54	0.957	s
PB-212	1	952.84	238.43	129.25	340.75	0.189	8.06	0.946	
RA-224	1	959.32	240.05	479.62	-112.96	-0.063	28.99	0.989	
PB-214	1	967.18	242.01	92.52	89.48	0.050	22.05	0.660	s
TL-208	1	1109.38	277.56	88.36	8.44	0.005	161.30	1.021	s
I-131	1	1142.73	285.90	43.77	0.90	0.000	1049.13	1.028	s
PB-214	1	1179.60	295.12	59.04	156.96	0.087	12.14	0.877	
PB-212	1	1202.08	300.74	40.00	59.00	0.033	25.83	0.604	s
AC-228	1	1352.19	338.26	34.91	82.09	0.046	16.54	1.071	
EU-152	1	1377.01	344.47	52.57	-0.91	-0.001	1137.52	1.081	s
PB-214	1	1406.27	351.78	66.99	262.01	0.146	9.17	1.022	
I-131	1	1459.52	365.09	56.39	-4.44	-0.002	243.78	1.099	s
BE-7	1	1909.54	477.60	36.71	0.00	0.000	856.87	1.198	s
CS-134	1	2248.31	562.28	28.91	-5.03	-0.003	157.53	1.273	s
CS-134	1	2276.47	569.32	32.87	-3.01	-0.002	-47.46	1.278	s D
Pa-234	1	2277.07	569.47	28.89	-0.11	0.000	-139.43	1.278	s D
TL-208	1	2331.72	583.13	34.75	129.25	0.072	12.48	1.376	
CS-134	1	2425.00	606.45	78.30	-18.33	-0.010	72.17	1.309	s
BI-214	1	2436.00	609.20	41.46	180.92	0.101	8.25	1.313	s
I-131	1	2543.31	636.03	28.50	0.32	0.000	2347.97	1.337	s
CS-137	1	2646.99	661.94	45.79	11.13	0.006	91.02	1.358	s
EU-154	1	2895.37	724.03	45.79	-5.68	-0.003	173.75	1.411	s
BI-212	1	2906.22	726.74	6.50	29.50	0.016	23.99	0.526	s
PA-234M	1	3064.92	766.41	59.19	0.00	0.000	1088.01	1.447	s
EU-152	1	3114.20	778.73	26.72	-1.44	-0.001	514.39	1.458	s
BI-212	1	3143.25	785.99	27.14	5.67	0.003	136.47	1.463	
CS-134	1	3178.13	794.71	21.38	9.11	0.005	79.06	1.472	s
CS-134	1	3212.68	803.35	25.74	-0.16	0.000	4558.51	1.477	s
TL-208	1	3440.28	860.24	3.00	29.00	0.016	22.08	0.734	s
EU-154	1	3488.32	872.25	25.69	-2.50	-0.001	293.97	1.537	s
Pa-234	1	3521.46	880.53	32.62	0.00	0.000	807.69	1.543	s
Pa-234	1	3533.50	883.54	22.35	-2.01	-0.001	339.95	1.546	s

AC-228	1	3645.62	911.57	10.64	103.36	0.057	11.25	1.151	s
Pa-234	1	3782.54	945.79	33.62	-3.22	-0.002	260.43	1.598	s
EU-152	1	3855.22	963.96	36.37	10.41	0.006	87.60	1.613	s
AC-228	1	3874.93	968.88	6.25	63.75	0.035	13.27	0.738	s
EU-154	1	3980.93	995.38	29.37	-0.47	0.000	1625.96	1.640	s
PA-234M	1	4003.60	1001.05	33.29	5.19	0.003	163.36	1.643	s
EU-154	1	4018.52	1004.77	14.95	0.00	0.000	546.78	1.647	s
EU-152	1	4447.80	1112.07	27.41	0.00	0.000	740.36	1.735	s
BI-214	1	4479.86	1120.09	37.96	42.12	0.023	22.14	1.741	s
CO-60	1	4690.20	1172.66	43.48	-3.41	-0.002	278.74	1.784	s
EU-154	1	5092.40	1273.19	16.92	0.12	0.000	5023.98	1.866	s
CO-60	1	5329.72	1332.50	62.18	0.00	0.000	1115.21	1.912	s
EU-152	1	5637.33	1409.38	11.40	4.07	0.002	127.50	1.972	s
K-40	1	5842.06	1460.55	12.54	480.46	0.267	4.50	1.846	
BI-214	1	7058.22	1764.49	13.10	22.56	0.013	24.23	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code		Peak MDA Value Becquerels	Peak Code	Peak Comments	
BI-212	N	1	9.950E+000	727.33	9.950E+000		(	4.921E+000G		7.0E+002	11.82
			9.950E+000	785.51	2.170E+001	%		1.032E+002G		7.0E+002	1.10
TH-234	N	1	9.521E+000	63.29	9.521E+000	%	(P	2.544E+001G		1.6E+012	4.82
			9.521E+000	92.59	7.558E+000	%	P	1.993E+001G		1.6E+012	5.58
EU-154	T F I	1	-9.215E-001	873.23	-9.215E-001	%	(	9.717E+000G		3.1E+003	12.27
			-9.215E-001	123.10	-2.861E-001	%		1.936E+000G		3.1E+003	40.79
			-9.215E-001	1274.54	1.956E-002	%		3.689E+000G		3.1E+003	35.19
			-9.215E-001	723.36	-1.115E+000	%		6.727E+000G		3.1E+003	20.22
			-9.215E-001	1004.77	0.000E+000	%		5.750E+000G		3.1E+003	18.01
			-9.215E-001	996.33	-2.217E-001	&		1.310E+001G		3.1E+003	10.60
			-7.949E-002	1408.00	1.239E+000	%		5.620E+000G		4.9E+003	21.00
EU-152	T F	1	-7.949E-002	344.29	-7.949E-002	%	(	3.205E+000G		4.9E+003	26.50
			-7.949E-002	121.78	5.128E-001	&		2.382E+000G		4.9E+003	28.58
			-7.949E-002	778.92	-4.655E-001	%		8.661E+000G		4.9E+003	12.94
			-7.949E-002	964.11	3.459E+000	%		1.024E+001G		4.9E+003	14.61
			-7.949E-002	1112.07	0.000E+000	%		1.067E+001G		4.9E+003	13.64
AM-241	T	1	7.016E-001	59.54	7.016E-001	%	(	3.140E+000G		1.6E+005	35.90
CS-134	T F I	1	-6.576E-001	604.71	-6.576E-001	&	(	1.577E+000G		7.5E+002	97.62
			-6.576E-001	795.87	4.522E-001	%		1.204E+000G		7.5E+002	85.53
			-6.576E-001	569.32	-6.576E-001	%		6.422E+000G		7.5E+002	15.38
			-6.576E-001	801.95	-7.741E-002	&		1.294E+001G		7.5E+002	8.69
			-6.576E-001	563.24	-2.007E+000	%		1.108E+001G		7.5E+002	8.35
TL-208	F N	1	5.221E+000	583.02	5.221E+000		(P	1.219E+000G		7.0E+002	84.50
			5.221E+000	277.28	2.656E+000	%		1.464E+001G		7.0E+002	6.31
			5.221E+000	860.56	1.047E+001	+		3.891E+000G		7.0E+002	12.42
RA-224	N	1	-4.960E+001	240.99	-4.960E+001		(	4.600E+001G		7.0E+002	4.10
CS-137	T F I	1	4.877E-001	661.66	4.877E-001	%	(	1.500E+000G		1.1E+004	85.21
Pa-234	N	1	-4.613E-002	131.29	-4.613E-002	%	(	4.791E+000G		1.6E+012	18.00
			-4.613E-002	569.47	-4.613E-002	%		1.136E+001G		1.6E+012	8.20
			-4.613E-002	946.02	-1.152E+000	%		1.063E+001G		1.6E+012	13.40
			-4.613E-002	883.24	-9.558E-001	%		1.176E+001G		1.6E+012	9.60
			-4.613E-002	880.53	0.000E+000	%		2.226E+001G		1.6E+012	6.00
PA-234	N	1	3.088E+001	1001.00	3.088E+001	%	(	1.762E+002G		1.6E+012	.84
			3.088E+001	766.41	0.000E+000	%		5.423E+002G		1.6E+012	.29
K-40	N	1	2.965E+002	1460.83	2.965E+002		(P	1.186E+001G		4.7E+011	10.67
EU-155	T F I	1	2.879E+000	105.31	7.889E-001	&	(	3.244E+000G		1.8E+003	21.20
			2.879E+000	86.54	4.323E+000	*	(	3.452E+000G		1.8E+003	30.70
PB-210	N	1	2.393E+001	46.54	2.393E+001	%	(P	4.014E+001G		8.1E+003	4.25
AC-228	N	1	1.678E+001	911.07	1.662E+001	@	(P	2.881E+000G		2.1E+003	29.00
			1.678E+001	968.97	1.778E+001		(P	4.006E+000G		2.1E+003	17.46
			1.678E+001	338.32	1.570E+001		(P	5.785E+000G		2.1E+003	12.01
			1.678E+001	93.35	1.678E+001	+	E	1.432E+001X	A	2.1E+003	5.56
PB-214	N	1	1.662E+001	351.93	1.648E+001		(P	2.569E+000G		5.8E+005	37.60
			1.662E+001	295.09	1.690E+001		(P	4.147E+000G		5.8E+005	19.30

			1.662E+001	242.00	2.174E+001	*		P	1.155E+001G	5.8E+005	7.43
BI-214	N	1	1.413E+001	609.31	1.382E+001	@	(	P	2.500E+000G	5.8E+005	46.09
			1.413E+001	1120.29	1.506E+001	@	(	P	1.124E+001G	5.8E+005	15.10
			1.413E+001	1764.49	1.125E+001	-		P	9.762E+000G	5.8E+005	15.40
PB-212	N	1	1.407E+001	238.63	1.407E+001		(	P	2.300E+000G	7.0E+002	43.30
			1.407E+001	300.03	3.783E+001	+			2.064E+001G	7.0E+002	3.28
I-131	T F I	1	-1.319E-001	364.48	-1.319E-001	%	(		1.120E+000G	8.0E+000	81.70
			-1.319E-001	284.30	2.953E-001	&			1.105E+001G	8.0E+000	6.14
			-1.319E-001	636.97	1.634E-001	%			1.398E+001G	8.0E+000	7.17
U-235	N	1	-1.252E+000	143.79	-1.252E+000	%	(	P	8.084E+000G	2.6E+011	10.96
			-1.252E+000	205.33	5.334E+000	%		P	1.157E+001G	2.6E+011	5.01
			-1.252E+000	163.38	4.283E-002	&		P	1.574E+001G	2.6E+011	5.08
			-1.252E+000	93.35	-1.252E+000	!		E	1.632E+001X	2.6E+011	5.81
BE-7	N P C	1	0.000E+000	477.60	0.000E+000	&	(		8.704E+000G	5.3E+001	10.52
CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(		2.422E+000G	1.9E+003	99.98
			0.000E+000	1173.24	-1.906E-001	%			1.869E+000G	1.9E+003	99.90

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
I-131	<	-1.319E-001	-1.353E-001	243.78	243.80	1.120E+000
CS-134	<	-6.576E-001	-6.577E-001	72.17	72.23	1.577E+000
EU-154	<	-9.215E-001	-9.215E-001	293.97	293.98	9.717E+000
PB-212		1.407E+001	1.408E+001	8.61	9.11	2.300E+000
PB-214		1.662E+001	1.662E+001	8.02	8.52	2.569E+000
BI-212		9.950E+000	9.953E+000	23.99	24.17	4.921E+000
BI-214	<	1.413E+001	1.413E+001	8.78	9.24	2.500E+000
AC-228		1.678E+001	1.678E+001	8.43	8.91	2.881E+000
BE-7	<			856.87	856.88	8.704E+000
K-40		2.965E+002	2.965E+002	4.62	5.47	1.186E+001
CO-60	<			1.115.21	1.115.22	2.422E+000
CS-137	<	4.877E-001	4.877E-001	91.02	91.06	1.500E+000
EU-152	<	-7.949E-002	-7.950E-002	1.137.52	1.137.53	3.205E+000
EU-155	<	2.879E+000	2.879E+000	25.50	25.72	3.244E+000
TL-208		5.221E+000	5.223E+000	13.34	13.65	1.219E+000
RA-224	<	-4.960E+001	-4.962E+001	28.99	29.14	4.600E+001
PB-210	#	2.393E+001	2.393E+001	49.33	49.48	4.014E+001
Pa-234	<	-4.613E-002	-4.613E-002	3.022.47	3.022.47	4.791E+000
TH-234	<	9.521E+000	9.521E+000	77.44	77.52	2.544E+001
PA-234M	<	3.088E+001	3.088E+001	163.36	163.39	1.762E+002
U-235	<	-1.252E+000	-1.252E+000	410.06	410.07	8.084E+000
AM-241	<	7.016E-001	7.016E-001	132.77	132.83	3.140E+000

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 359.16 Bq/sample

Analyzed by: _____

403605

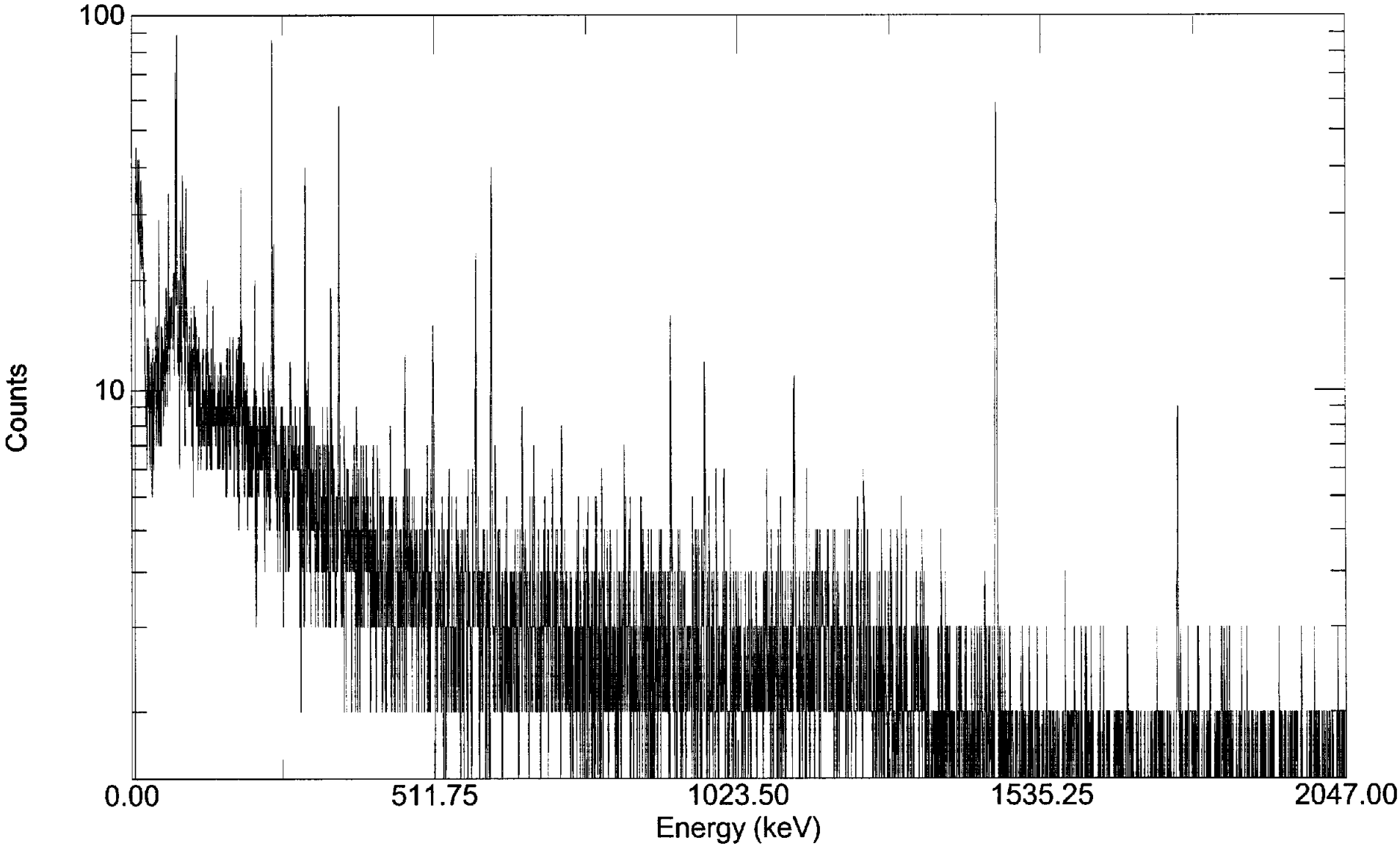
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKH91AC

7360294_KEKH91AC_F7L200271-012



Acquired: 26-Dec-2007 7:00:24 PM
File: C:\User\spectra\KEKH91AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.82 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,078

Sample Description: 7360294_KEKJC1AC_F7L200271-013

Spectrum Filename: KEKJC1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:00:50PM		
Live Time:	1800.00	Real Time:	1816.18
Dead Time:	0.89 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 1.0000

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.27	74.65	256.00	196.00	0.109	17.19	0.948	BI-207	
307.29	77.16	262.83	235.17	0.131	15.51	0.932	PB-214	
347.06	87.09	222.34	30.66	0.017	71.12	0.864		s
371.16	93.10	302.00	0.00	0.000	2457.64	0.912		s
1179.85	295.09	130.94	41.06	0.023	42.39	0.658		sD
1406.57	351.73	243.16	36.84	0.020	62.09	1.503		s
2436.46	609.06	124.63	69.37	0.039	25.73	1.300	BI-214	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.49	46.74	133.95	17.80	0.010	41.33	0.864	s
AM-241	1	235.29	59.17	211.28	-3.60	-0.002	573.53	0.878	s
TH-234	1	252.36	63.44	256.92	17.47	0.010	53.38	0.882	s
EU-155	1	347.78	87.27	258.80	69.84	0.039	34.70	0.906	s
TH-234	1	370.37	92.91	277.58	54.13	0.030	30.07	0.912	s
AC-228	1	372.14	93.35	207.70	37.44	0.021	3.52	0.913	s D
U-235	1	372.14	93.35	207.70	-3.14	-0.002	-448.95	0.913	s D
EU-155	1	418.56	104.94	136.34	26.00	0.014	66.46	0.925	
EU-154	1	482.52	120.92	72.58	4.59	0.003	266.44	0.943	
EU-152	1	486.67	121.95	122.32	15.12	0.008	106.58	0.942	
Pa-234	1	522.30	130.85	147.68	5.98	0.003	290.15	0.952	s
U-235	1	572.49	143.39	157.81	-5.77	-0.003	489.67	0.964	s
U-235	1	651.84	163.20	149.80	-13.93	-0.008	127.15	0.984	
U-235	1	820.50	205.33	120.95	1.46	0.001	1069.74	1.027	
PB-212	1	955.17	238.97	129.25	451.75	0.251	7.15	1.000	s
RA-224	1	960.27	240.24	466.05	-77.56	-0.043	40.97	1.062	s
PB-214	1	960.43	240.28	256.86	-42.61	-0.024	55.35	1.063	s
TL-208	1	1107.02	276.90	73.01	3.37	0.002	362.22	1.098	
I-131	1	1129.33	282.47	41.72	1.11	0.001	828.67	1.105	s
PB-214	1	1179.83	295.09	74.99	74.95	0.042	18.83	1.116	s D
PB-212	1	1199.08	299.90	84.31	21.27	0.012	64.78	1.121	s
AC-228	1	1352.37	338.19	76.12	45.60	0.025	29.30	1.158	
EU-152	1	1375.42	343.95	54.04	3.56	0.002	297.06	1.164	s
PB-214	1	1406.77	351.78	75.75	169.96	0.094	9.86	1.171	s
I-131	1	1460.35	365.17	57.59	7.34	0.004	150.83	1.184	s
BE-7	1	1912.58	478.15	28.82	1.49	0.001	514.51	1.292	s
CS-134	1	2252.08	562.98	19.45	4.78	0.003	138.22	1.372	s
CS-134	1	2277.45	569.32	23.24	-2.09	-0.001	-46.72	1.378	s D
Pa-234	1	2278.04	569.47	28.15	1.04	0.001	114.62	1.378	s D
TL-208	1	2331.38	582.80	24.96	136.04	0.076	11.14	1.235	s
CS-134	1	2421.04	605.20	84.33	-12.70	-0.007	106.05	1.410	s
BI-214	1	2436.97	609.18	52.04	108.57	0.060	12.42	1.415	s
I-131	1	2550.20	637.48	33.80	-4.07	-0.002	208.06	1.440	s
CS-137	1	2646.70	661.60	34.17	11.32	0.006	78.82	1.462	s
EU-154	1	2893.82	723.36	122.07	0.00	0.000	1562.51	1.518	s
BI-212	1	2909.51	727.28	33.76	14.65	0.008	61.88	1.521	s
PA-234M	1	3065.71	766.32	31.06	3.05	0.002	264.43	1.556	s
EU-152	1	3116.03	778.89	22.53	1.76	0.001	388.61	1.567	s
BI-212	1	3142.76	785.58	24.59	5.43	0.003	135.98	1.572	s
CS-134	1	3178.77	794.58	23.75	7.22	0.004	102.49	1.582	s
CS-134	1	3211.59	802.78	38.13	-0.18	0.000	4758.36	1.587	s
TL-208	1	3440.38	859.97	28.41	6.04	0.003	131.21	1.638	s
EU-154	1	3488.87	872.09	31.61	-4.37	-0.002	187.98	1.649	s
Pa-234	1	3506.50	876.50	20.00	-0.96	-0.001	668.25	1.655	s
Pa-234	1	3535.77	883.81	20.65	-1.32	-0.001	493.45	1.657	s

AC-228	1	3643.65	910.78	29.65	56.64	0.031	18.13	1.681	s
Pa-234	1	3784.61	946.02	17.54	0.00	0.000	592.35	1.710	s
EU-152	1	3855.85	963.83	36.39	5.52	0.003	160.37	1.726	s
AC-228	1	3873.45	968.23	21.10	26.64	0.015	31.15	1.730	s
EU-154	1	3980.43	994.98	21.68	-0.14	0.000	4823.65	1.753	s
PA-234M	1	4014.26	1003.43	20.10	-0.08	0.000	7583.31	1.756	s
EU-154	1	4016.05	1003.88	22.26	1.65	0.001	411.69	1.760	s
EU-152	1	4449.96	1112.37	21.95	-2.39	-0.001	285.07	1.847	s
BI-214	1	4477.78	1119.33	27.89	14.15	0.008	51.26	1.854	s
CO-60	1	4691.37	1172.74	33.21	-4.13	-0.002	203.27	1.896	s
EU-154	1	5099.14	1274.71	31.56	-2.97	-0.002	273.63	1.975	s
CO-60	1	5331.30	1332.77	14.68	-0.64	0.000	860.65	2.019	s
EU-152	1	5632.07	1408.00	-8.57	0.00	0.000	100.00	2.076	s
K-40	1	5840.66	1460.18	34.22	312.23	0.173	5.94	2.115	
BI-214	1	7055.56	1764.14	9.44	9.43	0.005	43.21	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
AC-228	N	1	8.314E+000	911.07	8.935E+000		(	P	4.430E+000G			2.1E+003	29.00
			8.314E+000	968.97	7.305E+000	?	(		6.613E+000G			2.1E+003	17.46
			8.314E+000	338.32	8.282E+000		(	P	7.877E+000G			2.1E+003	12.01
			8.314E+000	93.35	8.314E+000	+		E	1.552E+001X		A	2.1E+003	5.56
BI-214	N	1	8.022E+000	609.31	8.022E+000		(	P	2.684E+000G			5.8E+005	46.09
			8.022E+000	1120.29	5.003E+000	%		P	9.662E+000G			5.8E+005	15.10
			8.022E+000	1764.49	4.754E+000	%		P	8.588E+000G			5.8E+005	15.40
U-235	N	1	-6.684E-001	143.79	-6.684E-001	&	(	P	7.098E+000G			2.6E+011	10.96
			-6.684E-001	205.33	4.425E-001	%			1.637E+001G			2.6E+011	5.01
			-6.684E-001	163.38	-3.667E+000	&			1.573E+001G			2.6E+011	5.08
			-6.684E-001	93.35	-6.684E-001	!		E	1.485E+001X			2.6E+011	5.81
			5.441E+000	92.59	1.199E+001	%		P	1.780E+001G			1.6E+012	5.58
TH-234	N	1	5.441E+000	63.29	5.441E+000	*	(	P	2.410E+001G			1.6E+012	4.82
TL-208	F N	1	5.307E+000	583.02	5.307E+000	*	(	P	1.014E+000G			7.0E+002	84.50
			5.307E+000	277.28	1.003E+000	%			1.264E+001G			7.0E+002	6.31
			5.307E+000	860.56	2.134E+000	%			9.731E+000G			7.0E+002	12.42
PA-234	N	1	-4.905E-001	1001.00	-4.905E-001	%	(		1.383E+002G			1.6E+012	.84
			-4.905E-001	766.41	4.185E+001	&			3.932E+002G			1.6E+012	.29
CS-137	T F I	1	4.810E-001	661.66	4.810E-001	%	(		1.272E+000G			1.1E+004	85.21
			4.807E+000	785.51	2.027E+001	%			9.632E+001G			7.0E+002	1.10
BI-212	N	1	4.807E+000	727.33	4.807E+000	%	(		9.775E+000G			7.0E+002	11.82
CS-134	T F I	1	-4.405E-001	604.71	-4.405E-001	%	(		1.579E+000G			7.5E+002	97.62
			-4.405E-001	795.87	3.496E-001	%			1.231E+000G			7.5E+002	85.53
			-4.405E-001	569.32	-4.405E-001	&			5.302E+000G			7.5E+002	15.38
			-4.405E-001	801.95	-8.809E-002	&			1.509E+001G			7.5E+002	8.69
			-4.405E-001	563.24	1.840E+000	&			8.950E+000G			7.5E+002	8.35
Pa-234	N	1	4.113E-001	131.29	4.113E-001	%	(		4.079E+000G			1.6E+012	18.00
			4.113E-001	569.47	4.113E-001	&			1.084E+001G			1.6E+012	8.20
			4.113E-001	946.02	0.000E+000	%			7.803E+000G			1.6E+012	13.40
			4.113E-001	883.24	-6.163E-001	%			1.113E+001G			1.6E+012	9.60
			4.113E-001	880.53	-7.121E-001	%			1.751E+001G			1.6E+012	6.00
BE-7	N P C	1	4.034E-001	477.60	4.034E-001	%	(		7.483E+000G			5.3E+001	10.52
CO-60	T F	1	-3.892E-002	1332.50	-3.892E-002	%	(		1.258E+000G			1.9E+003	99.98
			-3.892E-002	1173.24	-2.289E-001	%			1.637E+000G			1.9E+003	99.90
RA-224	N	1	-3.204E+001	240.99	-3.204E+001	&	(		4.268E+001G			7.0E+002	4.10
			2.968E-001	1112.07	-9.289E-001	%			9.553E+000G			4.9E+003	13.64
			2.968E-001	1408.00	0.000E+000	%			2.244E+000G			4.9E+003	21.00
EU-152	T F	1	2.968E-001	344.29	2.968E-001	&	(		3.084E+000G			4.9E+003	26.50
			2.968E-001	121.78	6.457E-001	%			2.316E+000G			4.9E+003	28.58
			2.968E-001	778.92	5.549E-001	%			7.824E+000G			4.9E+003	12.94
			2.968E-001	964.11	1.802E+000	%			1.007E+001G			4.9E+003	14.61
EU-155	T F I	1	2.306E+000	105.31	1.488E+000	%	(		3.270E+000G			1.8E+003	21.20
			2.306E+000	86.54	2.870E+000		(		3.192E+000G			1.8E+003	30.70
I-131	T F I	1	2.075E-001	364.48	2.075E-001	*	(		1.076E+000G			8.0E+000	81.70

			2.075E-001	284.30	3.454E-001	%			1.021E+001G	8.0E+000	6.14
			2.075E-001	636.97	-1.997E+000	&			1.463E+001G	8.0E+000	7.17
K-40	N	1	1.929E+002	1460.83	1.929E+002		(	P	1.852E+001G	4.7E+011	10.67
PB-212	N	1	1.755E+001	238.63	1.755E+001	*	(	P	2.163E+000G	7.0E+002	43.30
			1.755E+001	300.03	1.291E+001	%			2.761E+001G	7.0E+002	3.28
AM-241 T		1	-1.591E-001	59.54	-1.591E-001	&	(		3.114E+000G	1.6E+005	35.90
EU-154 T F I		1	-1.581E+000	873.23	-1.581E+000	%	(		1.045E+001G	3.1E+003	12.27
			-1.581E+000	123.10	1.376E-001	&			1.271E+000G	3.1E+003	40.79
			-1.581E+000	1274.54	-4.983E-001	%			4.846E+000G	3.1E+003	35.19
			-1.581E+000	723.36	0.000E+000	&			1.035E+001G	3.1E+003	20.22
			-1.581E+000	1004.77	4.508E-001	&			6.746E+000G	3.1E+003	18.01
			-1.581E+000	996.33	-6.306E-002	%			1.126E+001G	3.1E+003	10.60
PB-210	N	1	1.031E+001	46.54	1.031E+001	%	(	P	3.282E+001G	8.1E+003	4.25
PB-214	N	1	1.016E+001	351.93	1.016E+001		(	P	2.588E+000G	5.8E+005	37.60
			1.016E+001	295.09	7.634E+000	-		P E	4.386E+000G	5.8E+005	19.30
			1.016E+001	242.00	-9.742E+000	%			1.770E+001G	5.8E+005	7.43

Analysis Codes:

% = Peak fails sensitivity test

? = Peak is too narrow

- = Peak activity lower than counting uncertainty range

= = Peak outside analysis energy range

(= This peak is used in the nuclide activity average

P = Peakbackround subtraction

* = Peak is too wide, but only one peak in library

@ = Peak is too wide at FW25M, but OK at FWHM

A = Derived Average Activity

E = Energy Duplication

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	4.034E-001	4.049E-001	514.51	514.52	7.483E+000
K-40	<	1.929E+002	1.929E+002	6.16	6.82	1.852E+001
CO-60	<	-3.892E-002	-3.892E-002	860.65	860.65	1.258E+000
I-131	<	2.075E-001	2.128E-001	150.83	150.85	1.076E+000
CS-134	<	-4.405E-001	-4.407E-001	106.05	106.09	1.579E+000
EU-154	<	-1.581E+000	-1.581E+000	187.98	188.01	1.045E+001
CS-137	<	4.810E-001	4.810E-001	78.82	78.87	1.272E+000
EU-152	<	2.968E-001	2.968E-001	297.06	297.08	3.084E+000
EU-155	<	2.306E+000	2.306E+000	34.70	34.86	3.270E+000
TL-208	#	5.307E+000	5.309E+000	11.79	12.14	1.014E+000
RA-224	<	-3.204E+001	-3.205E+001	40.97	41.08	4.268E+001
BI-214	<	8.022E+000	8.022E+000	13.21	13.52	2.684E+000
AC-228	<	8.314E+000	8.315E+000	15.87	16.13	4.430E+000
PA-234M	<	-4.905E-001	-4.905E-001	7,583.31	7,583.31	1.383E+002
U-235	<	-6.684E-001	-6.684E-001	671.66	671.67	7.098E+000
PB-210	<	1.031E+001	1.031E+001	91.30	91.39	3.282E+001
PB-212	#	1.755E+001	1.755E+001	7.48	8.05	2.163E+000
PB-214	<	1.016E+001	1.016E+001	10.40	10.79	2.588E+000
BI-212	<	4.807E+000	4.808E+000	61.88	61.95	9.775E+000
Pa-234	<	4.113E-001	4.113E-001	290.15	290.16	4.079E+000
TH-234	<	5.441E+000	5.441E+000	128.81	128.86	2.410E+001
AM-241	<	-1.591E-001	-1.591E-001	573.53	573.54	3.114E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 22.86 Bq/sample

Analyzed by: _____

403605

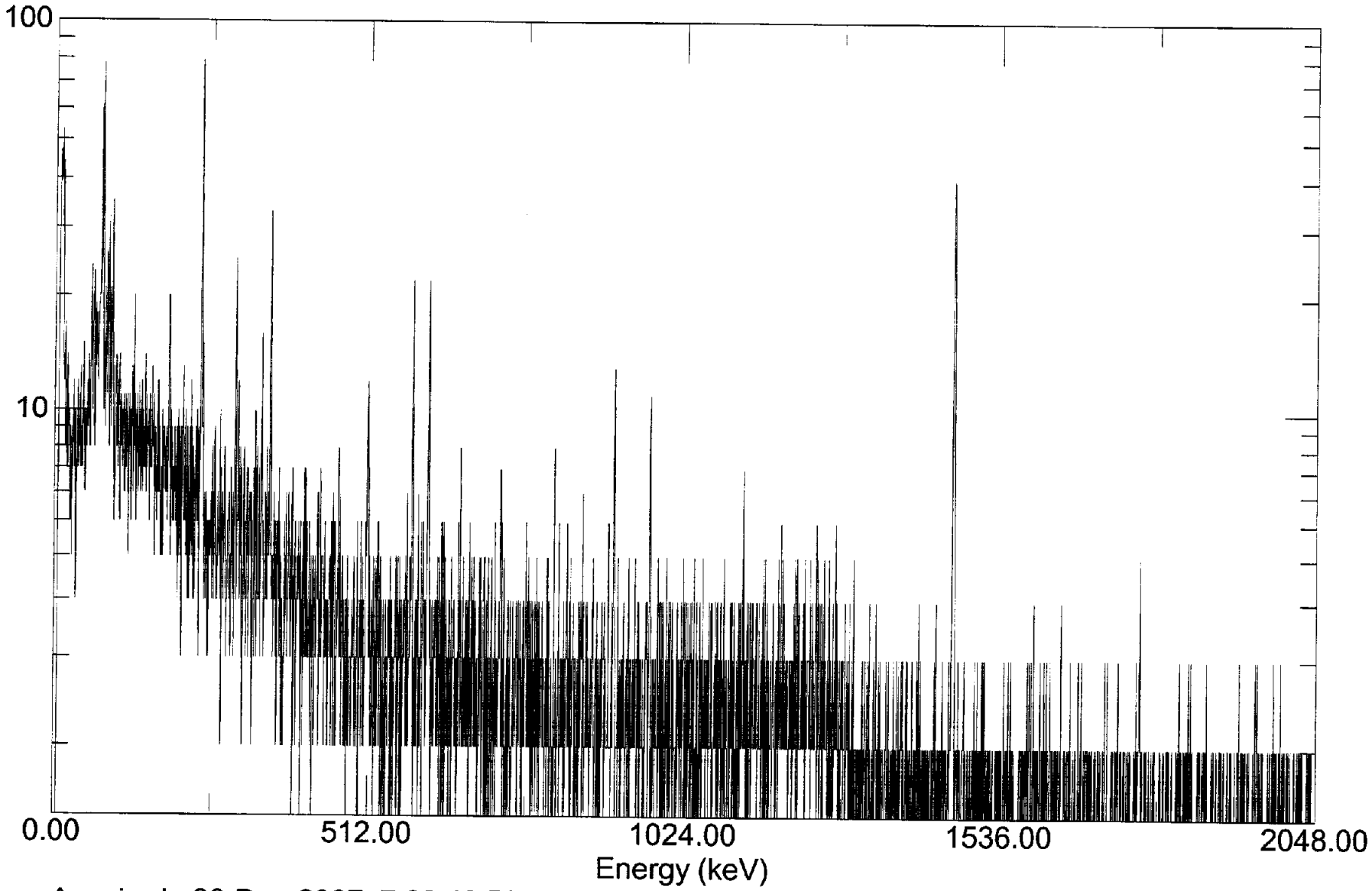
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKJC1AC

7360294_KEKJC1AC_F7L200271-013



Acquired: 26-Dec-2007 7:00:49 PM
File: C:\User\spectra\KEKJC1AC.spc
Detector: #0 Ge 3 SN/155

Real Time: 1816.18 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,077

Sample Description: 7360294_KEKJE1AC_F7L200271-014

Spectrum Filename: KEKJE1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:01:15PM		
Live Time:	1800.00	Real Time:	1804.08
Dead Time:	0.23 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.1616

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
297.97	74.54	144.00	117.00	0.065	21.71	0.635	PB-214	s
308.50	77.17	116.00	159.00	0.088	14.16	0.672	PB-214	
349.30	87.38	95.00	66.00	0.037	24.24	0.703	PB-214	
743.58	185.98	31.17	77.83	0.043	16.56	0.403	RA-226	s
1351.68	338.03	78.28	59.72	0.033	24.63	0.589	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.16	46.33	107.14	4.66	0.003	55.26	0.819	s
AM-241	1	239.28	59.86	145.83	-8.07	-0.004	214.55	0.830	s
TH-234	1	252.20	63.09	161.82	4.97	0.003	84.20	0.834	s
EU-155	1	345.96	86.54	187.04	0.00	0.000	1934.14	0.854	
TH-234	1	370.14	92.59	206.01	-22.84	-0.013	1566.97	0.859	s
AC-228	1	373.18	93.35	109.09	55.31	0.031	4.62	0.860	s D
U-235	1	373.18	93.35	109.09	5.85	0.003	37.96	0.860	s D
EU-155	1	423.55	105.95	98.41	25.30	0.014	58.91	0.871	s
EU-152	1	486.42	121.67	79.28	8.18	0.005	157.93	0.885	s
EU-154	1	491.45	122.93	83.15	-5.10	-0.003	256.80	0.886	s
Pa-234	1	525.50	131.44	145.23	-14.00	-0.008	124.64	0.894	s
U-235	1	576.25	144.14	100.89	11.04	0.006	132.11	0.904	s
U-235	1	653.31	163.41	66.30	2.69	0.001	432.03	0.922	s
U-235	1	822.66	205.75	63.25	8.91	0.005	130.58	0.958	s
PB-212	1	953.56	238.49	47.29	283.71	0.158	6.89	0.841	
RA-224	1	958.88	239.82	355.11	-99.15	-0.055	28.69	0.988	
PB-214	1	967.01	241.85	45.33	58.67	0.033	25.99	0.637	s
TL-208	1	1107.65	277.01	19.50	27.50	0.015	34.35	0.360	s
I-131	1	1138.24	284.66	54.87	-4.17	-0.002	256.10	1.025	s
PB-214	1	1180.36	295.19	38.21	105.79	0.059	15.69	0.995	s
PB-212	1	1198.65	299.77	43.38	24.01	0.013	43.84	1.039	
AC-228	1	1351.78	338.05	42.39	42.28	0.023	26.66	1.071	s
EU-152	1	1374.81	343.81	36.13	-4.18	-0.002	209.29	1.076	s
PB-214	1	1406.72	351.79	18.58	128.42	0.071	10.35	1.104	
I-131	1	1446.66	361.77	19.24	-0.10	0.000	6414.07	1.092	s
BE-7	1	1914.73	478.79	26.95	-1.06	-0.001	700.84	1.185	s
CS-134	1	2252.60	563.24	26.34	0.00	0.000	725.85	1.254	s
CS-134	1	2276.94	569.32	32.30	0.00	0.000	0.00	1.259	s D
Pa-234	1	2277.54	569.47	30.59	-2.08	-0.001	-157.83	1.259	s D
TL-208	1	2329.57	582.48	7.18	100.82	0.056	11.20	1.293	s
CS-134	1	2418.53	604.71	164.48	0.00	0.000	1813.75	1.286	s
BI-214	1	2435.74	609.01	10.25	100.75	0.056	11.00	1.280	
I-131	1	2542.76	635.76	22.47	-2.85	-0.002	242.89	1.312	s
CS-137	1	2645.54	661.44	25.42	6.24	0.003	121.10	1.331	s
EU-154	1	2898.80	724.73	30.74	-4.18	-0.002	193.78	1.378	s
BI-212	1	2908.33	727.12	16.57	7.93	0.004	80.78	1.381	s
PA-234M	1	3062.05	765.53	19.77	0.05	0.000	12060.91	1.411	s
EU-152	1	3115.27	778.83	21.28	0.42	0.000	1562.34	1.420	s
BI-212	1	3145.00	786.26	23.60	-0.01	0.000	76146.75	1.425	s
CS-134	1	3179.10	794.78	18.11	1.18	0.001	517.27	1.433	s
CS-134	1	3210.86	802.71	9.62	4.40	0.002	110.61	1.437	s
TL-208	1	3432.99	858.21	14.94	1.09	0.001	509.37	1.481	s
EU-154	1	3489.39	872.30	15.31	0.33	0.000	1679.09	1.490	s
Pa-234	1	3528.53	882.08	19.82	-3.15	-0.002	207.42	1.495	s
Pa-234	1	3536.50	884.08	13.12	3.30	0.002	164.76	1.497	s

AC-228	1	3643.17	910.73	17.51	64.91	0.036	15.40	1.518	
Pa-234	1	3783.16	945.70	16.76	1.91	0.001	310.88	1.543	s
EU-152	1	3857.77	964.34	27.38	5.12	0.003	151.28	1.556	s
AC-228	1	3874.43	968.50	25.66	20.02	0.011	42.19	1.559	s
EU-154	1	3982.90	995.60	17.87	-2.36	-0.001	261.39	1.579	s
PA-234M	1	4007.06	1001.63	21.07	-1.09	-0.001	602.99	1.582	s
EU-154	1	4019.86	1004.83	16.90	3.57	0.002	171.03	1.585	s
EU-152	1	4456.80	1113.97	15.77	-3.15	-0.002	187.02	1.659	s
BI-214	1	4481.41	1120.12	4.65	32.35	0.018	16.44	0.581	s
CO-60	1	4689.19	1172.02	19.96	-1.02	-0.001	628.21	1.701	s
EU-154	1	5096.45	1273.72	14.34	1.78	0.001	310.48	1.768	s
CO-60	1	5333.91	1333.02	5.89	-1.19	-0.001	302.51	1.806	s
EU-152	1	5634.21	1408.00	18.59	0.00	0.000	609.83	1.854	s
K-40	1	5844.37	1460.47	2.83	156.17	0.087	7.93	1.581	
BI-214	1	7057.53	1763.29	4.73	16.39	0.009	31.01	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Code		Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Analysis Code		MDA Value Becquerels	Code	Comments	
TL-208	F	N	1	6.066E+000	583.02	6.066E+000	*	(	P	9.146E-001G		7.0E+002	84.50
				6.066E+000	277.28	1.132E+001	+			9.588E+000G		7.0E+002	6.31
				6.066E+000	860.56	6.224E-001	%			1.181E+001G		7.0E+002	12.42
RA-224		N	1	-5.568E+001	240.99	-5.568E+001		(		5.084E+001G		7.0E+002	4.10
				-4.982E-001	121.78	4.610E-001	%			2.492E+000G		4.9E+003	28.58
				-4.982E-001	778.92	2.111E-001	%			1.218E+001G		4.9E+003	12.94
				-4.982E-001	964.11	2.723E+000	%			1.443E+001G		4.9E+003	14.61
				-4.982E-001	1112.07	-2.021E+000	%			1.362E+001G		4.9E+003	13.64
				-4.982E-001	1408.00	0.000E+000	%			1.162E+001G		4.9E+003	21.00
EU-152	T F		1	-4.982E-001	344.29	-4.982E-001	%	(		3.664E+000G		4.9E+003	26.50
AM-241	T		1	-4.954E-001	59.54	-4.954E-001	%	(		3.621E+000G		1.6E+005	35.90
BE-7		N P C	1	-4.284E-001	477.60	-4.284E-001	%	(		1.090E+001G		5.3E+001	10.52
CS-137	T F I		1	4.152E-001	661.66	4.152E-001	%	(		1.744E+000G		1.1E+004	85.21
BI-212		N	1	4.125E+000	727.33	4.125E+000	%	(		1.127E+001G		7.0E+002	11.82
				4.125E+000	785.51	-5.379E-002	%			1.511E+002G		7.0E+002	1.10
I-131	T F I		1	-3.947E-003	364.48	-3.947E-003	%	(		9.436E-001G		8.0E+000	81.70
				-3.947E-003	284.30	-1.803E+000	%			1.611E+001G		8.0E+000	6.14
				-3.947E-003	636.97	-2.179E+000	%			1.899E+001G		8.0E+000	7.17
PB-210		N	1	3.859E+000	46.54	3.859E+000	*	(	P	4.222E+001G		8.1E+003	4.25
TH-234		N	1	2.150E+000	63.29	2.150E+000	%	(	P	2.682E+001G		1.6E+012	4.82
				2.150E+000	92.59	-6.849E+000	%		P	2.087E+001G		1.6E+012	5.58
EU-154	T F I		1	1.934E-001	873.23	1.934E-001	%	(		1.222E+001G		3.1E+003	12.27
				1.934E-001	123.10	-2.016E-001	%			1.787E+000G		3.1E+003	40.79
				1.934E-001	1274.54	4.961E-001	%			5.682E+000G		3.1E+003	35.19
				1.934E-001	723.36	-1.265E+000	%			8.636E+000G		3.1E+003	20.22
				1.934E-001	1004.77	1.597E+000	%			9.769E+000G		3.1E+003	18.01
				1.934E-001	996.33	-1.780E+000	%			1.689E+001G		3.1E+003	10.60
EU-155	T F I		1	1.934E+000	105.31	1.934E+000	%	(		3.741E+000G		1.8E+003	21.20
				1.934E+000	86.54	0.000E+000	&			3.721E+000G		1.8E+003	30.70
				1.681E+000	205.33	3.612E+000	%			1.612E+001G		2.6E+011	5.01
				1.681E+000	163.38	9.328E-001	%			1.409E+001G		2.6E+011	5.08
				1.681E+000	93.35	1.681E+000	!		E	1.476E+001X		2.6E+011	5.81
U-235		N	1	1.681E+000	143.79	1.681E+000	%	(		7.536E+000G		2.6E+011	10.96
AC-228		N	1	1.660E+001	911.07	1.660E+001		(		5.682E+000G		2.1E+003	29.00
				1.660E+001	968.97	8.953E+000	%			1.177E+001G		2.1E+003	17.46
				1.660E+001	338.32	1.095E+001	-			8.558E+000G		2.1E+003	12.01
				1.660E+001	93.35	1.660E+001	!		E	1.543E+001X	A	2.1E+003	5.56
K-40		N	1	1.618E+002	1460.83	1.618E+002		(	P	1.093E+001G		4.7E+011	10.67
PB-212		N	1	1.496E+001	238.63	1.496E+001		(	P	1.833E+000G		7.0E+002	43.30
				1.496E+001	300.03	2.041E+001	%			2.839E+001G		7.0E+002	3.28
Pa-234		N	1	-1.266E+000	131.29	-1.266E+000	&	(		5.325E+000G		1.6E+012	18.00
				-1.266E+000	569.47	-1.266E+000	%			1.730E+001G		1.6E+012	8.20
				-1.266E+000	946.02	1.094E+000	&			1.244E+001G		1.6E+012	13.40
				-1.266E+000	883.24	2.485E+000	&			1.476E+001G		1.6E+012	9.60

				-1.266E+000	880.53	-3.790E+000	%			2.819E+001G	1.6E+012	6.00
CO-60	T F		1	-1.215E-001	1332.50	-1.215E-001	%	(		1.431E+000G	1.9E+003	99.98
				-1.215E-001	1173.24	-9.336E-002	%			2.157E+000G	1.9E+003	99.90
BI-214		N	1	1.215E+001	609.31	1.155E+001		(	P	2.021E+000G	5.8E+005	46.09
				1.215E+001	1120.29	1.888E+001	+		P	7.441E+000G	5.8E+005	15.10
				1.215E+001	1764.49	1.397E+001	?	(		1.095E+001G	5.8E+005	15.40
				1.101E+001	295.09	1.505E+001	+		P	4.485E+000G	5.8E+005	19.30
				1.101E+001	242.00	1.824E+001	+			1.060E+001G	5.8E+005	7.43
PB-214		N	1	1.101E+001	351.93	1.101E+001		(	P	1.955E+000G	5.8E+005	37.60
PA-234		N	1	-1.045E+001	1001.00	-1.045E+001	%	(		2.310E+002G	1.6E+012	.84
				-1.045E+001	766.41	1.140E+000	&			5.118E+002G	1.6E+012	.29
CS-134	T F I		1	0.000E+000	604.71	0.000E+000	%	(		3.359E+000G	7.5E+002	97.62
				0.000E+000	795.87	9.162E-002	%			1.747E+000G	7.5E+002	85.53
				0.000E+000	569.32	0.000E+000	%			9.452E+000G	7.5E+002	15.38
				0.000E+000	801.95	3.374E+000	&			1.318E+001G	7.5E+002	8.69
				0.000E+000	563.24	0.000E+000	%			1.573E+001G	7.5E+002	8.35

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-4.284E-001	-4.301E-001	700.84	700.85	1.090E+001
K-40		1.618E+002	1.618E+002	8.07	8.59	1.093E+001
CO-60	<	-1.215E-001	-1.215E-001	302.51	302.53	1.431E+000
I-131	<	-3.947E-003	-4.048E-003	6,414.07	6,414.07	9.436E-001
EU-154	<	1.934E-001	1.934E-001	1,679.09	1,679.09	1.222E+001
CS-134	<			1,813.75	1,813.76	3.359E+000
CS-137	<	4.152E-001	4.152E-001	121.10	121.13	1.744E+000
EU-152	<	-4.982E-001	-4.982E-001	209.29	209.31	3.664E+000
EU-155	<	1.934E+000	1.934E+000	58.91	59.00	3.741E+000
TL-208	#	6.066E+000	6.067E+000	11.44	11.80	9.146E-001
BI-212	<	4.125E+000	4.127E+000	80.78	80.83	1.127E+001
BI-214		1.215E+001	1.215E+001	11.58	11.93	2.021E+000
AC-228	<	1.660E+001	1.661E+001	15.40	15.67	5.682E+000
Pa-234	<	-1.266E+000	-1.266E+000	124.64	124.67	5.325E+000
AM-241	<	-4.954E-001	-4.954E-001	214.55	214.58	3.621E+000
RA-224	<	-5.568E+001	-5.570E+001	28.69	28.85	5.084E+001
PB-210	<	3.859E+000	3.859E+000	302.22	302.25	4.222E+001
PB-212		1.496E+001	1.497E+001	7.11	7.71	1.833E+000
PB-214		1.101E+001	1.101E+001	10.77	11.15	1.955E+000
TH-234	<	2.150E+000	2.150E+000	355.75	355.77	2.682E+001
PA-234M	<	-1.045E+001	-1.045E+001	602.99	602.99	2.310E+002
U-235	<	1.681E+000	1.681E+000	132.11	132.14	7.536E+000

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 205.99 Bq/sample

Analyzed by: _____

403605

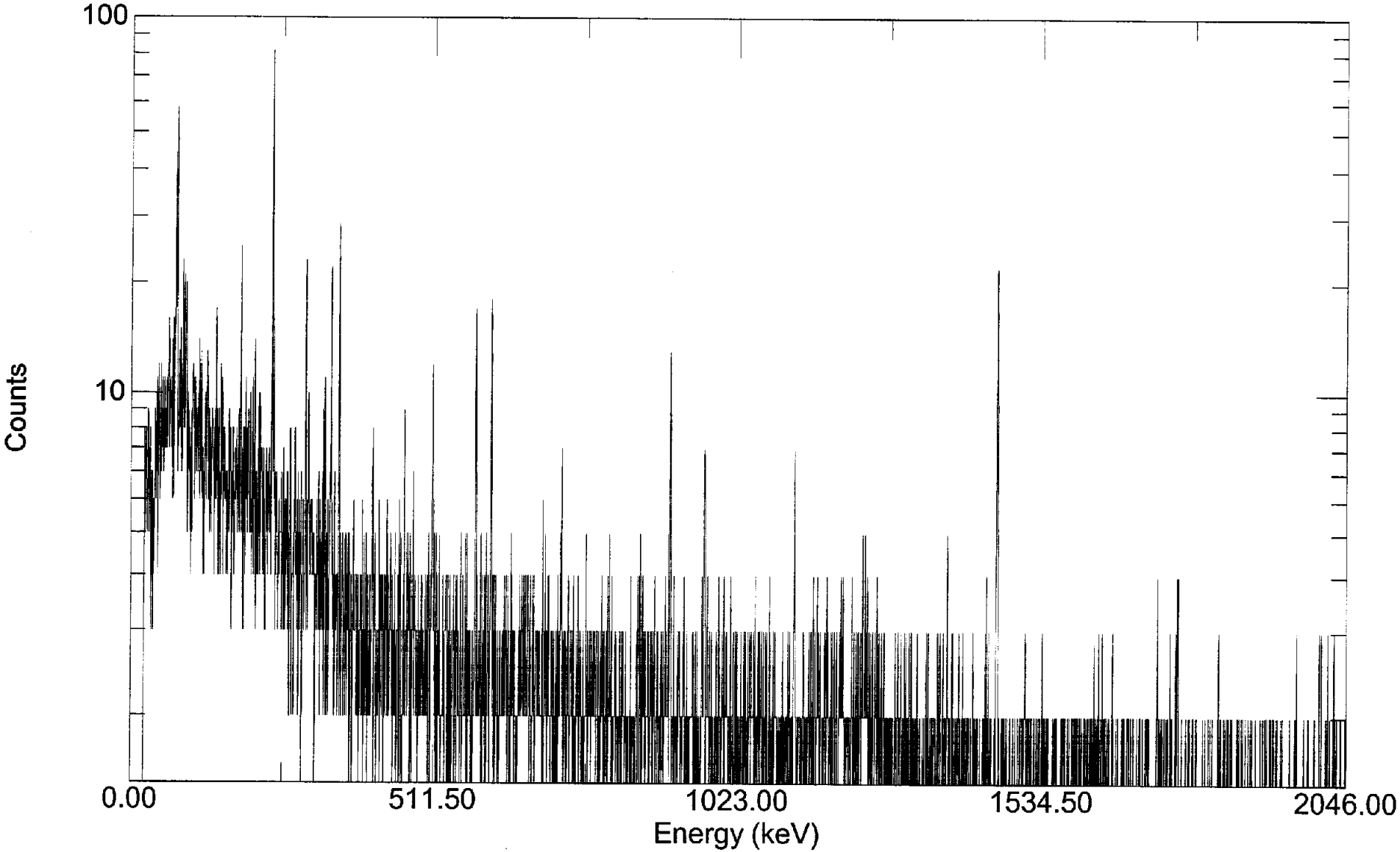
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KEKJE1AC

7360294_KEKJE1AC_F7L200271-014



Acquired: 26-Dec-2007 7:01:15 PM
File: C:\User\spectra\KEKJE1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1804.08 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,080

Sample Description: 7360294_KEKJG1AC_F7L200271-015

Spectrum Filename: KEKJG1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:01:46PM		
Live Time:	1800.00	Real Time:	1853.04
Dead Time:	2.86 %		
Detector ID:	5		

Detector System: Ge 5 SN/157

Calibration

Description:	Ge5 TunaCanCal_74139-334_05_08_07		
Filename:	C:\User\Calibrations\Ge5 calibrations\Ge5 TunaCanCal_74139-334_05_08_07.Clb		
Energy Created:	28-Mar-2007 6:08:23PM	Efficiency Created:	08-May-2007 3:55:34PM
Zero Offset:	0.272 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.74 keV
Stop Channel:	8,000 for an energy of 2000.57 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge5 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.1487

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
184.64	46.40	104.54	6.46	0.004	227.34	0.821		
298.28	74.78	209.67	129.33	0.072	23.62	0.546	PB-214	s
307.60	77.11	142.50	238.50	0.133	11.38	0.782	PB-214	
347.38	87.05	162.48	29.52	0.016	63.77	1.400		s
358.31	89.78	68.33	59.67	0.033	26.07	1.192	PB-214	sM
614.02	153.66	42.00	34.00	0.019	38.80	0.646	XE-138	
1352.42	338.15	88.06	30.94	0.017	46.50	0.706		s
2044.41	511.08	26.67	101.33	0.056	17.26	0.778	TL-208	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.03	46.49	128.76	17.95	0.010	45.63	0.749	
AM-241	1	238.82	59.93	161.06	4.73	0.003	223.54	0.761	s
TH-234	1	251.74	63.16	188.33	66.67	0.037	35.13	0.704	s
EU-155	1	347.88	87.17	134.66	80.14	0.045	23.33	0.788	s
TH-234	1	369.76	92.64	134.86	115.14	0.064	16.97	0.892	s
AC-228	1	372.61	93.35	153.29	49.38	0.027	3.95	0.795	s D
U-235	1	372.61	93.35	153.29	9.08	0.005	23.04	0.795	s D
EU-155	1	421.46	105.55	113.76	20.73	0.012	76.02	0.808	
EU-152	1	485.33	121.51	115.25	-0.64	0.000	2391.76	0.824	s
EU-154	1	499.00	124.92	74.92	6.66	0.004	187.70	0.826	s
Pa-234	1	526.78	131.87	104.35	-3.87	-0.002	376.68	0.834	s
U-235	1	573.75	143.60	93.73	17.17	0.010	72.37	0.847	s
U-235	1	653.82	163.60	95.17	8.71	0.005	131.09	0.867	s
U-235	1	822.47	205.74	62.00	8.21	0.005	140.05	0.909	s
PB-212	1	954.30	238.68	91.15	289.85	0.161	8.95	0.885	
RA-224	1	960.16	240.14	364.86	-93.28	-0.052	30.75	0.944	
PB-214	1	966.95	241.84	41.17	87.83	0.049	16.82	1.247	s
TL-208	1	1108.18	277.12	12.00	32.00	0.018	25.77	0.253	s
I-131	1	1135.98	284.07	60.53	-6.64	-0.004	170.24	0.987	s
PB-214	1	1180.98	295.31	37.08	140.92	0.078	12.27	0.482	s
PB-212	1	1199.29	299.89	18.67	37.33	0.021	26.73	0.714	s
AC-228	1	1353.53	338.43	42.22	53.39	0.030	21.99	1.040	s
EU-152	1	1376.97	344.29	49.13	0.00	0.000	991.21	1.045	s
PB-214	1	1407.48	351.91	30.21	187.79	0.104	9.60	1.014	s
I-131	1	1458.00	364.54	40.88	-2.99	-0.002	307.53	1.065	s
BE-7	1	1906.82	476.69	16.14	5.38	0.003	113.96	1.173	s
CS-134	1	2261.06	565.22	25.07	0.27	0.000	2645.07	1.252	s
CS-134	1	2277.45	569.32	22.41	0.06	0.000	547.14	1.258	s D
Pa-234	1	2278.05	569.47	19.87	-0.58	0.000	-127.69	1.258	s D
TL-208	1	2331.72	582.89	3.75	101.25	0.056	9.76	0.571	s
CS-134	1	2422.02	605.45	33.14	0.38	0.000	2128.29	1.290	s
BI-214	1	2438.61	609.60	14.06	145.94	0.081	8.95	1.228	s
I-131	1	2548.36	637.03	17.64	1.03	0.001	584.43	1.319	s
CS-137	1	2646.25	661.50	34.69	-7.50	-0.004	610.80	1.342	s
EU-154	1	2891.12	722.71	40.71	-6.34	-0.004	147.76	1.397	s
BI-212	1	2910.26	727.49	32.57	10.11	0.006	85.83	1.400	s
PA-234M	1	3060.01	764.93	21.38	1.88	0.001	355.33	1.434	s
EU-152	1	3116.47	779.04	15.92	1.24	0.001	463.08	1.445	s
BI-212	1	3140.59	785.07	29.30	-2.46	-0.001	318.21	1.451	s
CS-134	1	3180.01	794.92	16.56	9.59	0.005	68.12	1.460	s
CS-134	1	3203.64	800.83	16.71	-0.44	0.000	1323.26	1.465	s
TL-208	1	3440.02	859.93	16.48	4.53	0.003	135.14	1.516	s
EU-154	1	3493.24	873.23	15.03	0.00	0.000	548.31	1.527	s
Pa-234	1	3523.25	880.73	21.06	-3.80	-0.002	178.41	1.533	s
Pa-234	1	3534.17	883.46	22.47	-1.55	-0.001	440.61	1.535	s
AC-228	1	3645.72	911.35	16.39	60.52	0.034	15.96	1.559	

Pa-234	1	3784.38	946.02	46.19	0.00	0.000	961.19	1.588	s
EU-152	1	3848.86	962.14	25.91	0.21	0.000	3466.54	1.603	s
AC-228	1	3879.58	969.82	25.03	11.14	0.006	70.20	1.607	s
EU-154	1	3984.79	996.13	16.48	0.94	0.001	616.61	1.630	s
PA-234M	1	4007.12	1001.71	20.51	-1.50	-0.001	433.45	1.633	s
EU-154	1	4018.03	1004.44	18.44	2.21	0.001	282.46	1.637	s
EU-152	1	4448.32	1112.04	23.01	-2.37	-0.001	293.70	1.723	s
BI-214	1	4481.97	1120.45	24.56	22.07	0.012	38.24	1.730	
CO-60	1	4693.52	1173.35	25.36	4.11	0.002	180.11	1.772	s
EU-154	1	5089.91	1272.49	16.37	-0.06	0.000	9938.92	1.850	s
CO-60	1	5331.40	1332.89	17.18	3.54	0.002	174.02	1.894	s
EU-152	1	5638.97	1409.82	14.86	0.09	0.000	5899.38	1.950	s
K-40	1	5844.17	1461.15	0.00	304.00	0.169	5.74	1.793	
BI-214	1	7059.21	1765.14	11.48	12.47	0.007	40.48	2.196	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code		Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels		Peak Code	Peak Comments	
TL-208	F	N	1	5.850E+000	583.02	5.850E+000	@	(	P	6.780E-001	G		7.0E+002	84.50
				5.850E+000	277.28	1.266E+001	+			7.459E+000	G		7.0E+002	6.31
				5.850E+000	860.56	2.470E+000	&			1.179E+001	G		7.0E+002	12.42
BI-212		N	1	5.038E+000	727.33	5.038E+000	%	(		1.461E+001	G		7.0E+002	11.82
				5.038E+000	785.51	-1.402E+001	&			1.595E+002	G		7.0E+002	1.10
RA-224		N	1	-5.037E+001	240.99	-5.037E+001		(		4.952E+001	G		7.0E+002	4.10
CS-137	T F I		1	-4.789E-001	661.66	-4.789E-001	%	(	P	1.926E+000	G		1.1E+004	85.21
CO-60	T F		1	3.418E-001	1332.50	3.418E-001	%	(		2.128E+000	G		1.9E+003	99.98
				3.418E-001	1173.24	3.582E-001	%			2.281E+000	G		1.9E+003	99.90
Pa-234		N	1	-3.390E-001	131.29	-3.390E-001	%	(		4.406E+000	G		1.6E+012	18.00
				-3.390E-001	569.47	-3.390E-001	&			1.370E+001	G		1.6E+012	8.20
				-3.390E-001	946.02	0.000E+000	%			1.876E+001	G		1.6E+012	13.40
				-3.390E-001	883.24	-1.115E+000	%			1.786E+001	G		1.6E+012	9.60
				-3.390E-001	880.53	-4.366E+000	%			2.770E+001	G		1.6E+012	6.00
TH-234		N	1	3.045E+001	63.29	2.701E+001	%	(	P	2.700E+001	G		1.6E+012	4.82
				3.045E+001	92.59	3.342E+001	*	(	P	1.649E+001	G		1.6E+012	5.58
K-40		N	1	2.972E+002	1460.83	2.972E+002		(		7.204E+000	G		4.7E+011	10.67
AM-241	T		1	2.693E-001	59.54	2.693E-001	%	(	P	3.519E+000	G		1.6E+005	35.90
U-235		N	1	2.527E+000	143.79	2.527E+000	*	(	P	7.038E+000	G		2.6E+011	10.96
				2.527E+000	205.33	3.203E+000	%			1.537E+001	G		2.6E+011	5.01
				2.527E+000	163.38	2.913E+000	&		P	1.611E+001	G		2.6E+011	5.08
				2.527E+000	93.35	2.527E+000	&			1.681E+001	X	E	2.6E+011	5.81
BE-7		N P C	1	2.096E+000	477.60	2.096E+000	&	(		8.339E+000	G		5.3E+001	10.52
CS-134	T F I		1	1.980E-002	604.71	1.980E-002	%	(		1.525E+000	G		7.5E+002	97.62
				1.980E-002	795.87	7.122E-001	%			1.609E+000	G		7.5E+002	85.53
				1.980E-002	569.32	1.980E-002	&			7.703E+000	G		7.5E+002	15.38
				1.980E-002	801.95	-3.234E-001	%			1.600E+001	G		7.5E+002	8.69
				1.980E-002	563.24	1.523E-001	%			1.478E+001	G		7.5E+002	8.35
PB-214		N	1	1.676E+001	351.93	1.547E+001	*	(	P	2.334E+000	G		5.8E+005	37.60
				1.676E+001	295.09	1.927E+001		(	P	4.251E+000	G		5.8E+005	19.30
				1.676E+001	242.00	2.626E+001	+			9.750E+000	G		5.8E+005	7.43
BI-214		N	1	1.606E+001	609.31	1.606E+001		(	P	2.221E+000	G		5.8E+005	46.09

				1.606E+001	1120.29	1.225E+001	-			1.433E+001G		5.8E+005	15.10
				1.606E+001	1764.49	9.942E+000	%		P	1.475E+001G		5.8E+005	15.40
EU-155	T F I		1	1.536E+000	105.31	1.536E+000	%	(		3.885E+000G		1.8E+003	21.20
				1.536E+000	86.54	4.335E+000	*			3.071E+000G	A	1.8E+003	30.70
PB-212		N	1	1.470E+001	238.63	1.470E+001		(	P	2.394E+000G		7.0E+002	43.30
				1.470E+001	300.03	3.049E+001	+			1.866E+001G		7.0E+002	3.28
AC-228		N	1	1.436E+001	911.16	1.480E+001		(		5.277E+000G		2.1E+003	29.00
				1.436E+001	968.97	4.758E+000	&			1.111E+001G		2.1E+003	17.46
				1.436E+001	338.32	1.328E+001	@	(		8.208E+000G		2.1E+003	12.01
				1.436E+001	93.35	1.436E+001	&		E	1.756E+001G	A	2.1E+003	5.56
PA-234M		N	1	-1.376E+001	1001.00	-1.376E+001	%	(		2.177E+002G		1.6E+012	.84
				-1.376E+001	766.41	3.937E+001	%			5.078E+002G		1.6E+012	.29
PB-210		N	1	1.318E+001	46.54	1.318E+001	%	(	P	4.082E+001G		8.1E+003	4.25
				-1.172E-001	636.97	7.578E-001	&			1.638E+001G		8.0E+000	7.17
I-131	T F I		1	-1.172E-001	364.48	-1.172E-001	%	(		1.273E+000G		8.0E+000	81.70
				-1.172E-001	284.30	-2.760E+000	%			1.620E+001G		8.0E+000	6.14
				0.000E+000	123.10	2.554E-001	&			1.649E+000G		3.1E+003	40.79
				0.000E+000	1274.54	-1.525E-002	%			5.707E+000G		3.1E+003	35.19
				0.000E+000	723.36	-1.839E+000	%			9.411E+000G		3.1E+003	20.22
				0.000E+000	1004.77	9.437E-001	%			9.686E+000G		3.1E+003	18.01
				0.000E+000	996.33	6.794E-001	%			1.556E+001G		3.1E+003	10.60
EU-152	T F		1	0.000E+000	344.29	0.000E+000	%	(		4.053E+000G		4.9E+003	26.50
				0.000E+000	121.78	-3.473E-002	&			2.882E+000G		4.9E+003	28.58
				0.000E+000	778.92	5.988E-001	%			1.027E+001G		4.9E+003	12.94
				0.000E+000	964.11	1.058E-001	%			1.344E+001G		4.9E+003	14.61
				0.000E+000	1112.07	-1.447E+000	%			1.531E+001G		4.9E+003	13.64
				0.000E+000	1408.00	4.457E-002	%			9.955E+000G		4.9E+003	21.00
EU-154	T F I		1	0.000E+000	873.23	0.000E+000	%	(		1.160E+001G		3.1E+003	12.27

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	#	1.980E-002	1.981E-002	2,128.29	2,128.29	1.525E+000
CS-137	#	-4.789E-001	-4.789E-001	1,119.93	1,119.94	1.926E+000
EU-155	#	1.536E+000	1.537E+000	76.02	76.09	3.885E+000
BE-7	#	2.096E+000	2.104E+000	113.96	113.99	8.339E+000
K-40		2.972E+002	2.972E+002	5.74	6.44	7.204E+000
CO-60	#	3.418E-001	3.419E-001	174.02	174.04	2.128E+000
I-131	#	-1.172E-001	-1.202E-001	307.53	307.54	1.273E+000
EU-152	#			991.21	991.22	4.053E+000
EU-154	#			548.31	548.31	1.160E+001
TL-208		5.850E+000	5.852E+000	10.12	10.52	6.780E-001
PB-210	#	1.318E+001	1.318E+001	89.52	89.60	4.082E+001
PB-212		1.470E+001	1.470E+001	9.16	9.63	2.394E+000
PB-214		1.676E+001	1.676E+001	7.96	8.46	2.334E+000
RA-224	#	-5.037E+001	-5.038E+001	30.75	30.90	4.952E+001
AC-228	#	1.436E+001	1.436E+001	13.59	13.89	5.277E+000
Pa-234	#	-3.390E-001	-3.390E-001	376.68	376.69	4.406E+000
U-235	#	2.527E+000	2.527E+000	82.81	82.86	7.038E+000
AM-241	#	2.693E-001	2.693E-001	379.95	379.97	3.519E+000
BI-212	#	5.038E+000	5.040E+000	85.83	85.88	1.461E+001
BI-214	#	1.606E+001	1.606E+001	9.37	9.80	2.221E+000
TH-234	#	3.045E+001	3.045E+001	20.34	20.68	2.700E+001
PA-234M	#	-1.376E+001	-1.376E+001	433.45	433.46	2.177E+002

= All peaks for activity calculation had bad shape

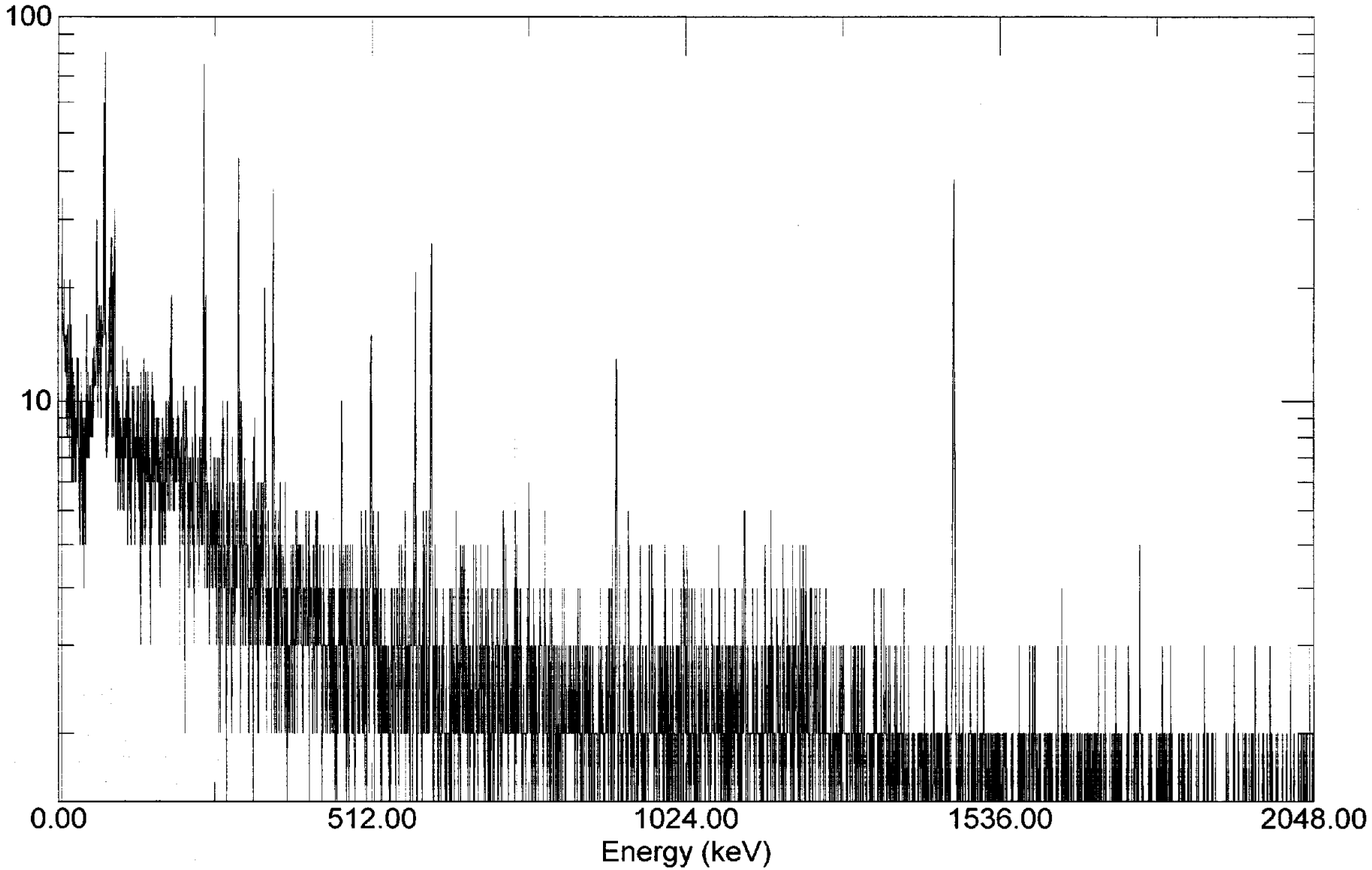
Total Activity (37.74 to 2,000.57 keV) 380.97 Bq/sample

Analyzed by: 403605

Laboratory: STL- St Louis

KEKJG1AC

7360294_KEKJG1AC_F7L200271-015



Acquired: 26-Dec-2007 7:01:46 PM
File: C:\User\spectra\KEKJG1AC.spc
Detector: #0 Ge 5 SN/157

Real Time: 1853.04 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,081

Sample Description: 7360294_KEKJJ1AC_F7L200271-016

Spectrum Filename: KEKJJ1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:02:17PM		
Live Time:	1800.00	Real Time:	1820.48
Dead Time:	1.12 %		
Detector ID:	7		

Detector System: Ge 7 SN/154

Calibration

Description:	Ge7 Tunacan 74139_334 01_16_07		
Filename:	C:\User\Calibrations\Ge7 calibrations\Ge7 Tunacan 01_16_07.Clb		
Energy Created:	16-Jan-2007 4:24:37PM	Efficiency Created:	16-Jan-2007 4:27:00PM
Zero Offset:	0.231 keV	Gain:	0.250 keV/Channel

Library 1 File:	mmr06 short.lib	Library based peak stripping used.
Library 2 File:	Null.Lib	
Library 3 File:	Null.Lib	

Analysis Parameters

Start Channel:	150 for an energy of 37.72 keV
Stop Channel:	8,000 for an energy of 2000.15 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge7 PBC table 11 26 07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Difference: 0.2265

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.46	74.83	544.00	222.00	0.123	21.64	0.862	PB-214	
307.40	77.06	516.00	430.00	0.239	11.61	0.931	PB-214	
348.38	87.31	216.68	194.32	0.108	12.89	0.690	PB-214	
359.21	90.01	160.00	107.00	0.059	19.31	0.534	PB-214	sM
833.84	208.65	122.04	124.96	0.069	15.37	0.978	LU-177	s
932.80	233.38	53.17	39.83	0.022	34.65	0.697	XE-133M	s
1311.93	328.15	48.00	70.00	0.039	22.41	0.896	AC-228	

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	184.70	46.39	138.44	50.56	0.028	28.59	0.913	
AM-241	1	237.27	59.54	419.10	-3.60	-0.002	805.52	0.846	
TH-234	1	252.45	63.33	431.54	33.98	0.019	54.09	0.850	s
EU-155	1	345.32	86.54	444.16	-8.69	-0.005	344.69	0.874	s
TH-234	1	371.52	93.09	459.72	110.17	0.061	22.91	0.881	s
U-235	1	372.56	93.35	355.01	0.00	0.000	0.00	0.882	s D
AC-228	1	372.56	93.35	252.00	178.45	0.099	1.40	1.236	s D
EU-155	1	420.20	105.26	278.35	33.34	0.019	72.87	0.894	s
EU-152	1	486.28	121.78	245.40	2.59	0.001	858.21	0.912	s
EU-154	1	488.74	122.39	214.17	-24.02	-0.013	88.54	0.913	s
Pa-234	1	531.47	133.07	211.67	-24.46	-0.014	86.50	0.922	s
U-235	1	574.34	143.79	274.09	0.00	0.000	2341.31	0.935	s
U-235	1	659.76	165.14	186.69	-0.93	-0.001	2083.09	0.955	s
U-235	1	819.33	205.02	197.05	-8.59	-0.005	233.55	0.999	s
PB-212	1	953.80	238.63	154.47	858.53	0.477	3.92	1.034	D
RA-224	1	963.22	240.99	237.89	73.11	0.041	32.05	1.036	D
PB-214	1	967.26	242.00	136.92	87.08	0.048	21.82	1.037	D
TL-208	1	1108.02	277.18	142.38	19.01	0.011	91.66	1.074	s
I-131	1	1135.33	284.01	98.81	8.36	0.005	171.65	1.081	s
PB-214	1	1180.60	295.32	63.33	203.67	0.113	10.74	1.378	s
PB-212	1	1201.98	300.67	69.33	104.67	0.058	20.81	0.989	s
AC-228	1	1353.49	338.54	48.00	212.00	0.118	10.03	1.530	s
EU-152	1	1384.63	346.32	54.94	5.21	0.003	206.05	1.142	s
PB-214	1	1407.43	352.02	32.22	339.78	0.189	6.39	1.295	s
I-131	1	1464.23	366.22	58.36	4.23	0.002	259.95	1.163	s
BE-7	1	1910.21	477.70	51.20	-4.77	-0.003	217.16	1.277	s
CS-134	1	2251.36	562.97	55.98	10.90	0.006	101.66	1.363	s
CS-134	1	2276.76	569.32	49.33	-1.37	-0.001	-43.88	1.369	s D
Pa-234	1	2277.35	569.47	50.80	-3.61	-0.002	-134.04	1.369	s D
TL-208	1	2332.29	583.20	33.24	319.76	0.178	7.23	1.501	
CS-134	1	2412.90	603.35	62.28	-8.26	-0.005	139.54	1.403	s
BI-214	1	2436.84	609.34	8.97	277.03	0.154	6.53	0.960	s
I-131	1	2549.00	637.37	42.99	-4.78	-0.003	199.24	1.435	s
CS-137	1	2647.12	661.90	59.96	-5.99	-0.003	211.84	1.459	s
EU-154	1	2893.01	723.37	76.23	-11.60	-0.006	110.40	1.519	s
BI-212	1	2908.62	727.27	31.38	52.94	0.029	20.32	1.523	s
PA-234M	1	3062.50	765.74	62.13	-4.67	-0.003	243.28	1.561	s
EU-152	1	3117.21	779.41	23.09	7.04	0.004	103.67	1.573	s
BI-212	1	3143.71	786.04	29.48	6.26	0.003	129.05	1.579	s
CS-134	1	3179.43	794.97	45.28	20.27	0.011	51.95	1.589	s
CS-134	1	3207.37	801.95	45.61	0.00	0.000	955.12	1.595	s
TL-208	1	3441.66	860.52	4.17	63.83	0.035	14.47	0.760	s
EU-154	1	3488.73	872.29	27.45	4.70	0.003	164.38	1.662	s
Pa-234	1	3520.15	880.14	27.61	5.81	0.003	134.50	1.669	s
Pa-234	1	3527.27	881.92	27.12	-2.20	-0.001	341.24	1.672	s
AC-228	1	3645.14	911.39	14.00	202.00	0.112	8.77	1.541	

Pa-234	1	3782.36	945.69	32.77	3.69	0.002	225.78	1.731	s
EU-152	1	3853.66	963.51	77.26	-4.43	-0.002	284.83	1.748	s
AC-228	1	3873.97	968.59	22.00	145.00	0.081	12.50	0.743	s
EU-154	1	3984.93	996.33	36.78	0.00	0.000	857.64	1.778	s
PA-234M	1	4001.02	1000.35	27.62	3.08	0.002	247.92	1.782	s
EU-154	1	4025.75	1006.53	28.34	-1.20	-0.001	635.58	1.785	s
EU-152	1	4441.72	1110.52	19.64	8.11	0.005	84.86	1.884	s
BI-214	1	4482.15	1120.63	0.00	106.00	0.059	9.71	1.475	
CO-60	1	4692.66	1173.26	39.76	-1.96	-0.001	459.47	1.939	s
EU-154	1	5099.08	1274.86	33.40	-4.37	-0.002	192.90	2.030	s
CO-60	1	5354.50	1338.72	5.40	-0.59	0.000	575.75	2.081	s
EU-152	1	5631.04	1407.86	9.11	5.62	0.003	86.88	2.147	s
K-40	1	5842.74	1460.78	0.00	389.00	0.216	5.07	1.990	
BI-214	1	7059.96	1765.11	7.34	21.30	0.012	28.15	2.447	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code		Peak MDA Value Becquerels	Code	Comments	
EU-152	T F	1	4.374E-001	344.29	4.374E-001	%	(	3.130E+000G		4.9E+003	26.50
			4.374E-001	121.78	1.021E-001	&		2.987E+000G		4.9E+003	28.58
			4.374E-001	778.92	2.519E+000	%		8.984E+000G		4.9E+003	12.94
			4.374E-001	964.11	-1.684E+000	%		1.662E+001G		4.9E+003	14.61
			4.374E-001	1112.07	3.737E+000	&		1.076E+001G		4.9E+003	13.64
			4.374E-001	1408.00	2.073E+000	%		6.187E+000G		4.9E+003	21.00
CO-60	T F	1	-4.322E-002	1332.50	-4.322E-002	%	(	9.984E-001G		1.9E+003	99.98
			-4.322E-002	1173.24	-1.295E-001	%		2.115E+000G		1.9E+003	99.90
AC-228	N	1	3.741E+001	911.16	3.689E+001		(	3.679E+000G		2.1E+003	29.00
			3.741E+001	968.97	4.635E+001	+		7.854E+000G		2.1E+003	17.46
			3.741E+001	338.32	3.867E+001	*	(	6.384E+000G		2.1E+003	12.01
			3.741E+001	93.35	3.741E+001	+	E	1.608E+001G	A	2.1E+003	5.56
PB-212	N	1	3.184E+001	238.63	3.184E+001		(P	2.249E+000G		7.0E+002	43.30
			3.184E+001	300.03	6.263E+001	+		2.484E+001G		7.0E+002	3.28
CS-134	T F I	1	-3.145E-001	604.71	-3.145E-001	%	(	1.503E+000G		7.5E+002	97.62
			-3.145E-001	795.87	1.118E+000	%		1.879E+000G		7.5E+002	85.53
			-3.145E-001	569.32	-3.145E-001	&		8.120E+000G		7.5E+002	15.38
			-3.145E-001	801.95	0.000E+000	&		1.868E+001G		7.5E+002	8.69
			-3.145E-001	563.24	4.558E+000	%		1.571E+001G		7.5E+002	8.35
PB-210	N	1	3.019E+001	46.54	3.019E+001	%	(P	3.436E+001G		8.1E+003	4.25
K-40	N	1	2.922E+002	1460.83	2.922E+002		(	5.536E+000G		4.7E+011	10.67
RA-224	N	1	2.887E+001	240.99	2.887E+001		(	2.946E+001G		7.0E+002	4.10
CS-137	T F I	1	-2.830E-001	661.66	-2.830E-001	&	(P	1.831E+000G		1.1E+004	85.21
BI-214	N	1	2.249E+001	609.31	2.249E+001	*	(P	1.353E+000G		5.8E+005	46.09
			2.249E+001	1120.29	4.440E+001	+		3.087E+000G		5.8E+005	15.10
			2.249E+001	1764.49	1.328E+001	-		9.561E+000G		5.8E+005	15.40
PA-234M	N	1	2.112E+001	1001.00	2.112E+001	&	(	1.865E+002G		1.6E+012	.84
			2.112E+001	766.41	-7.250E+001	&		6.126E+002G		1.6E+012	.29
PB-214	N	1	2.032E+001	351.93	2.053E+001	*	(P	1.762E+000G		5.8E+005	37.60
			2.032E+001	295.09	2.040E+001	*	(	3.986E+000G		5.8E+005	19.30
			2.032E+001	242.00	1.905E+001		(	1.252E+001G		5.8E+005	7.43
			1.955E+001	785.51	2.653E+001	%		1.188E+002G		7.0E+002	1.10

BI-212		N	1	1.955E+001	727.33	1.955E+001	@	(		1.064E+001G		7.0E+002	11.82
				1.955E+000	1004.77	-3.827E-001	%			8.798E+000G		3.1E+003	18.01
				1.955E+000	996.33	0.000E+000	%			1.670E+001G		3.1E+003	10.60
EU-154	T F I		1	1.955E+000	873.23	1.955E+000	%	(		1.129E+001G		3.1E+003	12.27
				1.955E+000	123.10	-6.648E-001	%			1.962E+000G		3.1E+003	40.79
				1.955E+000	1274.54	-8.803E-001	&			5.966E+000G		3.1E+003	35.19
				1.955E+000	723.36	-2.493E+000	%			9.326E+000G		3.1E+003	20.22
EU-155	T F I		1	1.781E+000	105.31	1.781E+000	%	(		4.298E+000G		1.8E+003	21.20
				1.781E+000	86.54	-3.397E-001	%			3.945E+000G	A	1.8E+003	30.70
TH-234		N	1	1.716E+001	63.29	1.031E+001	%	(	P	3.020E+001G		1.6E+012	4.82
				1.716E+001	92.59	2.306E+001	*	(	P	2.148E+001G		1.6E+012	5.58
AM-241	T		1	-1.556E-001	59.54	-1.556E-001	&	(		4.239E+000G		1.6E+005	35.90
Pa-234		N	1	-1.550E+000	131.29	-1.550E+000	%	(		4.466E+000G		1.6E+012	18.00
				-1.550E+000	569.47	-1.550E+000	&			1.544E+001G		1.6E+012	8.20
				-1.550E+000	946.02	1.504E+000	&			1.199E+001G		1.6E+012	13.40
				-1.550E+000	883.24	-1.183E+000	%			1.449E+001G		1.6E+012	9.60
				-1.550E+000	880.53	4.979E+000	%			2.331E+001G		1.6E+012	6.00
BE-7		N P C	1	-1.364E+000	477.60	-1.364E+000	%	(		1.031E+001G		5.3E+001	10.52
TL-208	F	N	1	1.362E+001	583.02	1.362E+001		(	P	1.260E+000G		7.0E+002	84.50
				1.362E+001	277.28	5.509E+000	%			1.690E+001G		7.0E+002	6.31
				1.362E+001	860.56	2.592E+001	+			4.963E+000G		7.0E+002	12.42
I-131	T F I		1	1.215E-001	364.48	1.215E-001	%	(		1.101E+000G		8.0E+000	81.70
				1.215E-001	284.30	2.546E+000	%			1.493E+001G		8.0E+000	6.14
				1.215E-001	636.97	-2.594E+000	%			1.805E+001G		8.0E+000	7.17
U-235		N	1	0.000E+000	143.79	0.000E+000	&	(		8.518E+000G		2.6E+011	10.96
				0.000E+000	205.33	-2.447E+000	%			1.940E+001G		2.6E+011	5.01
				0.000E+000	163.38	-2.258E-001	&			1.614E+001G		2.6E+011	5.08
				0.000E+000	93.35	0.000E+000	!		E	1.816E+001X		2.6E+011	5.81

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation	F = Fast Neutron Activation	I = Fission Product
P = Photon Reaction	N = Naturally Occurring Isotope	C = Charged Particle Reaction
M = No MDA Calculation		

Peak Codes:

G = Gamma Ray	X = X-Ray	P = Positron Decay
S = Single - Escape	D = Double - Escape	K = Key Line
A = Not in Average		

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	#	-1.364E+000	-1.369E+000	217.16	217.18	1.031E+001
K-40		2.922E+002	2.922E+002	5.07	5.85	5.536E+000
CO-60	#	-4.322E-002	-4.323E-002	575.75	575.76	9.984E-001
I-131	#	1.215E-001	1.247E-001	259.95	259.96	1.101E+000
CS-134	#	-3.145E-001	-3.146E-001	139.54	139.57	1.503E+000
CS-137	#	-2.830E-001	-2.830E-001	238.16	238.18	1.831E+000
EU-152	#	4.374E-001	4.375E-001	206.05	206.07	3.130E+000
EU-155	#	1.781E+000	1.781E+000	72.87	72.94	4.298E+000
TL-208		1.362E+001	1.362E+001	7.29	7.84	1.260E+000
BI-214		2.249E+001	2.249E+001	6.58	7.19	1.353E+000
RA-224		2.887E+001	2.888E+001	32.05	32.18	2.946E+001
AC-228		3.741E+001	3.741E+001	6.66	7.26	3.679E+000
TH-234	#	1.716E+001	1.716E+001	28.73	28.96	3.020E+001
PA-234M	#	2.112E+001	2.112E+001	247.92	247.93	1.865E+002
U-235	#			2,341.31	2,341.31	8.518E+000
EU-154	#	1.955E+000	1.955E+000	164.38	164.40	1.129E+001
PB-210		3.019E+001	3.019E+001	42.22	42.40	3.436E+001
PB-212		3.184E+001	3.185E+001	3.96	4.96	2.249E+000
PB-214		2.032E+001	2.032E+001	6.44	7.06	1.762E+000
BI-212	#	1.955E+001	1.956E+001	20.32	20.53	1.064E+001
Pa-234	#	-1.550E+000	-1.550E+000	86.50	86.55	4.466E+000
AM-241	#	-1.556E-001	-1.556E-001	805.52	805.53	4.239E+000

= All peaks for activity calculation had bad shape

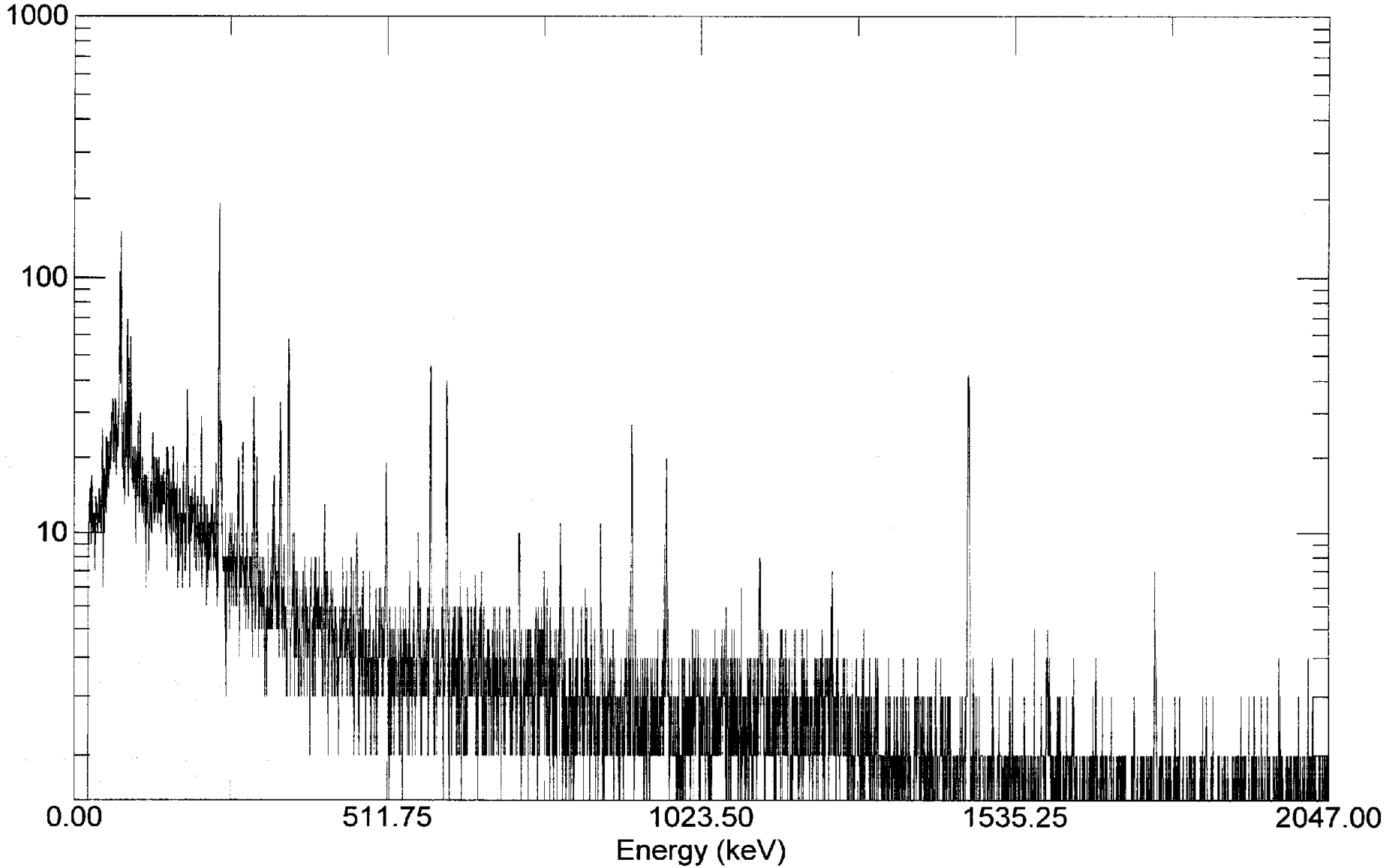
Total Activity (37.72 to 2,000.15 keV) 446.74 Bq/sample

Analyzed by: 403605

Laboratory: Test America

KEKJJ1AC

7360294_KEKJJ1AC_F7L200271-016



Acquired: 26-Dec-2007 7:02:16 PM
File: C:\User\spectra\KEKJJ1AC.spc
Detector: #0 Ge 7 SN/154

Real Time: 1820.48 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,082

Sample Description: 7360294_KEKLC1AC_F7L200271-017

Spectrum Filename: KEKLC1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:40:07PM		
Live Time:	1800.00	Real Time:	1810.60
Dead Time:	0.59 %		
Detector ID:	1		

Detector System: Ge 1 SN/242

Calibration

Description:	Ge1 Tunacan 74139-334 1_15_07		
Filename:	C:\User\Calibrations\Ge1 calibrations\Ge1 Tunacan polynomial 01_15_07.Clb		
Energy Created:	15-Jan-2007 5:43:37PM	Efficiency Created:	15-Jan-2007 5:44:16PM
Zero Offset:	0.212 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.71 keV
Stop Channel:	8,000 for an energy of 1999.84 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge1 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2280

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
298.27	74.78	294.67	233.33	0.130	15.82	0.747	PB-214	
307.52	77.09	161.33	275.67	0.153	9.82	0.886	PB-214	
347.24	87.03	254.67	30.33	0.017	76.60	1.212		s
358.85	89.93	119.18	54.82	0.030	31.23	0.842	PB-214	
370.68	92.89	380.00	0.00	0.000	2756.81	1.397		s
743.08	185.99	108.50	127.50	0.071	19.46	1.292	RA-226	s
1351.41	338.07	124.73	3.27	0.002	486.71	0.925		
3874.58	968.80	48.52	53.48	0.030	22.94	0.712	AC-228	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.31	46.54	131.46	61.54	0.034	24.13	0.829	s
AM-241	1	238.91	59.94	215.32	-4.40	-0.002	474.02	0.824	s
TH-234	1	252.77	63.41	304.29	15.84	0.009	45.96	0.828	
EU-155	1	347.53	87.10	260.30	86.67	0.048	28.43	0.849	s
TH-234	1	369.81	92.67	307.05	68.00	0.038	21.20	0.855	s
U-235	1	372.54	93.35	176.33	-2.25	-0.001	-4372.57	0.855	s D
AC-228	1	372.54	93.35	176.33	54.99	0.031	2.52	0.855	s D
EU-155	1	421.03	105.47	154.81	23.52	0.013	77.60	0.866	s
EU-152	1	488.77	122.41	173.98	-4.95	-0.003	379.86	0.881	
EU-154	1	495.45	124.08	175.82	-0.27	0.000	6860.56	0.882	s
Pa-234	1	525.76	131.66	196.25	-3.64	-0.002	546.08	0.890	s
U-235	1	572.59	143.36	174.96	-4.16	-0.002	4441.43	0.901	s
U-235	1	653.25	163.53	160.04	5.29	0.003	217.16	0.919	s
U-235	1	820.83	205.43	104.97	8.26	0.005	141.30	0.957	s
PB-212	1	953.66	238.63	70.47	376.53	0.209	5.57	0.987	D
RA-224	1	963.07	240.99	137.01	53.99	0.030	33.54	0.989	D
PB-214	1	967.12	242.00	98.54	78.46	0.044	19.17	0.990	D
TL-208	1	1108.24	277.28	93.41	13.21	0.007	107.10	1.021	s
I-131	1	1135.07	283.98	63.20	9.73	0.005	119.93	1.028	s
PB-214	1	1179.58	295.11	54.54	164.46	0.091	10.73	1.121	s
PB-212	1	1200.40	300.32	45.33	37.67	0.021	37.91	1.089	
AC-228	1	1351.58	338.11	51.63	94.14	0.052	14.01	1.076	
EU-152	1	1368.25	342.28	57.81	0.09	0.000	11473.75	1.081	
PB-214	1	1405.97	351.71	55.32	275.68	0.153	7.92	0.790	s
I-131	1	1454.80	363.91	55.28	-3.29	-0.002	324.57	1.099	s
BE-7	1	1908.26	477.28	35.27	-2.55	-0.001	334.79	1.198	s
CS-134	1	2253.64	563.61	53.38	-5.71	-0.003	185.74	1.273	s
CS-134	1	2276.47	569.32	36.49	-1.92	-0.001	-42.06	1.278	s D
Pa-234	1	2277.07	569.47	36.16	-0.66	0.000	-147.33	1.278	s D
TL-208	1	2331.43	583.06	20.42	139.58	0.078	9.62	1.140	
CS-134	1	2425.30	606.52	62.86	-11.66	-0.006	100.51	1.309	s
BI-214	1	2435.80	609.15	25.29	261.71	0.145	7.14	0.969	s
I-131	1	2534.92	633.93	23.71	0.29	0.000	2388.84	1.337	s
CS-137	1	2646.71	661.87	54.37	-6.97	-0.004	154.35	1.358	s
EU-154	1	2901.49	725.56	45.35	-5.67	-0.003	173.14	1.411	s
BI-212	1	2908.86	727.40	36.73	18.26	0.010	52.44	1.414	s
PA-234M	1	3062.51	765.81	35.60	1.48	0.001	576.20	1.447	s
EU-152	1	3119.05	779.94	27.59	-0.33	0.000	2228.91	1.458	s
BI-212	1	3141.32	785.51	62.34	0.00	0.000	1116.60	1.463	s
CS-134	1	3178.91	794.91	22.16	16.77	0.009	46.62	1.472	s
CS-134	1	3209.36	802.52	29.86	-0.90	0.000	866.73	1.477	s
TL-208	1	3439.97	860.16	0.00	37.00	0.021	16.44	0.625	s
EU-154	1	3491.64	873.08	27.01	1.49	0.001	498.67	1.537	s
Pa-234	1	3519.02	879.92	26.10	-1.11	-0.001	655.16	1.543	s
Pa-234	1	3545.68	886.59	16.53	-0.28	0.000	2062.88	1.546	s

AC-228	1	3643.71	911.09	39.49	74.82	0.042	15.33	1.569	
Pa-234	1	3784.25	946.22	28.13	2.10	0.001	362.98	1.598	s
EU-152	1	3863.10	965.93	82.17	-3.72	-0.002	348.49	1.613	s
AC-228	1	3875.16	968.94	26.50	42.65	0.024	20.94	1.617	s
EU-154	1	3985.15	996.43	37.27	-3.41	-0.002	258.78	1.640	s
PA-234M	1	3999.63	1000.05	28.24	-5.34	-0.003	147.13	1.643	s
EU-154	1	4018.52	1004.77	36.08	0.00	0.000	849.44	1.647	s
EU-152	1	4447.58	1112.02	40.99	-6.05	-0.003	155.03	1.735	s
BI-214	1	4480.47	1120.24	37.49	29.54	0.016	28.16	1.741	s
CO-60	1	4698.67	1174.78	31.25	-1.56	-0.001	514.58	1.784	s
EU-154	1	5097.76	1274.53	27.14	3.41	0.002	222.93	1.866	s
CO-60	1	5319.85	1330.03	16.12	0.19	0.000	2984.85	1.912	s
EU-152	1	5630.58	1407.70	19.50	-1.63	-0.001	390.35	1.972	s
K-40	1	5842.67	1460.70	12.54	581.46	0.323	4.10	2.093	
BI-214	1	7056.46	1764.05	10.14	36.69	0.020	17.40	2.246	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels		Peak Analysis Code		Peak MDA Value Becquerels	Code	Comments	
			-9.766E-002	284.30	3.205E+000	%			1.310E+001G		8.0E+000	6.14
			-9.766E-002	636.97	1.465E-001	%			1.287E+001G		8.0E+000	7.17
I-131	T F I	1	-9.766E-002	364.48	-9.766E-002	%	(		1.110E+000G		8.0E+000	81.70
EU-152	T F	1	8.233E-003	344.29	8.233E-003	&	(		3.349E+000G		4.9E+003	26.50
			8.233E-003	121.78	-2.276E-001	&			2.954E+000G		4.9E+003	28.58
			8.233E-003	778.92	-1.080E-001	%			8.787E+000G		4.9E+003	12.94
			8.233E-003	964.11	-1.236E+000	&			1.494E+001G		4.9E+003	14.61
			8.233E-003	1112.07	-2.382E+000	%			1.281E+001G		4.9E+003	13.64
			8.233E-003	1408.00	-4.976E-001	%			7.095E+000G		4.9E+003	21.00
BE-7	N P C	1	-7.183E-001	477.60	-7.183E-001	%	(		8.547E+000G		5.3E+001	10.52
BI-212	N	1	6.160E+000	727.33	6.160E+000	%	(		1.044E+001G		7.0E+002	11.82
			6.160E+000	785.51	0.000E+000	&			1.511E+002G		7.0E+002	1.10
TL-208	F N	1	5.639E+000	583.02	5.639E+000		(	P	9.601E-001G		7.0E+002	84.50
			5.639E+000	277.28	4.158E+000	&			1.503E+001G		7.0E+002	6.31
			5.639E+000	860.56	1.335E+001	+			2.660E+000G		7.0E+002	12.42
EU-154	T F I	1	5.514E-001	873.23	5.514E-001	%	(		9.938E+000G		3.1E+003	12.27
			5.514E-001	123.10	-8.831E-003	&			2.083E+000G		3.1E+003	40.79
			5.514E-001	1274.54	5.746E-001	&			4.551E+000G		3.1E+003	35.19
			5.514E-001	723.36	-1.114E+000	%			6.696E+000G		3.1E+003	20.22
			5.514E-001	1004.77	0.000E+000	%			8.517E+000G		3.1E+003	18.01
			5.514E-001	996.33	-1.599E+000	%			1.460E+001G		3.1E+003	10.60
U-235	N	1	-5.182E-001	143.79	-5.182E-001	&	(	P	8.017E+000G		2.6E+011	10.96
			-5.182E-001	205.33	2.675E+000	&		P	1.634E+001G		2.6E+011	5.01
			-5.182E-001	163.38	1.493E+000	%		P	1.741E+001G		2.6E+011	5.08
			-5.182E-001	93.35	-5.182E-001	!			E 1.486E+001X		2.6E+011	5.81
CS-134	T F I	1	-4.185E-001	604.71	-4.185E-001	%	(		1.423E+000G		7.5E+002	97.62
			-4.185E-001	795.87	8.321E-001	%			1.223E+000G		7.5E+002	85.53
			-4.185E-001	569.32	-4.185E-001	%			6.735E+000G		7.5E+002	15.38
			-4.185E-001	801.95	-4.411E-001	%			1.384E+001G		7.5E+002	8.69
			-4.185E-001	563.24	-2.278E+000	%			1.466E+001G		7.5E+002	8.35
PB-210	N	1	3.887E+001	46.54	3.887E+001	*	(	P	3.546E+001G		8.1E+003	4.25
K-40	N	1	3.588E+002	1460.83	3.588E+002		(	P	1.186E+001G		4.7E+011	10.67
			-3.182E+001	766.41	2.081E+001	%			4.292E+002G		1.6E+012	.29
PA-234	N	1	-3.182E+001	1001.00	-3.182E+001	%	(		1.636E+002G		1.6E+012	.84
CS-137	T F I	1	-3.052E-001	661.66	-3.052E-001	%	(		1.624E+000G		1.1E+004	85.21
EU-155	T F I	1	2.878E+000	105.31	1.455E+000	%	(		3.753E+000G		1.8E+003	21.20
			2.878E+000	86.54	3.861E+000	*	(		3.469E+000G		1.8E+003	30.70
Pa-234	N	1	-2.698E-001	131.29	-2.698E-001	*	(		5.033E+000G		1.6E+012	18.00
			-2.698E-001	569.47	-2.698E-001	%			1.258E+001G		1.6E+012	8.20
			-2.698E-001	946.02	7.522E-001	%			9.802E+000G		1.6E+012	13.40
			-2.698E-001	883.24	-1.331E-001	&			1.030E+001G		1.6E+012	9.60
			-2.698E-001	880.53	-8.460E-001	%			2.013E+001G		1.6E+012	6.00
RA-224	N	1	2.371E+001	240.99	2.371E+001		(		2.514E+001G		7.0E+002	4.10
AM-241	T	1	-2.127E-001	59.54	-2.127E-001	%	(		3.437E+000G		1.6E+005	35.90

			1.957E+001	1120.29	1.056E+001	-		P		1.117E+001G		5.8E+005	15.10
			1.957E+001	1764.49	1.830E+001	?	(	P		8.750E+000G		5.8E+005	15.40
BI-214	N	1	1.957E+001	609.31	2.000E+001		(	P		1.998E+000G		5.8E+005	46.09
PB-214	N	1	1.765E+001	351.93	1.734E+001		(	P		2.351E+000G		5.8E+005	37.60
			1.765E+001	295.09	1.771E+001	@	(	P		3.997E+000G		5.8E+005	19.30
			1.765E+001	242.00	1.907E+001		(	P		1.190E+001G		5.8E+005	7.43
PB-212	N	1	1.555E+001	238.63	1.555E+001		(	P		1.728E+000G		7.0E+002	43.30
			1.555E+001	300.03	2.415E+001	+				2.186E+001G		7.0E+002	3.28
AC-228	N	1	1.322E+001	911.07	1.203E+001		(	P		5.146E+000G		2.1E+003	29.00
			1.322E+001	968.97	1.190E+001		(	P		7.448E+000G		2.1E+003	17.46
			1.322E+001	338.32	1.801E+001		(	P		6.923E+000G		2.1E+003	12.01
			1.322E+001	93.35	1.322E+001	+			E	1.553E+001X	A	2.1E+003	5.56
CO-60	T F	1	1.171E-002	1332.50	1.171E-002	%	(			1.315E+000G		1.9E+003	99.98
			1.171E-002	1173.24	-8.693E-002	&				1.607E+000G		1.9E+003	99.90
TH-234	N	1	1.125E+001	63.29	5.386E+000	%	(	P		2.856E+001G		1.6E+012	4.82
			1.125E+001	92.59	1.631E+001	*	(	P		2.024E+001G		1.6E+012	5.58

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
CS-134	<	-4.185E-001	-4.186E-001	100.51	100.55	1.423E+000
EU-154	<	5.514E-001	5.514E-001	498.67	498.68	9.938E+000
EU-155	<	2.878E+000	2.878E+000	28.43	28.63	3.753E+000
BE-7	<	-7.183E-001	-7.213E-001	334.79	334.80	8.547E+000
K-40		3.588E+002	3.588E+002	4.19	5.11	1.186E+001
CO-60	<	1.171E-002	1.171E-002	2,984.85	2,984.85	1.315E+000
I-131	<	-9.766E-002	-1.004E-001	324.57	324.59	1.110E+000
CS-137	<	-3.052E-001	-3.052E-001	154.35	154.38	1.624E+000
EU-152	<	8.233E-003	8.233E-003	11,473.75	11,473.75	3.349E+000
TL-208		5.639E+000	5.641E+000	10.23	10.63	9.601E-001
RA-224		2.371E+001	2.372E+001	33.54	33.67	2.514E+001
PB-210	#	3.887E+001	3.887E+001	35.67	35.89	3.546E+001
PB-212		1.555E+001	1.556E+001	5.91	6.62	1.728E+000
AC-228	<	1.322E+001	1.322E+001	10.50	10.88	5.146E+000
Pa-234	<	-2.698E-001	-2.698E-001	546.08	546.09	5.033E+000
U-235	<	-5.182E-001	-5.182E-001	8,437.72	8,437.72	8.017E+000
AM-241	<	-2.127E-001	-2.127E-001	474.02	474.03	3.437E+000
PB-214		1.765E+001	1.765E+001	8.26	8.75	2.351E+000
BI-212	<	6.160E+000	6.162E+000	52.44	52.52	1.044E+001
BI-214		1.957E+001	1.957E+001	7.45	7.99	1.998E+000
TH-234	<	1.125E+001	1.125E+001	36.96	37.14	2.856E+001
PA-234M	<	-3.182E+001	-3.182E+001	147.13	147.16	1.636E+002

= All peaks for activity calculation had bad shape

Total Activity (37.71 to 1,999.84 keV) 479.83 Bq/sample

Analyzed by: _____

403605

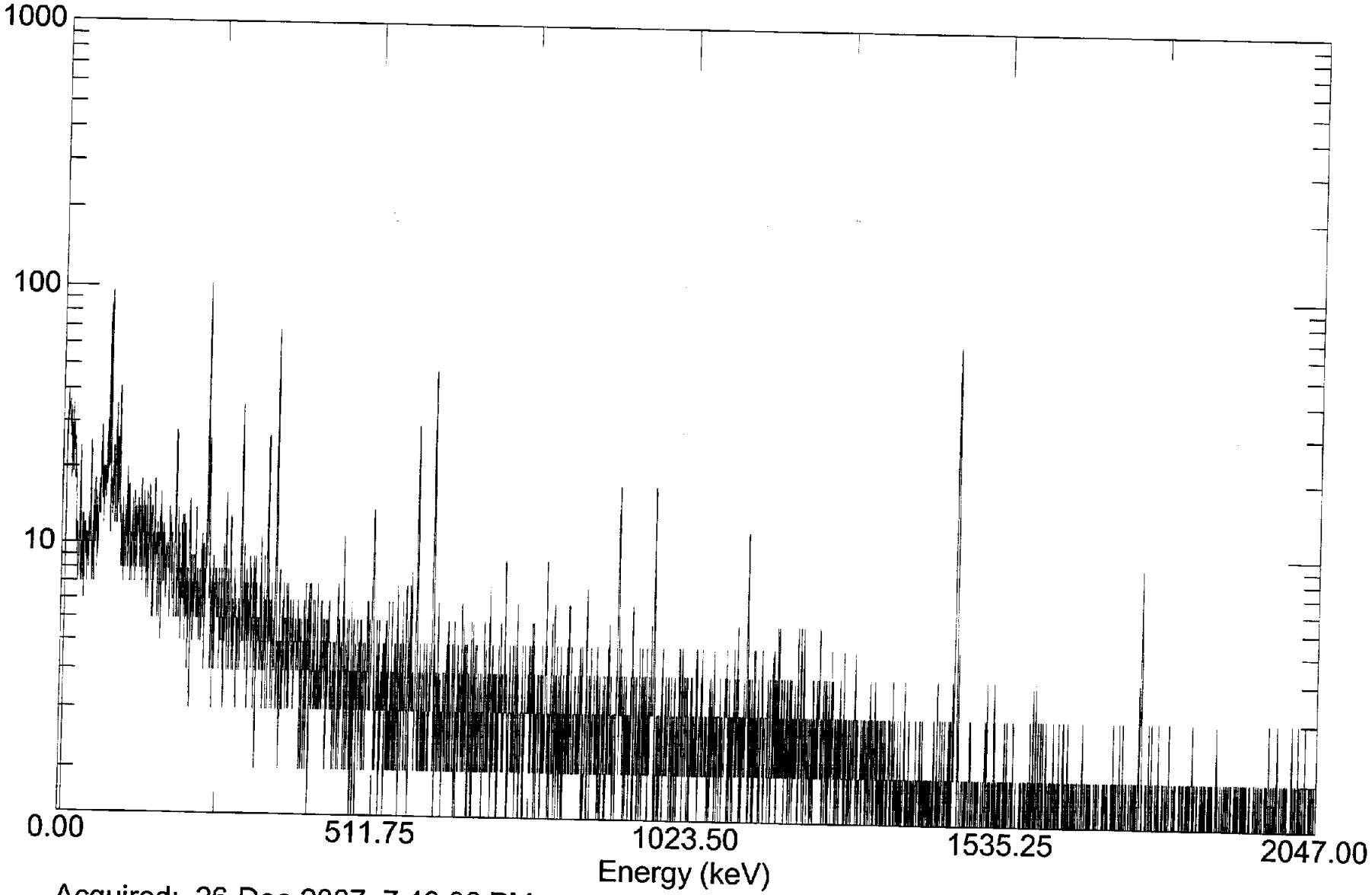
Reviewed by: _____

Supervisor

Laboratory: Test America

KEKLC1AC

7360294_KEKLC1AC_F7L200271-017



Acquired: 26-Dec-2007 7:40:06 PM
File: C:\User\spectra\KEKLC1AC.spc
Detector: #0 Ge 1 SN/242

Real Time: 1810.60 s. Live Time: 1800.00 s.
Channels: 8192

DB Analysis ID: 33,083

Sample Description: 7360294_KER4L1AA_F7L260000-294B

Spectrum Filename: KER4L1AA.An1

Acquisition Information

Start Time:	26-Dec-2007 7:41:19PM		
Live Time:	1800.00	Real Time:	1813.62
Dead Time:	0.75 %		
Detector ID:	3		

Detector System: Ge 3 SN/155

Calibration

Description:	Ge3 74139_334 Tunacan cal 01_11_07		
Filename:	C:\User\Calibrations\Ge3 cal post 5_8_06\Ge3 Tunacan 74139_334 01_11_07.Clb		
Energy Created:	10-Jan-2007 5:13:35PM	Efficiency Created:	11-Jan-2007 1:43:34PM
Zero Offset:	0.416 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.87 keV
Stop Channel:	8,000 for an energy of 2000.50 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	26-Dec-2007 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge3 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.0000

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty Sigma%	FWHM keV	Suspected Nuclide	Code

s = Peak fails shape tests.

D = Peak area deconvoluted.

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.23	46.67	52.85	-1.04	-0.001	44.50	0.864	s
AM-241	1	240.23	60.41	41.73	-4.06	-0.002	230.53	0.878	s
TH-234	1	250.58	62.99	62.89	-13.66	-0.008	84.76	0.882	s
EU-155	1	346.02	86.83	49.52	-4.66	-0.003	218.65	0.906	s
TH-234	1	369.15	92.60	56.70	-9.15	-0.005	51.94	0.912	s
U-235	1	372.14	93.35	30.06	19.37	0.011	42.15	0.913	s D
AC-228	1	372.14	93.35	48.37	-2.68	-0.001	-329.41	0.913	s D
EU-155	1	420.04	105.31	37.66	0.00	0.000	867.86	0.925	s
EU-152	1	483.64	121.20	26.34	-1.51	-0.001	488.66	0.942	s
EU-154	1	490.46	122.90	25.09	8.28	0.005	92.31	0.943	
Pa-234	1	527.53	132.16	27.68	-3.66	-0.002	209.87	0.952	
U-235	1	573.64	143.68	25.22	1.94	0.001	173.44	0.964	s
U-235	1	652.16	163.29	18.61	9.11	0.005	74.70	0.984	s
U-235	1	821.32	205.54	26.09	0.44	0.000	1651.13	1.027	s
PB-212	1	952.48	238.30	52.06	-10.56	-0.006	83.76	1.060	s
PB-214	1	960.44	240.29	26.45	-4.18	-0.002	180.89	1.063	s
RA-224	1	962.88	240.90	40.92	-5.53	-0.003	169.01	1.062	s
TL-208	1	1110.20	277.69	16.04	4.90	0.003	124.23	1.098	s
I-131	1	1140.97	285.38	20.40	-0.14	0.000	4532.72	1.105	s
PB-214	1	1177.27	294.45	25.36	-3.32	-0.002	992.17	1.116	s
PB-212	1	1201.23	300.44	23.44	1.10	0.001	632.47	1.121	s
AC-228	1	1354.59	338.75	25.67	6.68	0.004	84.68	1.158	s
EU-152	1	1376.77	344.29	21.84	0.00	0.000	660.96	1.164	s
PB-214	1	1407.68	352.01	36.05	-4.31	-0.002	156.33	1.171	s
I-131	1	1460.87	365.30	20.57	-3.55	-0.002	188.28	1.184	s
BE-7	1	1910.51	477.63	21.54	-0.04	0.000	16756.89	1.292	s
CS-134	1	2254.26	563.53	20.34	-4.42	-0.002	151.85	1.372	s
CS-134	1	2277.45	569.32	34.00	0.00	0.000	0.00	1.378	s D
Pa-234	1	2278.04	569.47	29.18	-0.64	0.000	-52.82	1.378	s D
TL-208	1	2331.96	582.94	23.13	-1.86	-0.001	98.96	1.390	s
CS-134	1	2419.07	604.71	15.83	0.00	0.000	562.75	1.410	s
BI-214	1	2438.95	609.68	28.65	-4.45	-0.002	271.99	1.415	s
I-131	1	2550.28	637.50	11.25	0.57	0.000	843.57	1.440	s
CS-137	1	2646.96	661.66	8.24	0.00	0.000	405.90	1.462	s
EU-154	1	2894.36	723.49	13.71	0.88	0.000	607.81	1.518	s
BI-212	1	2908.31	726.98	15.70	-0.64	0.000	889.00	1.521	s
PA-234M	1	3066.95	766.63	12.52	0.82	0.000	622.34	1.556	s
EU-152	1	3110.58	777.53	8.65	-2.30	-0.001	192.67	1.567	s
BI-212	1	3142.18	785.43	8.76	-1.94	-0.001	227.38	1.572	s
CS-134	1	3183.93	795.87	0.00	0.00	0.000	100.00	1.582	s
CS-134	1	3210.02	802.39	5.09	6.53	0.004	62.62	1.587	s
TL-208	1	3454.64	863.53	7.82	0.11	0.000	3734.78	1.638	s
EU-154	1	3492.16	872.91	14.38	5.54	0.003	105.65	1.649	s
Pa-234	1	3523.29	880.69	9.14	2.95	0.002	156.25	1.655	s
Pa-234	1	3533.48	883.24	22.45	0.00	0.000	670.02	1.657	s

AC-228	1	3638.95	909.61	17.00	-3.77	-0.002	350.91	1.681	s
Pa-234	1	3784.01	945.87	5.36	1.45	0.001	240.44	1.710	s
EU-152	1	3847.69	961.79	9.56	-0.06	0.000	7435.41	1.726	s
AC-228	1	3875.64	968.78	14.55	-2.78	-0.002	203.42	1.730	s
EU-154	1	3989.49	997.24	7.96	5.47	0.003	84.57	1.753	s
PA-234M	1	3998.05	999.38	15.33	-4.31	-0.002	137.09	1.756	s
EU-154	1	4019.63	1004.77	0.00	0.00	0.000	100.00	1.760	s
EU-152	1	4462.70	1115.56	8.66	-0.14	0.000	2931.44	1.847	s
BI-214	1	4481.62	1120.29	1.94	-1.94	-0.001	100.00	1.854	s
CO-60	1	4694.73	1173.58	17.31	-0.09	0.000	6280.24	1.896	s
EU-154	1	5098.47	1274.54	34.43	0.00	0.000	829.83	1.975	s
CO-60	1	5330.21	1332.50	0.00	0.00	0.000	100.00	2.019	s
EU-152	1	5632.07	1408.00	0.00	0.00	0.000	100.00	2.076	s
K-40	1	5838.66	1459.68	18.69	-3.08	-0.002	59.13	2.115	s
BI-214	1	7052.33	1763.33	12.14	-2.20	-0.001	2739.83	2.326	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak MDA Code	Peak Comments	
			-7.251E-002	860.56	3.753E-002	%	5.560E+000G		7.0E+002	12.42
TL-208	F N	1	-7.251E-002	583.02	-7.251E-002	% (P	9.800E-001G		7.0E+002	84.50
			-7.251E-002	277.28	1.455E+000	%	6.355E+000G		7.0E+002	6.31
PB-210	N	1	-6.019E-001	46.54	-6.019E-001	% (P	2.120E+001G		8.1E+003	4.25
			-5.950E-001	968.97	-7.611E-001	%	5.618E+000G		2.1E+003	17.46
			-5.950E-001	338.32	1.213E+000	% P	4.781E+000G		2.1E+003	12.01
			-5.950E-001	93.35	-5.950E-001	& E	7.799E+000X	A	2.1E+003	5.56
AC-228	N	1	-5.950E-001	911.07	-5.950E-001	% (P	3.458E+000G		2.1E+003	29.00
TH-234	N	1	-4.252E+000	63.29	-4.252E+000	% (P	1.235E+001G		1.6E+012	4.82
			-4.252E+000	92.59	-2.028E+000	% P	8.376E+000G		1.6E+012	5.58
PB-212	N	1	-4.103E-001	238.63	-4.103E-001	% (P	1.411E+000G		7.0E+002	43.30
			-4.103E-001	300.03	6.646E-001	%	1.534E+001G		7.0E+002	3.28
BI-214	N	1	-3.291E-001	609.31	-3.291E-001	& (P	2.044E+000G		5.8E+005	46.09
			-3.291E-001	1120.29	-6.861E-001	% P	3.254E+000G		5.8E+005	15.10
			-3.291E-001	1764.49	-1.109E+000	% P	9.556E+000G		5.8E+005	15.40
PB-214	N	1	-2.576E-001	351.93	-2.576E-001	* (P	1.835E+000G		5.8E+005	37.60
			-2.576E-001	295.09	-3.379E-001	% P	2.666E+000G		5.8E+005	19.30
			-2.576E-001	242.00	-9.549E-001	&	6.099E+000G		5.8E+005	7.43
PA-234	N	1	-2.528E+001	1001.00	-2.528E+001	% (	1.228E+002G		1.6E+012	.84
			-2.528E+001	766.41	1.120E+001	%	2.632E+002G		1.6E+012	.29
Pa-234	N	1	-2.517E-001	131.29	-2.517E-001	% (	1.872E+000G		1.6E+012	18.00
			-2.517E-001	569.47	-2.517E-001	%	1.101E+001G		1.6E+012	8.20
			-2.517E-001	946.02	5.094E-001	%	4.739E+000G		1.6E+012	13.40
			-2.517E-001	883.24	0.000E+000	%	1.155E+001G		1.6E+012	9.60
			-2.517E-001	880.53	2.193E+000	%	1.249E+001G		1.6E+012	6.00
RA-224	N	1	-2.285E+000	240.99	-2.285E+000	% (	1.343E+001G		7.0E+002	4.10
			2.251E-001	163.38	2.400E+000	%	6.008E+000G		2.6E+011	5.08
			2.251E-001	93.35	4.116E+000	& } E	7.465E+000X		2.6E+011	5.81
U-235	N	1	2.251E-001	143.79	2.251E-001	& (P	3.026E+000G		2.6E+011	10.96
			2.251E-001	205.33	1.333E-001	&	8.045E+000G		2.6E+011	5.01
BI-212	N	1	-2.090E-001	727.33	-2.090E-001	% (	6.949E+000G		7.0E+002	11.82
			-2.090E-001	785.51	-7.235E+000	%	6.155E+001G		7.0E+002	1.10
EU-154	T F I	1	2.003E+000	873.23	2.003E+000	% (	7.366E+000G		3.1E+003	12.27
			2.003E+000	123.10	2.482E-001	%	7.806E-001G		3.1E+003	40.79
			2.003E+000	1274.54	0.000E+000	%	5.041E+000G		3.1E+003	35.19
			2.003E+000	723.36	1.672E-001	%	3.815E+000G		3.1E+003	20.22
			2.003E+000	1004.77	0.000E+000	%	2.013E+000G		3.1E+003	18.01
			2.003E+000	996.33	2.523E+000	%	7.315E+000G		3.1E+003	10.60
K-40	N	1	-1.905E+000	1460.83	-1.905E+000	% (P	1.412E+001G		4.7E+011	10.67
AM-241	T	1	-1.794E-001	59.54	-1.794E-001	% (	1.450E+000G		1.6E+005	35.90
BE-7	N P C	1	-1.058E-002	477.60	-1.058E-002	% (	6.569E+000G		5.3E+001	10.52
I-131	T F I	1	-1.004E-001	364.48	-1.004E-001	% (	6.741E-001G		8.0E+000	81.70
			-1.004E-001	284.30	-4.394E-002	%	7.395E+000G		8.0E+000	6.14
			-1.004E-001	636.97	2.795E-001	%	9.001E+000G		8.0E+000	7.17

CO-60	T F	1	0.000E+000	1332.50	0.000E+000	%	(	4.508E-001G	1.9E+003	99.98
			0.000E+000	1173.24	-5.196E-003	%		1.224E+000G	1.9E+003	99.90
CS-134	T F I	1	0.000E+000	604.71	0.000E+000	%	(	7.373E-001G	7.5E+002	97.62
			0.000E+000	778.92	-7.243E-001	%		5.174E+000G	4.9E+003	12.94
			0.000E+000	964.11	-1.924E-002	%		5.591E+000G	4.9E+003	14.61
			0.000E+000	1112.07	-5.547E-002	%		6.391E+000G	4.9E+003	13.64
			0.000E+000	1408.00	0.000E+000	%		2.244E+000G	4.9E+003	21.00
			0.000E+000	795.87	0.000E+000	%		3.570E-001G	7.5E+002	85.53
			0.000E+000	569.32	0.000E+000	%		6.293E+000G	7.5E+002	15.38
			0.000E+000	801.95	3.130E+000	%		6.341E+000G	7.5E+002	8.69
			0.000E+000	563.24	-1.702E+000	%		9.130E+000G	7.5E+002	8.35
CS-137	T F I	1	0.000E+000	661.66	0.000E+000	%	(	6.831E-001G	1.1E+004	85.21
EU-152	T F	1	0.000E+000	344.29	0.000E+000	%	(	2.043E+000G	4.9E+003	26.50
			0.000E+000	121.78	-6.431E-002	%		1.137E+000G	4.9E+003	28.58
EU-155	T F I	1	0.000E+000	105.31	0.000E+000	%	(	1.792E+000G	1.8E+003	21.20
			0.000E+000	86.54	-1.914E-001	&		1.459E+000G	1.8E+003	30.70

Analysis Codes:

% = Peak fails sensitivity test

- = Peak activity lower than counting uncertainty range

(= This peak is used in the nuclide activity average

* = Peak is too wide, but only one peak in library

A = Derived Average Activity

+ = Peak activity higher than counting uncertainty range

! = Peak is part of a multiplet and this area went negative during deconvolution

$ = Peak identified, but first peak of this nuclide failed one or more qualification tests

& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

? = Peak is too narrow

= = Peak outside analysis energy range

P = Peakbackround subtraction

@ = Peak is too wide at FW25M, but OK at FWHM

E = Energy Duplication

Nuclide Codes:

T = Thermal Neutron Activation

F = Fast Neutron Activation

I = Fission Product

P = Photon Reaction

N = Naturally Occurring Isotope

C = Charged Particle Reaction

M = No MDA Calculation

Peak Codes:

G = Gamma Ray

X = X-Ray

P = Positron Decay

S = Single - Escape

D = Double - Escape

K = Key Line

A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.058E-002	-1.062E-002	16,756.89	16,756.89	6.569E+000
K-40	<	-1.905E+000	-1.905E+000	274.06	274.08	1.412E+001
CO-60	<			100.00	100.04	4.508E-001
I-131	<	-1.004E-001	-1.032E-001	188.28	188.30	6.741E-001
CS-134	<			562.75	562.75	7.373E-001
EU-154	<	2.003E+000	2.004E+000	105.65	105.69	7.366E+000
RA-224	<	-2.285E+000	-2.285E+000	169.01	169.03	1.343E+001
PB-210	<	-6.019E-001	-6.019E-001	966.66	966.66	2.120E+001
PB-212	<	-4.103E-001	-4.105E-001	248.29	248.31	1.411E+000
PB-214	<	-2.576E-001	-2.576E-001	490.33	490.34	1.835E+000
Pa-234	<	-2.517E-001	-2.517E-001	209.87	209.89	1.872E+000
AM-241	<	-1.794E-001	-1.794E-001	230.53	230.56	1.450E+000
CS-137	<			405.90	405.91	6.831E-001
EU-152	<			660.96	660.97	2.043E+000
EU-155	<			867.86	867.87	1.792E+000
TL-208	<	-7.251E-002	-7.253E-002	522.68	522.69	9.800E-001
BI-212	<	-2.090E-001	-2.090E-001	889.00	889.01	6.949E+000
BI-214	<	-3.291E-001	-3.291E-001	696.11	696.11	2.044E+000
AC-228	<	-5.950E-001	-5.950E-001	553.66	553.67	3.458E+000
TH-234	<	-4.252E+000	-4.252E+000	238.01	238.04	1.235E+001
PA-234M	<	-2.528E+001	-2.528E+001	137.09	137.12	1.228E+002
U-235	<	2.251E-001	2.251E-001	364.83	364.84	3.026E+000

= All peaks for activity calculation had bad shape

Total Activity (37.87 to 2,000.50 keV) 0.00 Bq/sample

Analyzed by: _____

403605

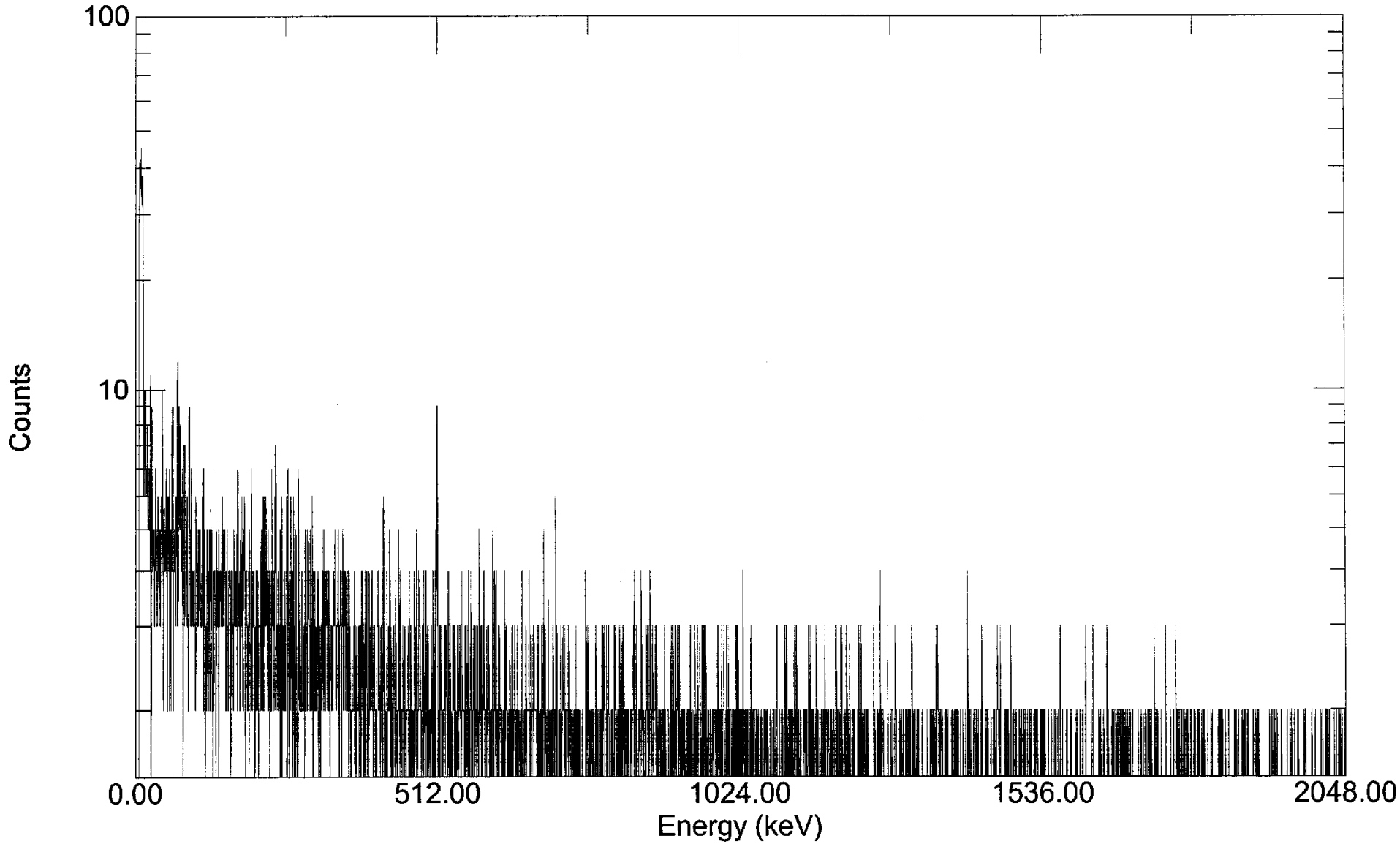
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KER4L1AA

7360294_KER4L1AA_F7L260000-294B



Acquired: 26-Dec-2007 7:41:19 PM
File: C:\User\spectra\KER4L1AA.spc
Detector: #0 Ge 3 SN/155

Real Time: 1813.62 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

DB Analysis ID: 33,084

Sample Description: 7360294_KER4L1AC_F7L260000-294C

Spectrum Filename: KER4L1AC.An1

Acquisition Information

Start Time:	26-Dec-2007 7:43:24PM		
Live Time:	1800.00	Real Time:	1810.74
Dead Time:	0.59 %		
Detector ID:	4		

Detector System: Ge 4 SN/181

Calibration

Description:	Ge4_TunaCanCal_74139_334_05_15_07		
Filename:	C:\User\Calibrations\Ge4 Post 09_07_07(Ge6)\Ge4_TunaCanCal_74139_334_05_15_		
Energy Created:	08-May-2007 1:28:13PM	Efficiency Created:	15-May-2007 10:05:02AM
Zero Offset:	0.017 keV	Gain:	0.250 keV/Channel

Library 1 File: mmr06 short.lib — Library based peak stripping used.
Library 2 File: Null.Lib
Library 3 File: Null.Lib

Analysis Parameters

Start Channel:	150 for an energy of 37.53 keV
Stop Channel:	8,000 for an energy of 1998.47 keV
Peak rejection level:	40.000 %
Activity Scaling Factor:	1.0000 / 1.0000 = 1.0000
Detection Limit Method:	Nureg method 4.16
Sample Size:	1.00E+000
Additional random error:	0.0000
Additional systematic error:	0.0000
Fraction Limit:	0.0000%
Background Width:	Average of three points

Corrections

	Status	Comments
Decay Correct to Date:	YES	01-Apr-2004 12:00:00PM
Decay During Acquisition:	NO	
Peaked Background Correction:	YES	Ge4 PBC table 11_26_07.Pbc
Absorption:	NO	
Geometry Correction:	NO	
Random Summing:	NO	

Energy Calibration Normalized Differe 0.2174

UNIDENTIFIED PEAK SUMMARY

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Suspected Nuclide	Code
146.17	36.58	1501.67	316.33	0.176	24.63	1.172	XE-133M	s
289.34	72.38	849.00	123.00	0.068	38.53	0.483	W-187	sM
351.98	88.05	1622.45	5729.55	3.183	1.65	0.818	PB-214	M
488.14	122.10	1335.00	0.00	0.000	10937.50	0.841		M
1540.27	385.18	386.33	123.67	0.069	33.67	0.700		s

s = Peak fails shape tests.

D = Peak area deconvoluted.

Test America St. Louis

IDENTIFIED PEAK SUMMARY

Nuclide	Library Used	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncertainty 1 Sigma%	FWHM keV	Code
PB-210	1	185.65	46.45	5288.31	18511.69	10.284	1.11	0.788	s
AM-241	1	237.78	59.49	4253.33	22409.67	12.450	0.92	0.792	
TH-234	1	253.56	63.44	1768.37	-9.89	-0.005	964.92	0.834	s
EU-155	1	345.58	86.45	3361.74	-327.63	-0.182	25.63	0.854	s
TH-234	1	371.14	92.84	1324.48	18.77	0.010	120.05	0.859	s
AC-228	1	373.18	93.35	1120.58	-2.39	-0.001	-864.50	0.860	s D
U-235	1	373.18	93.35	1120.58	1.61	0.001	430.02	0.860	s D
EU-155	1	420.79	105.26	1223.45	0.31	0.000	15764.28	0.871	s
EU-152	1	488.12	122.09	1166.66	776.24	0.431	7.18	0.885	
EU-154	1	500.12	125.10	982.03	-19.86	-0.011	224.28	0.886	s
Pa-234	1	524.48	131.19	1180.12	12.17	0.007	400.20	0.894	s
U-235	1	575.04	143.83	1034.41	3.04	0.002	1496.45	0.904	s
U-235	1	653.20	163.38	1056.07	3.92	0.002	1172.70	0.922	s
U-235	1	829.36	207.43	635.93	17.07	0.009	210.36	0.958	
PB-212	1	953.16	238.38	946.46	77.50	0.043	51.02	0.986	
RA-224	1	965.28	241.42	998.04	-19.00	-0.011	236.31	0.988	s
PB-214	1	969.89	242.57	929.31	-1.66	-0.001	2602.40	0.989	s
TL-208	1	1106.53	276.73	683.27	-6.59	-0.004	562.69	1.019	
I-131	1	1143.98	286.10	547.31	37.14	0.021	90.57	1.025	s
PB-214	1	1171.10	292.88	467.83	3.63	0.002	426.52	1.034	s
PB-212	1	1190.51	297.73	472.83	-13.43	-0.007	230.64	1.039	
AC-228	1	1352.69	338.28	760.83	-24.70	-0.014	159.24	1.071	s
EU-152	1	1376.86	344.32	728.51	-25.08	-0.014	153.51	1.076	s
PB-214	1	1406.63	351.76	679.55	35.03	0.019	92.54	1.082	s
I-131	1	1460.99	365.36	662.95	6.95	0.004	525.43	1.092	s
BE-7	1	1916.33	479.18	633.44	-35.43	-0.020	101.87	1.185	s
CS-134	1	2249.41	562.44	385.31	-23.92	-0.013	117.84	1.254	s
CS-134	1	2276.94	569.32	472.23	-0.01	0.000	-129.66	1.259	s D
Pa-234	1	2277.54	569.47	386.87	1.81	0.001	243.08	1.259	s D
TL-208	1	2332.38	583.18	167.18	69.82	0.039	35.40	0.422	s
CS-134	1	2425.39	606.42	290.83	-0.05	0.000	53417.99	1.286	s
BI-214	1	2434.97	608.82	178.08	66.92	0.037	37.56	1.012	
I-131	1	2545.31	636.40	347.01	26.34	0.015	101.90	1.312	s
CS-137	1	2644.84	661.27	334.33	7441.67	4.134	1.32	1.294	
EU-154	1	2891.73	722.97	395.26	-23.94	-0.013	119.21	1.378	s
BI-212	1	2911.82	727.99	363.36	5.86	0.003	462.18	1.381	s
PA-234M	1	3063.05	765.78	338.32	38.39	0.021	69.66	1.411	s
EU-152	1	3116.55	779.15	366.62	-8.06	-0.004	337.69	1.420	s
BI-212	1	3133.74	783.44	251.74	38.61	0.021	60.31	1.425	s
CS-134	1	3182.11	795.53	437.31	-26.37	-0.015	113.84	1.433	s
CS-134	1	3207.57	801.89	385.88	22.38	0.012	125.93	1.437	s
TL-208	1	3443.04	860.72	492.62	20.60	0.011	153.95	1.481	
EU-154	1	3482.76	870.65	379.62	-23.53	-0.013	118.90	1.490	s
Pa-234	1	3526.84	881.66	539.68	-14.40	-0.008	229.68	1.495	s
Pa-234	1	3534.28	883.52	586.14	1.98	0.001	1731.33	1.497	s

AC-228	1	3642.12	910.46	569.58	-2.81	-0.002	1202.80	1.518	s
Pa-234	1	3785.04	946.17	758.64	0.35	0.000	11155.29	1.543	s
EU-152	1	3851.65	962.81	492.59	33.92	0.019	94.10	1.556	s
AC-228	1	3877.32	969.22	478.87	32.30	0.018	97.40	1.559	s
EU-154	1	3982.82	995.58	435.48	-11.71	-0.007	253.67	1.579	s
PA-234M	1	4011.86	1002.83	438.48	-9.02	-0.005	329.97	1.582	s
EU-154	1	4031.46	1007.73	347.33	13.40	0.007	198.53	1.585	s
EU-152	1	4446.23	1111.33	446.24	-8.86	-0.005	338.82	1.659	s
BI-214	1	4482.74	1120.45	372.88	-4.29	-0.002	7607.92	1.665	s
CO-60	1	4692.58	1172.86	132.00	5574.00	3.097	1.44	1.624	
EU-154	1	5100.51	1274.74	60.32	-6.01	-0.003	187.39	1.768	s
CO-60	1	5330.10	1332.07	32.00	4954.00	2.752	1.46	1.620	
EU-152	1	5631.54	1407.34	17.82	2.56	0.001	241.34	1.854	s
K-40	1	5844.96	1460.62	17.63	6.30	0.003	68.18	1.887	s
BI-214	1	7060.82	1764.12	8.86	3.60	0.002	128.31	2.066	s

s = Peak fails shape tests.

D = Peak area deconvoluted.

A = Derived Aveage Activity.

SUMMARY OF LIBRARY PEAK USAGE

Nuclide Name	Nuclide Code	Library Used	Average Activity Becquerels	Peak Energy keV	Peak Activity Becquerels	Peak Analysis Code	Peak MDA Value Becquerels	Peak Code	Peak Comments	
PA-234	N	1	-8.645E+001	1001.00	-8.645E+001	& (	9.611E+002G		1.6E+012	.84
			-8.645E+001	766.41	8.386E+002	%	1.932E+003G		1.6E+012	.29
BI-214	N	1	7.670E+000	609.31	7.670E+000	% (P	7.438E+000G		5.8E+005	46.09
			7.670E+000	1120.29	-2.502E+000	% P	5.408E+001G		5.8E+005	15.10
			7.670E+000	1764.49	3.068E+000	%	1.413E+001G		5.8E+005	15.40
AC-228	N	1	-7.187E-001	911.07	-7.187E-001	% (	2.914E+001G		2.1E+003	29.00
			-7.187E-001	968.97	1.445E+001	%	4.681E+001G		2.1E+003	17.46
			-7.187E-001	338.32	-6.395E+000	%	3.399E+001G		2.1E+003	12.01
			-7.187E-001	93.35	-7.187E-001	% E	4.765E+001X	A	2.1E+003	5.56
K-40	N	1	6.524E+000	1460.83	6.524E+000	% (P	2.308E+001G		4.7E+011	10.67
CO-60	T F	1	5.083E+002	1332.50	5.056E+002	(	2.967E+000G		1.9E+003	99.98
			5.083E+002	1173.24	5.110E+002	(	5.156E+000G		1.9E+003	99.90
CS-137	T F I	1	4.953E+002	661.66	4.953E+002	(	5.851E+000G		1.1E+004	85.21
U-235	N	1	4.629E-001	143.79	4.629E-001	& (	2.322E+001G		2.6E+011	10.96
			4.629E-001	205.33	6.918E+000	%	4.873E+001G		2.6E+011	5.01
			4.629E-001	163.38	1.359E+000	%	5.341E+001G		2.6E+011	5.08
			4.629E-001	93.35	4.629E-001	% E	4.560E+001X		2.6E+011	5.81
TH-234	N	1	-4.277E+000	63.29	-4.277E+000	% (P	8.594E+001G		1.6E+012	4.82
			-4.277E+000	92.59	5.627E+000	& P	5.166E+001G		1.6E+012	5.58
TL-208	F N	1	4.200E+000	583.02	4.200E+000	@ (P	3.788E+000G		7.0E+002	84.50
			4.200E+000	277.28	-2.711E+000	%	5.127E+001G		7.0E+002	6.31
			4.200E+000	860.56	1.174E+001	%	6.047E+001G		7.0E+002	12.42
PB-212	N	1	4.088E+000	238.63	4.088E+000	% (P	7.705E+000G		7.0E+002	43.30
			4.088E+000	300.03	-1.141E+001	%	8.843E+001G		7.0E+002	3.28
BI-212	N	1	3.045E+000	727.33	3.045E+000	& (	4.760E+001G		7.0E+002	11.82
			3.045E+000	785.51	2.301E+002	&	4.569E+002G		7.0E+002	1.10
PB-214	N	1	3.004E+000	351.93	3.004E+000	% (P	1.065E+001G		5.8E+005	37.60
			3.004E+000	295.09	5.162E-001	% P	1.473E+001G		5.8E+005	19.30
			3.004E+000	242.00	-5.154E-001	%	4.502E+001G		5.8E+005	7.43
I-131	T F I	1	2.832E-001	364.48	2.832E-001	% (	5.001E+000G		8.0E+000	81.70
			2.832E-001	284.30	1.607E+001	&	4.834E+001G		8.0E+000	6.14
			2.832E-001	636.97	2.016E+001	&	6.853E+001G		8.0E+000	7.17
CS-134	T F I	1	-2.427E-003	604.71	-2.427E-003	% (	4.418E+000G		7.5E+002	97.62
			-2.427E-003	795.87	-2.044E+000	%	7.763E+000G		7.5E+002	85.53
			-2.427E-003	569.32	-2.427E-003	&	3.366E+001G		7.5E+002	15.38
			-2.427E-003	801.95	1.718E+001	&	7.236E+001G		7.5E+002	8.69
			-2.427E-003	563.24	-1.413E+001	%	5.564E+001G		7.5E+002	8.35
EU-155	T F I	1	2.399E-002	105.31	2.399E-002	% (	1.267E+001G		1.8E+003	21.20
			2.399E-002	86.54	-1.835E+001	+	1.528E+001G		1.8E+003	30.70
EU-152	T F	1	2.127E+001	344.29	-2.991E+000	% (	1.532E+001G		4.9E+003	26.50
			2.127E+001	121.78	4.377E+001	(	9.127E+000G		4.9E+003	28.58
			2.127E+001	778.92	-4.057E+000	%	4.626E+001G		4.9E+003	12.94
			2.127E+001	964.11	1.806E+001	%	5.650E+001G		4.9E+003	14.61
			2.127E+001	1112.07	-5.687E+000	%	6.491E+001G		4.9E+003	13.64

			2.127E+001	1408.00	1.305E+000	%			1.140E+001G	4.9E+003	21.00
PB-210	N	1	1.534E+004	46.54	1.534E+004	@	(	P	2.831E+002G	8.1E+003	4.25
BE-7	N P C	1	-1.435E+001	477.60	-1.435E+001	%	(		4.860E+001G	5.3E+001	10.52
AM-241 T		1	1.376E+003	59.54	1.376E+003		(		1.883E+001G	1.6E+005	35.90
EU-154 T F I		1	-1.374E+001	873.23	-1.374E+001	%	(		5.458E+001G	3.1E+003	12.27
			-1.374E+001	123.10	-7.853E-001	%			5.881E+000G	3.1E+003	40.79
			-1.374E+001	1274.54	-1.676E+000	%			1.086E+001G	3.1E+003	35.19
			-1.374E+001	723.36	-7.243E+000	%			2.885E+001G	3.1E+003	20.22
			-1.374E+001	1004.77	5.988E+000	&			4.001E+001G	3.1E+003	18.01
			-1.374E+001	996.33	-8.829E+000	%			7.535E+001G	3.1E+003	10.60
Pa-234	N	1	1.101E+000	131.29	1.101E+000	&	(		1.473E+001G	1.6E+012	18.00
			1.101E+000	569.47	1.101E+000	&			5.732E+001G	1.6E+012	8.20
			1.101E+000	946.02	1.995E-001	%			7.486E+001G	1.6E+012	13.40
			1.101E+000	883.24	1.491E+000	%			8.701E+001G	1.6E+012	9.60
			1.101E+000	880.53	-1.731E+001	%			1.334E+002G	1.6E+012	6.00
RA-224	N	1	-1.067E+001	240.99	-1.067E+001	%	(		8.420E+001G	7.0E+002	4.10

Analysis Codes:

% = Peak fails sensitivity test
? = Peak is too narrow
- = Peak activity lower than counting uncertainty range
= = Peak outside analysis energy range
(= This peak is used in the nuclide activity average
P = Peakbackround subtraction
* = Peak is too wide, but only one peak in library
@ = Peak is too wide at FW25M, but OK at FWHM
A = Derived Average Activity
E = Energy Duplication
+ = Peak activity higher than counting uncertainty range
! = Peak is part of a multiplet and this area went negative during deconvolution
$ = Peak identified, but first peak of this nuclide failed one or more qualification tests
& = Calculated peak centroid is not close enough to the library energy centroid for positive identification

Nuclide Codes:

T = Thermal Neutron Activation
F = Fast Neutron Activation
I = Fission Product
P = Photon Reaction
N = Naturally Occurring Isotope
C = Charged Particle Reaction
M = No MDA Calculation

Peak Codes:

G = Gamma Ray
X = X-Ray
P = Positron Decay
S = Single - Escape
D = Double - Escape
K = Key Line
A = Not in Average

SUMMARY OF NUCLIDES IN SAMPLE

Nuclide		Time of Count Activity Bq/sample	Time Corrected Activity Bq/sample	Uncertainty Counts 1 Sigma %	Uncertainty Total 1 Sigma %	Minimum Detectable Activity
BE-7	<	-1.435E+001		101.87	101.91	4.860E+001
K-40	<	6.524E+000	6.524E+000	98.83	98.87	2.308E+001
CO-60		5.083E+002	8.307E+002	1.03	3.02	2.967E+000
I-131	<	2.832E-001		525.43	525.43	5.001E+000
CS-134	<	-2.427E-003	-8.505E-003	53,417.99	53,417.99	4.418E+000
CS-137		4.953E+002	5.399E+002	1.32	3.19	5.851E+000
EU-152	<	2.127E+001	2.575E+001	7.18	7.74	1.532E+001
EU-155	<	2.399E-002	4.043E-002	15,764.28	15,764.28	1.267E+001
TL-208	#	4.200E+000	1.629E+001	36.50	36.62	3.788E+000
RA-224	<	-1.067E+001	-4.138E+001	236.31	236.32	8.420E+001
PB-210	#	1.534E+004	1.723E+004	1.11	4.05	2.831E+002
BI-214		7.670E+000	7.682E+000	40.51	40.61	7.438E+000
AC-228	<	-7.187E-001	-1.128E+000	1,202.80	1,202.81	2.914E+001
PA-234M	<	-8.645E+001	-8.645E+001	329.97	329.98	9.611E+002
U-235	<	4.629E-001	4.629E-001	1,496.45	1,496.46	2.322E+001
AM-241		1.376E+003	1.384E+003	0.92	3.97	1.883E+001
EU-154	<	-1.374E+001	-1.856E+001	118.90	118.93	5.458E+001
PB-212		4.088E+000	1.586E+001	57.14	57.22	7.705E+000
PB-214	<	3.004E+000	3.009E+000	106.39	106.43	1.065E+001
BI-212	<	3.045E+000	1.181E+001	462.18	462.19	4.760E+001
Pa-234	<	1.101E+000	1.101E+000	400.20	400.21	1.473E+001
TH-234	<	-4.277E+000	-4.277E+000	2,529.12	2,529.12	8.594E+001

= All peaks for activity calculation had bad shape

Total Activity (37.53 to 1,998.47 keV) 17,723.38 Bq/sample

Analyzed by: _____

403605

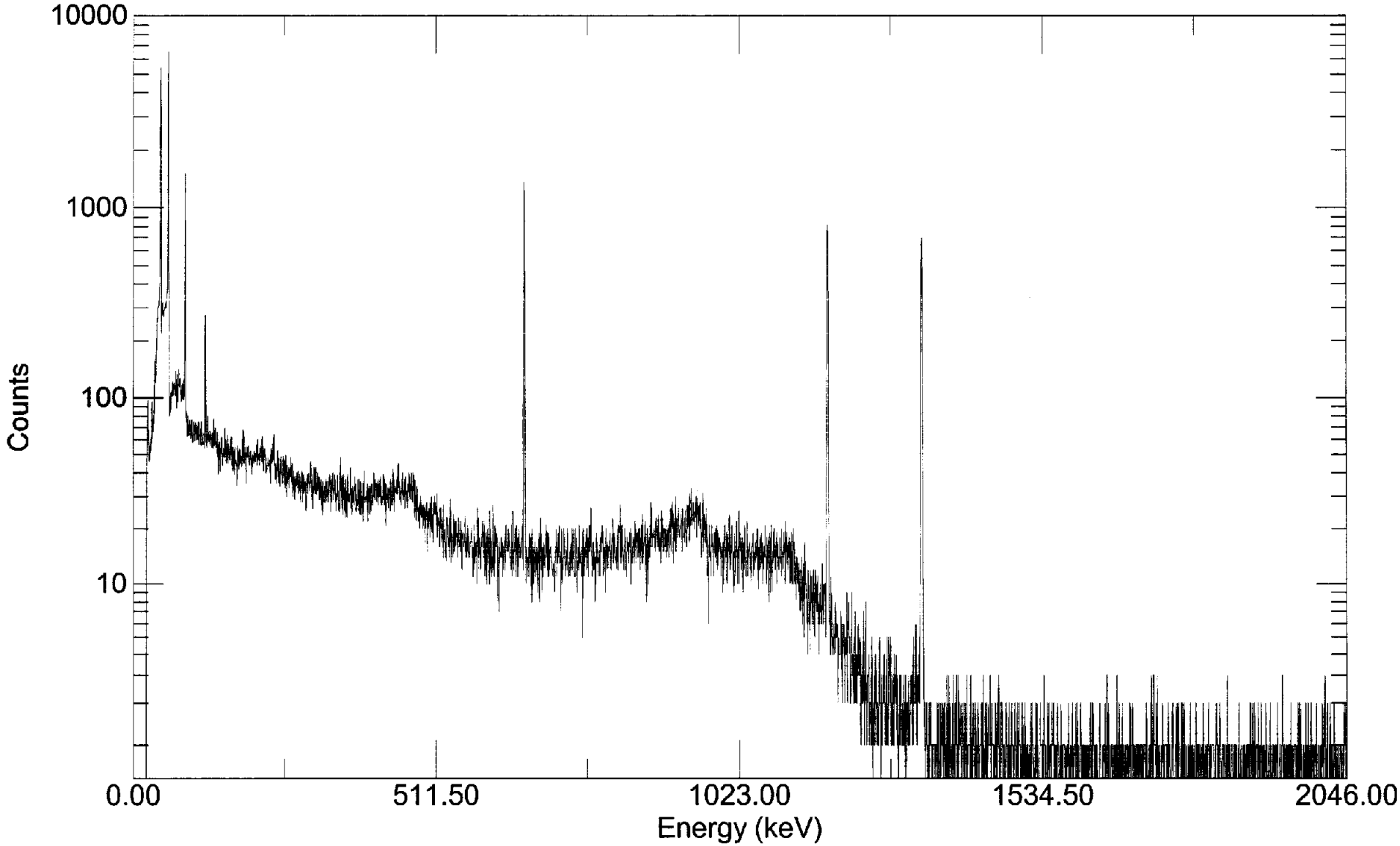
Reviewed by: _____

Supervisor

Laboratory: STL- St Louis

KER4L1AC

7360294_KER4L1AC_F7L260000-294C



Acquired: 26-Dec-2007 7:43:24 PM
File: C:\User\spectra\KER4L1AC.spc
Detector: #0 Ge 4 SN/181

Real Time: 1810.74 s. Live Time: 1800.00 s.
Channels: 8192

TestAmerica St. Louis

APPENDIX F

BACKFILL REQUEST AUTHORIZATION REQUEST LETTERS FOR SUs 1, 3, 4 and 5

CABRERA SERVICES
RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

03-3040.30
December 13, 2007

Mr. David Horton, Project Manager
U.S. Army Joint Munitions Command
1 Rock Island Arsenal
Rock Island IL 61299-6000

RE: Backfill Authorization Request for Survey Unit No. 1

Dear Mr. Horton;

Cabrera Services, Inc. (CABRERA) requests authorization to backfill the open excavation in survey unit (SU) 1 within the DRMO area at the Naval Station Great Lakes. Results of the surveys and sampling performed within SU 1 have been shown to meet the criteria outlined in the *Public Private Venture Area Remediation, Addendum to Work Plan for the Remediation of the Recreation and Center Tank Areas and Site-Wide Final Status Survey (hereafter referred to as the Work Plan Addendum [WPA])*, dated May 2007. (CABRERA 2007a) as well as the recently developed derived concentration guideline level (DCGL) of 4 picocuries per gram (pCi/g) above background for thorium-232 (^{232}Th).

Summary of Results

The survey and sampling approach provided in the WPA was designed in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* for Class 1 final status surveys (FSS). Systematic soil samples on a specified grid, performance of a 100% gamma walkover survey (GWS), and collection of biased soil samples, as required, were all performed. Areas that were identified as suspected or confirmed as elevated in previous investigations at the site were test pitted, and surveyed. Excavation was directed using a 2x2 NaI detector. Those areas that exhibited readings of approximately 2x background were remediated. Following remediation the areas were re-surveyed and biased samples were collected to confirm successful remediation.

473 Silver Lane, East Hartford, CT 06118 • Phone: 860.569.0095 • Fax: 860.569.0277
www.cabreraservices.com

A summary of all SU 1 soil sample results is also attached, with summary statistics for the systematic and biased samples provided in Table 1 and Table 2, respectively. All soil sample results were shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. The GWS identified areas of elevated activity within the excavation footprint for follow-up biased sampling. However, analysis of these biased samples (Table 2) did not identify ^{232}Th activity above $DCGL_W$. Therefore, no $DCGL_{EMC}$ concerns were identified.

Table 1. Systematic Sample Summary Statistics for SU 1. (All values in pCi/g)

Survey Unit	Mean	Median	Max	Standard Deviation
SU-1	0.31	0.18	0.99	0.35

Table 2. Results of SU 1 Biased Samples

Sample ID	^{232}Th (pCi/g)	2-σ Uncertainty (pCi/g)	Comments
SU1-B-59	0.77	.23	Concentration below DCGL.

Summary and Conclusion

The results of the data for SU 1 presented above have all been shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. As such, CABRERA requests authorization to backfill the open excavation to grade in SU 1.

This data serves as a partial FSS package and will be incorporated into the complete FSS data package for SU 1, which will be assembled after all excavation activities are complete.

Should you have questions or comments, please contact me at 314.703.6784

Sincerely,

//SIGNED//

John Eberlin, PMP
Project Manager
Cabrera Services, Inc.

Attachment
cc: Project File

ATTACHMENTS

Gamma Walkover Survey Results Maps for SU 1 Excavation

Onsite Gamma Spec Lab Data Summary

SU 1 Onsite Gamma Spec Lab Data Summary (all Results in pCi/g)

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Class 1 FSS Samples							
SU1-1-PR	1492	grams	12/4/2007	11:00	<MDA	N/A	0.34
SU1-2-PR	1639	grams	12/4/2007	12:45	0.42	.11	0.16
SU1-3-PR	1287	grams	12/4/2007	13:13	<MDA	N/A	0.32
SU1-4-PR	1445	grams	12/4/2007	13:33	<MDA	N/A	0.30
SU1-5-PR	1556	grams	12/5/2007	7:45	0.69	0.12	0.22
SU1-6-PR	1578	grams	12/5/2007	9:49	0.25	0.09	0.14
SU1-7-PR	2074	grams	12/5/2007	9:28	0.69	0.11	0.19
SU1-8-PR	2185	grams	12/5/2007	8:46	<MDA	N/A	0.20
SU1-9-PR	1796	grams	12/5/2007	9:10	0.69	0.11	0.19
SU1-10-PR	1662	grams	12/5/2007	10:10	0.38	0.09	0.16
SU1-10-PR-FD	1594	grams	12/5/2007	10:31	0.35	0.09	0.14
SU1-11-PR	1860	grams	12/5/2007	11:08	0.66	0.12	0.15
SU1-12-PR	1424	grams	12/5/2007	12:49	<MDA	N/A	0.31
SU1-13-PR	1665	grams	12/5/2007	12:31	<MDA	N/A	0.34
SU1-14-PR	1370	grams	12/5/2007	11:28	0.99	0.16	0.27
SU1-15-PR	1759	grams	12/5/2007	11:46	0.71	0.10	0.24
SU1-16-PR	1248	grams	12/5/2007	12:10	<MDA	N/A	0.40
SU1-17-PR	1940	grams	12/5/2007	13:07	0.41	0.09	0.15
SU1-18-PR	1370	grams	12/5/2007	13:24	<MDA	N/A	0.41
SU1-19-PR	1570	grams	12/5/2007	13:43	0.82	0.12	0.21
SU1-20-PR	1465	grams	12/5/2007	14:01	<MDA	N/A	0.28
SU1-20-PR-FD	1699	grams	12/5/2007	14:20	<MDA	N/A	0.25
SU1-21-PR	1193	grams	12/5/2007	14:39	<MDA	N/A	0.47
Biased Samples							
SU1-B-59	1393		12/7/2007	11:22	0.77	.23	0.46

Notes:
1. SU# = Survey Unit
2. PR = post-remediation
3. FD = field duplicate
4. B = bias
5. MDA = Minimum Detectable Activity

03-3040.30
December 13, 2007

Mr. David Horton, Project Manager
U.S. Army Joint Munitions Command
1 Rock Island Arsenal
Rock Island IL 61299-6000

RE: Backfill Authorization Request for Survey Unit No. 3

Dear Mr. Horton;

Cabrera Services, Inc. (CABRERA) requests authorization to backfill the open excavation in survey unit (SU) 3 within the DRMO area at the Naval Station Great Lakes. Results of the surveys and sampling performed within SU 3 have been shown to meet the criteria outlined in the *Public Private Venture Area Remediation, Addendum to Work Plan for the Remediation of the Recreation and Center Tank Areas and Site-Wide Final Status Survey (hereafter referred to as the Work Plan Addendum [WPA])*, dated May 2007. (CABRERA 2007a) as well as the recently developed derived concentration guideline level (DCGL) of 4 picocuries per gram (pCi/g) above background for thorium-232 (^{232}Th).

Summary of Results

The survey and sampling approach provided in the WPA was designed in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* for Class 1 final status surveys (FSS). Systematic soil samples on a specified grid, performance of a 100% gamma walkover survey (GWS), and collection of biased soil samples, as required, were all performed. Areas that were identified as suspected or confirmed as elevated in previous investigations at the site were test pitted, and surveyed. Excavation was directed using a 2x2 NaI detector. Those areas that exhibited readings of approximately 2x background were remediated. Following remediation the areas were re-surveyed and biased samples were collected to confirm successful remediation. None of the excavations in SU-3 contained systematic sample locations, as such the systematic data is provided to give an overall understanding of the survey unit and are not directly used to determine that the excavation is candidate for backfill.

A summary of all SU 3 soil sample results is attached, with summary statistics for the systematic and biased samples provided in

Table 1 and Table 2, respectively. All soil sample results were shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. Biased samples (Table 2) taken within the excavation did not identify ^{232}Th activity above $DCGL_W$. Therefore, no $DCGL_{EMC}$ concerns were identified.

Table 1. Systematic Sample Summary Statistics for SU 3. (All values in pCi/g)

Survey Unit	Mean	Median	Max	Standard Deviation
SU-3	0.90	0.84	1.70	0.27

Table 2. Results of SU 3 Biased Samples

Sample ID	^{232}Th (pCi/g)	2-σ Uncertainty (pCi/g)	Comments
SU3B-045 PR	0.97	0.16	Concentration below DCGL.
SU3B-046 PR	0.70	0.13	Concentration below DCGL.
SU3B-048 PR	0.67	0.12	Concentration below DCGL.
SU3B-049 PR	3.90	0.21	Concentration below DCGL.
SU3B-050 PR	1.20	0.13	Concentration below DCGL.

Summary and Conclusion

The results of the data for SU 3 presented above have all been shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. As such, CABRERA requests authorization to backfill the open excavation to grade in SU 3.

This data serves as a partial FSS package and will be incorporated into the complete FSS data package for SU 3, which will be assembled after all excavation activities are complete.

Should you have questions or comments, please contact me at 314.703.6784

Sincerely,

//SIGNED//

John Eberlin, PMP
Project Manager
Cabrera Services, Inc.

Attachment
cc: Project File

ATTACHMENTS

Gamma Walkover Survey Results Maps for SU 3 Excavation

Onsite Gamma Spec Lab Data Summary

SU 3 Onsite Gamma Spec Lab Data Summary (all Results in pCi/g)

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Class 1 FSS Samples							
SU3-42-1	1358	grams	8/2/2007	16:10	0.69	0.13	0.23
SU3-42-2	1154	grams	8/2/2007	16:27	0.94	0.14	0.28
SU3-43-1	872	grams	8/2/2007	19:50	1.70	0.23	0.44
SU3-43-2	1467	grams	8/2/2007	20:07	0.88	0.12	0.27
SU3-44-1	1127	grams	8/3/2007	14:41	1.21	0.16	0.32
SU3-44-2	1563	grams	8/3/2007	14:58	0.76	0.12	0.25
SU3-45-1	1153	grams	8/2/2007	21:03	1.07	0.18	0.28
SU3-45-4	1374	grams	8/2/2007	21:20	0.93	0.16	0.26
SU3-46-1	1181	grams	8/2/2007	12:51	0.66	0.14	0.25
SU3-46-3	1503	grams	8/2/2007	13:08	0.56	0.13	0.22
SU3-47-1	1394	grams	8/2/2007	22:12	0.84	0.12	0.28
SU3-47-3	1158	grams	8/2/2007	22:28	0.84	0.16	0.24
SU3-48-1	1117	grams	8/2/2007	16:46	1.01	0.15	0.26
SU3-48-3	1107	grams	8/2/2007	17:04	1.24	0.16	0.29
SU3-49-1	1507	grams	8/2/2007	14:36	0.57	0.12	0.20
SU3-49-3	1360	grams	8/2/2007	14:54	1.06	0.17	0.28
SU3-50-1	1312	grams	8/1/2007	19:43	0.72	0.17	0.27
SU3-50-4	1268	grams	8/1/2007	20:01	0.96	0.14	0.25
SU3-51-1	1349	grams	8/2/2007	18:01	0.93	0.16	0.26
SU3-51-3	1334	grams	8/2/2007	18:20	0.94	0.16	0.25
SU3-52-1	1228	grams	8/2/2007	14:03	1.12	0.17	0.25
SU3-52-2	1199	grams	8/2/2007	14:20	1.36	0.19	0.32
SU3-53-1	1481	grams	8/2/2007	12:12	0.84	0.14	0.22
SU3-53-3	1378	grams	8/2/2007	12:29	0.77	0.14	0.23
SU3-54-1	1102	grams	8/2/2007	18:37	0.87	0.17	0.32
SU3-54-3	1367	grams	8/2/2007	18:54	0.77	0.15	0.26
SU3-55-1	1291	grams	8/2/2007	21:37	1.59	0.16	0.25
SU3-55-3	1310	grams	8/2/2007	21:54	0.68	0.15	0.30
SU3-56-1	1198	grams	8/2/2007	19:12	0.79	0.00	0.26
SU3-56-4	1493	grams	8/2/2007	19:30	0.70	0.15	0.24
SU3-57-1	1394	grams	8/2/2007	15:12	0.71	0.13	0.23
SU3-57-3	1143	grams	8/2/2007	15:30	0.85	0.17	0.34
SU3-58-1	1327	grams	8/2/2007	20:25	0.62	0.11	0.22
SU3-58-3	1234	grams	8/2/2007	20:42	0.93	0.16	0.24
SU3-59-1	1138	grams	8/3/2007	16:31	0.56	0.13	0.22
SU3-59-3	1500	grams	8/3/2007	16:48	0.58	0.12	0.25

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Biased Samples							
SU3B-045 PR	1405	grams	11/29/2007	11:04	0.97	0.16	0.21
SU3B-046 PR	1667	grams	12/3/2007	13:44	0.70	0.13	0.21
SU3B-048 PR	1741	grams	12/3/2007	14:22	0.67	0.12	0.22
SU3B-049 PR	1727	grams	12/3/2007	12:57	3.90	0.21	0.31
SU3B-050 PR	1683	grams	12/3/2007	13:23	1.20	0.13	0.22

Notes:
1. SU# = Survey Unit
2. PR = post-remediation
3. FD = field duplicate
4. B = bias

MDA = Minimum Detectable Activity

03-3040.30
December 13, 2007

Mr. David Horton, Project Manager
U.S. Army Joint Munitions Command
1 Rock Island Arsenal
Rock Island IL 61299-6000

RE: Backfill Authorization Request for Survey Unit No. 4

Dear Mr. Horton;

Cabrera Services, Inc. (CABRERA) requests authorization to backfill the open excavation in survey unit (SU) 4 within the DRMO area at the Naval Station Great Lakes. Results of the surveys and sampling performed within SU 4 have been shown to meet the criteria outlined in the *Public Private Venture Area Remediation, Addendum to Work Plan for the Remediation of the Recreation and Center Tank Areas and Site-Wide Final Status Survey (hereafter referred to as the Work Plan Addendum [WPA])*, dated May 2007. (CABRERA 2007a) as well as the recently developed derived concentration guideline level (DCGL) of 4 picocuries per gram (pCi/g) above background for thorium-232 (^{232}Th).

Summary of Results

The survey and sampling approach provided in the WPA was designed in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* for Class 1 final status surveys (FSS). Systematic soil samples on a specified grid, performance of a 100% gamma walkover survey (GWS), and collection of biased soil samples, as required, were all performed. Areas that were identified as suspected or confirmed as elevated in previous investigations at the site were test pitted, and surveyed. Excavation was directed using a 2x2 NaI detector. Those areas that exhibited readings of approximately 2x background were remediated. Following remediation the areas were re-surveyed and biased samples were collected to confirm successful remediation. None of the excavations in SU-4 contained systematic sample locations; as such the systematic data is provided to give an overall understanding of the survey unit and are not directly used to determine that the excavation is candidate for backfill.

A summary of all SU 4 soil sample results is attached, with summary statistics for the systematic and biased samples provided in

Table 1 and Table 2, respectively. All soil sample results were shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. Biased samples (Table 2) taken within the excavation did not identify ^{232}Th activity above $DCGL_W$. Therefore, no $DCGL_{EMC}$ concerns were identified.

Table 1. Systematic Sample Summary Statistics for SU 4. (All values in pCi/g)

Survey Unit	Mean	Median	Max	Standard Deviation
SU-4	0.81	0.8	1.63	0.34

Table 2. Results of SU 4 Biased Samples

Sample ID	^{232}Th (pCi/g)	2-σ Uncertainty (pCi/g)	Comments
SU4B-047 PR	1.08	0.16	Concentration below DCGL.
SU4B-053 PR	0.82	0.17	Concentration below DCGL.

Summary and Conclusion

The results of the data for SU 4 presented above have all been shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. As such, CABRERA requests authorization to backfill the open excavation to grade in SU 4.

This data serves as a partial FSS package and will be incorporated into the complete FSS data package for SU 4, which will be assembled after all excavation activities are complete.

Should you have questions or comments, please contact me at 314.703.6784

Sincerely,

//SIGNED//

John Eberlin, PMP
Project Manager
Cabrera Services, Inc.

Attachment
cc: Project File

ATTACHMENTS

Gamma Walkover Survey Results Maps for SU 4 Excavation

Onsite Gamma Spec Lab Data Summary

SU 4 Onsite Gamma Spec Lab Data Summary (all Results in pCi/g)

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Class 1 FSS Samples							
SU4-62-1	961	grams	8/2/2007	9:05	0.54	0.15	0.28
SU4-62-2	1004	grams	8/2/2007	9:23	0.45	0.14	0.20
SU4-64-1	1334	grams	8/3/2007	11:41	0.96	0.14	0.24
SU4-64-2	1100	grams	8/3/2007	11:57	1.63	0.20	0.29
SU4-65-1	841	grams	8/2/2007	9:40	1.11	0.18	0.25
SU4-65-3	1176	grams	8/2/2007	9:57	1.18	0.17	0.21
SU4-66-1	1144	grams	7/31/2007	17:11	0.50	0.11	0.24
SU4-66-3	1576	grams	7/31/2007	17:32	0.79	0.11	0.21
SU4-67-1	1448	grams	8/3/2007	17:48	0.94	0.15	0.25
SU4-67-2	1522	grams	8/3/2007	18:06	1.03	0.15	0.29
SU4-68-1	892	grams	8/4/2007	11:18	0.68	0.16	0.26
SU4-68-2	1215	grams	8/4/2007	11:34	1.04	0.17	0.28
SU4-69-1	1010	grams	8/3/2007	11:05	0.27	0.12	0.21
SU4-69-3	1383	grams	8/3/2007	11:23	0.71	0.15	0.24
SU4-70-1	1278	grams	8/2/2007	8:19	0.99	0.17	0.31
SU4-70-3	1424	grams	8/2/2007	8:47	1.27	0.16	0.22
SU4-71-1	1168	grams	8/2/2007	7:46	0.81	0.16	0.30
SU4-71-4	1599	grams	8/2/2007	8:03	0.74	0.12	0.22
SU4-72-1	1233	grams	8/1/2007	23:22	0.92	0.15	0.25
SU4-72-4	1328	grams	8/2/2007	7:28	1.04	0.18	0.30
SU4-73-1	879	grams	8/2/2007	13:27	0.78	0.17	0.33
SU4-73-3	1396	grams	8/2/2007	13:44	0.51	0.13	0.26
SU4-74-1	1194	grams	8/3/2007	9:23	0.59	0.14	0.28
SU4-74-3	863	grams	8/3/2007	9:40	0.95	0.19	0.33
SU4-75-1	807	grams	8/1/2007	17:53	<MDA	N/A	0.66
SU4-75-2	1212	grams	8/1/2007	18:10	0.75	0.14	0.22
SU4-76-1	1356	grams	8/1/2007	22:12	1.61	0.17	0.28
SU4-76-2	1339	grams	8/1/2007	22:29	0.92	0.13	0.28
SU4-77-1	1587	grams	8/1/2007	17:16	0.68	0.13	0.21
SU4-77-4	1575	grams	8/1/2007	17:36	0.97	0.13	0.29
SU4-78-1	1041	grams	8/1/2007	18:27	0.66	0.15	0.31
SU4-78-2	1560	grams	8/1/2007	18:50	0.94	0.12	0.24
SU4-79-1	1207	grams	8/2/2007	10:51	1.05	0.15	0.25
SU4-79-3	1405	grams	8/2/2007	11:12	1.24	0.16	0.29
SU4-80-1	1140	grams	8/1/2007	19:09	<MDA	N/A	0.48
SU4-80-4	1317	grams	8/1/2007	19:26	0.99	0.16	0.27
SU4-81-1	1225	grams	8/2/2007	11:33	0.45	0.15	0.26
SU4-81-4	1346	grams	8/2/2007	11:55	0.80	0.15	0.27
SU4-82-1	1366	grams	8/1/2007	21:13	0.69	0.12	0.22
SU4-82-3	1335	grams	8/1/2007	21:34	0.99	0.15	0.23
SU4-83-1	1218	grams	8/3/2007	12:15	0.34	0.13	0.22
SU4-83-4	1213	grams	8/3/2007	13:32	0.67	0.14	0.24

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Biased Samples							
SU4B-047 PR	1629	grams	12/3/2007	14:02	1.08	0.16	0.28
SU4B-053 PR	1669	grams	12/4/2007	7:56	0.82	0.17	0.35

Notes:
1. SU# = Survey Unit
2. PR = post-remediation
3. FD = field duplicate
4. B = bias

MDA = Minimum Detectable Activity

03-3040.30
December 13, 2007

Mr. David Horton, Project Manager
U.S. Army Joint Munitions Command
1 Rock Island Arsenal
Rock Island IL 61299-6000

RE: Backfill Authorization Request for Survey Unit No. 5

Dear Mr. Horton;

Cabrera Services, Inc. (CABRERA) requests authorization to backfill the open excavation in survey unit (SU) 4 within the DRMO area at the Naval Station Great Lakes. Results of the surveys and sampling performed within SU 5 have been shown to meet the criteria outlined in the *Public Private Venture Area Remediation, Addendum to Work Plan for the Remediation of the Recreation and Center Tank Areas and Site-Wide Final Status Survey (hereafter referred to as the Work Plan Addendum [WPA])*, dated May 2007. (CABRERA 2007a) as well as the recently developed derived concentration guideline level (DCGL) of 4 picocuries per gram (pCi/g) above background for thorium-232 (^{232}Th).

Summary of Results

The survey and sampling approach provided in the WPA was designed in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* for Class 1 final status surveys (FSS). Systematic soil samples on a specified grid, performance of a 100% gamma walkover survey (GWS), and collection of biased soil samples, as required, were all performed. Areas that were identified as suspected or confirmed as elevated in previous investigations at the site were test pitted, and surveyed. Excavation was directed using a 2x2 NaI detector. Those areas that exhibited readings of approximately 2x background were remediated. Following remediation the areas were re-surveyed and biased samples were collected to confirm successful remediation. None of the excavations in SU-5 contained systematic sample locations; as such the systematic data is provided to give an overall understanding of the survey unit and are not directly used to determine that the excavation is candidate for backfill.

A summary of all SU 5 soil sample results is attached, with summary statistics for the systematic and biased samples provided in Table 1 and Table 2, respectively. All soil sample results were shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. Biased samples (Table 2) taken within the excavation did not identify ^{232}Th activity above $DCGL_W$. Therefore, no $DCGL_{EMC}$ concerns were identified.

Table 1. Systematic Sample Summary Statistics for SU 5. (All values in pCi/g)

Survey Unit	Mean	Median	Max	Standard Deviation
SU-5	0.8	0.79	1.26	0.29

Table 2. Results of SU 5 Biased Samples

Sample ID	^{232}Th (pCi/g)	2-σ Uncertainty (pCi/g)	Comments
SU5-B51	1.01	0.15	Concentration below DCGL.
SU5-B52	0.98	0.13	Concentration below DCGL.
SU5-B54	2.39	0.21	Concentration below DCGL.

Summary and Conclusion

The results of the data for SU 5 presented above have all been shown to be below the $DCGL_W$ of 4 pCi/g for ^{232}Th. As such, CABRERA requests authorization to backfill the open excavation to grade in SU 5.

This data serves as a partial FSS package and will be incorporated into the complete FSS data package for SU 5, which will be assembled after all excavation activities are complete.

Should you have questions or comments, please contact me at 314.703.6784

Sincerely,

//SIGNED//

John Eberlin, PMP
Project Manager
Cabrera Services, Inc.

Attachment
cc: Project File

ATTACHMENTS

Gamma Walkover Survey Results Maps for SU 5 Excavation

Onsite Gamma Spec Lab Data Summary

SU 5 Onsite Gamma Spec Lab Data Summary (all Results in pCi/g)

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Class 1 FSS Samples							
SU5-101-1	1098	grams	8/1/2007	20:19	0.57	0.15	0.24
SU5-101-2	1359	grams	8/1/2007	20:37	0.85	0.15	0.24
SU5-102-1	1520	grams	7/31/2007	20:33	0.68	0.14	0.20
SU5-102-3	1303	grams	7/31/2007	20:50	1.11	0.17	0.30
SU5-103-1	1277	grams	8/3/2007	15:18	1.10	0.18	0.33
SU5-103-2	1451	grams	8/3/2007	15:38	0.92	0.15	0.24
SU5-104-1	1273	grams	8/3/2007	15:56	1.18	0.17	0.27
SU5-104-2	1327	grams	8/3/2007	16:14	1.07	0.16	0.25
SU5-105-1	1161	grams	8/3/2007	22:12	0.58	0.16	0.26
SU5-105-3	1371	grams	8/3/2007	22:30	0.93	0.16	0.30
SU5-84-1	1539	grams	8/3/2007	17:09	0.78	0.12	0.22
SU5-84-4	1595	grams	8/3/2007	17:29	0.67	0.12	0.20
SU5-85-1	869	grams	8/3/2007	12:49	0.75	0.18	0.23
SU5-85-3	1019	grams	8/3/2007	13:11	1.21	0.00	0.35
SU5-86-1	885	grams	8/3/2007	20:55	0.66	0.21	0.25
SU5-86-3	1403	grams	8/3/2007	21:12	0.55	0.13	0.24
SU5-87-1	1207	grams	8/1/2007	22:46	0.84	0.15	0.23
SU5-87-4	1289	grams	8/1/2007	23:03	1.08	0.16	0.26
SU5-88-1	1263	grams	8/3/2007	10:31	1.15	0.16	0.29
SU5-88-2	1387	grams	8/3/2007	10:47	0.79	0.15	0.30
SU5-89-1	1221	grams	8/4/2007	9:38	0.55	0.12	0.23
SU5-89-2	1230	grams	8/4/2007	9:55	0.68	0.14	0.26
SU5-90-1	968	grams	8/3/2007	21:32	0.58	0.16	0.31
SU5-90-2	1167	grams	8/3/2007	21:49	0.76	0.18	0.29
SU5-91-1	1384	grams	8/7/2007	9:53	0.73	0.14	0.24
SU5-91-3	1430	grams	8/7/2007	10:09	0.65	0.13	0.25
SU5-92-1	1506	grams	7/31/2007	19:55	0.21	0.08	0.16
SU5-92-4	1539	grams	7/31/2007	20:12	0.64	0.12	0.21
SU5-100-1	1170	grams	8/2/2007	10:13	1.26	0.18	0.29
SU5-93-1	1001	grams	8/7/2007	14:24	1.13	0.19	0.35
SU5-93-2	1275	grams	8/7/2007	14:42	1.02	0.17	0.28
SU5-93-3	1527	grams	8/2/2007	10:30	0.94	0.13	0.26
SU5-94-1	1136	grams	7/31/2007	19:13	0.90	0.16	0.29
SU5-94-2	1775	grams	7/31/2007	19:31	0.72	0.12	0.20
SU5-95-1	1128	grams	7/31/2007	21:08	0.95	0.17	0.30
SU5-95-4	1468	grams	7/31/2007	21:25	1.02	0.15	0.23
SU5-96-1	1066	grams	8/3/2007	18:25	0.98	0.18	0.36
SU5-96-2	1455	grams	8/3/2007	18:42	0.81	0.15	0.25
SU5-97-1	949	grams	8/3/2007	22:52	<MDA	N/A	0.51
SU5-97-4	1226	grams	8/3/2007	23:12	0.65	0.15	0.29
SU5-98-1	1056	grams	8/3/2007	14:04	0.00	N/A	0.46
SU5-98-3	1116	grams	8/3/2007	14:23	0.76	0.15	0.27

Filename	Sample Size	Units	Date Started	Time Started	^{228}Ac-(^{232}Th)	2σ Uncert	MDA
Biased Samples							
SU5-B51	1545	grams	12/4/2007	10:40	1.01	0.15	0.21
SU5-B52	1751	grams	12/3/2007	14:41	0.98	0.13	0.23
SU5-B54	1655	grams	12/4/2007	8:36	2.39	0.21	0.37

Notes:
1. SU# = Survey Unit
2. PR = post-remediation
3. FD = field duplicate
4. B = bias

MDA = Minimum Detectable Activity

APPENDIX G

SITE-SPECIFIC DCGL DOCUMENT SUBMISSION

FINAL

SITE-SPECIFIC
DERIVED CONCENTRATION GUIDELINE LEVEL

ADDENDUM

NAVAL STATION GREAT LAKES
RADIOLOGICAL REMEDIATION
GREAT LAKES, ILLINOIS

Navy Control Number 2006-009
Contract number DAAA09-02-D-0024/30

Prepared for:
DEPARTMENT OF THE ARMY
HEADQUARTERS, JOINT MUNITIONS COMMAND
ROCK ISLAND, IL

Prepared by:

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION
103 E. Mount Royal Ave., Suite 2B
Baltimore, Maryland

September 2007

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Appendix A RESRAD Input Parameters

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
cc	cubic centimeter
CFR	Code of Federal Regulations
cm	centimeter
cm^3	cubic centimeters
DCGL	derived concentration guideline level
DSR	dose-to-source ratio
EPA	U. S. Environmental Protection Agency
EMC	elevated measurement comparison
g	gram
K_d	element partition coefficient
m	meter
m^2	square meter
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picocurie per gram
RCOC	radionuclide contaminant of concern
TEDE	total effective dose equivalent
yr	year
^{228}Ra	radium-228
^{228}Th	thorium-228
^{232}Th	thorium-232

1.0 INTRODUCTION

This report is an addendum to the site-specific derived concentration guideline level (DCGL) for the radionuclide contaminants of concern (RCOC) in soil at the Naval Station Great Lakes (hereafter referred to as the Site) resulting from storage of monazite sand in 1974. The original site-specific DCGL was based on an "industrial use" scenario. However, after further consideration, it has been determined that a more conservative approach to achieve unrestricted use of the Site is appropriate. Therefore, a "resident gardener" is proposed in lieu of an "industrial use" scenario.

1.1 Purpose

The purpose of the analyses presented in this report is to provide a site-specific DCGL in support of decisions regarding the need for additional remediation at the Site and/or demonstrating that the Site can be release for unrestricted use. Specifically, when the DCGL is applied to the final status survey and the survey data demonstrates that the DCGL has been satisfied, the following requirements of Title 10, Code of Federal Regulations (CFR), Part 20 (10 CFR 20), Paragraph 1402 (10 CFR 20.1402) are achieved:

> *A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem per year, including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are ALARA must take into account the consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.*

In addition to 10 CFR 20, several Nuclear Regulatory Commission (NRC) and Environmental Protection Agency (EPA) reference documents were used in the derivation of the site-specific DCGL presented in this report.

2.0 DETERMINATION OF DERIVED CONCENTRATION GUIDELINE LEVEL

Methods for determining the DCGL involved a three step process, presented in order in this section:

1. Identifying the regulatory limit for the total effective dose equivalent (TEDE) per year, to which an acceptable level of residual contamination corresponds;
2. Developing a site environmental model (conceptual site model) that accounts for the physical characteristics of the site, identifies exposure pathways from the residual radioactivity, and computes the annual TEDE per unit concentration of natural thorium and natural uranium;
3. Using RESRAD Version 6.3 (Yu 2005) to calculate the TEDE per year per unit concentration or area, respectively, of natural thorium. Computation models must output the TEDE as a function of time, out to 1000 years, to determine allowable soil concentrations to meet the requirements of 10 CFR 20.1402. Microsoft Excel was utilized to generate additional output results based on the dose assessment model results.

2.1 Annual Public Dose Limit

The NRC annual dose limit for a member of the public is 100 mrem TEDE associated with licensed activities and exclusive of background (and other) sources, as specified in 10 CFR 20.1301. As described in Section 1.1 of this report, 10 CFR 20.1402, *Radiological Criteria for Unrestricted Use*, specifies that an average member of the critical population group may not receive a TEDE in excess of 25 mrem, including groundwater sources of drinking water. The RESRAD model utilized this required input parameter (25 mrem) for the applicable dose limit to establish the resulting DCGL for the Site

2.2 Conceptual Site Model

The conceptual site model has been developed on the basis of Site review, how the Site is currently used and the most probable use of the Site once released, and a complete understanding of the most relevant exposure pathways to occupants/residents on the Site.

Figure 2-1, from the *Users Manual for RESRAD Version 6* (Yu 2001), presents all potential exposure pathways, using a worst case, resident farmer exposure scenario.

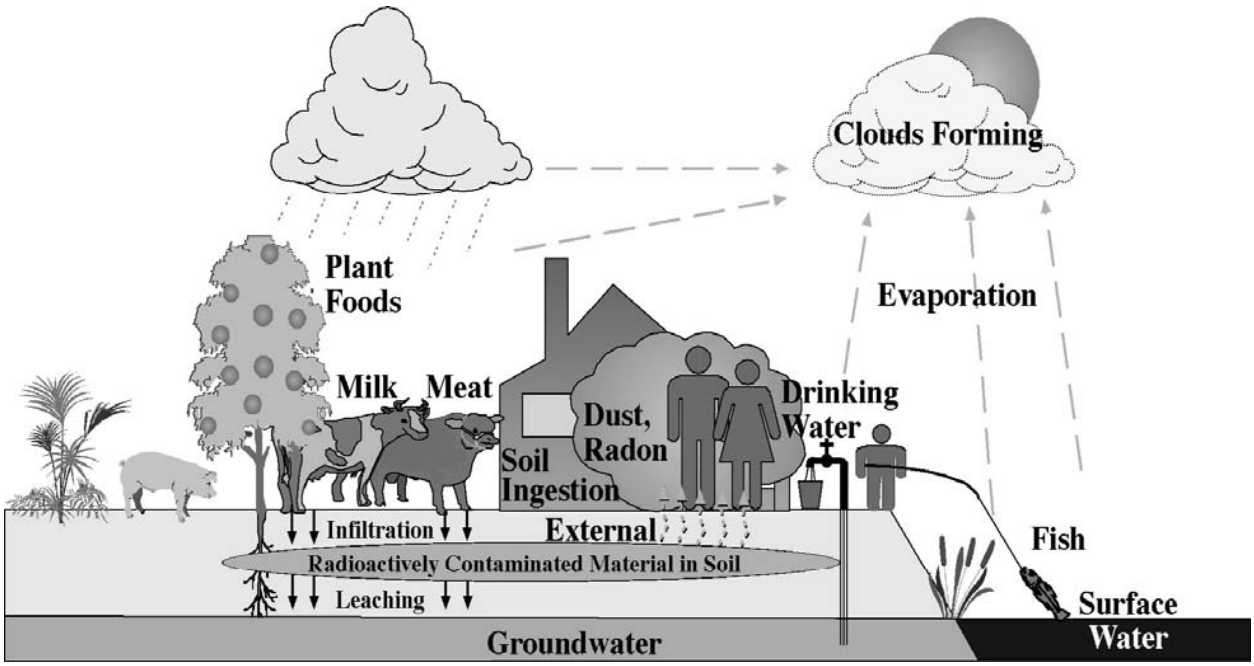

Figure 2-1: Exposure Pathways Considered in RESRAD

This is also presented schematically in Figure 2-2.

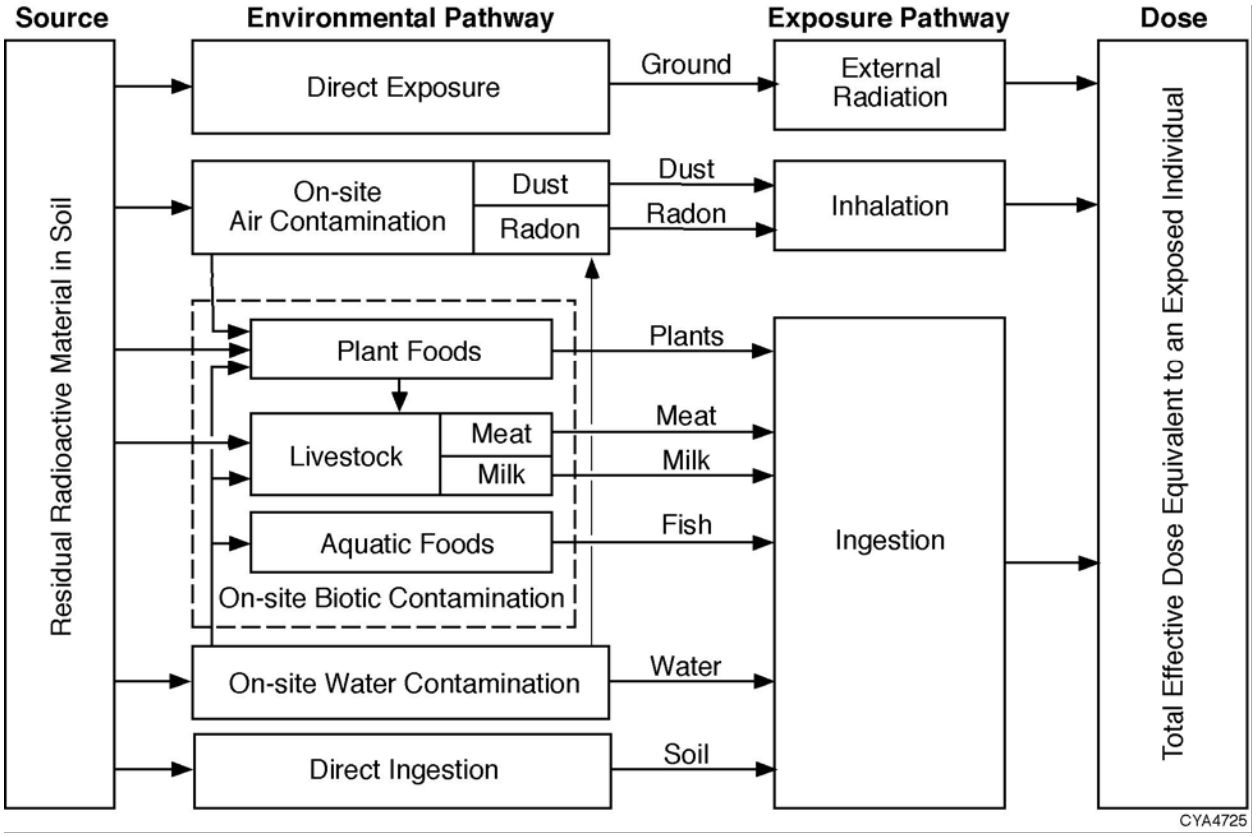

Figure 2-2: Schematic Representation of RESRAD Pathways

As mentioned previously, Figures 2-1 and 2-2 present all potential exposure pathways for a worst case resident farmer scenario. This assumes the area of a site that may be occupied by a future resident is large enough to support raising livestock for meat and milk, and growing crops, fruit, etc. to support a large portion of the resident farmer's dietary intake needs, as well as provide feed for livestock. The Site, however, is not in a rural location conducive to farming activities at present nor will this be the most plausible future land use. Therefore, a site-specific exposure scenario is proposed based on the following justifications:

- The Site is located in an urbanized area of Lake County, used predominantly for single and multi-family residences, as well as industrial use.
- The Site is currently bounded on all sides by residential areas and industrial properties.
- The Site is approximately 36 miles from Chicago, Illinois, which is a rapidly expanding urban area.
- Portions of the Site are already designated for residential use and privatization efforts are underway to further utilize this area for residential purposes.

- The size of residential properties at the Site is typical of residential lots, averaging approximately 0.25 acres but not exceeding 0.5 acres. This property size is not sufficient to support a farm with livestock as a source of food and milk or raising crops for food. Additionally, typical urban area zoning ordnances prohibit raising livestock.
- The western portion of the Site, bounded on the west by the Site boundary and on the east by Mississippi Avenue, formerly designated Site 18, is currently an industrial area. This portion of the Site will continue to be used for industrial purposes in the foreseeable future. However, although unlikely, future changes in land use may utilize this portion of the Site for residential property expansion.

Given the above considerations regarding current and most probable future land use, the "critical group" is determined to be a relatively small group of residents who reside at the Site and obtain a small portion of their food from a backyard garden, i.e., resident gardener. Although a majority of residents in urban areas do not maintain a garden of any size for this purpose, this "critical group" is chosen as the worst case bounding condition for determining the individual who could receive the highest hypothetical exposure at some time in the future. As such, the exposure to a majority of residents who do not maintain a garden will be lower.

Exposure pathways considered in the resident gardener model are discussed below:

- Although potable water is supplied to the Site by public water sources, the resident gardener scenario developed for the Site assumes the resident does install a well on the property to provide a source of drinking water. This is believed highly unlikely, but provides a reasonable amount of conservatism in the model. It should be noted that considering the very low thorium mobility in soil, leaving the water pathway "on" has no impact on the resulting site-specific DCGL for natural thorium compared to values generated with the water pathway suppressed.
- There are no bodies of water on the Site of sufficient size to support aquatic life to provide a source of food for a resident gardener. Therefore, the aquatic foods pathway is not considered in the Site model.
- The radon pathway is suppressed in this assessment due to its inapplicability. In a Federal Register Notice (NRC 1994), issued as a result of comments received from a radon workshop, the NRC noted that "radon would not be evaluated when developing release

criteria due to: the ubiquitous nature of radon in the general environment, the large uncertainties in the models used to predict radon concentrations; and the inability to distinguish between naturally occurring radon and that which occurs due to licensed activities."

Complete exposure pathways applicable to the resident gardener scenario include:

1. Direct radiation from radionuclides in the soil,
2. Inhalation of re-suspended contaminated dust,
3. Ingestion of home grown produce in the contaminated soil,
4. Ingestion of water from a contaminated well, and
5. Ingestion of contaminated soil.

These exposure pathways are depicted in the adjustment to the schematic representation of RESRAD pathways in Figure 2-3.

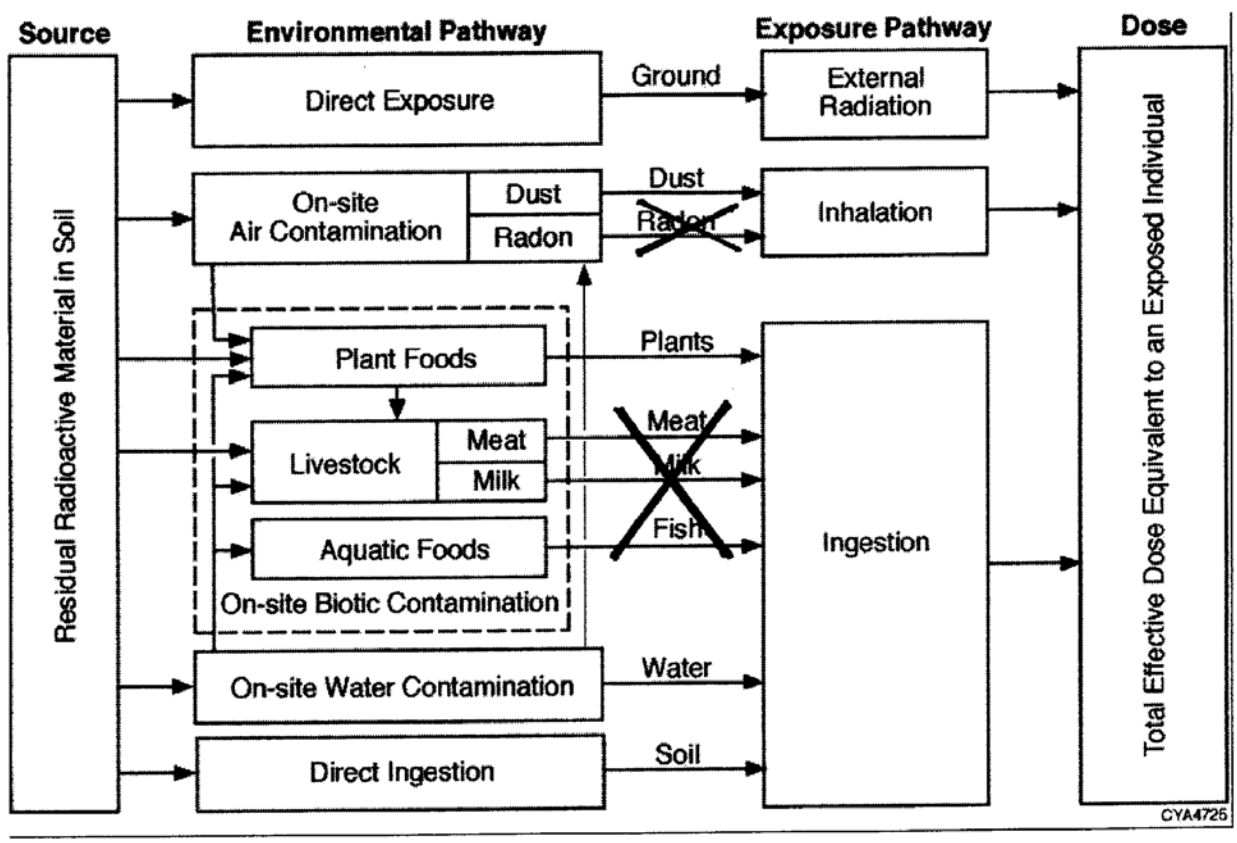

Figure 2-3: Adjusted Schematic of RESRAD Pathways for Resident Gardener

As will be shown, direct exposure to radiation from soil contamination, i.e., external radiation, results in the greatest contribution to dose. Direct ingestion of soil and foods grown in a garden contribute minimally to the dose. Consumption of water from a well placed on the resident's property has no contribution to the dose.

2.3 RESRAD Input Parameters

2.3.1 General Basis for the Dose Modeling Assessment

The following general assumptions formed the basis for the dose modeling assessments:

- The resident gardener scenario is applicable to soils at the Site.
- The DCGL for soil was derived based on a review of site surveys, sampling and prior remediation.
- Site-specific values, where available, were used as input to the RESRAD code. In lieu of site-specific values, NRC values, principally from NUREG/CR-5512, Volume 3 (NRC 1999a), NUREG/CR-5512, Volume 4 (NRC 1999b), and NUREG/CR-6697 (NRC 2000b); EPA *Soil Screening Guidance for Radionuclides: User's Guide* (EPA 2000); RESRAD default values; or information contained in the RESRAD manual (Yu 2001) were used to determine the selected inputs to the code.
- Each parameter and user input selection was evaluated individually and collectively for its appropriateness to the Site. As an example, distribution coefficients for specific elements of interest were ultimately determined based on the soil type comprising the contaminated zone. This was determined to be primarily silty clay loam (with some areas predominantly clay) (USDA 2006a). Corresponding values provided in Table 32.1 of the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993) were selected for this type of soil matrix. This same matrix and coefficient value was used for the unsaturated and saturated zones.
- The most recent version of RESRAD (Version 6.3) was used for this assessment.
- Where appropriate, parameter values were selected or determined using values provided by the EPA (EPA 2000).

2.3.2 Specific Justification for Parameter Selection

All parameters utilized in the RESRAD evaluations for natural thorium are listed with justifications for their selection in Appendix A.

The following parameters, taken from Appendix A, were specifically selected for further discussion.

2.3.2.1 Pathway Selection

Pathways applicable to the resident gardener scenario were selected. These included direct exposure from external sources, inhalation of dust, plant ingestion, water ingestion and soil ingestion. The meat, milk and aquatic food pathways were suppressed. Additionally, the radon pathway was suppressed for reasons previously discussed.

2.3.2.2 Source Term

Thorium-232 (^{232}Th), thorium-228 (^{238Th}) and radium-228 (^{228}Ra) constitute the principal radionuclides for the thorium decay chain. Secular equilibrium between the parent and decay products was assumed.

2.3.2.3 Radionuclide Concentrations

Unit concentrations of one picocurie per gram (1 pCi/g) for each of the Site radionuclides of concern were used. This approach provided dose-to-source ratios (DSRs), i.e., dose per unit concentration (mrem/y per pCi/g) which when divided into the primary dose limit resulted in a DCGL for that radionuclide in units of pCi/g.

2.3.2.4 Area of Contamination Zone

The contaminated zone is an area in which radionuclides are present in above background concentrations. The contaminated zone was modeled with no cover depth under the assumptions that contaminated silty clay loam existed to a depth of one meter. The primary case assumed a contaminated area of 10,000 square meters. Additional, smaller areas were then evaluated by reducing the contaminated area and length parallel to the aquifer while keeping all other parameters constant (in all cases the length parallel to the aquifer was assumed to be equal to the square root of the contaminated area).

2.3.2.5 Thickness of Contaminated Zone

Contamination was assumed to extent to a depth of 0.46 meters (one and a half feet). This was based on previous remediation requirements and results in a conservative approach since soil contamination in most remaining areas is expected to be found within the top 6 inches of soil (15 centimeters).

2.3.2.6 Cover Depth

The cover depth corresponds to the distance to the uppermost contaminated soil. No cover depth was assumed overlying the contaminated area for conservatism in the model.

2.3.2.7 Soil Density

The U.S. Department of Agriculture, Natural Resources Conservation Service, measured the density of soil samples obtained from many locations at the Site (USDA 2006b). For silty clay loam, which covers much of the Site, the soil density had a range of 1.2 to 1.7 grams per cubic centimeter (g/cc). This was obtained from samples from 0 to 60 inches below ground surface. Therefore, the RESRAD default of 1.5 g/cc was determined appropriate.

2.3.2.8 Elemental Distribution (partition) Coefficients (K_d)

This parameter is one of the most important to understand as it relates to contaminant migration and retardation in soil. Site-specific values for this parameter were not determined based on actual sample analysis, but were obtained from "look-up" values in Table 32.1 in the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993). Partition coefficients for elements in this table are provided for four different soil types; sand, loam, clay and organic. The following table provides the K_d values for the elements of concern at the Site for loam and clay soil types.

TABLE 2-1: ELEMENT PARTITION COEFFICIENTS (K_d)

Element	Loam K_d (cm^3/g)	Clay K_d (cm^3/g)
Thorium (Th)	3,300	5,800
Radium (Ra)	36,000	9,100

As indicated in the above Table, the K_d values for the two soil types are considerably different. However, the corresponding dose from the RESRAD model using natural thorium (and decay products) as the contaminant with K_d values for loam versus K_d values for clay do not differ. Therefore, K_d is not a sensitive parameter for natural thorium in soil at the Site.

2.3.2.9 Contaminated Zone Hydraulic Conductivity

The hydraulic conductivity, in meters per year (m/yr), for the contaminated zone (and unsaturated zone) were assumed to be a factor of 10 less than the saturated zone hydraulic conductivity for silty clay loam in Table 5.2 of the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993) or 5.36 m/yr.

2.3.2.10 Saturated Zone "b" Parameter

The soil specific exponential "b" parameter (unitless) is one of several hydrological parameters used to calculate the radionuclide leaching rate of the contaminated zone. The "b" parameters used in the Site model for the contaminated, unsaturated and saturated zones are 7.75 for silty clay loam and 11.40 for clay (Yu 1993).

2.3.2.11 Unsaturated Zone Thickness

The unsaturated zone thickness is the thickness of soil between the bottom of the contaminated zone and the water table. The unsaturated zone thickness used for the Site model is 1.54 meters. This value is derived by subtracting the contaminated zone thickness (0.46 meters) from the distance below ground surface to the water table, which for the Site is assumed to be 2 meters.

2.3.2.12 Groundwater Concentrations and Solubility Constants

The lack of site-specific groundwater and solubility data precluded the input of groundwater concentrations. The groundwater (water dependent) pathway for thorium was an "active" pathway for conservative dose modeling purposes. However, given the relatively immobile nature of thorium, groundwater contamination is not considered viable.

2.3.2.13 External Gamma Radiation Pathway

The external gamma pathway is the predominant, most significant pathway in the DCGL determination for thorium at the Site. Appendix A cites the input values selected for shielding factors and the fraction of time spent indoors/outdoors. For the resident gardener exposure scenario, these three values were obtained from the EPA (EPA 2000).

2.3.2.14 Ingestion Pathway

The significance of the dietary and non-dietary parameters on the DCGL determination is minimal for natural thorium. For the resident gardener exposure scenario, the parameter input values for the ingestion pathways were obtained from the EPA *Soil Screening Guidance for Radionuclides: User's Guide* (EPA 2000).

2.3.2.15 Radon Parameters

As noted previously, this pathway was "suppressed" in the evaluation.

3.0 RESULTS

Previous sections of this report have detailed the approach and methodology for determining the DCGL for natural thorium. This section utilizes the preceding information to provide the results of the dose assessments for natural thorium in soil at the Site.

3.1 Site-Specific DCGL

3.1.1 Radiological Parameter Inputs to the RESRAD Code

The following inputs and approach were applied to the RESRAD DCGL determination:

- Principal radionuclides and decay products are in secular equilibrium
  - natural thorium
- A normalized (unit) concentration of 1 pCi/g per radionuclide was applied.
- Doses were calculated (by radionuclide) as a function of time, up to 1,000 years.
- The peak dose over the 1,000 year time period was determined (per unit activity of the parent radionuclide).
- Resulting dose-to-source ratios (DSRs) were compared to the NRC regulatory exposure limit of 25 mrem per year, resulting in a DCGL (pCi/g), using the following equation:

$$\text{DCGL (pCi/g)} = 25 \text{ mrem} / \text{DSR (mrem per pCi/g)}$$

3.1.2 RESRAD Results

3.1.2.1 Natural Thorium

Because natural thorium (^{232}Th and decay products) is the Site contaminant in soil within the areas of concern, this radionuclide, with decay products in secular equilibrium, was used in the model to investigate environmental transport and resulting exposure.

Dose Contribution from All Pathways

For the analysis of natural thorium in Site soil, the maximum (summed) dose of 6.21 mrem is delivered at time (t) = “0” years. This dose assumes a maximum contaminated area of 10,000 square meters, with a depth of contaminants in soil of 0.46 meters. Numerous additional evaluations were performed with reduced contaminated areas. As expected, the maximum (summed) dose delivered is reduced as the area is reduced. One important aspect of the evaluation is that the maximum delivered dose does not vary considerably when the contaminated area is 1,000 square meters or greater (up to the maximum of 10,000 square meters).

Significant Pathways

The external dose pathway for this model is the greatest contributor to the total dose delivered. As expected, the parameters associated with this pathway have the most significant impact on the total dose. These parameters include:

- Gamma shielding factor
- Fraction of time spent indoors (on an annual basis)
- Fraction of time spent outdoors (on an annual basis)

Natural Thorium Site-Specific DCGL

The maximum DSR for natural thorium (^{232}Th and decay products) in soil at the Site was determined to be:

5.61 mrem/yr per pCi/g

Using the equation in Section 3.1.1, the site-specific DCGL for natural thorium, determined by dividing the annual dose limit by the DSR, is:

Site-Specific DCGL = 25 mrem/5.61 mrem/yr per pCi/g = 4.46 pCi/g

As a conservative measure and in keeping with the ALARA requirement in 10 CFR 20, this has been rounded down to 4.0 pCi/g. Therefore, the final site-specific DCGL which can be applied to any portion of the Site is **4.0 pCi/g**.

This site-specific DCGL is applicable to ^{232}Th and each decay product under the assumption that all decay products are in secular equilibrium with the parent and possess radiological half-lives greater than 180 days (RESRAD recommended half-life cutoff for dose calculations). Therefore, if the ^{232}Th activity in Site soil does not exceed 4.0 pCi/g, the total dose to a future resident gardener will not exceed 25 mrem per year TEDE.

3.2 Area Factors

An area factor (A_m) is defined in NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (NRC 2000a), as follows:

> *A factor used to adjust $DCGL_w$ to estimate $DCGL_{EMC}$ and the minimum detectable concentration for scanning surveys in Class 1 survey units---$DCGL_{EMC} = DCGL_w \times A_m$. A_m is the magnitude by which the residual radioactivity in a small area of elevated activity can exceed the DCGLw while maintaining compliance with the release criterion.*

Area factors were generated for natural thorium in Site soil. To accomplish this, the RESRAD parameter for contaminated area size and length of contaminated area parallel to the aquifer (assumed to be equal to the square root of the contaminated area size) were adjusted while keeping all other parameters constant. The area factors were then computed by taking the ratio of the dose per unit concentration generated by RESRAD for the 10,000 square meter area to that generated for the smaller area. If the DCGL for residual radioactivity distributed over 10,000 square meters is multiplied by the area factor (for the appropriate contaminated area size), the resulting concentration distributed over the smaller area delivers the same calculated dose. Area factors for the Site are provided in Table 3-1.

TABLE 3-1: SITE AREA FACTORS

Nuclide	Area Factor								
	1 m^2	**5 m^2**	**10 m^2**	**50 m^2**	**100 m^2**	**300 m^2**	**1000 m^2**	**3000 m^2**	**10000 m^2**
Th-nat	10.3	3.6	2.5	1.5	1.4	1.2	1.0	1.0	1.0

An example of the use of the area factors is provided below:

> Assume that an area of interest at the Site is identified and the size of the contaminated area is 100 square meters. The adjusted natural thorium site-specific DCGL for this area is:

$$4.0 \text{ pCi/g} \times 1.4 = 5.6 \text{ pCi/g}$$

If the $DCGL_{EMC}$ is used, a final evaluation will be necessary to verify residual radioactivity within the survey unit results in a total effective dose equivalent not greater than 25 mrem year using MARSSIM Equation 8-2.

4.0 SUMMARY AND CONCLUSIONS

A site-specific DCGL for natural thorium in soil has been generated for use in remediation planning and/or verification that applicable regulatory dose requirements have been achieved at the Naval Station Great Lakes. In determining the DCGL several conservative and reasonable factors were utilized in the dose modeling assessments. These included:

- Selection of a resident gardener scenario as the conceptual site model and critical population group. Although it can't be ruled out, very few residents in urban areas actually use gardens for any significant amount of their dietary needs. Also, portions of the Site will most likely remain as industrial areas. However, the assessments performed assume the industrial area is used at some time in the future for urban residential expansion.
- No credit was taken for the potential dilution of contaminated soil with clean soil which will occur in the process of gardening, area renovations, landscaping and new construction.
- The depth of contamination in soil at the Site was assumed to be 0.46 meters. This was based on remediation performed in some areas of the Site.

Many other input parameters to the dose modeling code were used with justification for the use of all input parameters provided.

A unit concentration of 1 pCi/g for the Site radionuclides of concern (natural thorium with decay products in secular equilibrium) were used in the RESRAD evaluations. This approach provided dose-to-source ratios (DSRs) in units of mrem/yr per pCi/g, calculated for exposed individuals over a 1000 year time period. The DSRs represent the maximum dose to a member of the critical population group (resident gardener) over the 1000 year time period. A DCGL (pCi/g) for the radionuclide of concern in Site soil was determined by dividing the DSR into the primary dose limit of 25 mrem per year.

As a result of the RESRAD analysis, the site-specific DCGL for natural thorium in Site soil using resident gardener input parameters was determined to be **4.0 pCi/g**.

The site-specific DCGL represent the amount of soil contamination above background that would result in a total effective dose equivalent (TEDE) of 25 mrem to a member of the critical group in an area of 10,000 square meters uniformly contaminated with natural thorium to a depth of 0.46 meters. This DCGL is applicable to the parent, as well as each of the individual decay products associated with natural thorium.

5.0 REFERENCES

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(Yu 1993) EAIS-8, *Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil*, Argonne National Laboratory, C. Yu, et. al., April 1993.

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FINAL

SITE-SPECIFIC
DERIVED CONCENTRATION GUIDELINE LEVEL

NAVAL STATION GREAT LAKES
RADIOLOGICAL REMEDIATION
GREAT LAKES, ILLINOIS

Navy Control Number 2006-009
Contract number DAAA09-02-D-0024/30

Prepared for:
DEPARTMENT OF THE ARMY
HEADQUARTERS, JOINT MUNITIONS COMMAND
ROCK ISLAND, IL

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Baltimore, Maryland

March 2007

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LIST OF ACRONYMS

AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
bgs	below ground surface
CABRERA	Cabrera Services, Inc.
cc	cubic centimeter
CFR	Code of Federal Regulations
cm	centimeter
cm^3	cubic centimeter
CTA	center tank area
DCGL	derived concentration guideline level
DRMO	Defense Reutilization and Marketing Office
DSR	dose-to-source ratio
EPA	U. S. Environmental Protection Agency
EMC	elevated measurement comparison
g	gram
IL	Illinois
K_d	element partition coefficient
m	meter
m^2	square meter
MDC	minimum detectable concentration
NAVSTA	Naval Station
NFA	north fence area
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picocurie per gram
PPV	Public Private Venture
RCOC	radiological contaminant of concern
TEDE	total effective dose equivalent
UIRB	Upper Illinois River Basin
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
yr	year
^{228}Ra	radium-228
^{228}Th	thorium-228
^{232}Th	thorium-232
U.S.	United States

EXECUTIVE SUMMARY

This report presents the site-specific derived concentration guideline level (DCGL) for the radiological contaminant of concern (RCOC) in soil at the Naval Station Great Lakes within an area designated for industrial use. The RCOC in soil within the industrial area, natural thorium and decay products in secular equilibrium, resulted from storage of monazite sand prior to 1974. The industrial use DCGL was developed to provide a realistic, site specific clean-up level based on reasonable site specific conditions. In determining the DCGL several conservative and reasonable factors were utilized in the dose modeling assessments.

As a result of the evaluations and RESRAD analysis presented in this report, the site-specific DCGL for natural thorium in soil within the Site industrial area for the scenario evaluated was determined to be **5 pCi/g**.

The site-specific DCGL represent the amount of soil contamination above background in the Site industrial area that would result in a total effective dose equivalent (TEDE) of 25 mrem to a member of the critical group (industrial worker) in an area of 10,000 square meters (m^2) uniformly contaminated with natural thorium to a depth of 1 meter. This DCGL is applicable to the parent, as well as each of the individual decay products associated with natural thorium.

Area factors have also been generated to account for areas of contaminated soil smaller than the area used in the model (10,000 m^2) as shown below.

SITE AREA FACTORS

Nuclide	Area Factor								
	1 m^2	**5 m^2**	**10 m^2**	**50 m^2**	**100 m^2**	**300 m^2**	**1000 m^2**	**5000 m^2**	**10000 m^2**
Th-nat	10.1	3.3	2.2	1.4	1.2	1.1	1.0	1.0	1.0

1.0 INTRODUCTION

This report presents the site-specific derived concentration guideline level (DCGL) for the radiological contaminant of concern (RCOC) in soil at the Naval Station Great Lakes (hereafter referred to as the Site) within an area designated for industrial use. The RCOC in soil within the industrial area resulted from storage of monazite sand prior to 1974. The industrial use DCGL was developed to provide a realistic, site specific clean-up level based on reasonable site specific conditions.

1.1 Purpose

The purpose of the analyses is to provide a site-specific, realistic DCGL in support of decisions regarding the need for additional remediation in the Site industrial area and demonstrating the industrial area is suitable for restricted use. Specifically, when the DCGL is applied to the final status survey and the survey data demonstrates that the DCGL has been satisfied, the requirements of Title 10, Code of Federal Regulations (CFR), Part 20, Paragraph 1403 (10 CFR 20.1403) for restricted release of the Site industrial area are achieved.

In addition to 10 CFR 20, several United States (U.S.) Nuclear Regulatory Commission (NRC) and U.S. Environmental Protection Agency (EPA) reference documents were used in the derivation of the site-specific DCGL presented in this report.

1.2 Site Description, Radiological History and Contaminants

1.2.1 Site Description

The Site is located in Lake County, Illinois, 36 miles north-northwest of Chicago and slightly west of the Lake Michigan shore, occupying an area of approximately 1,600 acres. The location of Lake County is presented in Figure 1-1.

FIGURE 1-1: ILLINOIS COUNTY MAP

The Site is located in an urbanized area of the county, on the eastern edge of the Upper Illinois River Basin (UIRB) (USGS 1999). The U.S. Census Bureau estimated the Lake County population in 2005 to be 702,680. Like many urban areas in proximity to Lake Michigan, the Site obtains potable water from a public water supply. An aerial photograph of the Site, with the industrial area highlighted, is presented in Figure 1-2. As indicated in this figure, the Site industrial area boundaries generally coincide with the Site property boundaries to the north, west and south, and Mississippi Street to the east (Mississippi Street turns into Superior Street south of Ontario Court).

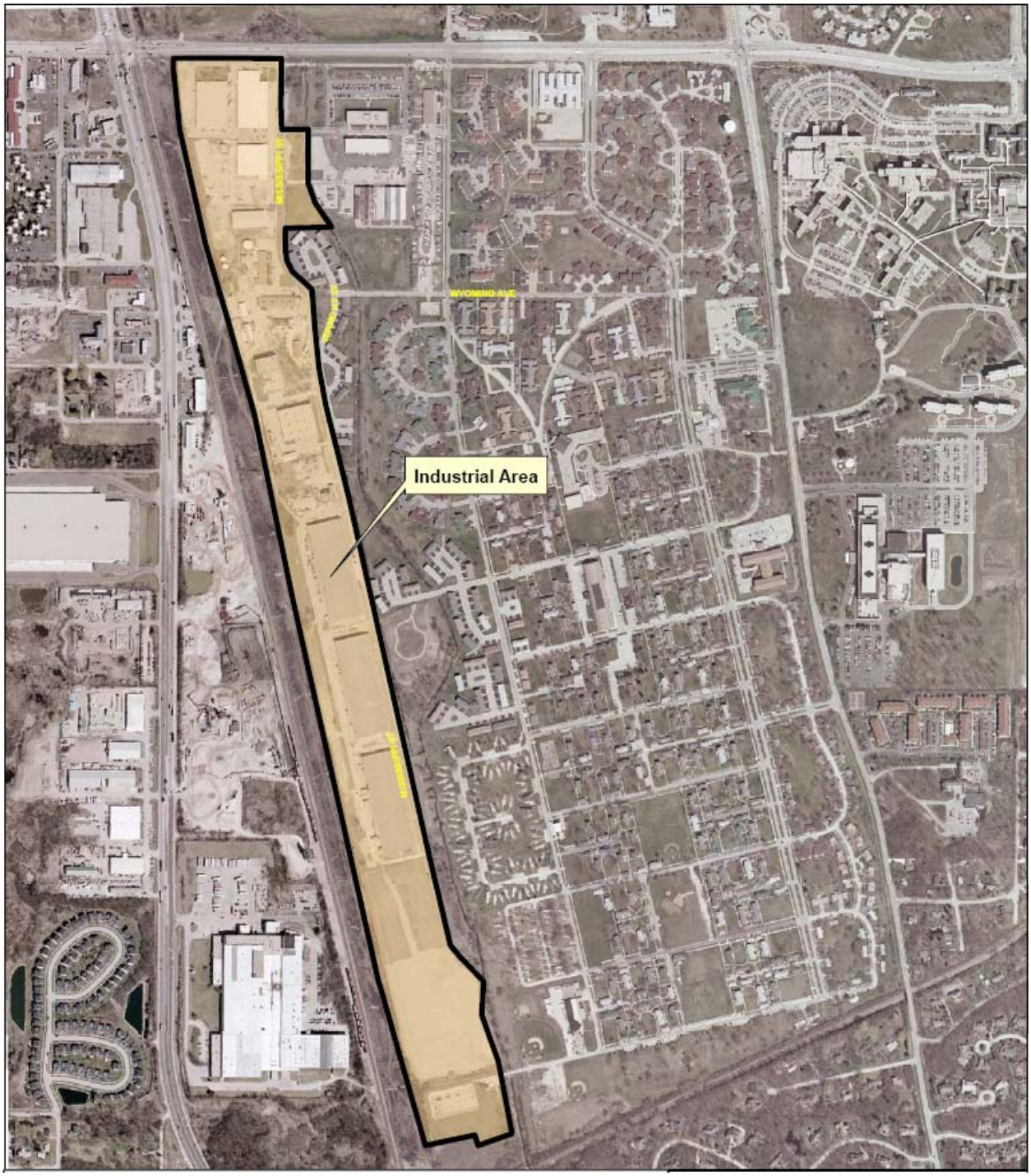

FIGURE 1-2: AERIAL VIEW OF NAVAL STATION GREAT LAKES

1.2.2 Radiological History

In 1974 the U.S. Atomic Energy Commission (AEC) granted a license (license number STE-8179) to Engelhard Minerals & Chemicals to package and ship a strategic stockpile of monazite sand from the Site. This sand was reportedly shipped to Holland in 1974. In January 2000, the NRC found residual monazite sand during a confirmatory survey of the previous AEC decommissioning of the Site. The NRC found elevated areas of gamma activity on the north side of the former monazite sand storage area along the fence near the Defense Reutilization and Marketing Office (DRMO) facility (North Fence Area). In the spring of 2000, CABRERA Services, Inc. (CABRERA) performed a detailed site characterization of the North Fence Area (NFA) that confirmed the NRC findings and identified several other areas of elevated concentrations of thorium-232 (^{232}Th). The final characterization report identified a monazite sand area of concern approximately 90,000 square meters (m^2) in the tank farm area of the Site (Center Tank Area).

In 2004, as part of a removal action, CABRERA characterized the remainder of this portion of the Site, with results published in a technical memorandum. It was estimated that an additional 1,526 cubic yards of material required remediation. As part of Phase III and Phase IV, CABRERA performed remediation in the NFA, Center Tank Area (CTA) and the area just south of the CTA referred to as the Recreation Area. Final status surveys in the CTA performed by CABRERA and scoping surveys completed by the NRC showed additional areas of contamination above the existing clean-up goal of 1 picocurie per gram (pCi/g) above background (NRC default surface soil screening value). This included some areas at the boundary of the original footprint remediated under Phase IV at a greater depth than anticipated and over a larger area than previously identified. Additionally, the NRC identified contamination up to 20 pCi/g at the headwall of a drainage pipe that empties into Skokie ditch. The headwall is in the northern portion of the Site industrial area.

The former monazite sand storage area, NFA, CTA, recreation area and the headwall discussed above are all contained within the Site industrial area.

1.2.3 Radiological Contaminants of Concern

The RCOC associated with monazite sand is natural thorium and the decay products from natural thorium. Since the monazite sand was stored in its natural, unprocessed form at the Site, the decay products associated with natural thorium remain in the same concentrations as would be found in locations where these sands occur in nature. Therefore, the decay or daughter products for natural thorium would remain in secular equilibrium with the parent radionuclide.

The parent radionuclide in the natural thorium decay chain, ^{232}Th, decays by emitting alpha particles. The daughter products in the natural thorium decay chain decay by emission of alpha or beta particles, some with accompanying emission of gamma rays. The decay scheme for natural thorium is provided in Figures 1-3.

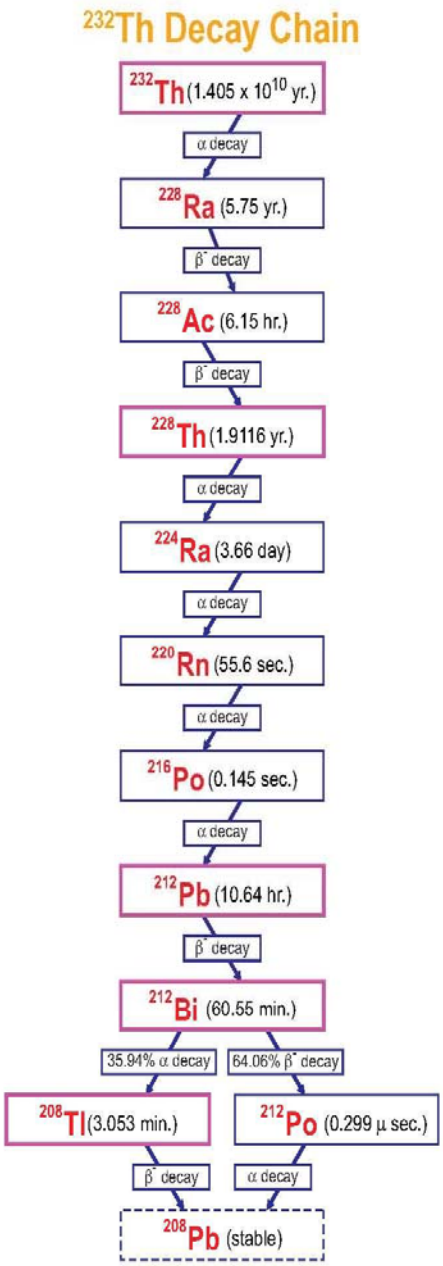

FIGURE 1-3: THORIUM 232 DECAY CHAIN

1.2.4 Radionuclides Present in Monazite Sand[1]

Thorium is a naturally occurring radioactive element commonly found in very small amounts in rocks, soil, sand, water, plants and animals, including humans. The radioactivity of thorium in the environment is typically very low and contributes to low levels of natural background radiation. A higher concentration of natural thorium (^{232}Th) is found in certain sands, such as monazite sand. Table 1-1 provides the specific activity and radiological half-life of ^{232}Th.

TABLE 1-1: THORIUM 232 RADIOLOGICAL INFORMATION

Specific Activity (Ci/g)	Half-life (years)
1.10E-07	1.405E10

Monazite sand differs from most other environmental media in that it contains much higher concentrations of natural thorium, specifically ^{232}Th. The percentage of ^{232}Th in monazite sand has a range of 3 to 10 percent.

1.2.5 Potential or Known Contaminated Media

The following environmental media at the Site have been identified as contaminated through sampling or evaluated for potential contamination: surface soil, subsurface soil, surface water, groundwater, and structures.

1.2.5.1 Soil

Surface soil is defined as the top layer (15 centimeters) of soil on the Site. Subsurface soil is any solid materials not considered to be surface soil. Soil contamination has resulted from the storage of monazite sand, migration of the contaminated material by natural methods (wind, rain, etc) and the possible use of monazite sand or soil mixed with monazite sand as fill material, although there are no records indicating this occurred. Extensive surveys and sampling have been performed at the Site. As a result, several areas have been remediated by removal and disposal of contaminated soil. Since prior remediation in some areas required excavation below the surface soil layer, the thickness of the contaminated soil is assumed to be 1 meter for the purpose of site-specific DCGL determination. Although soil contamination in most areas is limited to surface soil, a contaminated soil thickness of 1 meter results in a conservative approach to DCGL determination.

[1] Throughout this section, natural thorium refers to ^{232}Th.

1.2.5.2 Surface Water and Groundwater

There is no evidence of surface water or groundwater contamination at the Site and is not expected due to a lack of significant source term. Also, because of the low mobility of thorium in soil, the contamination of surface water and groundwater is considered an unlikely current or future event.

1.2.5.3 Structures

Monazite sand was stockpiled in outdoor areas at the Site. This material was not processed, handled or stored within structures, other than tanks. Therefore, there is no evidence to indicate that any structure on the Site may contain residual surface contamination.

2.0 GENERAL ENVIRONMENTAL AND PHYSICAL SITE CHARACTERISTICS

As discussed in Section 1.0, the Site is located in Lake County, Illinois. Lake County, with an area of 301,435 acres or about 471 square miles, is in the northeast corner of Illinois. Lake County is bordered by Cook County on the south, McHenry County on the west, Kenosha County, Wisconsin on the north and Lake Michigan on the east. Lake County has a temperate, humid continental climate, which has had an important influence on the characteristics of the soils. However, the climate is essentially uniform throughout the county and has not caused any major differences among the soils (USGS 1999).

Lake County is overlain by a thick (mostly greater than 250 feet) succession of Quaternary deposits that resulted from the multiple glacial advances of the last glaciation (Wisconsian period, approximately 17,000 to 12,000 years ago). Each time glaciers of the Lake Michigan lobe advanced out of and retreated into the Lake Michigan basin a layer of glacial, fluvial and lacustrine materials was deposited. Because the ice from earlier advances did not completely melt from the area before subsequent ice advanced, the sediment layers were modified by dead-ice sedimentation during deglaciation.

The Site is located in the southeastern portion of Lake County, in close proximity to Lake Michigan, with portions set aside for industrial use. The terrain is generally flat, with minimal slopes. The land surface is approximately 585 feet above sea level, covering an area of approximately 1,600 acres. The annual average precipitation is 35.82 inches per year (0.91 meters per year) and the annual average wind speed is 10.4 miles per hour (4.65 meters per second). In winter, the average temperature is 23.9 degrees Fahrenheit (F) and, in summer, the average temperature is 69.1 degrees F, with an annual average temperature of 49.8 degrees F.

The U.S. Geological Survey (USGS) has established numerous study areas as part of the National Water Quality Assessment Program. One of these study areas is the Upper Illinois River Basin (UIRB), which is subdivided into four sub-basins: the Kankakee, Illinois, Fox and Des Plaines River Basins. The Site lies on the northeastern edge of the Upper Illinois River Basin (UIRB), at the edge of the Des Plaines sub-basin (USGS ND). A depiction of the UIRB is provided in Figure 2-1.

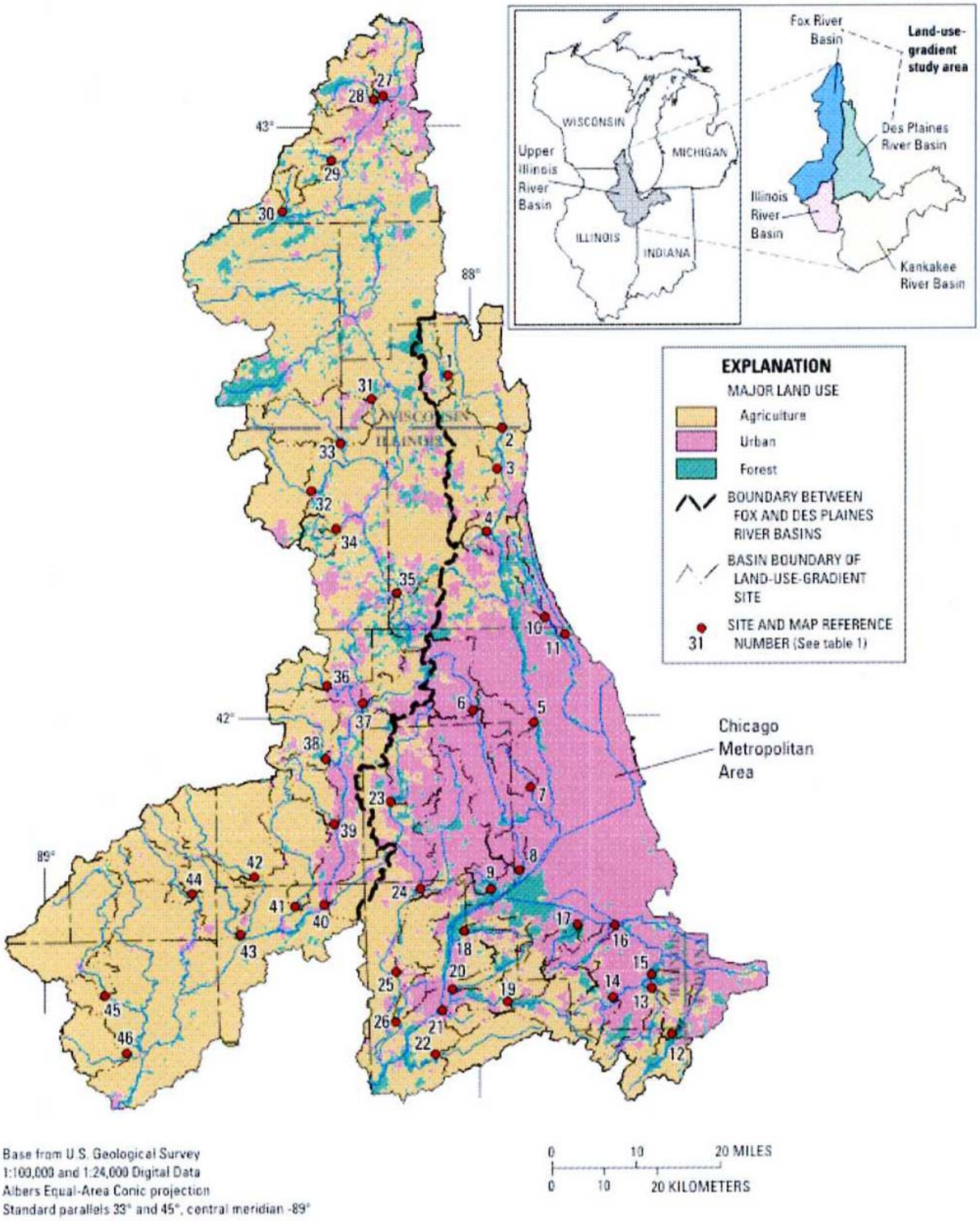

FIGURE 2-1: UPPER ILLINOIS RIVER BASIN AND SUB-BASINS

The entire UIRB is underlain by Precambrian granite rocks at depths of about 1,000 feet below land surface in the northern part of the basin. The Precambrian rocks are overlain by sedimentary rocks of the Cambrian System. These sedimentary rocks are predominantly sandstone. The Cambrian rocks are about 1,000 feet thick in the northern part of the UIRB. Ordovician-aged rocks overlie the Cambrian rocks and are composed predominantly of limestone and dolomite. The Ordovician rocks are less than 1,000 feet thick in the northern portion of the UIRB. The uppermost bedrock units of the Des Plaines River Basin are predominantly undifferentiated Silurian-Devonian dolomite and limestone.

Overlying soil at the Site is predominantly silty clay loam, with 0 to 4 percent slopes. The western portion of the site, however, is predominantly clay (USDA 2006a). Both soil types exhibit very low permeability and water infiltration rates (USDA 2006b).

Groundwater level is estimated to be 2 meters below ground surface at the Site. This is a conservative estimate since site-specific data is not available.

3.0 DETERMINATION OF DERIVED CONCENTRATION GUIDELINE LEVEL

Methods for determining the DCGL involved a three step process, presented in order in this section:

1. Identifying the regulatory limit for the total effective dose equivalent (TEDE) per year, to which an acceptable level of residual contamination corresponds;
2. Developing a site model (conceptual site model) that accounts for the physical characteristics of the site, identifies exposure pathways from the residual radioactivity, and computes the annual TEDE per unit concentration of natural thorium, including decay products; and
3. Using RESRAD Version 6.3 (Yu 2005) to calculate the TEDE per year per unit concentration or area, respectively, of natural thorium. Computation models must output the TEDE as a function of time, out to 1000 years, to determine allowable soil concentrations to meet the requirements of 10 CFR 20.1403. Microsoft Excel was utilized to generate additional output results based on the dose assessment model results.

3.1 Annual Public Dose Limit

The NRC annual dose limit for a member of the public is 100 mrem TEDE associated with licensed activities and exclusive of background (and other) sources, as specified in 10 CFR 20.1301. As specified in 10 CFR 20.1403, *Criteria for license termination under restricted conditions*, an average member of the critical population group may not receive a TEDE in excess of 25 mrem, including groundwater sources of drinking water. The RESRAD model utilized this required input parameter (25 mrem) for the applicable dose limit to establish the resulting DCGL for the Site industrial area.

3.2 Conceptual Site Model

The conceptual site model has been developed on the basis of Site review, how the industrial portion of the Site is currently used and the most probable use of this area of the Site once released for restricted use, and a complete understanding of the most relevant exposure pathways to the critical group at the Site, defined as an industrial worker.

Figure 3-1, from the *Users Manual for RESRAD Version 6* (Yu 2001), presents all potential exposure pathways, using a worst case, resident farmer exposure scenario.

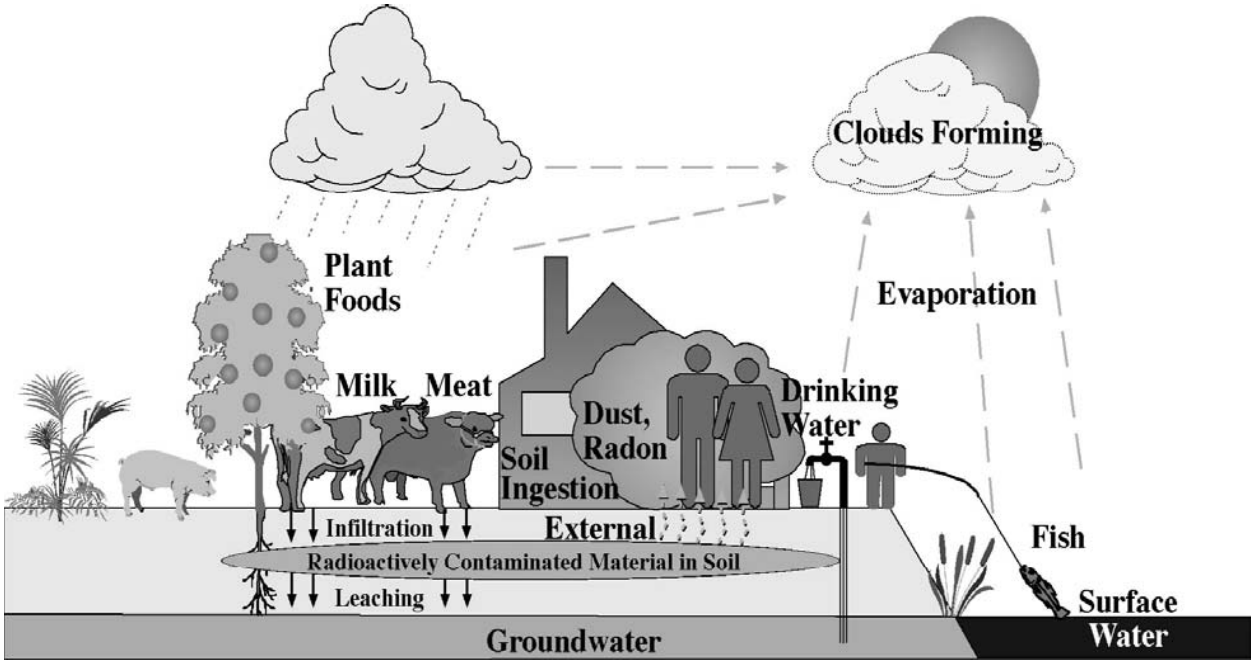

FIGURE 3-1: EXPOSURE PATHWAYS CONSIDERED IN RESRAD

This is also presented schematically in Figure 3-2.

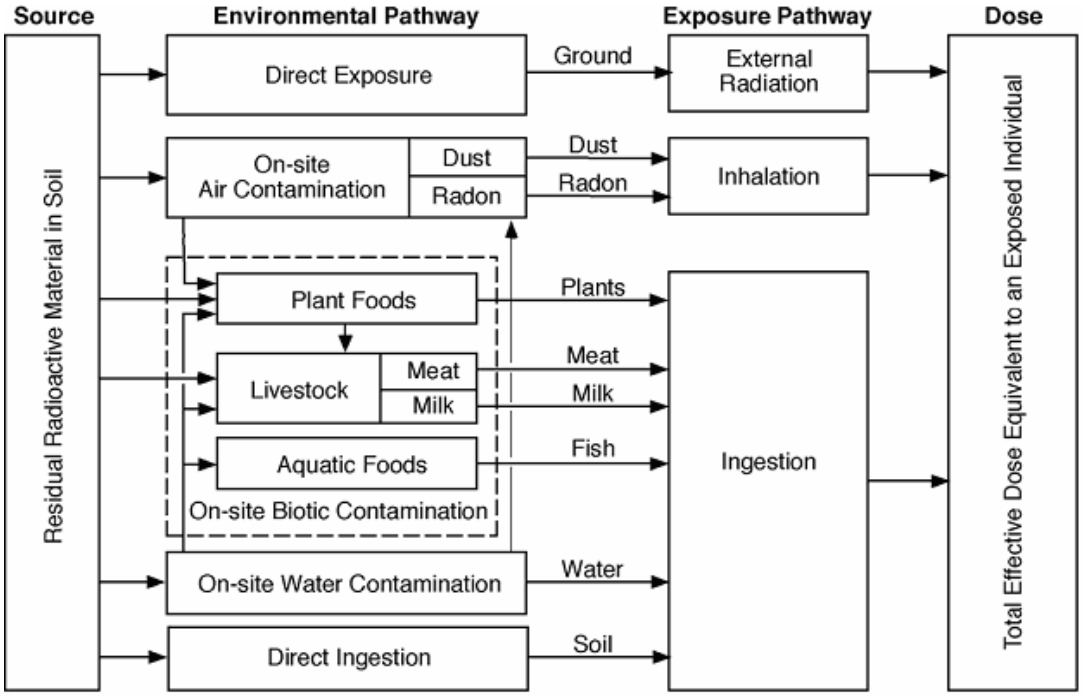

FIGURE 3-2: SCHEMATIC REPRESENTATION OF RESRAD PATHWAYS

As mentioned previously, Figures 3-1 and 3-2 present all potential exposure pathways for a worst case resident farmer scenario. This assumes the area of a site that may be occupied by a future resident is large enough to support raising livestock for meat and milk, and growing crops, fruit, etc. to support a large portion of the resident farmer's dietary intake needs, as well as provide feed for livestock. Section 1.0 of this report provides a discussion of the Site location and current use. As discussed, the Site is currently federally owned and designated for industrial use and will continue to be used for industrial purposes in the foreseeable future. Hence, the industrial worker scenario was selected as the receptor scenario for the site.

Under this scenario, the industrial worker is assumed to work at the Site following restricted release. An industrial worker is modeled as a typical site worker who spends most of the time outdoors. The worker will be at the site for 25 years (EPA 1991a). A typical industrial worker usually spends 250 days per year at the site. As a conservative approach, the site specific DCGL is derived assuming an industrial worker will spend 300 days per year at this site, with a 10-hour work day. During the 10-hour working day, the worker is assumed to spend 2 hours indoors and 8 hour outdoors. Based on EPA guidance document, the indoor and outdoor soil ingestion rates for a worker are 50 and 480 milligrams (mg) per day, respectively (EPA 1991b). Therefore, the time-weighted soil ingestion rate for the worker is 143.8 grams (g) per day. Based on NUREG/CR 5512, the indoor and outdoor inhalation rates for the receptor are 0.9 and 1.4 cubic meters (m^3) per hour respectively, so the weighted inhalation rate for the receptor is 11,388 m^3 per year (yr) (NRC 1999).

Also, there are no bodies of water on the Site of sufficient size to support aquatic life to provide a source of food for an industrial worker scenario. Therefore, the aquatic foods pathway is not considered in the Site model. In addition, plant ingestion pathways are not considered for the industrial worker scenario. Although potable water is supplied to the Site, including the industrial area, by public water sources, as a conservative approach, the industrial worker scenario developed for the Site assumes the receptor does install a well on the property to provide a source of drinking water. This is believed highly unlikely, but provides a reasonable amount of conservatism in the model. Additionally, sufficient restrictions are in place at the Site to prohibit installation of wells for the purpose of obtaining potable water. However, it will be shown that leaving the water pathway "on" in the analysis has no impact on the resulting site-specific DCGL for natural thorium compared to values generated with the water pathway suppressed.

The radon pathway is suppressed in this assessment due to its inapplicability. In a Federal Register Notice (NRC 1994), issued as a result of comments received from a radon workshop,

the NRC noted that "radon would not be evaluated when developing release criteria due to: the ubiquitous nature of radon in the general environment, the large uncertainties in the models used to predict radon concentrations; and the inability to distinguish between naturally occurring radon and that which occurs due to licensed activities."

Complete exposure pathways applicable to the industrial worker scenario include:

1. Direct radiation from radionuclides in the soil;
2. Inhalation of re-suspended contaminated dust;
3. Ingestion of water from a contaminated well; and
4. Ingestion of contaminated soil.

These exposure pathways are depicted in the adjustment to the schematic representation of RESRAD pathways in Figure 3-3.

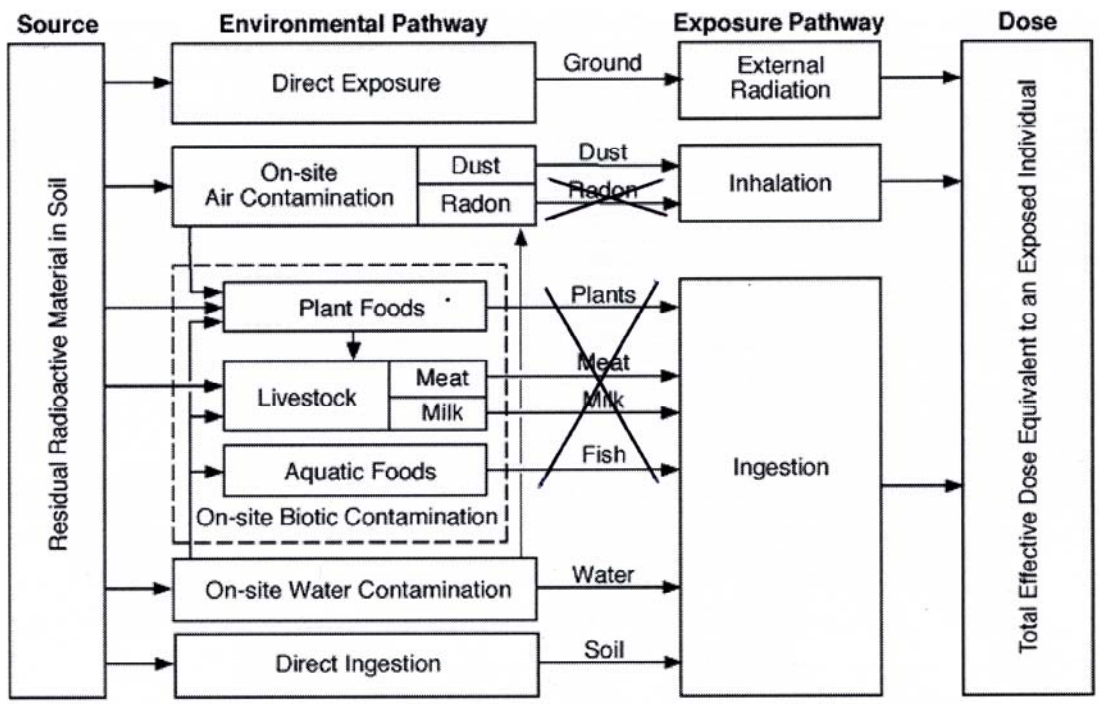

FIGURE 3-3: ADJUSTED SCHEMATIC OF RESRAD PATHWAYS FOR INDUSTRIAL WORKER

As will be shown, direct exposure to radiation from soil contamination, i.e., external radiation, results in the greatest contribution to dose. Consumption of water from a well placed on the property has no contribution to the dose.

3.3 RESRAD Input Parameters

3.3.1 General Basis for the Dose Modeling Assessment

The following general assumptions formed the basis for the dose modeling assessments:

- The industrial worker scenario is applicable to soils at the Site within the industrial area;
- The DCGL for soil was derived based on a review of site surveys, sampling and prior remediation;
- Site-specific values, where available, were used as input to the RESRAD code. In lieu of site-specific values, NRC values, principally from NUREG/CR-5512, Volume 3 (NRC 1999a), NUREG/CR-5512, Volume 4 (NRC 1999b), and NUREG/CR-6697 (NRC 2000b); *Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual* (Part B, Development of Risk-based Preliminary Remediation Goals) (EPA 1991a), *Risk Assessment Guidance for Superfund, Volumes 1: Human Health Evaluation Model* (EPA 1991b); *EPA Soil Screening Guidance for Radionuclides: User's Guide* (EPA 2000); RESRAD default values; or information contained in the RESRAD manual (Yu 2001) were used to determine the selected inputs to the code;
- Each parameter and user input selection was evaluated individually and collectively for its appropriateness to the Site. As an example, distribution coefficients for specific elements of interest were ultimately determined based on the soil type comprising the contaminated zone. This was determined to be primarily silty clay loam (with some areas predominantly clay) (USDA 2006a). Corresponding values provided in Table 32.1 of the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993) were selected for this type of soil matrix. This same matrix and coefficient value was used for the unsaturated and saturated zones;
- The most recent version of RESRAD (Version 6.3) was used for this assessment; and
- Where appropriate, parameter values were selected or determined using values provided by the EPA (EPA 2000).

3.3.2 Specific Justification for Parameter Selection

All parameters utilized in the RESRAD evaluations for natural thorium are listed with justifications for their selection in Appendix A. The input/output reports for the RESRAD results are provided in Appendix B.

The following parameters taken from Appendix A were specifically selected for further discussion.

3.3.2.1 Pathway Selection

Pathways applicable to the industrial worker scenario were selected. These included direct exposure from external sources, inhalation of dust, water ingestion and soil ingestion. The meat, milk, plant, and aquatic food pathways were suppressed. Additionally, the radon pathway was suppressed for reasons previously discussed.

3.3.2.2 Source Term

^{232}Th, ^{238}Th and radium-228 (^{228}Ra) constitute the principal radionuclides for the natural thorium decay chain. Secular equilibrium between the parent and decay products was assumed.

3.3.2.3 Radionuclide Concentrations

A unit concentration of 1 pCi/g for the Site RCOC was used. This approach provided dose-to-source ratios (DSRs), i.e., dose per unit concentration (mrem/y per pCi/g) which when divided into the primary dose limit resulted in a DCGL for that radionuclide in units of pCi/g.

3.3.2.4 Area of Contamination Zone

The contaminated zone is an area in which radionuclides are present in above background concentrations. The contaminated zone was modeled with no cover depth under the assumptions that contaminated silty clay loam existed to a depth of one meter. The primary case assumed a contaminated area of 10,000 m^2. Additional, smaller areas were then evaluated by reducing the contaminated area and length parallel to the aquifer while keeping all other parameters constant (in all cases the length parallel to the aquifer was assumed to be equal to the square root of the contaminated area).

3.3.2.5 Thickness of Contaminated Zone

Contamination was assumed to extend to a depth of one meter. This was based on previous remediation requirements and results in a conservative approach since soil contamination in most remaining areas is expected to be found within the top 6 inches of soil (15 centimeters).

3.3.2.6 Cover Depth

The cover depth corresponds to the distance to the uppermost contaminated soil. No cover depth was assumed overlying the contaminated area for conservatism in the model.

3.3.2.7 Soil Density

The U.S. Department of Agriculture, Natural Resources Conservation Service, measured the density of soil samples obtained from many locations at the Site (USDA 2006b). For silty clay loam, which covers much of the Site, the soil density had a range of 1.2 to 1.7 grams per cubic

centimeter (g/cc). This was obtained from samples from 0 to 60 inches below ground surface. Therefore, the RESRAD default of 1.5 g/cc was determined appropriate.

3.3.2.8 Elemental Distribution (partition) Coefficients (Kd)

This parameter is one of the most important to understand as it relates to contaminant migration and retardation in soil. Site-specific values for this parameter were not determined based on actual sample analysis, but were obtained from "look-up" values in Table 32.1 in the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993). Partition coefficients for elements in this table are provided for four different soil types; sand, loam, clay and organic. The following table provides the K_d values for the elements of concern at the Site for loam and clay soil types.

TABLE 3-1: ELEMENT PARTITION COEFFICIENTS (K_d)

Element	Loam K_d (cm^3/g)	Clay K_d (cm^3/g)
Thorium (Th)	3,300	5,800
Radium (Ra)	36,000	9,100

As indicated in Table 3-1, the K_d values for the two soil types are considerably different. However, the corresponding dose from the RESRAD model using natural thorium (and decay products) as the contaminant with K_d values for loam versus K_d values for clay do not differ. Therefore, K_d is not a sensitive parameter for natural thorium in soil at the Site.

3.3.2.9 Contaminated Zone Hydraulic Conductivity

The hydraulic conductivity, in meters per year (m/yr), for the contaminated zone (and unsaturated zone) were assumed to be a factor of 10 less than the saturated zone hydraulic conductivity for silty clay loam in Table 5.2 of the *RESRAD Data Collection Handbook To Support Modeling Impacts of Radioactive Material In Soil* (Yu 1993) or 5.36 m/yr.

3.3.2.10 Saturated Zone "b" Parameter

The soil specific exponential "b" parameter (unitless) is one of several hydrological parameters used to calculate the radionuclide leaching rate of the contaminated zone. The "b" parameters used in the Site model for the contaminated, unsaturated and saturated zones are 7.75 for silty clay loam and 11.40 for clay (Yu 1993).

3.3.2.11 Unsaturated Zone Thickness

The unsaturated zone thickness is the thickness of soil between the bottom of the contaminated zone and the water table. The unsaturated zone thickness used for the Site model is 1 meter. This value is derived by subtracting the contaminated zone thickness (1 meter for the Site) from the distance below ground surface to the water table, which for the Site is assumed to be 2 meters.

3.3.2.12 Groundwater Concentrations and Solubility Constants

The lack of site-specific groundwater and solubility data precluded the input of groundwater concentrations. The groundwater (water dependent) pathway for thorium was an "active" pathway for conservative dose modeling purposes. However, given the relatively immobile nature of thorium, groundwater contamination is not considered viable. Additionally, sufficient restrictions are in place at the Site to prohibit installation of wells for the purpose of obtaining potable water.

3.3.2.13 External Gamma Radiation Pathway

The external gamma pathway is the predominant, most significant pathway in the DCGL determination for thorium at the Site. Appendix A cites the input values selected for shielding factors and the fraction of time spent indoors/outdoors. For the industrial worker exposure scenario, these three values were obtained from the NRC guidance document (NRC 2000).

3.3.2.14 Ingestion Pathway

The significance of the dietary and non-dietary parameters on the DCGL determination is minimal for natural thorium. For the industrial worker exposure scenario, the parameter input values for the ingestion pathways were obtained from the EPA *Soil Screening Guidance for Radionuclides: User's Guide* (EPA 2000).

3.3.2.15 Radon Parameters

As noted previously, this pathway was "suppressed" in the evaluation.

4.0 RESULTS

Previous sections of this report have detailed the approach and methodology for determining the DCGL for natural thorium. This section utilizes the preceding information to provide the results of the dose assessments for natural thorium in soil at the Site.

4.1 Site-Specific DCGL

4.1.1 Radiological Parameter Inputs to the RESRAD Code

The following inputs and approach were applied to the RESRAD DCGL determination:

- The RCOC (natural thorium) and decay products are in secular equilibrium;
- A normalized (unit) concentration of 1 pCi/g per radionuclide was applied;
- Doses were calculated (by radionuclide) as a function of time, up to 1,000 years;
- The peak dose over the 1,000 year time period was determined (per unit activity of the parent radionuclide); and
- Resulting dose-to-source ratios (DSRs) were compared to the NRC regulatory exposure limit of 25 mrem per year, resulting in a DCGL (pCi/g), using the following equation:

$$\text{DCGL (pCi/g)} = 25 \text{ mrem / DSR (mrem per pCi/g)}$$

4.1.2 RESRAD Results

4.1.2.1 Natural Thorium

Because natural thorium (^{232}Th and decay products) is the Site RCOC in soil within the industrial area, this radionuclide, with decay products in secular equilibrium, was used in the model to investigate environmental transport and resulting exposure.

Dose Contribution from All Pathways

For the analysis of natural thorium in Site soil, the maximum (summed) dose of 4.99 mrem is delivered at time (t) = “0”. This dose assumes a maximum contaminated area of 10,000 m^2, with a depth of contaminants in soil of 1 meter. Numerous additional evaluations were performed with reduced contaminated areas. As expected, the maximum (summed) dose delivered is reduced as the area is reduced. One important aspect of the evaluation is that the maximum delivered dose does not vary considerably when the contaminated area is 1,000 m^2 or greater (up to the maximum of 10,000 m^2).

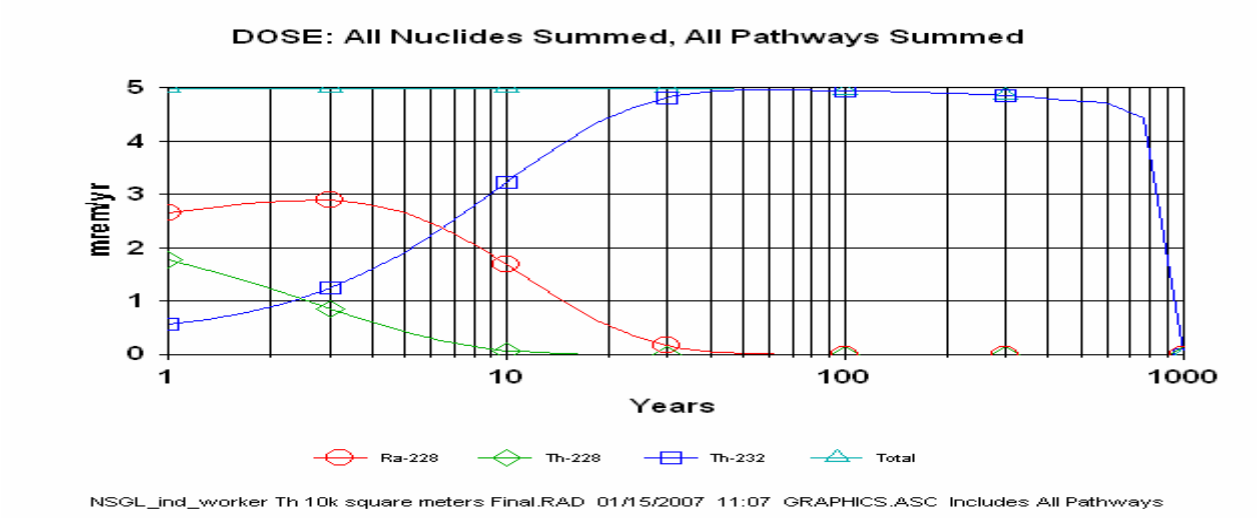

FIGURE 4-1: TOTAL DOSE FOR NATURAL THORIUM, ALL NUCLIDES SUMMED, ALL PATHWAYS SUMMED

Significant Pathways

The external dose pathway clearly drives the DCGL for this environmental model and therefore has the most significant impact on the potential dose to the critical group, as depicted in Figure 4-2.

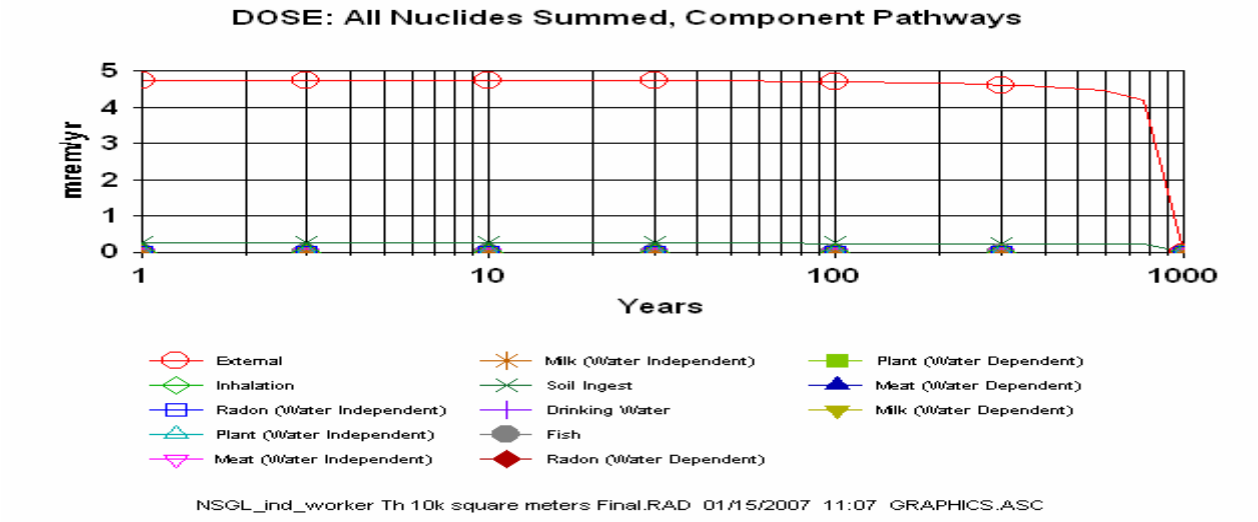

FIGURE 4-2: TOTAL DOSE ALL NUCLIDES (THORIUM CHAIN) SUMMED, COMPONENT PATHWAYS

The external dose pathway for this model is the greatest contributor to the total dose delivered. As expected, the parameters associated with this pathway have the most significant impact on the total dose. These parameters include:

- Gamma shielding factor;
- Fraction of time spent indoors (on an annual basis); and
- Fraction of time spent outdoors (on an annual basis).

Natural Thorium Site-Specific DCGL

The maximum DSR for natural thorium (^{232}Th and decay products) in soil at the Site for the industrial scenario was determined to be:

4.99 mrem/yr per pCi/g

Using the equation in Section 4.1.1, the site-specific DCGL for natural thorium, determined by dividing the annual dose limit by the DSR, is:

Site-Specific DCGL = 25 mrem/4.99 mrem/yr per pCi/g = <u>5 pCi/g</u>

This site-specific DCGL is applicable to ^{232}Th and each decay product under the assumption that all decay products are in secular equilibrium with the parent and possess radiological half-lives greater than 180 days (RESRAD recommended half-life cutoff for dose calculations). Therefore, if the ^{232}Th activity in Site soil does not exceed 5 pCi/g, the total dose to a future industrial worker will not exceed 25 mrem per year TEDE.

4.2 Area Factors

An area factor (A_m) is defined in NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (NRC 2000a), as follows:

> *A factor used to adjust $DCGL_w$ to estimate $DCGL_{EMC}$ and the minimum detectable concentration for scanning surveys in Class 1 survey units---$DCGL_{EMC} = DCGL_w \times A_m$. A_m is the magnitude by which the residual radioactivity in a small area of elevated activity can exceed the DCGLw while maintaining compliance with the release criterion.*

Area factors were generated for natural thorium in Site soil. To accomplish this, the RESRAD parameter for contaminated area size and length of contaminated area parallel to the aquifer (assumed to be equal to the square root of the contaminated area size) were adjusted while keeping all other parameters constant. The area factors were then computed by taking the ratio of the dose per unit concentration generated by RESRAD for the 10,000 m^2 area to that generated for the smaller area. If the DCGL for residual radioactivity distributed over 10,000 m^2 is multiplied by the area factor (for the appropriate contaminated area size), the resulting

concentration distributed over the smaller area delivers the same calculated dose. Area factors for the Site are provided in Table 4-1.

TABLE 4-1: SITE AREA FACTORS

Nuclide	Area Factor								
	1 m^2	**5 m^2**	**10 m^2**	**50 m^2**	**100 m^2**	**300 m^2**	**1000 m^2**	**5000 m^2**	**10000 m^2**
Th-nat	10.1	3.3	2.2	1.4	1.2	1.1	1.0	1.0	1.0

An example of the use of the area factors is provided below:

Assume that an area of interest at the Site is identified and the size of the contaminated area is 100 m^2. The adjusted natural thorium site-specific DCGL for this area is:

$$5 \text{ pCi/g} \times 1.2 = 6 \text{ pCi/g}$$

5.0 SUMMARY AND CONCLUSIONS

A site-specific DCGL for natural thorium in soil has been generated for use in remediation planning and/or verification that applicable regulatory dose requirements have been achieved for the industrial area at the NAVSTA Great Lakes. In determining the DCGL several conservative and reasonable factors were utilized in the dose modeling assessments. These included:

- Selection of an industrial worker scenario as the conceptual site model and critical population group. The industrial worker scenario selected during this evaluation is much more conservative than a typical industrial worker (300 days/year versus 250 days/year, 10 hours/day versus 8 hours workday). An industrial worker typically spends most of the time indoors. However, this evaluation assumed that the industrial worker scenario for this site will spend most of the time outdoors (even more than typical residential receptor) to take account for the dose related to external gamma pathway as external gamma pathway is the predominant dose contributor for the site;
- No credit was taken for the potential dilution of contaminated soil with clean soil which will occur in the process of gardening, area renovations, landscaping and new construction; and
- The depth of contamination in soil at the Site was assumed to be 1 meter. This was based on remediation performed in some areas of the Site.

Many other input parameters to the dose modeling code were used with justification for the use of all input parameters provided.

A unit concentration of 1 pCi/g for the Site RCOC (natural thorium with decay products in secular equilibrium) was used in the RESRAD evaluations. This approach provided a dose-to-source ratio (DSRs) in units of mrem/yr per pCi/g, calculated for exposed individuals over a 1000 year time period. The DSR represent the maximum dose to a member of the critical population group (industrial worker) over the 1000 year time period. A DCGL (pCi/g) for the RCOC in Site soil was determined by dividing the DSR into the primary dose limit of 25 mrem per year.

As a result of the RESRAD analysis, the site-specific DCGL for natural thorium in soil within the Site industrial area for the scenario evaluated was determined to be **5 pCi/g**.

The site-specific DCGL represent the amount of soil contamination above background that would result in a total effective dose equivalent (TEDE) of 25 mrem to a member of the critical group (industrial worker) in an area of 10,000 m^2 uniformly contaminated with natural thorium

to a depth of 1 meter. This DCGL is applicable to the parent, as well as each of the individual decay products associated with natural thorium.

Area factors have also been generated to account for contaminated soil areas smaller in size than the area used in the model (10,000 m^2). These area factors are presented in Table 4-1.

6.0 REFERENCES

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APPENDIX A

RESRAD INPUT PARAMETERS

NAVAL STATION GREAT LAKES
DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
PATHWAY SELECTIONS						
External Gamma	N/A	Active	Active	N/A	N/A	N/A
Inhalation (without radon)	N/A	Active	Active	N/A	N/A	N/A
Plant Ingestion	N/A	Active	Active	N/A	N/A	N/A
Meat Ingestion	N/A	Active	**Inactive**	N/A	Not applicable for resident gardener	N/A
Milk Ingestion	N/A	Active	**Inactive**	N/A	Not applicable for resident gardener	N/A
Aquatic Foods	N/A	Active	**Inactive**	N/A	Not applicable for resident gardener	N/A
Drinking Water	N/A	Active	Active	N/A	N/A	N/A
Soil Ingestion	N/A	Active	Active	N/A	N/A	N/A
Radon	N/A	Inactive	Inactive	N/A	Not applicable per Federal Register, 1994, p. 43210	NRC 1994
CONTAMINATED ZONE PARAMETERS						
Area of contaminated zone	AREA	10,000	10,000	m^2	The RESRAD default is used as the base case for natural thorium.	Yu 1993 (Section 30)
Thickness of contaminated zone	THICK0	2	**0.46**	m	A conservative approach was selected to define this parameter. The thickness was determined based on previous remediation history at portions of the facility.	Yu 1993 (Section 39)
Length parallel to the aquifer	LCZPAQ	100	100	m	For all cases, the length parallel to the aquifer was calculated as the square root of the contaminated zone area.	Yu 1993 (Section 16)
Times for calculations	TI	1, 3, 10, 30, 100, 300, 1000	1, 3, 10, 30, 100, 300, 1000	yr	RESRAD defaults for calculation times.	Yu 2001
COVER AND CONTAMINATED ZONE HYDROLOGICAL DATA						
Cover depth	COVER)	0	0	m	As a conservative approach for dose modeling, no cover depth was assumed.	Yu 1993 (Section 31)
Density of cover material	DENSCV	1.5	**N/A**	g/cm^3	Lack of cover depth precludes an assigned value for this parameter.	Yu 1993 (Section 2)
Cover erosion rate	VCV	0.001	**N/A**	m/yr	Lack of cover depth precludes an assigned value for this parameter.	Yu 1993 (Section 14)

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RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Density of contaminated zone	DENSCZ	1.5	1.5	g/cm^3	Soil density range from samples obtained by USDA at the site was 1.2 to 1.7. The RESRAD default was chosen as a reasonable average.	USDA 2006b Yu 1993 (Section 2)
Contaminated zone erosion rate	VCZ	0.001	0.001	m/yr	RESRAD default used.	Yu 1993 (Section 14)
Contaminated zone total porosity	TPCZ	0.4	0.4	unitless	RESRAD default used as an estimate of the total porosity	Yu 1993 (Section 3)
Contaminated zone field capacity	FCCZ	0.2	0.2	unitless	RESRAD default used as an estimate of field capacity	Yu 2001
Contaminated zone hydraulic conductivity	HCCZ	10	**5.36**	m/yr	Assumed to be a factor of 10 less than the saturated zone hydraulic conductivity for silty clay loam from Table 5.2 of the reference.	Yu 1993 (Section 5)
Contaminated zone b parameter	BCZ	5.3	**7.75**	unitless	The contaminated zone b parameter was selected from Table 13.1 of the reference for silty clay loam.	Yu 1993 (Section 13)
Humidity in air	HUMID	8	**N/A**	g/m^3	Humidity input is only required in RESRAD when tritium is a radionuclide of concern.	Yu 2001
Evapotranspiration coefficient	EVAPTR	0.5	0.5	unitless	No site-specific data available. RESRAD default used.	Yu 1993 (Section 12)
Wind speed	WIND	2	**4.65**	m/sec	Per city-data.com, the wind speed for the Chicgao, IL area averages 10.4 miles per hour (4.65 m/sec).	Yu 1993 (Section 21) Internet search
Precipitation	PRECIP	1	**0.91**	m/yr	Site-specific value based on reported 35.82 inches per year (0.91 m/yr)	Yu 1993 (Section 9) Internet search
Irrigation	RI	0.2	0.2	m/yr	No site-specific data available. RESRAD default used.	Yu 1993 (Section 11)
Irrigation mode	IDITCH	Overhead	Overhead	unitless	The “Overhead” and “Ditch” designations are independent of the depth of contaminated zone and have no significant impact on the RESRAD evaluation. The RESRAD default designation was selected.	Yu 2001
Runoff coefficient	RUNOFF	0.2	0.2	unitless	The RESRAD default value was selected based on reference value for intermediate combinations of clay and loam.	Yu 1993 (Section 10)

NAVAL STATION GREAT LAKES
DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Watershed area for nearby stream or pond	WAREA	1.00E6	1.00E6	m^2	RESRAD default used.	Yu 1993 (Section 17)
Accuracy for water/soil computations	EPS	0.001	0.001	unitless	RESRAD default used.	Yu 2001
SATURATED ZONE HYDROLOGICAL DATA						
Density of saturated zone	DENSAQ	1.5	1.5	g/cm^3	Soil density range from samples obtained by USDA at the site was 1.2 to 1.7. The RESRAD default was chosen as a reasonable average.	USDA 2006b Yu 1993 (Section 2)
Saturated zone total porosity	TPSZ	0.4	0.4	unitless	RESRAD default used. Equivalent to contaminated zone total porosity.	Yu 1993 (Section 3)
Saturated zone effective porosity	EPSZ	0.2	0.2	unitless	RESRAD default used.	Yu 1993 (Section 4)
Saturated zone field capacity	FCSZ	0.2	0.2	unitless	RESRAD default used.	Yu 2001
Saturated zone hydraulic conductivity	HCSZ	100	**53.6**	m/yr	Saturated zone hydraulic conductivity for silty clay loam taken from Table 5.2 of the reference.	Yu 1993 (Section 5)
Saturated zone hydraulic gradient	HGWT	0.02	0.02	unitless	RESRAD default used. Potable water at the Site is obtained via public water supply. Groundwater contamination is not considered a significant exposure pathway, though this parameter is "active" for conservatism.	Yu 1993 (Section 15)
Saturated zone b parameter	BSZ	5.3	**7.75**	unitless	The contaminated zone b parameter was selected from Table 13.1 of the reference for silty clay loam.	Yu 1993 (Section 13)
Water table drop rate	VWT	0.001	0.001	m/yr	RESRAD default used. Groundwater contamination is not considered a significant exposure pathway, though this parameter is "active" for conservatism.	Yu 1993 (Section 18)
Well pump intake depth (meters below water table)	DWIBWT	10	10	m	RESRAD default used. Groundwater contamination is not considered a significant exposure pathway, though this parameter is "active" for conservatism.	Yu 1993 (Section 19)
Model for Water Transport Parameters [Non-dispersion (ND) or Mass-Balance (MB)]	MODEL	ND	**MB**	unitless	Per NRC guidance, the MB model is an acceptable approach and provides a potentially more conservative dose estimate relative to the ND model. The MB model assumes a well is located at the center of the site rather than on the down gradient side of the Site boundary.	NUREG-1757, Vo. 2, App. I, page I-40

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RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
					In addition, all radionuclides released from the contaminated zone are withdrawn through the well. Groundwater contamination is not considered a significant exposure pathway, though this parameter is "active" for conservatism.	NRC 1999b
Well pumping rate	UW	250	250	m^3/yr	RESRAD default used. Groundwater contamination is not considered a significant exposure pathway, though this parameter is "active" for conservatism.	Yu 2001
UNCONTAMINATED UNSATURATED ZONE PARAMETERS						
Number of unsaturated zone strata	NS	1	1	unitless	RESRAD default used.	Yu 1993 (Section 25)
Unsaturated zone thickness	H(1)	4	**1.54**	m	Determined by subtracting the contaminated zone thickness (0.46 m) from the assumed saturated zone depth below ground surface (2 m).	Yu 1993 (Section 25)
Unsaturated zone soil density	DENSUZ(1)	1.5	1.5	g/cm^3	Soil density range from samples obtained by USDA at the site was 1.2 to 1.7. The RESRAD default was chosen as a reasonable average.	USDA 2006b Yu 1993 (Section 2)
Unsaturated zone total porosity	TPUZ(1)	0.4	0.4	unitless	RESRAD default used (equivalent to saturated and contaminated zone total porosity inputs).	Yu 1993 (Section 3)
Unsaturated zone effective porosity	EPUZ(1)	0.2	0.2	unitless	RESRAD default used.	Yu 1993 (Section 4)
Unsaturated zone field capacity	FCUZ(1)	0.2	0.2	unitless	RESRAD default used.	Yu 2001
Unsaturated zone hydraulic conductivity	HCUZ(1)	100	**5.36**	m/yr	Assumed to be a factor of 10 less than the saturated zone hydraulic conductivity for silty clay loam from Table 5.2 of the reference.	Yu 1993 (Section 5)
Unsaturated zone b parameter	BUZ	5.3	**7.75**	unitless	The unsaturated zone b parameter was selected from Table 13.1 of the reference for silty clay loam.	Yu 1993 (Section 13)
NATURAL THORIUM						
ELEMENTAL DISTRIBUTION (PARTITION) COEFFICIENTS AND LEACH RATES: THORIUM						
Contaminated zone	DCNUCC(2 & 3)	60,000	**3,300**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input. However, for thorium, the value selected has no impact on the DCGL determination.	Yu 1993 (Section 32)

NAVAL STATION GREAT LAKES
DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Unsaturated zone	DCNUCU(2 & 3,1)	60,000	**3,300**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input. However, for thorium, the value selected has no impact on the DCGL determination.	Yu 1993 (Section 32)
Saturated zone	DCNUCS(2 & 3)	60,000	**3,300**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input. However, for thorium, the value selected has no impact on the DCGL determination.	Yu 1993 (Section 32)
Leach rate	ALEACH(2 & 3)	0	0	y^{-1}	RESRAD default used.	Yu 2001
Solubility constant	SOLUBK(2 & 3)	0	0	unitless	RESRAD default used.	Yu 2001
ELEMENTAL DISTRIBUTION (PARTITION) COEFFICIENTS AND LEACH RATES: RADIUM						
Contaminated zone	DCNUCC(1)	70	**36,000**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input.	Yu 1993 (Section 32)
Unsaturated zone	DCNUCU(1,1)	70	**36,000**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input.	Yu 1993 (Section 32)
Saturated zone	DCNUCS(1)	70	**36,000**	cm^3/g	Site is predominantly silty clay loam. Value from Table 32.1 of the reference for loam selected as the input.	Yu 1993 (Section 32)
Leach rate	ALEACH(1)	0	0	y^{-1}	RESRAD default used.	Yu 2001
Solubility constant	SOLUBK(1)	0	0	unitless	RESRAD default used.	Yu 2001
OCCUPANCY, INHALATION AND EXTERNAL GAMMA DATA						
Inhalation rate	INHALR	8,400	8,400	m^3/y	RESRAD default used.	Yu 1993 (Section 43)
Mass loading for inhalation	MLINH	0.0001	0.0001	g/m^3	RESRAD default used.	Yu 1993 (Section 35)
Exposure duration	ED	30	30	yr	RESRAD default used. DCGL calculations not influenced by exposure duration.	Yu 2001
Inhalation shielding factor	SHF3	0.4	0.4	unitless	RESRAD default used.	Yu 1993 (Section 36)
External gamma shielding factor	SHF1	0.7	**0.4**	unitless	EPA value from Equation 4 in reference used.	EPA 2000

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DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Indoor time fraction	FIND	0.5	**0.683**	unitless	EPA value from Equation 4 in reference used.	EPA 2000
Outdoor time fraction	FOTD	0.25	**0.073**	unitless	EPA value from Equation 4 in reference used.	EPA 2000
Shape of the contaminated zone (circular or non-circular)	FS	Circular	Circular	unitless	RESRAD default used.	Yu 1993 (Section 50)
INGESTION PATHWAY (DIETARY DATA)						
Fruits, vegetables and grain consumption	DIET(1)	160	**42.7**	kg/yr	EPA value from Equation 5 in reference used.	EPA 2000
Leafy vegetable consumption	DIET(2)	14	**4.66**	kg/yr	EPA value from Equation 5 in reference used	EPA 2000
Milk consumption	DIET(3)	92	**N/A**	L/yr	Pathway not active	N/A
Meat and poultry consumption	DIET(4)	63	**N/A**	kg/yr	Pathway not active	N/A
Fish consumption	DIET(5)	5.4	**N/A**	kg/yr	Pathway not active	N/A
Other seafood consumption	DIET(6)	0.9	**N/A**	kg/yr	Pathway not active	N/A
Soil ingestion rate	SOIL	36.5	**43.8**	g/yr	EPA value from Equation 1 in reference used.	EPA 2000
Drinking water intake	DWI	510	**730**	L/yr	EPA value from Attachment D (paragraph D.2) in reference used.	EPA 2000
Contamination fraction of drinking water	FDW	1	1	unitless	Maximum NRC value used.	NRC 1999b Yu 2001
Contamination fraction of household water	FHHW	1	**NA**	unitless	Radon pathway is not selected; hence this parameter is not applicable	N/A
Contamination fraction of livestock water	FLW	1	**N/A**	unitless	Pathway not active.	N/A
Contamination fraction of irrigation water	FIRW	1	1	unitless	Maximum NRC value used.	NRC 1999b
Contamination fraction of aquatic food	FR9	0.5	**N/A**	unitless	Pathway not active.	N/A
Contaminated fraction of plant food	FPLANT	-1	**0.1**	unitless	0.1 chosen to more accurately represent the limited available residential garden area and much shorter growing period in this region.	EPA 2000
Contaminated fraction of meat	FMEAT	-1	**N/A**	unitless	Pathway not active	N/A

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DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Contaminated fraction of milk	FMILK	-1	**N/A**	unitless	Pathway not active	N/A
INGESTION PATHWAY (NON-DIETARY DATA)						
Livestock fodder intake for meat	LP15	68	**N/A**	kg/day	Pathway not active	N/A
Livestock fodder intake for milk	LP16	55	**N/A**	kg/day	Pathway not active	N/A
Livestock water intake for meat	LW15	50	**N/A**	L/day	Pathway not active	N/A
Livestock water intake for milk	LW15	160	**N/A**	L/day	Pathway not active	N/A
Livestock intake of soil	LS1	0.5	**N/A**	kg/day	Pathway not active	N/A
Mass loading for foliar deposition	MLFD	0.0001	0.0001	g/m^3	RESRAD default used.	Yu 1993
Depth of soil mixing layer	DM	0.15	0.15	m	RESRAD default used.	Yu 1993 (Section 35)
Depth of roots	DROOT	0.9	0.9	m	RESRAD default used.	Yu 1993 (Section 37)
Groundwater fractional usage: Drinking water	FGWDW	1	1	unitless	RESRAD default used.	Yu 1993
Groundwater fractional usage: Household water	FGWHH	1	**N/A**	unitless	Radon pathway not active	N/A
Groundwater fractional usage: Livestock water	FGWLW	1	**N/A**	unitless	Pathway not active	N/A
Groundwater fractional usage: Irrigation water	FGWIR	1	1	unitless	RESRAD default used.	Yu 1993
PLANT TRANSPORT FACTORS						
Wet weight crop yield: non-leafy vegetables	YV(1)	0.7	0.7	kg/m^2	RESRAD default used.	Yu 1993 NRC 2000b
Wet weight crop yield: leafy vegetables	YV(2)	1.5	1.5	kg/m^2	RESRAD default used.	Yu 1993 NRC 2000b

NAVAL STATION GREAT LAKES
DEFAULT AND RECOMMENDED VALUES FOR RESRAD INPUT PARAMETERS

RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Wet weight crop yield: fodder	YV(3)	1.1	**N/A**	kg/m^2	Pathway not active.	N/A
Length of growing season: non-leafy vegetables	TE(1)	0.17	0.17	years	RESRAD default used.	Yu 1993 NRC 2000b
Length of growing season: leafy vegetables	TE(2)	0.25	0.25	years	RESRAD default used.	Yu 1993 NRC 2000b
Length of growing season: fodder	TE(3)	0.08	**N/A**	years	Pathway not active	N/A
Translocation factor: non-leafy vegetables	TIV(1)	0.1	0.1	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Translocation factor: leafy vegetables	TIV(2)	1	1	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Translocation factor: fodder	TIV(3)	1	**N/A**	unitless	Pathway not active	N/A
Weathering removal constant	WLAM	20	20	y^{-1}	RESRAD default used.	Yu 1993 NRC 2000b
Wet foliar interception fraction: non-leafy vegetables	RWET(1)	0.25	0.25	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Wet foliar interception fraction: leafy vegetables	RWET(2)	0.25	0.25	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Wet foliar interception fraction: fodder	RWET(3)	0.25	**N/A**	unitless	Pathway not active.	N/A
Dry foliar interception fraction: non-leafy vegetables	RDRY(1)	0.25	0.25	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Dry foliar interception fraction: leafy vegetables	RDRY(2)	0.25	0.25	unitless	RESRAD default used.	Yu 1993 NRC 2000b
Dry foliar interception fraction: fodder	RDRY(3)	0.25	**N/A**	unitless	Pathway not active.	N/A
STORAGE TIMES BEFORE USE						
Fruits, non-leafy vegetables and grain	STOR_T(1)	14	14	days	RESRAD default used.	Yu 2001 Yu 1993

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RESRAD Version 6.3					Parameter Justification	
Parameter	**Code**	**Default Value**	**User Input Value**	**Units**	**Comments**	**Reference**
Leafy vegetables	STOR_T(2)	1	1	days	RESRAD default used.	Yu 2001 Yu 1993
Milk	STOR_T(3)	1	**N/A**	days	Pathway not active.	N/A
Meat	STOR_T(4)	20	**N/A**	days	Pathway not active.	N/A
Fish	STOR_T(5)	7	**N/A**	days	Pathway not active.	N/A
Crustacea and mollusks	STOR_T(6)	7	**N/A**	days	Pathway not active.	N/A
Well water	STOR_T(7)	1	1	days	RESRAD default used.	Yu 2001 Yu 1993
Surface water	STOR_T(8)	1	1	days	RESRAD default used.	Yu 2001 Yu 1993
Livestock fodder	STOR_T(9)	45	**N/A**	days	Pathway not active.	N/A

APPENDIX B

RESRAD INPUT/OUTPUT FILES FOR THORIUM

(Provided on Accompanying Electronic Compact Disc)