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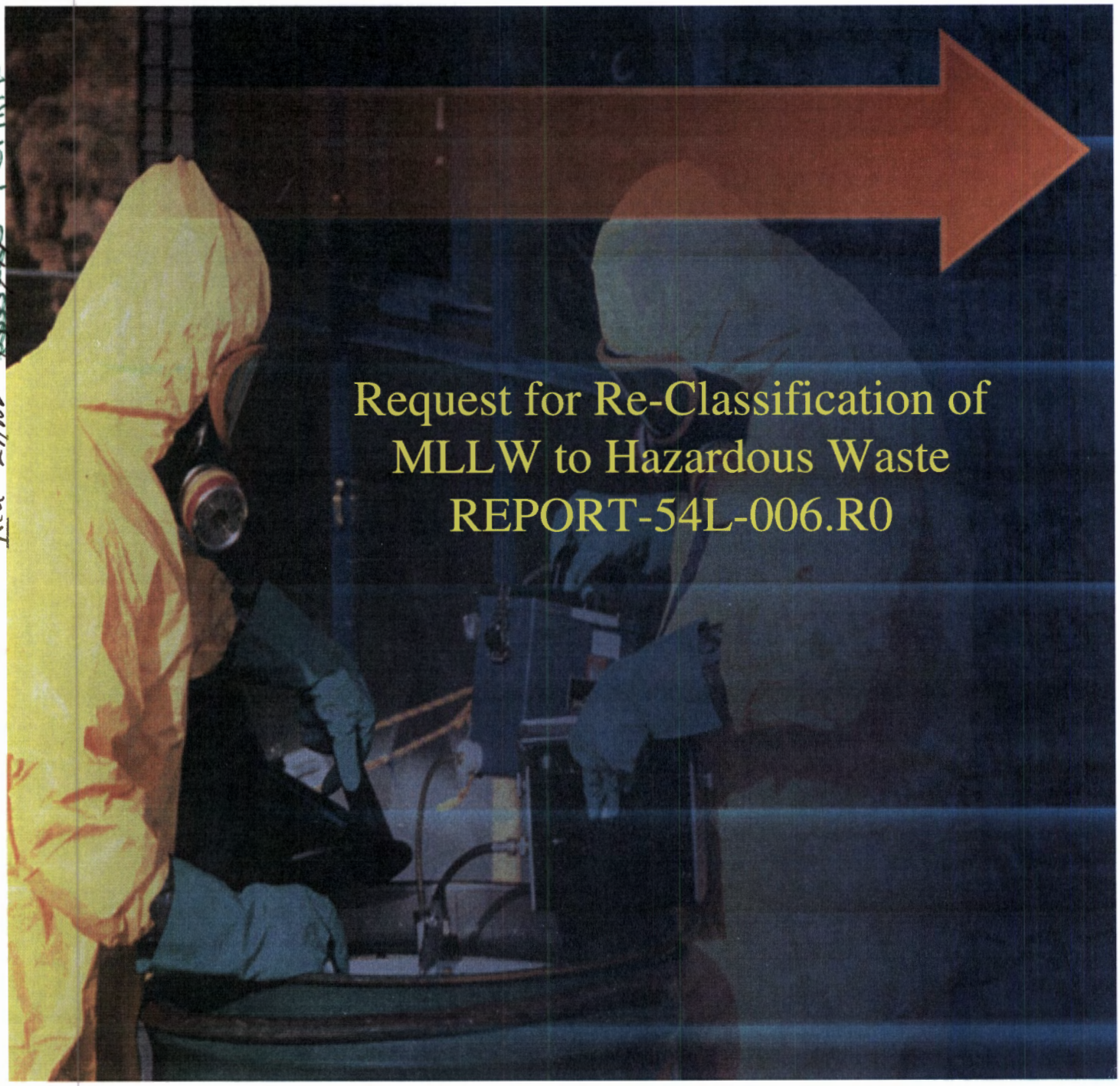

Request for Re-Classification of MLLW to Hazardous Waste REPORT-54L-006.R0

Prepared by LANL EM-SWO

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1.0 Introduction

The Sort, Survey, and Decontamination Project at Los Alamos National Laboratory (LANL) was initiated under recommendations set forth in the Albuquerque (AL) Mixed-Waste Treatment Plan (March 1994). This plan recognized that large numbers of waste items had been classified as suspect radioactive waste solely because it had come from Radioactive Materials Management Areas (RMMA) in accordance with Department of Energy (DOE) policy. Process knowledge indicated that it was unlikely that this waste was actually radioactive. Waste items for this project were specifically selected because process knowledge and generator interviews indicated that it was, in all likelihood, not radioactive.

During 1995 and 1996 an effort was initiated, with the support of Department of Energy, to perform detailed radiological surveys of this waste to verify that much of the "suspect" waste was free of radioactive constituents. RUST Geotech, Inc. as the prime contractor at the DOE Grand Junction Project Office, began this effort (termed the Sort, Survey, and Decontamination [SSD] Project). On September 5, 1996, MACTEC Environmental Restoration Services, LLC was awarded the Technical Assistance and Remediation contract for the DOE Grand Junction Project Office (GJPO) and subsequently took over the final stage of the SSD Project.

After completion of the field surveys, DOE and LANL thought that it would not be cost effective to perform any additional field surveys or to complete the review process required to prepare a data submittal for NMED review. At that time DOE and LANL intended to pursue treatment and disposal of this waste as MLLW. However, a data review was required to treat and dispose of this waste as MLLW. The review was necessary to ensure that the data collected would meet the commercial facilities' waste acceptance criteria. During this review process, it became clear that many of the items were not radioactive and that defensible and valid data had been collected to demonstrate this determination.

2.0 Work Plan Summary

The project was performed under the *Site-Specific Work Plan for Sort, Survey, and Decontamination of Potential Mixed Waste at Los Alamos National Laboratory* (January 1995). DOE approved the plan and implementing procedures. The plan provided the foundation upon which data would be collected to support a Los Alamos National Laboratory (LANL) determination that the waste items were free of DOE added radioactive materials. This plan is summarized below.

2.1 Objectives

The objective of the SSD Project was to reduce LANL's mixed-waste inventory through sorting, surveying, and sampling and analysis. This objective was accomplished through:

- Deploying a mobile field team to sort, survey and perform sampling and analysis of suspect waste materials.
- Provide sorting space, sampling and analysis, and survey equipment and instrumentation.
- Preparing documentation of the process and the mechanism that results in the certification that hazardous wastes are not contaminated with radioactivity, thereby allowing LANL to release waste to a RCRA permitted treatment, storage, or disposal facility.

2.1.1 Performance Objectives

SSD performance objectives consisted of administrative controls and technical procedures that have been used for documentation and management, surveying, and sampling and analyzing the waste to ensure that hazardous wastes determined to be acceptable for release to off site facilities for treatment and disposal are not contaminated with radioactivity. The following controls and procedures were developed to meet these objectives:

Administrative Controls:

- Cradle-to-Grave Tracking System
- Quality Assurance/Quality Control
- Training Records
- Records Management

Technical Procedures:

- Release limits for water, liquids other than water, surface contamination, and volume-contaminated solids.

2.1.2 Data Quality

The data quality objectives for this project have been to provide data inputs for decision-makers that will allow waste to be categorized and managed as non-radioactive waste. The data needed to satisfy the SSD objectives have been generated through procedures covering the following subjects:

- Radiation dose rate surveys.
- Hand-Held surface contamination surveys.
- Use of liquid scintillation analysis for tritium, gross alpha, gross beta analysis.
- Sampling and analysis of volume contaminated waste.
    - Sampling equipment including augers, COLIWASAs, core borers, tube thief samplers, etc.
    - Analytical instrumentation including gamma spectrometer, liquid scintillation counter and gross alpha/beta detector.
- Document control and management
- Analytical laboratory quality control practices and protocols.

2.2 Procedures

The SSD project was fully implemented under a set of "change controlled" procedures. The procedures were written specifically to ensure that the data collected would enable defensible decisions to be made regarding waste disposition. Further, the procedures required that appropriate documentation be produced and maintained so that decision-makers could complete a review of results and necessary QA/QC requirements. A full listing of these procedures is found in Attachment II.

2.2.1 Surface Radiological Surveys

Surface radiological surveys were performed on waste items. Both direct reading and removable contamination surveys were performed. The minimum detectable activity for each of these survey methods was at or below the release limits specified in DOE Order 5400.5, "Radiation Protection of the Public and Environment" (DOE, January 7, 1993). The procedures reflected and incorporated standard industry practice for completion of these types of activities.

Instruments used to carry out these surveys included:

The Eberline E-600 Ratemeter/Scaler with an Eberline SHP-330 detector was used for direct reading surveys for total alpha and beta. The E-600 is a hand held instrument that is programmed to read out directly in disintegrations per minute (dpm). The SHP-330 is a gas flow proportional probe that is capable of detecting both alpha and beta emissions. Alpha efficiencies are approximately 19% with beta efficiencies ranging from 13% to 15%. Data is collected for alpha and beta emissions in separate channels and can be data logged. The survey technique used for the SSD project was to operate the E-600 in ratemeter mode reading in dpm. Any case in which audible clicks were detected, additional measurements were taken using the instrument as a scaler and taking stationary counts. Additional technically equivalent instruments were used for direct reading surveys.

The Ludlum Model 2929 scaler with the Ludlum 43-10-1 probe was used to count smears. The 43-10-1 is a scintillation probe that combines a Zinc Sulfide scintillator for alpha with a plastic scintillator for beta. The scaler simultaneously collects both alpha and beta data in separate channels and can log this data.

The Berthold LB 770 Proportional counter was also used for smear counting. Gas proportional counters are capable of detecting both alpha and beta radiations. The radiations ionize the P-10 counting gas. The ionized particles are counted by the system. Background is eliminated as much as possible through the use of a guard counter that is installed directly above the measuring counter. The guard counter works in anticoincidence with the measuring counter so that events occurring simultaneously will be detected and eliminated. Alpha and beta radiations are discriminated because of the greatly differing ionization potential between alpha and beta particles.

A Tricarb 2750/LL liquid scintillation counter was used for alpha, beta and tritium smear analysis. Liquid scintillation counters will detect alpha and beta as well as tritium. Sample blanks were used to calibrate the equipment and develop appropriate quench curves.

2.2.2 Volume Contamination Sampling

Potentially volume contaminated waste items required sampling and analysis to determine that no detectable radioactivity had been added through DOE activities in order to declare that the items are non-radioactive. DOE guidelines specify that a determination of "no detectable activity" should be made through reasonable sample preparation, instrumentation, counting times, and analytical techniques. Best available technology was used. This approach was adopted by the SSD project through the use of various procedures reflecting and incorporating industry standard techniques in the aforementioned areas.

Instruments used to analyze for volume contamination included:

A high purity germanium detector capable of detecting gamma ray energies from 20 KeV to 3000 KeV was used for gamma spectroscopy. Both n and p type detectors were used. The analysis program used for data output was EG&G Ortec Omnigram software. An example of the output can be found in Attachment IV.

Gross alpha, beta and tritium analyses were accomplished using liquid scintillation (LSC) and gas proportional counting systems (GPC). LSC and GPC systems are used to determine the activities of radionuclides in chemically processed samples utilizing external standardization. The LSC used by the GJPO laboratory comprised two photomultiplier tubes that recognize coincident events. The GPC systems used comprised a small detector, guard detector, and pulse height discriminating circuitry for measuring alpha and beta activity. All LSC measurements utilized external standard quench correction. GPC operating parameters such as plateau, operating voltage, and crosstalk were determined every twelve months or after the instrument had been serviced. For each system the background count contribution were determined once per batch of samples and compared to acceptance criteria. Blanks and matrix spikes were run as specified in Attachment III.

2.3 Quality Assurance

The objective of the SSD QA/QC program was to provide systematic control of all tasks, including waste segregation, sampling and surveying, process documentation, sample handling, laboratory analysis, and data management, to ensure that the precision, accuracy, completeness, and representativeness of the data were known and demonstrated. Various elements of the QA/QC program are presented below.

2.3.1 Sample Control

Sample containers were labeled with container, item, identification number, site, date collected, time collected, sampler's name, and the analysis to be performed. Chain of Custody forms and SSD Sample Tracking Logs were used to document sample

custody from the time the sample was collected until it was analyzed. While samples were in transit, custody seals were placed across the opening of containers to ensure the integrity of the sample had not been compromised. The receiving laboratory documented the condition of the samples.

2.3.2 Field Quality Control and Instrumentation

Quality control samples were collected in the field following the procedures outlined in the EPA Test Methods for Evaluating Solid Waste (EPA 1986). Equipment blanks, duplicate samples, and trip blanks were collected.

Radiological field instruments were calibrated every six months. In addition daily operational checks were performed in accordance with procedures. Quality control limits (control charts) were maintained for each instrument based on statistical results from previous operational checks. Instruments that performed out of tolerance were removed from service.

2.3.3 Laboratory Quality Control and Instrument Calibration

Laboratory QC requirements were based on *Test Methods for Evaluating Solid Waste* (EPA 1986). For each batch of 20 or fewer samples submitted for analysis, laboratory duplicates, blanks, and quality control samples were prepared and analyzed according to SOPs specified by the analytical method. See Attachment III for QA/QC requirements summary.

2.3.4 Document Control

During the SSD project, consistent and accurate record keeping procedures were implemented. Corrections to records were made by a single line through, then initialed and dated. Documents have been managed in accordance with prescribed retention and disposition requirements. See Attachment III for a listing of these procedures.

3.0 Results

This section discusses the waste segregation decision criteria, provides a detailed summary of the waste items proposed, and gives a textual description of the data presented in Attachment I.

3.1 Decision Criteria

Decision criteria to segregate waste were two fold. Surface contamination decisions were based on the limits set forth in DOE Order 5400.5. Volume contamination decisions were based on a determination of no detectable activity. No detectable activity is defined by the method detection limit (MDL). Values that are less the MDL are defined to have "no detectable activity".

3.1.1 Surface Contamination

MDL values were determined for direct reading instruments and for the smear counting instruments. MDL for direct reading instruments were determined a priori and are documented in Rust Geotech Procedure HS-304. MDL values for direct

reading instruments were at or below the release limits specified in DOE Order 5400.5.

The MDL for an instrument used to determine removable surface contamination levels was calculated using the following equation:

MDL EQUATION:

$$\frac{2.71+3.29\sqrt{(R_b)(t_{s+b})\left(1+\frac{t_{s+b}}{t_b}\right)}}{(E)(t_{s+b})}$$

Where:

Factors "2.71" and "3.29" represent the 95% confidence level

R_b = The background count rate in cpm

t_{s+b} = The sample count time plus the background count time

t_b = The background count time

E = The instrument efficiency

Example MDL equation for removable alpha, Survey ID 47507

$$\frac{2.71+3.29\sqrt{(1)(21)\left(1+\frac{21}{20}\right)}}{(30\%)(21)}=4\text{ dpm}$$

Example MDL equation for removable beta, survey ID 47507

$$\frac{2.71+3.29\sqrt{(49)(21)\left(1+\frac{21}{20}\right)}}{(29.6\%)(21)}=25\text{dpm}$$

3.1.2 Volume Contamination

The decision criteria for volume contamination were based on instrument MDL. Only those items with non detectable radioactive material were categorized as non-radioactive. The gas proportional instrument MDL gross alpha, gross beta, and tritium is calculated using:

MDL EQUATION:

$$\frac{2.71+4.65\sqrt{S_c - N_c}}{(E)(t)(s)(2.22)}$$

Where:

Factors "2.71" and "4.65" represent the 95% confidence level

S_c = Gross sample counts

N_c = Net counts

E = Instrument efficiency

t = count time

s = Sample size

2.22 = Converstion factor from dpm to pCi

$$\frac{2.71+4.65\sqrt{7-1.4}}{(18.2\%)(100)(5ml)(2.22)} = .07\ pCi/ml$$

Example alpha data from lab sample ID 235801 survey ID 47507 using data in Attachment IV.

3.2 Summary of Items Proposed

The total number of items determined by LANL and DOE to be free of DOE added radioactivity is 532. The total volume is 3.04 m3. Of these items, 345 (2.94 m3) are currently covered by the STP, 59 (0.02 m3) have been proposed for addition in Revision 7.0 and are now approved, 60 (0.0 m3) are "split items" and 68 (0.08 m3) are additional items that were found during the SSD project and subsequent data review. All items underwent the same radiological analysis process and are free of DOE added radioactivity. The "split items" are associated with STP covered volume and only affect item count in the STP.

Summary of Proposed Items

STP Code	EPA Codes	Volume (m3)	Item Count	Description
LA-W906	D001, D002, F002, F005, U003	.01	7	Aqueous Organic Liquids
LA-W907	U080, U228, U226, U210, U077, U044, F005, D009, U211, F003, D002, D022, D039, F001, F002, D001	.99	54	Halogenated Organic Liquids
LA-W908	U019, U057, U239, U159, U122, U140, U154, U161, U196, U213, U226, U002, U003, U220, D003, U056, D001, D002, D004, D007, D008, D011, F005, F002, F003, F004, D0043	.5	276	Non-Halogenated Organic Liquids
LA-W909	D030, D033, D034, D035, D036, F002, D043, D040, F001, D008, D039, D028, D027, D022, D019, D018, D009, D007, D006, D004, D001, F003, D032, D010, F005, D029, F004	.83	4	Bulk Oils
LA-W911	D001, U165	.001	3	Organic Contaminated Combustible Solids
LA-W912	D001, D011	.003	4	Combustible Debris
LA-W913	D010, D011, D009, D008, D007, D006, D003, D002, D005	.14	19	Aqueous Waste with Heavy Metals
LA-W914	D002, D003, D001	.008	11	Corrosive Solutions
LA-W916	D005, D003	.0004	10	Water Reactive Wastes
LA-W918	U075, D001, U226, U228	.02	19	Compressed Gasses Requiring Oxidation
LA-W919	D006, D008	.42	2	Organic Contaminated Non-Combustible Solids
LA-W923	D001, D007, D011	.007	5	Inorganic Solid Oxidizers
LA-W925	D009, D003, D002	.003	5	Mercury Wastes TBD
LA-W933	D003, D005, D006, D007, D008, D010, D011, P012, P113, U144, U190, U204, U216, U219, U131, D004	.03	45	Labpacks
TBD	D001, D002, D003, D007, F003, U056, U057, U122, U140, U154, U213, U220, U226, U227, U239	.08	68	Newly Found

3.3 Discussion of Results in Attachment I

The SSD project involved unpacking containers and surveying each item within that container. In cases where there were multiple items within a container, each item was surveyed and analyzed for volume contamination. The outside container was also surveyed. In cases where there were overpacks, each successive container "layer" was surveyed. In all cases both removable and direct reading survey results met release limits established in DOE Order 5400.5.

Attachment I provides a summary of results for each item. In all cases volume contamination results were less than or equal to MDL. Only the MDL values are reported. Column one provides the requisition number. The requisition number is the analytical laboratory number used to track all samples submitted for a given set of containers. The final reports issued by GJPO are organized by requisition number. Column two provides the Survey/Analysis ID number. Each individual item within a container was surveyed and analyzed. The Survey/Analysis ID numbers are used to document all survey and analytical data collected for a given item. Column three is the direct reading alpha survey indication, column four is the direct reading beta survey indication, column five is the removable alpha MDL, column six is the removable beta MDL, column seven is the removable tritium MDL, column eight is the gross alpha

MDL, column nine is the gross beta MDL, column ten is the gross tritium MDL, column eleven is the gamma spec indication, and column twelve is the units for volume contamination.

3.3.1 Volume Contamination Analysis Results

The data reported is the MDL. A "less than or equal to" is implied. The reporting convention is to report the MDL value, "NS", "s", or "<". "NS" means that the particular analyte was not suspected in the waste. The "s" indicates that analysis was not required, as the item was factory sealed and therefore could not be volume contaminated. 100% of the items proposed received volume contamination analysis.

The "<" is used specifically for gamma spec. This indicates that the result was less than MDL for all radioisotopes. Attachment IV is provided as an example gamma spec documentation package. Additional packages are available for review upon request.

3.3.2 Direct Reading Surveys for Alpha and Beta

The reporting convention is that "y" indicates a direct reading survey for alpha and beta was performed and the results were less than MDL values. "NR" means not required. External surveys were not required if the item was a bulk liquid. Over 98% of the proposed items received a direct reading survey.

3.3.3 Surveys for Removable Alpha/Beta and Tritium Contamination

In most cases the MDL is reported for removable alpha, beta and tritium. In cases where values exceeded MDL, the result is reported. An "NS" means the analyte was not suspected in the waste and an "NR" means that the analysis was not required. One example of a "NR" designation is a case where the MDL for a direct reading survey meets the removable release requirements for the given analyte. Uranium is one analyte where this is the case. Over 99% of the proposed items underwent removable surface radiological surveys for alpha and beta and over 96% of the items received tritium smear surveys.

3.4 Results of QA Review

As an additional check of data validity, LANL performed an independent QA review. Separate reviews were conducted for the field survey measurements and laboratory results. The parameters examined for field instruments were to verify a valid calibration and a background and source check were performed on days the instruments were in use.

All project documentation has been archived at the GJPO in Grand Junction, CO. A review of those records, performed by LANL in April of 1998, indicated project documentation is in order and retrievable. Instruments used were in current calibration and were function checked.

QA review of analytical results encompassed evaluation of parameters such as duplicates, matrix spikes, continuing calibration verification, preparation blank,

laboratory control samples, quench indicator parameter, and current calibration. See Attachment V for a full listing of quality control requirements for analytical systems. A limited number of batches did not meet all QC requirements established in the work plan. Several factors indicate that these data are valid and should still be used to characterize the waste as hazardous only. First, of the numerous batches analyzed, only a few had any QC issues. Further, the QC criteria were set with severely restrictive limits. All QC failures ranged between ± 10% and ± 20%. The parameter that was furthest outside the established criteria was a laboratory control sample (LCS) that resulted in 113% of the known value. The +13% level is exceedingly restrictive, especially when taking into account that the continuing calibration verification (CCV) resulted in 94.3% of the known value. In other words, there was no indication of an upward trend in instrument performance.

Each item with a QC issue was evaluated. In each case other QC parameters indicating similar aspects of data quality passed. Finally, because both radioactive decay, and instrument response are statistical features, a normal distribution centered around 100% is expected. On occasion values may fall outside of certain ranges without implying the data is invalid, provided other QC measures do not fail as well, and provided that the problem is not systematic or trend indicative.

In one case an instrument was used that was one month beyond the specified calibration date. While this is a procedural violation, the subsequent calibration indicated no change from the previous calibration. Further, continuing calibration verifications (CCVs) were being performed when the instrument was in use documenting acceptable instrument performance. Thus, these data were accepted.

The only other QC issue was that two batches did not have a matrix spike for tritium, gross alpha, or gross beta. However, the continuing calibration verification and the laboratory control sample results passed in each case, thus indicating appropriate instrument performance.

4.0 Conclusions

LANL is proposing that the items documented in this report be considered hazardous waste only. The waste items were believed to be non-radioactive based on process knowledge and generator interviews. The verification data presented in this report support the determination that the wastes were hazardous only.

The ultimate destination for most of the proposed waste items is the APTUS incinerator, or a technically equivalent incinerator. A few containers will need to be sent to the BDT incinerator and acid wash facility, or the Deer Park, Texas incinerator. All waste containers are confirmed to have a treatment and disposal option as hazardous waste. All waste items will be shipped for treatment and disposal within 90 days of approval by NMED of this report.

Attachment I
Data Summary

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14074	1385	NR	NR	NR	NR	NR	0.06	0.15	16.91	NS	pCi/ml
14074	1035790	NR	NR	NR	NR	NR	0.12	0.3	40.04	<	pCi/ml
14088	11973	NR	NR	NR	NR	NR	0.14	0.3	17.41	NS	pCi/ml
14088	1019319	NR	NR	NR	NR	NR	0.19	0.3	33.81	NS	pCi/ml
14171	1010087	y	y	4	25	NS	0.13	0.3	19.02	NS	pCi/ml
14171	1016176	y	y	4	25	NS	0.13	0.3	18.87	NS	pCi/ml
14216	1105	NR	NR	NR	NR	NR	0.03	0.06	10.53	NS	pCi/ml
14350	1998	y	y	4	25	NS	0.12	0.19	15.08	NS	pCi/ml
14350	11785	y	y	4	25	NS	0.06	0.12	62.82	NS	pCi/ml
14350	47506	y	y	8	36	14	0.06	0.12	15.03	<	pCi/ml
14350	47516	y	y	8	36	14	0.06	0.12	15.19	<	pCi/ml
14350	47517	y	y	8	36	14	0.06	0.12	15.05	<	pCi/ml
14350	49155	y	y	8	36	14	0.06	0.12	15.06	<	pCi/ml
14350	1024388	y	y	8	36	14	0.06	0.12	15.37	<	pCi/ml
14391	27522	y	y	4	25	NS	8	6	22.63	NS	pCi/gm
14391	27525	y	y	4	25	NS	7	6	19.17	NS	pCi/gm
14391	45938	y	y	4	25	NS	0.8	0.6	15.65	NS	pCi/ml
14391	45939	y	y	4	25	NS	0.05	0.04	17.33	NS	pCi/ml
14391	45940	y	y	4	25	NS	0.05	0.04	15.73	NS	pCi/ml
14391	45941	y	y	4	25	NS	0.04	0.03	15.66	NS	pCi/ml
14391	45943	y	y	4	25	NS	0.1	0.08	15.37	NS	pCi/ml
14391	1009135	y	y	8	29	12	0.012	0.03	70.65	NS	pCi/ml
14468	45937	y	y	4	25	NS	0.3	0.3	17.29	<	pCi/ml
14468	45942	y	y	4	25	NS	0.2	0.2	17.28	<	pCi/ml
14489	45944	y	y	4	25	NS	0.09	0.18	23.49	<	pCi/ml
14489	1026530	y	y	9	32	12	0.2	0.4	17.46	NS	pCi/ml
14546/14552/14564	39640	y	y	4	25	NS	0.05	0.1	154.17	NS	pCi/ml
14546/14552/14564	39642	y	y	4	25	NS	0.05	0.1	154.17	NS	pCi/ml
14546/14552/14564	39644	y	y	4	25	NS	0.05	0.1	154.17	NS	pCi/ml
14546/14552/14564	2050792	y	y	4	25	NS	0.07	0.15	64.51	NS	pCi/ml
14546/14552/14564	2050795	y	y	4	35 (1)	NS	0.07	0.15	64.51	NS	pCi/ml
14622	9975	y	y	12	32	14	s	s	s	s	s
14622	1018653	y	y	4	25	NS	s	s	s	s	s
14622	2050804	y	y	11	31	12	s	s	s	s	s
14622	2050805	y	y	11	31	12	s	s	s	s	s
14622	2050806	y	y	11	31	12	s	s	s	s	s
14622	2050815	y	y	11	33	12	s	s	s	s	s
14622	2050816	y	y	11	33	12	s	s	s	s	s
14622	2050817	y	y	11	33	12	s	s	s	s	s
14622	2050818	y	y	11	33	12	s	s	s	s	s
14622	2050819	y	y	11	33	12	s	s	s	s	s
14622	1016921	y	y	10	32	14	0.02	0.06	92.11	NS	pCi/ml
14622	1025462	y	y	11	31	12	9.63	6.47	12.39	<	pCi/gm
14622	1025576	y	y	11	33	12	9.59	6.74	12.61	<	pCi/gm
14622	1034991	y	y	11	30	12	9.57	6.84	12.67	<	pCi/gm

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14622	1035145	y	y	12	32	14	9.67	6.77	12.74	NS	pCi/gm
14622	11389	y	y	4	25	NS	0.02	0.06	92.31	<	pCi/ml
14622	11390	y	y	4	25	NS	0.3	0.6	53.83	<	pCi/ml
14622	11391	y	y	10	30	12	0.02	0.06	91.58	<	pCi/ml
14622	11392	y	y	10	30	12	7.17	8.89	38.56	<	pCi/gm
14622	11393	y	y	10	30	12	3.22	6.22	12.54	<	pCi/gm
14622	11394	y	y	10	30	12	9.63	6.75	12.93	<	pCi/gm
14622	2050803	y	y	11	31	12	0.39	0.61	55.64	<	pCi/ml
14622	2050814	y	y	11	33	12	9.53	6.67	12.63	<	pCi/gm
14622	2050820	y	y	11	33	12	9.7	6.82	12.6	<	pCi/gm
14622	4535	NR	NR	NR	NR	NR	1.53	1.94	12.55	<	pCi/gm
14622	4644	y	y	11	31	12	0.37	0.42	54.44	<	pCi/ml
14622	8978	y	y	10	31	13	0.05	0.12	53.66	<	pCi/ml
14622	9977	y	y	12	32	14	9.47	6.63	12.67	<	pCi/gm
14626	10701	y	y	11	31	12	s	s	s	s	s
14626	10702	y	y	11	31	12	s	s	s	s	s
14626	10703	y	y	11	33 (1)	27 (1)	9.09	6.89	12.24	NS	pCi/gm
14626	10706	y	y	11	31	12	8.81	6.61	12.57	NS	pCi/gm
14626	10707	y	y	11	31	12	8.97	6.67	13.11	NS	pCi/gm
14626	10709	y	y	11	31	12	9.31	6.94	12.69	NS	pCi/gm
14626	10711	y	y	11	31	12	4.29	6.21	13.05	NS	pCi/gm
14626	10712	y	y	11	31	12	8.54	6.7	11.46	NS	pCi/gm
14626	10713	y	y	11	31	12	8.92	6.63	13.1	NS	pCi/gm
14626	10715	y	y	11	31	12	7.95	5.94	14.63	NS	pCi/gm
14626	10716	y	y	11	31	12	8.81	6.67	13.08	NS	pCi/gm
14626	1004825	y	y	12	31	14 (1)	0.23	0.28	14.97	NS	pCi/gm
14626	1004826	y	y	12	31	11	3.29	5.97	47.99	NS	pCi/gm
14626	1004830	y	y	12	31	11	2.92	4.75	49.48	NS	pCi/gm
14626	1004831	y	y	11	31	12	s	s	s	s	s
14626	2050834	y	y	11	31	12	s	s	s	s	s
14628	8975	y	y	4	25	NS	s	s	s	s	s
14628	8977	y	y	4	25	NS	s	s	s	s	s
14628	9503	y	y	12	31	12	8.38	7.26	12.27	NS	pCi/gm
14628	9504	y	y	12	31	12	7.73	6.65	13.17	NS	pCi/gm
14628	9506	y	y	12	31	12	8.11	7.15	12.81	NS	pCi/gm
14628	9556	y	y	11	30	12	0.04	0.06	99.43	NS	pCi/ml
14628	9557	y	y	11	30	12	0.04	0.06	107.6	NS	pCi/ml
14628	9569	y	y	12	31	13 (1)	8.01	6.86	13.26	NS	pCi/gm
14628	9573	y	y	12	31	12	6.15	6.87	13.08	NS	pCi/gm
14628	30108	y	y	11	31	12	7.82	6.69	13.32	NS	pCi/gm
14628	30120	y	y	11	31	12	7.83	6.7	13.02	NS	pCi/gm
14628	1014103	y	y	11	31	12	0.13	0.12	98.13	NS	pCi/ml
14628	1014104	y	y	11	31	12	0.08	0.12	49.51	NS	pCi/ml
14633	3843	y	y	11	31	12	1.34	1.19	106.26	NS	pCi/ml
14633	10018	y	y	11	31	12	s	s	s	s	s

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14633	10029	y	y	11	31	12	0.04	0.06	15.1	<	pCi/ml
14633	11049	y	y	11	31	12	9.87	6.85	13.34	NS	pCi/gm
14633	11839	y	y	11	31	12	9.89	6.87	13.31	NS	pCi/gm
14633	11840	y	y	11	31	12	s	s	s	s	s
14633	11841	y	y	11	31	12	10.16	7.13	12.81	NS	pCi/gm
14633	11842	y	y	11	31	12	10.46	7.32	12.86	NS	pCi/gm
14633	11846	y	y	11	31	12	9.88	6.87	12.57	NS	pCi/gm
14633	11847	y	y	11	31	12	3.27	6.32	13.63	NS	pCi/gm
14633	11848	y	y	11	31	12	s	s	s	s	s
14633	11849	y	y	11	31	12	9.87	6.85	13.34	NS	pCi/gm
14633	11850	y	y	11	31	12	10.1	7.03	13.23	NS	pCi/gm
14633	11852	y	y	11	31	12	s	s	s	s	s
14633	11853	y	y	11	31	12	s	s	s	s	s
14633	11854	y	y	11	31	12	9.99	6.96	12.61	NS	pCi/gm
14633	1033790	y	y	11	31	12	0.07	0.12	13.47	NS	pCi/ml
14647/14769	3969	y	y	12	31	12	0.08	0.17	67.34	<	pCi/ml
14647/14769	3970	y	y	12	31	12	0.07	0.17	14.9	<	pCi/ml
14647/14769	6967	y	y	11	30	12	0.08	0.15	15.4	<	pCi/ml
14647/14769	6970	y	y	11	30	12	s	s	s	s	s
14647/14769	6971	y	y	11	30	12	0.29	0.39	44.9	<	pCi/ml
14647/14769	7315	y	y	4	25	NS	0.17	0.18	14.53	<	pCi/ml
14647/14769	7317	y	y	4	25	NS	0.13	0.08	15	<	pCi/ml
14647/14769	10723	y	y	12	32	13	0.04	0.08	18.5	<	pCi/ml
14647/14769	10724	y	y	12	32	13	0.04	0.08	15.8	<	pCi/ml
14647/14769	10725	y	y	12	32	12	0.04	0.08	16.2	<	pCi/ml
14647/14769	10726	y	y	12	32	13	0.04	0.07	15.7	<	pCi/ml
14647/14769	10727	y	y	12	32	13	1.74	2.87	24.4	<	pCi/ml
14647/14769	10730	y	y	12	32	13	0.04	0.07	16.2	<	pCi/ml
14647/14769	10737	y	y	12	32	13	0.04	0.08	17.1	<	pCi/ml
14647/14769	1001614	y	y	11	31	12	0.07	0.17	15.63	<	pCi/ml
14647/14769	1002397	y	y	11	31	12	0.07	0.17	15.49	<	pCi/ml
14647/14769	1002399	y	y	11	31	12	0.54	1.28	15.71	NS	pCi/ml
14647/14769	1007514	y	y	11	31	12	0.07	0.17	15.42	<	pCi/ml
14647/14769	1011286	y	y	4	25	NS	0.04	0.08	30	<	pCi/ml
14647/14769	1011289	y	y	4	25	NS	0.07	0.17	22.97	<	pCi/ml
14647/14769	1014351	y	y	10	31	12	0.07	0.17	31.09	<	pCi/ml
14647/14769	1014356	y	y	10	31	12	0.07	0.17	30.28	<	pCi/ml
14647/14769	1014358	y	y	4	25	NS	0.07	0.17	108.11	<	pCi/ml
14647/14769	1014359	y	y	10	31	12	0.07	0.17	29.91	<	pCi/ml
14647/14769	1014360	y	y	10	31	12	0.07	0.17	29.52	<	pCi/ml
14647/14769	1019096	y	y	11	31	12	s	s	s	s	s
14647/14769	2050851	y	y	11	31	12	0.41	0.85	15.43	<	pCi/ml
14647/14769	2050867	y	y	4	25	NS	0.17	0.18	14.53	<	pCi/ml
14647/14769	2050868	y	y	4	25	NS	0.2	0.18	14.75	<	pCi/ml
14647/14769	2050869	y	y	4	25	NS	0.15	0.18	17.09	<	pCi/ml

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14647/14769	2050870	y	y	4	25	NS	0.12	0.17	15.14	<	pCi/ml
14647/14769	2056514	y	y	12	32	13	s	s	s	s	s
14647/14769	2056515	y	y	12	32	13	s	s	s	s	s
14647/14769	2056516	y	y	12	32	13	s	s	s	s	s
14647/14769	2056517	y	y	12	32	13	s	s	s	s	s
14647/14769	2056518	y	y	12	32	13	s	s	s	s	s
14647/14769	2056562	y	y	11	30	12	0.29	0.39	44.9	<	pCi/ml
14647/14769	2056563	y	y	11	30	12	s	s	s	s	s
14649	10605	y	y	10	30	11	0.07	0.17	14.95	NS	pCi/ml
14649	10606	y	y	4	25	NS	0.07	0.17	15.13	NS	pCi/ml
14649	10607	y	y	10	30	11	0.07	0.16	16.06	NS	pCi/ml
14649	10608	y	y	10	30	11	0.07	0.17	159.24	NS	pCi/ml
14649	10609	y	y	10	30	11	0.07	0.17	15.42	NS	pCi/ml
14649	10610	y	y	10	30	11	0.07	0.17	14.96	NS	pCi/ml
14649	10611	y	y	4	25	NS	0.07	0.17	159.96	NS	pCi/ml
14649	10613	y	y	10	30	11	0.07	0.17	16.34	NS	pCi/ml
14649	10698	y	y	4	25	NS	0.07	0.17	31.65	NS	pCi/ml
14649	10699	y	y	4	25	NS	0.07	0.17	16.54	NS	pCi/ml
14649	10700	y	y	10	30	11	0.07	0.16	15.63	NS	pCi/ml
14649	10943	y	y	11	32	13	0.07	0.17	158.63	NS	pCi/ml
14649	10947	y	y	11	32	13	0.07	0.17	149.88	NS	pCi/ml
14649	10948	y	y	11	32	13	0.07	0.16	153.97	NS	pCi/ml
14649	10949	y	y	4	25	NS	0.11	0.17	157.61	NS	pCi/ml
14649	10950	y	y	11	32	13	s	s	s	s	s
14649	10951	y	y	11	32	13	s	s	s	s	s
14649	10953	y	y	11	32	13	0.62	0.94	139.13	NS	pCi/gm
14649	10955	y	y	11	32	13	0.38	0.83	158.08	NS	pCi/ml
14649	11268	y	y	4	25	NS	0.07	0.17	151.37	NS	pCi/ml
14649	2050862	y	y	11	32	13	0.07	0.17	15.02	NS	pCi/ml
14649	2050895	y	y	4	25	NS	0.07	0.17	16.54	NS	pCi/ml
14649	2050896	y	y	4	25	NS	0.07	0.17	16.54	NS	pCi/ml
14649	2050897	y	y	10	30	11	0.07	0.16	15.56	NS	pCi/ml
14649	2050898	y	y	10	30	11	0.07	0.17	16.14	NS	pCi/ml
14649	2050899	y	y	10	30	11	0.07	0.16	15.77	NS	pCi/ml
14660	12247	y	y	11	31	13	0.07	0.17	118.75	NS	pCi/ml
14660	12249	y	y	11	31	13	3.62	4.57	45.86	NS	pCi/gm
14660	12251	y	y	11	31	13	0.37	0.84	107.09	NS	pCi/ml
14660	12281	y	y	11	31	13	0.2	0.29	62.17	NS	pCi/ml
14660	14380	y	y	11	31	13	0.09	0.17	16.31	NS	pCi/ml
14660	1006478	y	y	12	31	11	0.42	0.96	32.97	NS	pCi/g
14660	1009257	y	y	4	25	NS	0.07	0.17	16.17	NS	pCi/ml
14660	1018980	y	y	4	25	NS	0.07	0.17	15.56	NS	pCi/ml
14660	1023943	y	y	12	31	11	1.26	2.21	15.66	NS	pCi/ml
14687	4637	y	y	11	31	12	0.09	0.17	61.15	NS	pCi/ml
14687	4705	y	y	11	31	12	0.43	0.99	49.27	NS	pCi/gm

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14687	14218	y	y	4	25	NS	0.07	0.17	31.28	<	pCi/ml
14687	14219	y	y	4	25	NS	0.07	0.17	15.48	<	pCi/ml
14687	14255	y	y	4	25	NS	0.11	0.28	64.62	NS	pCi/ml
14687	47507	y	y	4	25		0.07	0.17	29.87	<	pCi/ml
14687	47508	y	y	12	31	12	0.07	0.17	30.65	NS	pCi/ml
14687	47509	y	y	4	32 (1)		s	s	s	s	s
14687	1035581	y	y	4	25		0.07	0.17	31.06	<	pCi/ml
14687	2049653	y	y	11	31	16 (1)	0.18	0.42	15.84	NS	pCi/ml
14687	2049654	y	y	11	31	11	0.13	0.28	17.65	NS	pCi/ml
14687	2049655	y	y	11	31	11	0.19	0.42	61.99	NS	pCi/ml
14687	2049658	y	y	11	31	11	0.45	0.86	15.26	NS	pCi/ml
14687	2049663	y	y	4	25	NS	0.07	0.17	15.36	NS	pCi/ml
14687	2049698	y	y	4	25		0.07	0.17	33.51	NS	pCi/ml
14712/14726	22875	y	y	12	31	12	0.08	0.15	15.5	<	pCi/ml
14712/14726	22876	y	y	12	31	12	0.08	0.15	17.7	<	pCi/ml
14712/14726	22878	y	y	12	31	12	0.08	0.15	16.5	<	pCi/ml
14712/14726	22931	y	y	12	31	12	0.08	0.16	15.8	<	pCi/ml
14712/14726	22940	y	y	12	31	12	0.08	0.15	78	<	pCi/ml
14712/14726	22964	y	y	12	31	12	0.03	0.05	15.6	<	pCi/ml
14712/14726	22967	y	y	12	31	12	0.03	0.05	15.6	<	pCi/ml
14712/14726	22969	y	y	4	35 (1)	NS	0.08	0.15	15.1	<	pCi/ml
14712/14726	1001738	y	y	13	32	13	s	s	s	s	s
14712/14726	1001739	y	y	13	32	13	s	s	s	s	s
14712/14726	1001743	y	y	13	32	13	s	s	s	s	s
14712/14726	1025579	y	y	11	32	13	1.32	1.01	18.6	NS	pCi/gm
14712/14726	1034287	y	y	4	25	NS	s	s	s	s	s
14712/14726	2049671	y	y			NS	0.08	0.15	16.1	NS	pCi/ml
14712/14726	2049672	y	y			NS	s	s	s	s	pCi/gm
14712/14726	2049700	y	y	13	32	13	s	s	s	s	s
14712/14726	2049701	y	y	13	32	13	s	s	s	s	s
14712/14726	2049702	y	y	13	32	13	s	s	s	s	s
14712/14726	2049703	y	y	13	32	13	s	s	s	s	s
14712/14726	2049704	y	y	13	32	13	s	s	s	s	s
14712/14726	2049705	y	y	13	32	13	s	s	s	s	s
14712/14726	2049706	y	y	13	32	13	s	s	s	s	s
14712/14726	2049707	y	y	13	32	13	s	s	s	s	s
14712/14726	2049708	y	y	13	32	13	s	s	s	s	s
14712/14726	2049709	y	y	13	32	13	s	s	s	s	s
14712/14726	2051710	y	y	13	32	13	s	s	s	s	s
14712/14726	2051711	y	y	13	32	13	s	s	s	s	s
14712/14726	2051712	y	y	13	32	13	s	s	s	s	s
14712/14726	2051713	y	y	13	32	13	s	s	s	s	s
14712/14726	2051714	y	y	13	32	13	s	s	s	s	s
14712/14726	2051715	y	y	13	32	13	s	s	s	s	s
14712/14726	2051716	y	y	13	32	13	s	s	s	s	s

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14712/14726	2051717	y	y	13	32	13	s	s	s	s	s
14712/14726	2051718	y	y	13	32	13	s	s	s	s	s
14712/14726	2051719	y	y	13	32	13	s	s	s	s	s
14712/14726	2051720	y	y	13	32	13	s	s	s	s	s
14712/14726	2051721	y	y	13	32	13	s	s	s	s	s
14712/14726	2051722	y	y	13	32	13	s	s	s	s	s
14712/14726	2051723	y	y	13	32	13	s	s	s	s	s
14712/14726	2051750	y	y	12	31	12	0.03	0.05	15.6	<	pCi/ml
14712/14726	2051751	y	y	12	31	12	0.08	0.16	15.2	<	pCi/ml
14712/14726	1001736	y	y	13	32	13	0.06	0.14	61.8	<	pCi/ml
14712/14726	1001737	y	y	13	32	13	0.06	0.14	16	<	pCi/ml
14712/14726	1001741	y	y	13	32	13	0.06	0.14	15.2	<	pCi/ml
14712/14726	1001742	y	y			NS	0.06	0.14	34.4	<	pCi/ml
14712/14726	1001744	y	y	13	32	13	0.17	0.35	15.8	<	pCi/ml
14712/14726	1019224	y	y	4	25	NS	0.08	0.15	15.5	NS	pCi/ml
14712/14726	10768	y	y	14	32	13	0.19	0.35	35.7	NS	pCi/ml
14712/14726	10769	y	y	14	32	13	0.09	0.17	34.8	<	pCi/ml
14712/14726	10771	y	y	14	32	17 (1)	0.13	0.28	78.1	<	pCi/ml
14712/14726	10774	y	y	14	32	13	0.07	0.17	15.5	<	pCi/ml
14712/14726	10775	y	y	14	32	13	0.08	0.17	32.8	<	pCi/ml
14712/14726	10777	y	y	14	32	13	0.43	1.04	36.4	<	pCi/gm
14712/14726	10778	y	y	14	32	13	0.19	0.43	64.5	<	pCi/ml
14712/14726	10784	y	y	14	32	13	0.22	0.43	43.8	<	pCi/ml
14712/14726	10785	y	y	14	32	13	0.2	0.43	30.9	<	pCi/ml
14712/14726	10789	y	y	14	32	13	0.2	0.43	31.1	<	pCi/ml
14712/14726	11259	y	y	4	25	NS	0.08	0.17	15.6	<	pCi/ml
14712/14726	2049673	y	y	11	32	12	1.48	2.28	21	NS	pCi/gm
14712/14726	2049674	y	y	11	32	12	0.44	0.8	16.3	NS	pCi/gm
14712/14726	2049676	y	y	11	32	12	0.08	0.15	15.5	NS	pCi/ml
14712/14726	2049677	y	y	11	32	12	0.44	0.77	15.5	NS	pCi/ml
14712/14726	2049678	y	y	11	32	12	0.43	0.78	87.9	NS	pCi/ml
14712/14726	2049679	y	y	11	31	12	1.12	1.23	26.6	NS	pCi/gm
14712/14726	2049693	y	y	14	32	13	0.11	0.23	33.8	<	pCi/ml
14712/14726	2049694	y	y	14	32	13	0.11	0.23	31.2	<	pCi/ml
14712/14726	2049695	y	y	14	32	13	0.08	0.14	47.4	<	pCi/ml
14712/14726	2051724	y	y	13	32	13	0.06	0.14	16.3	<	pCi/ml
14712/14726	2051725	y	y	13	32	13	0.06	0.14	15.6	<	pCi/ml
14712/14726	2051726	y	y	12	30	12	0.06	0.14	15.4	<	pCi/ml
14712/14726	2051727	y	y	13	30	13	0.06	0.14	15.4	<	pCi/ml
14712/14726	2051728	y	y	13	32	13	0.06	0.14	15.4	<	pCi/ml
14712/14726	2051729	y	y	13	32	13	0.06	0.14	15.3	<	pCi/ml
14740/14742	9027	y	y	12	31	12	0.94	1.82	18.2	<	pCi/gm
14740/14742	9029	y	y	13	31	12	1.94	3.72	51	<	pCi/gm
14740/14742	9030	y	y	12	31	12	0.08	0.15	88	<	pCi/ml
14740/14742	9033	y	y	12	31	12	s	s	s	s	s

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14740/14742	9035	y	y	13	31	12	0.08	0.15	91	<	pCi/ml
14740/14742	9036	y	y	12	31	12	1.95	2.91	33.7	<	pCi/gm
14740/14742	9037	y	y	12	31	12	4.08	3.05	16.3	<	pCi/ml
14740/14742	9038	y	y	4	29 (1)	NS	0.24	0.39	15.4	<	pCi/ml
14740/14742	9039	y	y	4	25	NS	0.24	0.39	16.7	<	pCi/ml
14740/14742	9063	y	y	11	30	12	1.85	1.63	15.3	NS	pCi/ml
14740/14742	9064	y	y	11	30	12	0.3	0.4	15.8	NS	pCi/ml
14740/14742	9072	y	y	11	30	12	0.55	0.6	29.8	NS	pCi/ml
14740/14742	9078	y	y	11	30	12	1.33	1.98	29.4	NS	pCi/gm
14740/14742	9081	y	y	12	31	12	2.15	3.1	26.2	NS	pCi/gm
14740/14742	11095	y	y	4	25	NS	0.08	0.15	14.8	NS	pCi/ml
14740/14742	11096	y	y	4	25	NS	0.08	0.15	15	NS	pCi/ml
14740/14742	11101	y	y	4	25	NS	0.08	0.15	34.9	NS	pCi/ml
14740/14742	25872	y	y	11	32	13	1.65	2.5	25.5	NS	pCi/gm
14740/14742	47512	y	y	12	31	12	s	s	s	s	s
14740/14742	2051753	y	y	12	31	12	s	s	s	s	s
14740/14742	2051754	y	y	12	31	12	s	s	s	s	s
14740/14742	2051755	y	y	12	31	12	s	s	s	s	s
14740/14742	2051756	y	y	12	31	12	s	s	s	s	s
14740/14742	2051757	y	y	12	31	12	s	s	s	s	s
14740/14742	2051758	y	y	12	31	12	s	s	s	s	s
14740/14742	2051759	y	y	12	31	12	s	s	s	s	s
14740/14742	2051760	y	y	12	31	12	s	s	s	s	s
14740/14742	2051761	y	y	12	31	12	s	s	s	s	s
14740/14742	2051762	y	y	12	31	12	s	s	s	s	s
14740/14742	2051763	y	y	12	31	12	s	s	s	s	s
14740/14742	2051764	y	y	12	31	12	s	s	s	s	s
14740/14742	2051765	y	y	12	31	12	s	s	s	s	s
14740/14742	2051766	y	y	12	31	12	s	s	s	s	s
14740/14742	2051767	y	y	12	31	12	s	s	s	s	s
14740/14742	2051768	y	y	12	31	12	s	s	s	s	s
14740/14742	2051769	y	y	12	31	12	s	s	s	s	s
14740/14742	2051770	y	y	12	31	12	s	s	s	s	s
14740/14742	2051771	y	y	12	31	12	s	s	s	s	s
14740/14742	2051772	y	y	12	31	12	s	s	s	s	s
14740/14742	2051773	y	y	12	31	12	s	s	s	s	s
14740/14742	2051774	y	y	12	31	12	s	s	s	s	s
14740/14742	2051775	y	y	12	31	12	s	s	s	s	s
14740/14742	2051776	y	y	12	31	12	s	s	s	s	s
14740/14742	2051777	y	y	12	31	12	s	s	s	s	s
14740/14742	2051778	y	y	12	31	12	s	s	s	s	s
14740/14742	2051779	y	y	12	31	12	s	s	s	s	s
14740/14742	2051780	y	y	12	31	12	s	s	s	s	s
14740/14742	2051781	y	y	12	31	12	s	s	s	s	s
14740/14742	2051782	y	y	12	31	12	s	s	s	s	s

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14740/14742	2051783	y	y	12	31	12	s	s	s	s	s
14740/14742	2051784	y	y	12	31	12	s	s	s	s	s
14740/14742	2051785	y	y	12	31	12	s	s	s	s	s
14740/14742	2051786	y	y	12	31	12	s	s	s	s	s
14740/14742	2051787	y	y	12	31	12	s	s	s	s	s
14740/14742	2051788	y	y	12	31	12	s	s	s	s	s
14740/14742	2051789	y	y	12	31	12	s	s	s	s	s
14740/14742	2051790	y	y	12	31	12	s	s	s	s	s
14740/14742	2051791	y	y	12	31	12	s	s	s	s	s
14740/14742	2051792	y	y	12	31	12	s	s	s	s	s
14740/14742	2051793	y	y	12	31	12	s	s	s	s	s
14740/14742	2051794	y	y	12	31	12	s	s	s	s	s
14740/14742	2051795	y	y	12	31	12	s	s	s	s	s
14740/14742	2051796	y	y	12	31	12	s	s	s	s	s
14740/14742	2051797	y	y	12	31	12	s	s	s	s	s
14740/14742	2051798	y	y	12	31	12	s	s	s	s	s
14740/14742	2051799	y	y	12	31	12	s	s	s	s	s
14740/14742	2051801	y	y	12	31	12	0.62	0.79	16.3	<	pCi/ml
14740/14742	2051808	y	y	4	26 (1)	NS	1.59	2.78	19.7	NS	pCi/gm
14767	10812	y	y	4	25	NS	0.06	0.14	15.8	<	pCi/ml
14767	10813	y	y	12	33	13	0.07	0.14	15.3	<	pCi/ml
14767	10814	y	y	4	25	NS	0.06	0.14	15	<	pCi/ml
14767	10815	y	y	12	33	13	0.06	0.14	15.3	<	pCi/ml
14767	10816	y	y	12	33	13	0.06	0.14	34.9	<	pCi/ml
14767	10817	y	y	4	25	NS	0.86	0.49	17.6	<	pCi/ml
14767	10818	y	y	12	33	13	0.03	0.07	15.8	<	pCi/ml
14767	10819	y	y	12	33	13	0.03	0.07	15.8	<	pCi/ml
14767	10820	y	y	12	33	13	0.03	0.07	15.8	<	pCi/ml
14767	10821	y	y	12	33	13	0.03	0.07	15.8	<	pCi/ml
14767	10823	y	y	12	33	13	0.04	0.08	66	<	pCi/ml
14767	10824	y	y	12	33	13	0.2	0.15	16	<	pCi/ml
14767	10826	y	y	4	48 (1)	NS	0.03	0.07	15.8	<	pCi/ml
14767	10828	y	y	12	33	13	0.06	0.14	34.9	<	pCi/ml
14767	10831	y	y	12	33	13	0.04	0.08	66	<	pCi/ml
14767	10835	y	y	12	33	13	1.75	3.8	23	<	pCi/gm
14767	10838	y	y	12	33	13	0.78	1.21	15.7	<	pCi/gm
14767	10839	y	y	12	33	13	0.06	0.14	15.4	<	pCi/ml
14767	10840	y	y	12	33	13	0.28	0.37	15.7	<	pCi/ml
14767	2051805	y	y	12	33	13	0.22	0.25	15.8	<	pCi/ml
14767	2051806	y	y	12	33	13	0.22	0.25	15.8	<	pCi/ml
14767	2051807	y	y	12	33	13	0.78	1.21	15.7	<	pCi/gm
14773	1006793			11	31	12	s	s	s	s	pCi/gm
14773	1006786			11	31	12	0.08	0.08	30.6	<	pCi/ml
14773	1025578			4	25	NS	0.04	0.08	80.5	NS	pCi/ml
14773	2056510			12	30	12	1.08	1.08	29.1	NS	pCi/gm

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14773	47164			12	30	12	0.42	0.78	15.4	NS	pCi/ml
14773	47166			12	30	12	0.13	0.26	82.8	NS	pCi/ml
14773	47167			12	30	12	0.11	0.16	15.1	NS	pCi/ml
14773	47168			12	30	12	0.21	0.39	31.2	NS	pCi/ml
14773	47169			12	30	12	0.29	0.27	16.1	NS	pCi/ml
14773	47170			12	30	12	0.47	0.83	18	NS	pCi/gm
14773	47172			12	30	12	1.27	0.95	21.3	NS	pCi/gm
14773	47173			12	30	12	0.26	0.22	77.2	NS	pCi/ml
14778	14227	y	y	4	25	NS	0.07	0.14	16	<	pCi/ml
14778	14228	y	y	4	25	NS	0.07	0.14	92.6	<	pCi/ml
14778	14230	y	y	11	31	12	0.35	0.62	27	<	pCi/gm
14778	14233	y	y	4	25	NS	0.03	0.07	16.1	<	pCi/gm
14778	1001142	y	y	4	25		1.4	1.78	31.9	<	pCi/gm
14778	1001144	y	y	4	32 (1)		0.64	1.18	31.1	NS	ab pCi/g H3 pCi/ml
14778	1009699	y	y	4	25		0.04	0.07	91.1	<	pCi/ml
14778	1009701	y	y	4	48 (1)		0.23	0.37	79.3	<	pCi/ml
14778	1009703	y	y	12	31	12	0.14	0.24	22.2	<	pCi/ml
14778	1009704	y	y	4	25		0.04	0.07	91.1	<	pCi/ml
14778	1009705	y	y	4	51 (1)		0.13	0.24	15.9	<	pCi/ml
14778	1009707	y	y	4	25		0.06	0.14	15.6	<	pCi/ml
14778	1009708	y	y	12	31	12	0.14	0.24	15.8	<	pCi/ml
14778	1009709	y	y	4	25		0.23	0.37	79.3	<	pCi/ml
14778	1009710	y	y	12	31	12	0.12	0.24	79.9	<	pCi/ml
14778	2056507	y	y	4	26 (1)	NS	0.03	0.07	16.1	<	pCi/gm
14802/14828	11006	y	y	4	25	NS	0.08	0.16	15.3	<	pCi/ml
14821	11051	y	y	4	25	NS	0.04	0.08	14.9	<	pCi/ml
14821	11052	y	y	4	25	NS	0.13	0.26	15	<	pCi/ml
14821	11054	y	y	12	31	12	0.13	0.26	15.4	<	pCi/ml
14821	11055	y	y	12	31	12	0.08	0.16	15.1	<	pCi/ml
14821	11056	y	y	12	31	12	0.04	0.08	103.3	<	pCi/ml
14821	11057	y	y	12	31	12	0.04	0.08	15.5	<	pCi/ml
14821	11059	y	y	12	31	12	0.79	1.54	30.1	<	pCi/ml
14821	11060	y	y	12	31	12	0.08	0.16	15.3	<	pCi/ml
14821	11062	y	y	12	31	12	0.55	1.08	18.6	<	pCi/ml
14821	11063	y	y	12	31	12	0.66	1.14	37.8	<	pCi/ml
14821	11064	y	y	12	31	12	0.24	0.32	15.5	<	pCi/ml
14821	11065	y	y	12	31	12	1.9	2.7	93.9	<	pCi/ml
14821	11067	y	y	12	31	12	0.04	0.08	15.8	<	pCi/ml
14821	11069	y	y	12	31	12	3.92	7.7	31.1	<	pCi/ml
14821	12257	y	y	9	31	12	s	s	s	s	s
14821	2056582	y	y	4	25	NS	0.04	0.08	14.9	<	pCi/ml
14821	2056583	y	y	12	31	12	0.03	0.05	16.9	<	pCi/ml
14821	2056584	y	y	12	31	12	0.03	0.05	16.9	<	pCi/ml
14821	2056585	y	y	12	31	12	0.22	0.39	15.7	<	pCi/ml

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
14821	2056586	y	y	12	31	12	0.05	0.1	48.1	<	pCi/ml
14821	2056588	y	y	9	31	12	0.8	1.36	60.9	<	pCi/ml
14821	11070	y	y	12	31	12	0.03	0.05	16.9	<	pCi/ml
14821	11071	y	y	12	31	12	0.22	0.39	15.7	<	pCi/ml
14821	11832	y	y	11	29	11	0.4	0.77	167.2	<	pCi/ml
14821	11834	y	y	11	29	11	0.13	0.26	159.6	<	pCi/ml
14821	12263	y	y	9	31	12	0.8	1.36	60.9	<	pCi/ml
14821	2056581	y	y	12	31	12	0.05	0.1	48.1	<	pCi/ml
14894	9002	y	y	13	31	12	0.1	0.16	14.91	<	pCi/ml
14894	9005	y	y			NS	0.08	0.15	15.9	<	pCi/ml
14894	9006	y	y	13	31	12	0.1	0.16	15.84	<	pCi/ml
14894	11406	y	y	4	25	NS	0.07	0.13	32.19	<	pCi/ml
14894	11407	y	y	4	25	NS	1.28	2.49	25.08	<	pCi/gm
14894	11408	y	y	11	31	12	6.2	4.54	11.47	<	pCi/gm
14894	11409	y	y	4	25	NS	0.04	0.08	65.73	<	pCi/ml
14894	2056610	y	y	4	25	NS	0.04	0.08	65.73	<	pCi/ml
14902/14904	6722	y	y	4	25	NS	5.4	5.35	10.05	<	pCi/gm
14902/14904	6723	y	y	4	25	NS	5.4	5.35	10.05	<	pCi/gm
14902/14904	6842	y	y	9	31	12	0.13	0.2	15.5	<	pCi/ml
14902/14904	6879	y	y	12	31	12	8.53	6.76	10.01	<	pCi/gm
14902/14904	2056618	y	y	4	25	NS	5.4	5.35	10.05	<	pCi/gm
14905/14930	6848	y	y	12	31	12	s	s	s	s	s
14905/14930	6849	y	y	12	31	12	s	s	s	s	s
14905/14930	1036802	y	y	12	30	12	s	s	s	s	s
14905/14930	2058636	y	y	12	30	12	7.93	7.6	10.02	<	pCi/gm
14905/14930	2058639	y	y	12	30	12	s	s	s	s	s
14905/14930	2058640	y	y	12	31	12	8.65	5.76	10.15	<	pCi/gm
14905/14930	2058641	y	y	12	30	12	s	s	s	s	s
14905/14930	2058642	y	y	12	30	12	s	s	s	s	s
14905/14930	2058643	y	y	12	30	12	s	s	s	s	s
14905/14930	2058644	y	y	12	30	12	s	s	s	s	s
14905/14930	2058635	y	y	12	30	12	7.93	7.6	10.02	<	pCi/gm
14905/14930	6850	y	y	12	31	12	8.65	5.76	10.15	<	pCi/gm
15013	10935	y	y	12	30	12	0.04	0.06	15.43	<	pCi/ml
15013	10937	y	y	12	30	12	0.25	0.25	15.4	<	pCi/ml
15013	10938	y	y	12	30	12	0.35	0.25	15.45	<	pCi/ml
15013	10939	y	y	12	30	12	0.14	0.18	15.33	<	pCi/ml
15013	10940	y	y	12	30	12	0.36	0.25	15.38	<	pCi/ml
15013	10941	y	y	12	30	12	0.11	0.06	15.82	<	pCi/ml
15013	11875	y	y	11	31	12	s	s	s	s	s
15013	11876	y	y	11	31	12	0.09	0.19	13.63	<	pCi/ml
15013	11877	y	y	11	31	12	0.09	0.19	14.55	<	pCi/ml
15013	11878	y	y	11	31	12	0.03	0.06	14.11	<	pCi/ml
15013	30882	y	y	4	25	NS	1	0.64	15.3	<	pCi/ml
15013	30883	y	y	4	25	NS	1	0.64	15.3	<	pCi/ml

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
15013	44495	y	y	4	25	NS	0.04	0.06	15.3	<	pCi/ml
15013	44508	y	y	4	25	NS	0.87	0.63	15.74	<	pCi/ml
15013	44509	y	y	4	25	NS	0.87	0.63	15.74	<	pCi/ml
15013	44510	y	y	4	25	NS	0.87	0.63	15.74	<	pCi/ml
15013	44511	y	y	4	25	NS	0.87	0.63	15.74	<	pCi/ml
15013	1019682	y	y	12	28	11	0.02	0.04	15.7	<	pCi/ml
15013	1019685	y	y	4	25	NS	3.84	2.17	15.4	<	pCi/ml
15013	1019686	y	y	4	25	NS	0.02	0.04	61.7	<	pCi/ml
15013	1019687	y	y	12	28	11	0.02	0.04	15	<	pCi/ml
15013	1025569	y	y	4	25	NS	0.02	0.04	15.8	<	pCi/ml
15013	2058648	y	y	4	25	NS	0.02	0.04	15.8	<	pCi/ml
15013	2058653	y	y	4	25	NS	0.02	0.04	64.1	<	pCi/ml
15038	165	y	y	4	25		0.05	0.11	63.62	<	pCi/ml
15038	167	y	y	4	25		0.01	0.03	15.3	<	pCi/ml
15038	168	y	y	4	25		0.01	0.03	15.8	<	pCi/ml
15038	169	y	y	11	31	11	s	s	s	s	s
15038	172	y	y	4	25		0.01	0.03	15.93	<	pCi/ml
15038	244	y	y	4	25		2.07	2.86	43.51	<	pCi/gm
15038	717	y	y	4	25		0.05	0.11	15.74	<	pCi/ml
15038	9106	y	y	13	29	11	s	s	s	<	pCi/gm
15038	9107	y	y	12	29	12	s	s	s	<	pCi/gm
15038	9110	y	y	12	29	12	s	s	s	<	pCi/gm
15038	9111	y	y	12	29	12	s	s	s	<	pCi/gm
15038	47591	y	y	8	31	12	s	s	s	s	s
15038	47592	y	y	8	31	12	0.64	0.82	36.85	<	pCi/gm
15038	47593	y	y	8	31	12	s	s	s	s	s
15038	47594	y	y	8	31	12	0.46	0.47	66.38	<	pCi/gm
15038	47596	y	y	11	31	11	0.01	0.03	16.38	<	pCi/ml
15038	47597	y	y	11	31	11	0.02	0.06	91.9	<	pCi/ml
15038	47599	y	y	4	25		2.63	2.9	86.72	<	pCi/ml
15038	47901	y	y	12	31	12	0.84	1.14	82.37	<	pCi/ml
15038	47902	y	y	4	25		0.02	0.06	15.87	<	pCi/ml
15038	47904	y	y	12	31	12	0.06	0.11	62.65	<	pCi/ml
15038	47905	y	y	12	31	12	s	s	s	s	s
15038	47906	y	y	12	31	12	s	s	s	s	s
15038	1026238	y	y	4	25		0.96	0.94	110.51	<	pCi/gm
15038	2058664	y	y	12	31	12	s	s	s	s	s
15038	2058665	y	y	12	31	12	s	s	s	s	s
15038	2058666	y	y	12	31	12	s	s	s	s	s
15038	2058667	y	y	12	31	12	s	s	s	s	s
15038	2058668	y	y	12	31	12	s	s	s	s	s
15038	2058669	y	y	12	31	12	s	s	s	s	s
15038	2058670	y	y	12	31	12	s	s	s	s	s
15038	2058671	y	y	12	31	12	s	s	s	s	s
15038	2058673	y	y	11	31	11	s	s	s	s	s

		Surface Contamination Results					Volume Contamination Results				
Requisition #	Survey ID	Direct Alpha	Direct Beta	Removable alpha mdl	Removable beta mdl	Removable H-3 mdl	Gross alpha mdl	Gross beta mdl	H-3 mdl	Gamma spec	Units
15038	2058674	y	y	12	31	12	s	s	s	s	s
15038	2058677	y	y	4	25		0.01	0.03	15.8	<	pCi/ml
15038	2058678	y	y	12	29	12	s	s	s	s	s
15038	2058680	y	y	12	29	12	0.53	0.96	36.31	<	pCi/gm
15038	2058681	y	y	12	29	12	0.35	0.39	63.81	<	pCi/gm
15038	2058682	y	y	12	29	12	0.35	0.39	63.81	<	pCi/gm
15038	2058683	y	y	12	29	12	0.35	0.39	63.81	<	pCi/gm
15038	2058687	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058688	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058689	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058690	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058691	y	y	12	30	12	s	s	s	<	pCi/gm
15038	2058692	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058693	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058694	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058695	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058696	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058697	y	y	12	29	12	s	s	s	<	pCi/gm
15038	2058699	y	y	4	25		0.01	0.03	15.3	<	pCi/ml
15038	2058700	y	y	8	31	12	s	s	s	s	s
15038	2058701	y	y	8	31	12	0.46	0.47	66.38	<	pCi/gm
15038	2058702	y	y	8	30	12	s	s	s	s	s
52	9045	y	y	12	31	12	s	s	s	s	s
52	9053	y	y	12	31	12	s	s	s	s	s
52	23883	y	y	4	25	NS	s	s	s	s	s
52	23886	y	y	4	25	NS	s	s	s	s	s
52	32675	y	y	4	25	NS	s	s	s	s	s
52	32676	y	y	4	25	NS	s	s	s	s	s
52	32677	y	y	4	25	NS	s	s	s	s	s
52	32678	y	y	4	25	NS	s	s	s	s	s
52	1002398	y	y	4	25	NS	s	s	s	s	s
52	1017656	y	y	11	31	12	s	s	s	s	s
52	1017657	y	y	11	31	12	s	s	s	s	s
52	1017658	y	y	11	31	12	s	s	s	s	s
52	1026204	y	y	11	32	15	s	s	s	s	s
52	1035910	y	y	11	31	12	s	s	s	s	s
52	2050824	y	y	4	25	NS	s	s	s	s	s
52	2050828	y	y	4	25	NS	s	s	s	s	s

Footnote:

(1) Indicates a result, rather than MDL, is being reported. In these cases the result was greater than the MDL.

Attachment II
SSD Procedure Listing

Attachment II
(SSD Procedures)

Sampling Procedures

Standard Practice for Sample Labeling (Environmental Procedures Catalog, Procedure GN-8 (P))

Standard Practice for Chain-of-Sample-Custody Control and Physical Security of Samples (Environmental Procedures Catalog,
Procedure GN-9 (P))

Standard Practice for Equipment Decontamination (Environmental Procedures Catalog, Procedure GN-13 (P))

Standard Practice for Handling, Staging, and Opening Drums to Sample Hazardous, Low-Level Radioactive, and Mixed Wastes (Environmental Procedures Catalog, Procedure GN-15 (P))

Standard Practice for the sampling of Liquids (Environmental Procedures Catalog, Procedure LQ-11 (P))

Standard Practice for Sampling of Liquids and Sludges in Drums and Carboys, and Pails – Containing Hazardous, Mixed and Low-Level Radioactive Waste (Environmental Procedures Catalog, Procedure LQ-23 (P))

Standard Practice for Sampling of Bulk Solids in Piles or Storage Containers—Hazardous, Mixed, and Low-Level Radioactive Waste (Environmental Procedures Catalog, Procedure SL-26 (P))

Standard Practice for Sampling Consolidated and Compacted (Solid) Materials in Containers—Hazardous, Mixed and Low-Level Radioactive Waste (Environmental Procedures Catalog, Procedure SL-27 (P))

Standard Practice for Reducing Field Samples of Aggregate to Testing Size (ASTM C 702-87)

Health and Safety Procedures

Contamination Surveys and Equipment & Material Release (Health and Safety Desktop Procedures, Procedure HS-304)

Tritium Monitoring (Health and Safety Desktop Procedures, Procedure HS-307)

Instrument Response Checks and Beta Correction Factors. (Health and Safety Desktop Procedures, Procedure HS-306)

Operation of Ludlum Model 12 Count Rate Meter and Pancake GM Beta/Gamma Detector (Health and Safety Desktop Procedures, Procedure HP-0408)

Operation of Ludlum Models 177, 177-10, and 177-41 Alarm Rate Meter and Ludlum Model 43-5 Alpha Detector (Health and Safety Desktop Procedures, Procedure HP-0410)

Decontamination (Health and Safety Desktop Procedures, Procedure HP-0701)

Standard Test Method for Alpha Surface Contamination with the LRAD-1 (Environmental Procedures Catalog, Procedure RD-8 (T)

Draft Standard Test Method for Use for the Eberline TCM-2 (Environmental Procedures Catalog, Procedure RD-11 (P)

GJPO Analytical Laboratory procedures

Radiochemistry Quality Control (Handbook of Analytical Procedures, Procedure RQ-1)

Operation of Liquid Scintillation and Proportional Counting Systems (Handbook of Analytical Procedures, Procedure RQ-3)

Performance Tracking of Alpha and Beta Particle Counting System (Handbook of Analytical Procedures, Procedure RQ-4)

Determination of Gross Alpha/Beta Activity (Handbook of Analytical Procedures, Procedure RC-3)

Determination of Gross-Alpha and Gross-Beta Activity of Air Filters and Smears (Handbook of Analytical Procedures, Procedure RC-8)

Determination of Tritium in Water and Soil Samples by Liquid Scintillation Spectrometry (Handbook of Analytical Procedures, Procedure RC-9)

Determination of Gross-Alpha and Gross Beta Activity by Liquid Scintillation Spectrometry (Handbook of Analytical Procedures Procedure RC-14)

Gamma Spectrometry (Handbook of Analytical Procedures, Procedure GS-1)

Analytical Instrument Calibration (Administrative and Quality Control Plan, Procedure QC-03)

Chemical Reagents (Administrative and Quality Control Plan, Procedure QC-11)

Good Laboratory Practices to Prevent Contamination in the Laboratory (Administrative and Quality Control Plan, Procedure QC-29)

Introduction (to GJPO Analytical Laboratory Administrative Plan) (Administrative and Quality Control Plan, Procedure QP-1)

Training and Qualification (Administrative and Quality Control Plan, Procedure QP-3)

Receipt, Handling, Storage, and Disposal of Samples (Administrative and Quality Control Plan, Procedure QP-6)

Attachment III
QA/QC

ATTACHMENT III

Quality Control (QC) Requirements for Analytical Systems Used During the Sort, Survey, and Decontamination (SSD) Project.

I. Liquid Scintillation Analysis

Duplicates:
Frequency - 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria - Information Only.

Matrix Spike:
Frequency - 1 per 20, or 1 per batch (most frequent)
Acceptance Criteria- Information only.

Continuing Calibration Verification (CCV):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Within 10% of most recent calibration.

Preparation Blank (PB):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Less than 5 times the detection limit of that sample.

Laboratory Control Sample (LCS):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Variable control limits presented in QC summary.

Quench Indicator Parameter (QIP)/ Transformed Spectral Index of External Standard (tSIE):
Acceptance Criteria - QIP/tSIE for each sample and for each standard (i.e., CCV, PB, and LCS) must be within the range of the tritium (H-3) quench curve and the background quench curve.

Calibration:
Frequency – Every 6 months, or after each service.

II. Proportional Counter System – Gross Alpha Analysis

Duplicates:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Information only.

Matrix Spike:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Information only.

Continuing Calibration Verification (CCV):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Within 10 % of most recent calibration.

Preparation Blank:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Less than 5 times the detection limit of that sample.

Laboratory Control Sample (LCS):
Frequency –1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Variable control limits presented in QC summary.

Sample Net Weight:
Acceptance Criteria – Sample net weight (grams) for each sample and for each standard (i.e., CCV, PB and LCS) must be within the range of the net weight (grams) of the standards used to establish the Calibration Curve for Gross Alpha.

Calibration:
Frequency – Every 6 months, or after each service.

III. Proportional Counter System – Gross Beta Analysis

Duplicates:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Information only.

Matrix Spike:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Information only.

Continuing Calibration Verification (CCV):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Within 10% of most recent calibration.

Preparation Blank:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Less than 5 times the detection limit of that sample.

Laboratory Control Sample (LCS):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Variable control limits presented in QC summary.

Sample Net Weight:
Acceptance Criteria – Sample net weight (grams) for each\ sample and for each standard (i.e., CCV, PB, and LCS) \must be within the range of

the net weight (grams) of the\Standards used to establish the Calibration Curve for Gross Beta.

Calibration:
Frequency – Every 6 months, or after each service.

IV. Gamma Spectroscopy System Analysis

Duplicates:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Information only.

Preparation Blank:
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Less than 5 times the detection limit of that sample.

Laboratory Control Sample (LCS):
Frequency – 1 per 20, or 1 per batch (most frequent).
Acceptance Criteria – Variable control limits presented in QC summary.

Calibration:
Frequency - Efficiency calibration every month.
Energy calibration every batch.

Attachment IV
Sample Documentation Package

This attachment includes documentation for Item 45070. This attachment is included as an example of the documentation that is available and that has been reviewed for all proposed items. Included are the gross alpha, gross beta and tritium determination, showing blanks, instrument efficiencies, sample size, sample count time gross counts, net counts, etc. Further, quench and calibration curves are provided. A sample gamma spec results sheet and backup documentation are included as well. Finally, there are sheets showing a direct reading survey and smear survey.

Determination of Gross Alpha & Gross Beta

(SECTION III)

Worklist ID: 96046684

Sample Type: Various

Instrument ID: CAN2404

C. Mitchell Albrite 4/15/96

Chemist ID: 50196

Geotech Req #	Sample ID	#	Sample Size	Planchet Tare Weight (g)	Planchet Gross Weight (g)	Net Solids Weight (g)	Count Time (min.)	Start Count Date	Start Count Time
	PB	1	1 SA	10.1865	10.1867	0.0002	100	4/11/96	11:32
	LCSWR24	2	1.00 L	8.9958	9.0429	0.0471	100	4/11/96	13:12
14687	235798	3	1.00 mL	10.2798	10.2970	0.0172	100	4/11/96	14:53
14687	235799	4	5.00 mL	10.1746	10.1919	0.0173	100	4/11/96	16:33
14687	235800	5	3.00 mL	10.2917	10.2917	0.0000	100	4/11/96	18:14
14687	235801	6	5.00 mL	10.2068	10.2068	0.0000	100	4/11/96	19:54
14687	235802	7	5.00 mL	10.1770	10.1773	0.0003	100	4/11/96	21:35
14687	235803	8	5.00 mL	10.2296	10.2327	0.0031	100	4/11/96	23:15
14687	235804	9	5.00 mL	10.1185	10.1193	0.0008	100	4/12/96	00:56
14687	235805	10	5.00 mL	10.0596	10.0596	0.0000	100	4/12/96	02:36
14687	235806	11	5.00 mL	10.2927	10.2942	0.0015	100	4/12/96	04:17
14687	235807	12	5.00 mL	10.1914	10.1935	0.0021	100	4/12/96	05:57
14687	235808	13	5.00 mL	10.1696	10.1696	0.0000	100	4/12/96	07:38
14687	235809	14	5.00 mL	10.3027	10.3041	0.0014	100	4/12/96	09:18
14687	235810	15	5.00 mL	10.0768	10.0768	0.0000	100	4/12/96	10:59
14687	235811	16	5.00 mL	10.3328	10.3328	0.0000	100	4/12/96	12:39
14687	235812	17	5.00 mL	10.0967	10.0967	0.0000	100	4/12/96	14:20
14687	235813	18	5.00 mL	10.1585	10.1589	0.0004	100	4/12/96	16:00
14687	235814	19	0.856 G	10.1247	10.1289	0.0042	100	4/12/96	17:41
14687	235805D	20	5.00 mL	10.1561	10.1563	0.0002	100	4/12/96	19:21
14687	235805MS	21	5.00 mL	10.2763	10.2765	0.0002	100	4/12/96	21:02
	CCV	22	1.00 mL	8.9659	9.0285	0.0626	100	4/12/96	22:43
		23							
		24							
		25							
		26							
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		38							
		39							
		40							

dditional Comments:

Sample Prep Procedure: See Attached

Analysis Procedure: RC-3 R03

Date of sample preparation: 4/11/96

Time of sample preparation: N/A

High Voltage: 1500

Disc Window: 750

Supervisor Review: [illegible] 4-16-96

Calculations by Excel: GABV1.XLS

Q.C. Review: [illegible] 4/16/96

Determination of Gross Alpha

Worklist ID: 96046684

Sample ID	#	Gross Alpha Results	Uncert. +/-	Minimal Detectable Activity	Effic-iency	Gross Counts	Gross - Bkgd Counts	Net Counts	Reference Date	Known Value	% of Known
PB	1	0.03 pCi/SA	0.17	0.34	0.181	7	1.4	1.4	4/11/96		
LCSWR24	2	53.96 pCi/L	3.47	0.68	0.091	1096	1090.4	1090.4	4/11/96	42.8	126.1
235798	3	0.21 pCi/mL	0.27	0.45	0.138	12	6.4	6.4	4/11/96		
235799	4	0.02 pCi/mL	0.05	0.09	0.138	9	3.4	3.4	4/11/96		
235800	5	0.00 pCi/mL	0.05	0.11	0.182	5	-0.6	-0.6	4/11/96		
235801	6	0.01 pCi/mL	0.03	0.07	0.182	7	1.4	1.4	4/11/96		
235802	7	0.04 pCi/mL	0.04	0.07	0.181	13	7.4	7.4	4/11/96		
235803	8	0.02 pCi/mL	0.04	0.07	0.173	10	4.4	4.4	4/11/96		
235804	9	0.03 pCi/mL	0.04	0.07	0.179	12	6.4	6.4	4/12/96		
235805	10	0.00 pCi/mL	0.03	0.07	0.182	6	0.4	0.4	4/12/96		
235806	11	-0.01 pCi/mL	0.03	0.07	0.177	4	-1.6	-1.6	4/12/96		
235807	12	2.83 pCi/mL	0.25	0.07	0.176	558	552.4	552.4	4/12/96		
235808	13	0.11 pCi/mL	0.06	0.07	0.182	27	21.4	21.4	4/12/96		
235809	14	0.70 pCi/mL	0.12	0.07	0.178	143	137.4	137.4	4/12/96		
235810	15	0.01 pCi/mL	0.03	0.07	0.182	7	1.4	1.4	4/12/96		
235811	16	1.78 pCi/mL	0.19	0.07	0.182	365	359.4	359.4	4/12/96		
235812	17	1.04 pCi/mL	0.15	0.07	0.182	216	210.4	210.4	4/12/96		
235813	18	0.08 pCi/mL	0.05	0.07	0.181	21	15.4	15.4	4/12/96		
235814	19	0.20 pCi/G	0.25	0.43	0.170	12	6.4	6.4	4/12/96		
235805D	20	0.01 pCi/mL	0.03	0.07	0.181	7	1.4	1.4	4/12/96		
235805MS	21	9.18 pCi/mL	0.47	0.07	0.181	1852	1846.4	1846.4	4/12/96		
CCV	22	427.77 pCi/mL	14.23	0.82	0.075	7162	7156.4	7156.4	4/12/96	400.0	106.9
	23										
	24	MS Recovery 235805MS = $\frac{9.18 - 0}{(42.8/5)} \times 100 =$					CMA 4-15-96				
	25						~~102.~~				
	26						107.2 %				
	27										
	28										
	29										
	30										
	31										
	32										
	33										
	34										
	35										
	36										
	37										
	38										
	39										
	40										

Alpha Calibration Data:

** Uncertainty: 2.0 %
N: 6
RSD: 1.63 %

Efficiency Coefficients:
A: -1.704357
B: -16.59455
C: 40.236374

Background CPM: 0.056
Count time of Background: 60 min

Half life for decay correction: N/A years
Crosstalk of Beta into Alpha: 0.00 %

** Uncertainty is the uncertainty of the calibration standard activity.

Uncertainty was calculated with sigma= 1.96 (95% Confidence)

Determination of Gross Beta

(SECTION III)

Worklist ID: 96046684

Sample ID	#	Gross Beta Results	Uncert. +/-	Minimal Detectable Activity	Effic-iency	Gross Counts	Gross - Bkgd Counts	Net Counts	Reference Date	Known Value	% of Known
PB	1	0.20 pCi/SA	0.48	0.84	0.239	91	11.0	10.8	4/11/96		
LCSWR24	2	50.72 pCi/L	2.93	2.23	0.227	2052	1972.0	1786.6	7/6/81	46.0	110.3
235798	3	0.52 pCi/mL	0.52	0.86	0.234	108	28.0	26.9	4/11/96		
235799	4	0.02 pCi/mL	0.10	0.17	0.234	85	5.0	4.4	4/11/96		
235800	5	0.11 pCi/mL	0.16	0.28	0.239	98	18.0	18.1	4/11/96		
235801	6	0.10 pCi/mL	0.10	0.17	0.239	106	26.0	25.8	4/11/96		
235802	7	0.08 pCi/mL	0.10	0.17	0.239	102	22.0	20.7	4/11/96		
235803	8	0.07 pCi/mL	0.10	0.17	0.238	99	19.0	18.3	4/11/96		
235804	9	0.04 pCi/mL	0.10	0.17	0.239	92	12.0	10.9	4/12/96		
235805	10	0.08 pCi/mL	0.10	0.17	0.239	102	22.0	21.9	4/12/96		
235806	11	0.08 pCi/mL	0.10	0.17	0.238	101	21.0	21.3	4/12/96		
235807	12	0.36 pCi/mL	0.16	0.24	0.238	270	190.0	96.1	4/12/96		
235808	13	0.09 pCi/mL	0.10	0.17	0.239	108	28.0	24.4	4/12/96		
235809	14	0.06 pCi/mL	0.11	0.19	0.238	119	39.0	15.6	4/12/96		
235810	15	0.05 pCi/mL	0.10	0.17	0.239	93	13.0	12.8	4/12/96		
235811	16	1.47 pCi/mL	0.19	0.22	0.239	530	450.0	388.9	4/12/96		
235812	17	0.14 pCi/mL	0.12	0.20	0.239	153	73.0	37.2	4/12/96		
235813	18	0.04 pCi/mL	0.10	0.17	0.239	94	14.0	11.4	4/12/96		
235814	19	0.42 pCi/G	0.58	0.99	0.238	100	20.0	18.9	4/12/96		
235805D	20	0.07 pCi/mL	0.10	0.17	0.239	98	18.0	17.8	4/12/96		
235805MS	21	7.68 pCi/mL	0.43	0.36	0.239	2428	2348.0	2034.1	4/12/96		
CCV	22	1159.02 pCi/mL	29.13	3.80	0.223	53152	53072.0	51855.4	2/1/92	1005.0	115.3
	23										
	24										
	25	MS Recovery 235805 MS = 7.68 - 0				x 100 =	119.4 %				
	26			$\frac{46.0 \times .699}{5}$							
	27										
	28										
	29										
	30										
	31										
	32										
	33										
	34										
	35										
	36										
	37										
	38										
	39										
	40										

Beta Calibration Data:

** Uncertainty: 1.5 %
N: 6
RSD: 2.27 %

Efficiency Coefficients:
A: 0.238758
B: -0.249667

Background CPM: 0.80
Count time of Background: 60 min

Half life for decay correction: 28.6 years
Crosstalk of Alpha into Beta: 17.00 %

** Uncertainty is the uncertainty of the calibration standard activity.

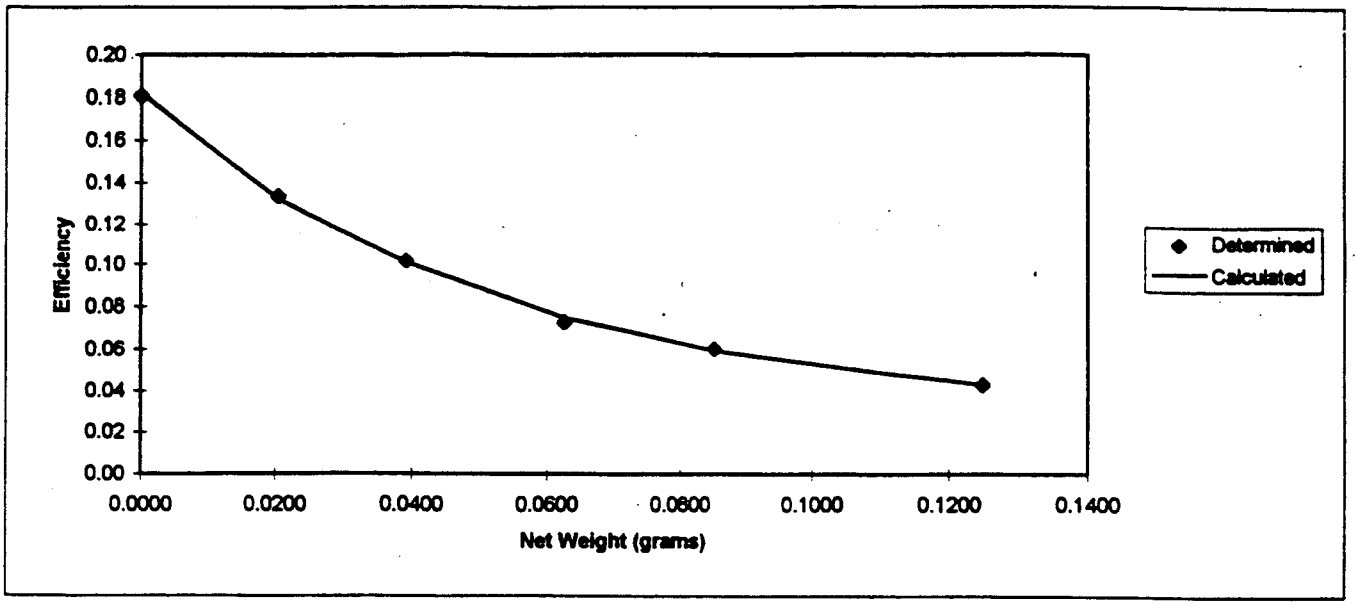
Uncertainty was calculated with sigma= 1.96 (95% Confidence)

Alpha Efficiency Curve for CAN2404

SECTION III

Efficiency = exp (A + B * X + C * X^2)
X= Net Weight in grams
A= -1.70436
B= -16.5945
C= 40.23637

Chemist: C Mitchell Wilcoxson 3-21-96



#	Alpha Gross Counts	Beta Gross Counts	Gross - Bkgd Counts	Alpha Net Counts	Tare Weight (grams)	Gross Weight (grams)	Net Weight (grams)	Determined Efficiency	Calculated Efficiency	% of Determined / Calculated
1	15975	51552	15973.3	15973.3	8.9867	8.9867	0.0000	0.1808	0.1819	99.4
2	11775	47391	11773.3	11773.3	8.9608	8.9812	0.0204	0.1333	0.1318	101.1
3	8984	49151	8982.3	8982.3	8.9888	9.0280	0.0392	0.1017	0.1010	100.7
4	6474	46242	6472.3	6472.3	8.9659	9.0285	0.0626	0.0733	0.0754	97.2
5	5332	45086	5330.3	5330.3	8.8962	8.9814	0.0852	0.0603	0.0592	101.9
6	3780	42356	3778.3	3778.3	8.9042	9.0291	0.1249	0.0428	0.0429	99.7

Average =	100.0
SD =	1.6
% RSD =	1.627
N =	6

Standard Information:

Isotope(s):	Am-241
ID:	#82-49-1
Standard Activity:	1000.0 pCi/mL
Reference Date:	12-05-92
Aliquot:	0.40 mL
Half-life:	432.7 years
Decay-Corrected Activity:	397.9 pCi

Instrument:	CAN2404
Alpha Background CPM:	0.017
Count time:	100 min.
Date Samples Counted:	03-18-96
Crosstalk of Beta into Alpha:	0.00 %

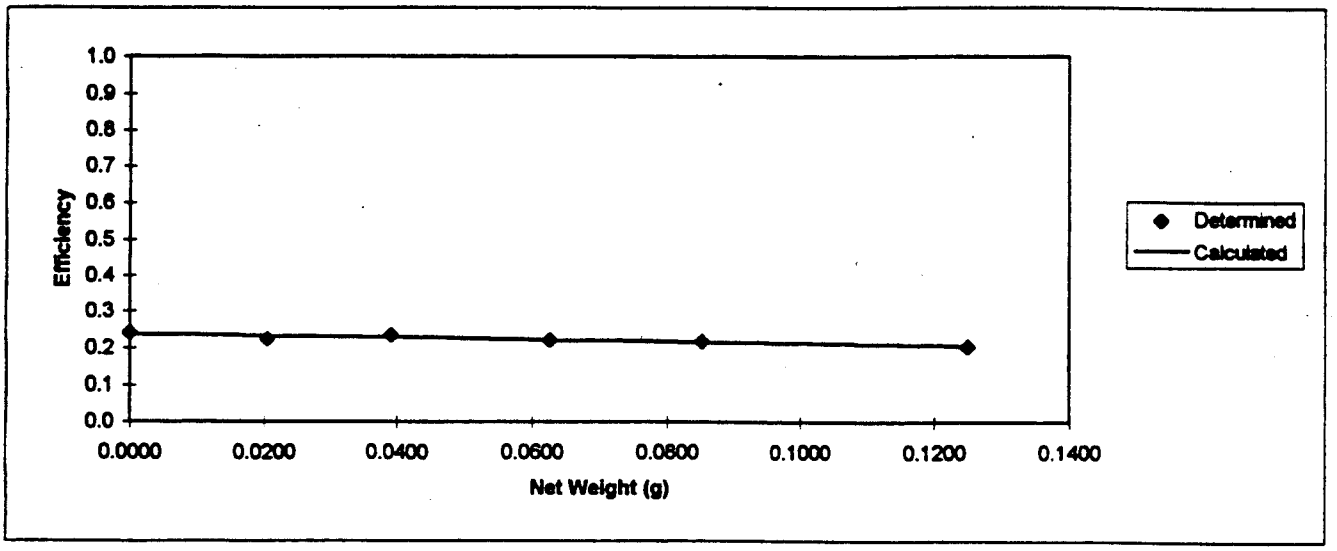
Calculations by Excel: GABV1.XLS

Beta Efficiency Curve for CAN2404

(SECTION III

Efficiency = A + B X
X= Net Weight in grams
A= 0.238758
B= -0.249667

Chemist: C. Mitchell Ahlrate 3-21-96



#	Alpha Gross Counts	Beta Gross Counts	Gross - Bkgd Counts	Beta Net Counts	Tare Weight (grams)	Gross Weight (grams)	Net Weight (grams)	Determined Efficiency	Calculated Efficiency	% of Determined / Calculated
1	15975	51552	51477.0	48761.3	8.9867	8.9867	0.0000	0.2416	0.2388	101.2
2	11775	47391	47316.0	45314.3	8.9608	8.9812	0.0204	0.2245	0.2337	96.1
3	8984	49151	49076.0	47548.7	8.9888	9.0280	0.0392	0.2355	0.2290	102.9
4	6474	46242	46167.0	45066.4	8.9659	9.0285	0.0626	0.2232	0.2231	100.1
5	5332	45086	45011.0	44104.6	8.8962	8.9814	0.0852	0.2185	0.2175	100.5
6	3780	42356	42281.0	41638.4	8.9042	9.0291	0.1249	0.2063	0.2076	99.4
									Average =	100.0
									SD =	2.3
									% RSD =	2.267

Standard Information:

Isotope(s):	Sr90/Y90
ID:	#82-22-4
Standard Activity:	1005.0 pCi/mL
Reference Date:	2/1/92
Aliquot:	1.00 mL
Half-life:	28.6 years
Decay-Corrected Activity:	909.3 pCi

Regression Output:

Intercept:	0.238758
X Variable:	-0.249667
R Squared:	0.823
No. of Observations:	6

Instrument:	CAN2404
Beta Background CPM:	0.75
Count time:	100 min.
Date Samples Counted:	3/18/96
Crosstalk of Alpha into Beta:	17.0 %

Calculations by Excel: GABV1.XLS
Regression performed by MS Excel 5.0.

Determination of H-3

Worklist name: 96046686

Sample Id	Vial #	Sample Size	Count time (min.)	Start Count Date & Time	Reference Date	Gross CPM	QIP	Non-H-3 ROI CPM	Oxidizer Recovery %	
PB	1	1 SA	100.0	04-09-96 13:16	04-09-96	8.48	421.4	19.55	93.73	
LCSWR51	2	0.100 mL	100.0	04-09-96 15:00	06-03-93	780.18	413.7	25.92	93.73	
235798	3	0.100 mL	100.0	04-09-96 16:43	04-09-96	8.13	414.7	19.06	93.73	
235799	4	0.025 mL	100.0	04-09-96 18:26	04-09-96	7.66	413.6	19.74	93.73	
235800	5	0.025 mL	100.0	04-09-96 20:10	04-09-96	8.08	380.0	19.48	93.73	
235801	6	0.050 mL	100.0	04-09-96 21:53	04-09-96	8.03	428.5	18.52	93.73	
235802	7	0.050 mL	100.0	04-09-96 23:36	04-09-96	8.46	412.1	19.84	93.73	
235803	8	0.050 mL	100.0	04-10-96 01:20	04-10-96	7.78	403.8	20.22	93.73	
235804	9	0.050 mL	100.0	04-10-96 03:03	04-10-96	7.77	359.1	20.06	93.73	
235805	10	0.050 mL	100.0	04-10-96 04:46	04-10-96	8.43	399.4	20.63	93.73	
235806	11	0.100 mL	100.0	04-10-96 06:30	04-10-96	8.26	405.9	19.53	93.73	
235807	12	0.010 mL	100.0	04-10-96 08:13	04-10-96	7.85	378.4	20.05	93.73	
235808	13	0.100 mL	100.0	04-10-96 09:56	04-10-96	8.29	399.0	20.23	93.73	
235809	14	0.020 mL	100.0	04-10-96 11:40	04-10-96	7.79	385.8	19.79	93.73	
235810	15	0.100 mL	100.0	04-10-96 13:23	04-10-96	8.48	410.6	19.94	93.73	
235811	16	0.100 mL	100.0	04-10-96 15:06	04-10-96	8.51	410.7	19.41	93.73	
235812	17	0.100 mL	100.0	04-10-96 16:50	04-10-96	8.59	407.4	19.76	93.73	
235813	18	0.100 mL	100.0	04-10-96 18:34	04-10-96	8.43	409.1	20.91	93.73	
235814	19	0.0325 G	100.0	04-10-96 20:17	04-10-96	7.98	385.2	20.37	93.73	
235806D	20	0.100 mL	100.0	04-10-96 22:00	04-10-96	7.98	393.5	19.43	93.73	
235806MS	21	0.100 mL	100.0	04-10-96 23:44	04-10-96	87.75	415.7	21.28	93.73	
CCV	22	1.00 mL	100.0	04-11-96 01:27	06-03-93	318.34	401.5	22.78	N/A	
INTBLK	23	1 SA	100.0	04-11-96 03:10	04-11-96	8.91	411.8	19.19	93.73	
	24									
	25									
	26									
	27									
	28									
	29									
	30									

COMMENTS OR ACTUAL CONDITIONS:

Determination of H-3

Worklist name: 96046686

Sample Type: Various
Prep Method: RC-10 R00
Method: RC-9 R05
Instrument ID: PACK255

Chemist ID: G40349 Hutchison R. Bass 04-11-96

Geotech Req. #	Sample Id	Vial #	Decay-Corrected H-3 Result	Uncert. + / -	Method Detection Limit	Effic-iency	Back-ground CPM	Net CPM	Known Value	% of Known Value
	PB	1	0.11 pCi/SA	0.86	1.51	0.429	8.39	0.09		
	LCSWR51	2	10296 pCi/mL	106	18	0.423	8.34	771.84	10130	101.6
14687	235798	3	-2.48 pCi/mL	8.63	15.26	0.424	8.35	-0.22		
14687	235799	4	-31.03 pCi/mL	34.04	61.15	0.423	8.34	-0.68		
14687	235800	5	-3.73 pCi/mL	36.70	64.62	0.396	8.16	-0.08		
14687	235801	6	-8.73 pCi/mL	16.79	29.87	0.435	8.43	-0.40		
14687	235802	7	2.86 pCi/mL	17.53	30.65	0.422	8.33	0.13		
14687	235803	8	-11.77 pCi/mL	17.39	31.06	0.415	8.29	-0.51		
14687	235804	9	-6.87 pCi/mL	18.91	33.51	0.379	8.04	-0.27		
14687	235805	10	3.87 pCi/mL	17.91	31.28	0.412	8.26	0.17		
14687	235806	11	-0.46 pCi/mL	8.80	15.48	0.417	8.30	-0.04		
14687	235807	12	-36.29 pCi/mL	91.32	161.98	0.395	8.15	-0.30		
14687	235808	13	0.33 pCi/mL	8.92	15.65	0.411	8.26	0.03		
14687	235809	14	-23.93 pCi/mL	44.94	79.98	0.401	8.19	-0.40		
14687	235810	15	1.76 pCi/mL	8.79	15.36	0.421	8.33	0.15		
14687	235811	16	2.09 pCi/mL	8.80	15.36	0.421	8.33	0.18		
14687	235812	17	3.23 pCi/mL	8.87	15.44	0.418	8.31	0.28		
14687	235813	18	1.28 pCi/mL	8.80	15.40	0.419	8.32	0.11		
14687	235814	19	-7.60 pCi/G	27.87	49.27	0.400	8.19	-0.21		
14687	235806D	20	-2.97 pCi/mL	8.92	15.79	0.407	8.23	-0.25		
14687	235806MS	21	898.13 pCi/mL	22.58	15.24	0.425	8.35	79.40		
	CCV	22	397.04 pCi/mL	5.40	1.72	0.413	8.28	310.06	401.6	98.9
	INTBLK	23	0.66 pCi/SA	0.89	1.53	0.422	8.33	0.58		
		24								
		25								
		26								
		27								
		28								
		29								
		30								

COMMENTS OR ACTUAL CONDITIONS:

Half-life of Tritium = 12.28 years

Pipettes calibrated on balance # 13.
15 mL of "Monophase S" liquid scintillation cocktail was used for each sample.
Samples were dark-adapted for at least 1 hour.

Background Curve Parameters:
Intercept = 6.05225
X Variable = 0.005538
Count Time (min) = 120

Efficiency Curve Parameters:
Intercept = 0.08840
X Variable = 0.0008093
%RSD = 1.0
N = 7

Uncertainty was calculated with standard deviation= 1.96 (95% confidence interval)

Date of sample preparation: 09-Apr-96 at: 10:00

Instrument Conditions:
H-3 ROI Window: 0-18.6 KeV
Non-H-3 ROI Window: 18.7-2000 KeV
QIP for the Packard 2550 is tSIE.

Supervisor Review: OKPP 4/11/96

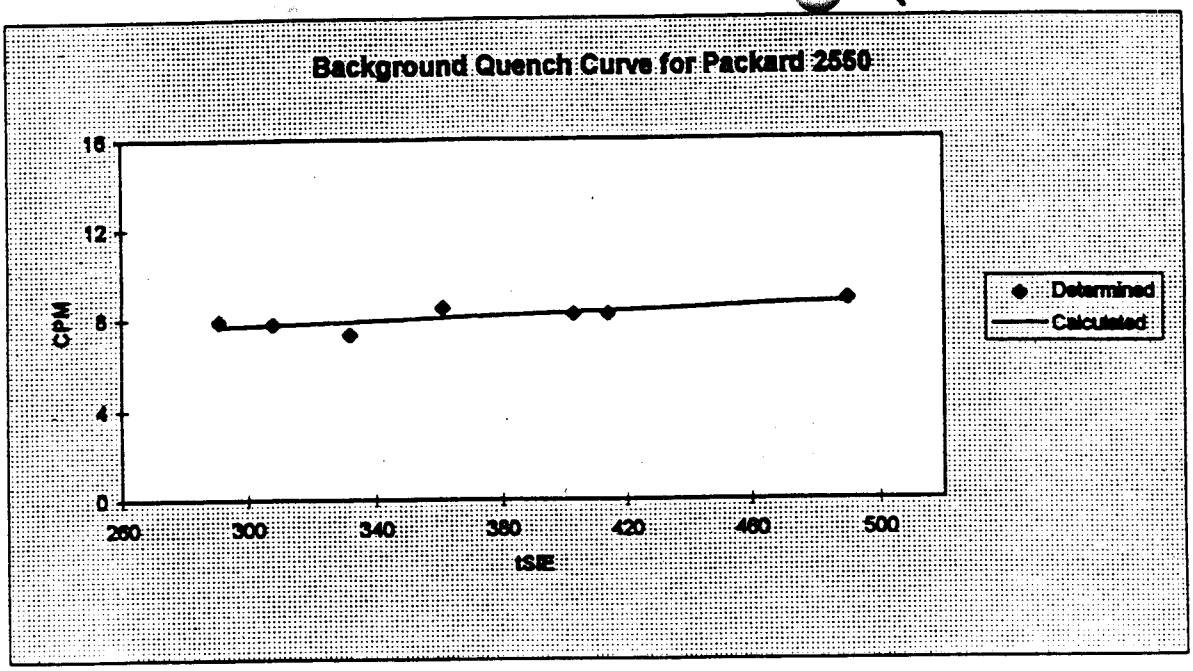
Q.C. Review: [signature] 4/11/96

Calculations by Excel: H3v1.xls

MS Recovery: $\frac{898.13 - 0}{862.01} = 104.2\%$

Background Quench Curve for Packard 2550

(SECTION III)



Background Quench Data

#	tSIE	CPM (determined)	CPM (calculated)	Determined / Calculated (%)
1	291.00	7.90	7.66	103.1
2	308.00	7.78	7.76	100.3
3	332.00	7.33	7.89	92.9
4	361.00	8.48	8.05	105.3
5	403.00	8.20	8.28	99.0
6	414.00	8.21	8.35	98.4
7	490.00	8.86	8.77	101.1
			Average=	100.0
			%RSD=	3.9

Regression Output:

Intercept	6.05225
Std Error of Intercept	0.759
X Variable	0.005538
Std Error of X Var	0.002014
R Squared	0.602
No. of Observations	7

Count time = 120 min

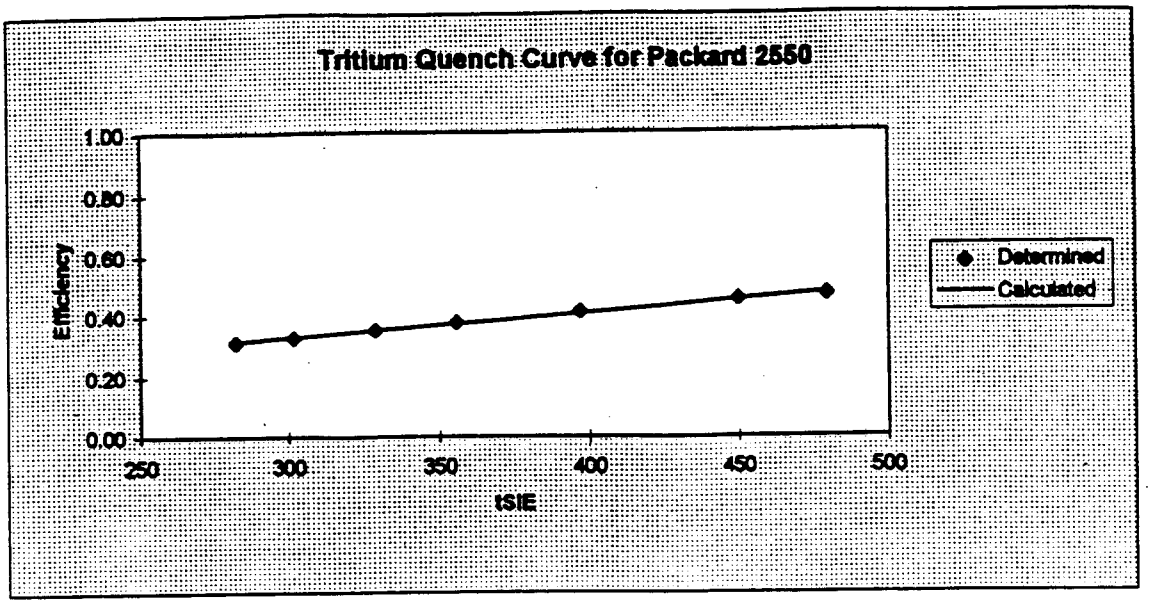
Date Samples Counted = 2/27/96

Calculations by Excel: H3V1.xls

Regression performed by MS Excel 5.0.

Analyst: C. Mitchell Ahlstrom 2-29-96

Tritium Quench Curve for Packard 2550



#	Gross CPM	Back-ground CPM	Net CPM	tSIE	Determined Efficiency	Calculated Efficiency	% of Determined / Calculated
1	246.34	7.61	238.73	282	0.3133	0.317	98.9
2	259.34	7.72	251.62	302	0.3302	0.333	99.2
3	278.85	7.87	270.98	329	0.3556	0.355	100.3
4	298.28	8.02	290.26	356	0.3809	0.377	101.2
5	324.16	8.25	315.91	397	0.4146	0.410	101.2
6	354.30	8.54	345.76	450	0.4537	0.453	100.3
7	367.97	8.71	359.26	480	0.4715	0.477	98.9
						Average =	100.0
						% RSD =	1.0

Standard Information:		Regression Output:	
Isotope:	H-3		
ID:	4926C	Intercept:	0.08840
Concentration:	3.41E+03 Bq/g	Std Error of Intercept:	0.00887
Reference Date:	9/3/78	X Variable:	0.0008093
Dilution:	0.0100 mL/mL	Std Error of X Var:	0.0000235
Aliquot:	1.00 mL	R Squared:	0.996
Half-life:	12.28 years	No. of Observations:	6
Decay-Corrected Activity:	762.0 dpm		

Background Parameters:

Intercept:	6.05225
X Variable:	0.005538

Calculations by Excel: H3V1.xls
Regression performed by MS Excel 5.0.

Count time = 100 min.
Date Samples Counted = 2/28/96

Analyst: C. Mitchell Albrate 2-29-96

Grand Junction Projects Office Analytical Laboratory

11

ANALYTICAL RESULTS

(SECTION I)

Customer ID: 47507
Ticket ID:

Requestor: K. KARP
Sample Matrix: LIQUID
Project Number: WMT3124L3

Date: April 16, 1996
Lab ID: 235801

Case: 14687
Date Received: Mar 29, 1996
Date Collected: Mar 21, 1996

ANALYSIS REQUESTED	RESULTS	QUALI's	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Gross Alpha	<0.07		NA	pCi/mL	04/11/96	RC-3 R03
Gross Beta	<0.17		NA	pCi/mL	04/11/96	RC-3 R03
Tritium	<29.87		NA	pCi/mL	04/09/96	RC-9 R05
Actinium-228	<215.00	U	NA	pCi/L	04/04/96	GS-1 R03
Americium-241	<143.00	U	NA	pCi/L	04/04/96	GS-1 R03
Bismuth-211	<368.00	U	NA	pCi/L	04/04/96	GS-1 R03
Bismuth-212	<1190.0	U	NA	pCi/L	04/04/96	GS-1 R03
Bismuth-214	<403.00	U	NA	pCi/L	04/04/96	GS-1 R03
Cobalt-57	<47.40	U	NA	pCi/L	04/04/96	GS-1 R03
Cobalt-60	<51.80	U	NA	pCi/L	04/04/96	GS-1 R03
Cesium-134	<44.00	U	NA	pCi/L	04/04/96	GS-1 R03
Cesium-137	<53.50	U	NA	pCi/L	04/04/96	GS-1 R03
Potassium-40	<950.00	U	NA	pCi/L	04/04/96	GS-1 R03
Manganese-54	<37.10	U	NA	pCi/L	04/04/96	GS-1 R03
Sodium-22	<14.90	U	NA	pCi/L	04/04/96	GS-1 R03
Protactinium-231	<3050.0	U	NA	pCi/L	04/04/96	GS-1 R03
Protactinium-234 (meta)	<4340.0	U	NA	pCi/L	04/04/96	GS-1 R03
Lead-210	<1850.0	U	NA	pCi/L	04/04/96	GS-1 R03
Lead-211	<1410.0	U	NA	pCi/L	04/04/96	GS-1 R03
Lead-212	<122.00	U	NA	pCi/L	04/04/96	GS-1 R03
Lead-214	<118.00	U	NA	pCi/L	04/04/96	GS-1 R03
Radium-223	<399.00	U	NA	pCi/L	04/04/96	GS-1 R03
Radium-224	<1130.0	U	NA	pCi/L	04/04/96	GS-1 R03
Radium-226	<1730.0	U	NA	pCi/L	04/04/96	GS-1 R03
Radon-219	<624.00	U	NA	pCi/L	04/04/96	GS-1 R03
Ruthenium-106	<467.00	U	NA	pCi/L	04/04/96	GS-1 R03
Thorium-227	<503.00	U	NA	pCi/L	04/04/96	GS-1 R03
Thorium-234	<1570.0	U	NA	pCi/L	04/04/96	GS-1 R03
Thallium-208	<56.40	U	NA	pCi/L	04/04/96	GS-1 R03
Uranium-235	<369.00	U	NA	pCi/L	04/04/96	GS-1 R03
Annihilation Radiation	<88.80	U	NA	pCi/L	04/04/96	GS-1 R03
Barium-140	<153.00	U	NA	pCi/L	04/04/96	GS-1 R03
Cadmium-109	<1390.0	U	NA	pCi/L	04/04/96	GS-1 R03
Cerium-139	<37.60	U	NA	pCi/L	04/04/96	GS-1 R03
Cerium-144	<295.00	U	NA	pCi/L	04/04/96	GS-1 R03
Europium-152	<209.00	U	NA	pCi/L	04/04/96	GS-1 R03
Mercury-203	<49.70	U	NA	pCi/L	04/04/96	GS-1 R03
Iodine-129	<31.70	U	NA	pCi/L	04/04/96	GS-1 R03
Lanthanum-140	<30.20	U	NA	pCi/L	04/04/96	GS-1 R03
Neptunium-237	<426.00	U	NA	pCi/L	04/04/96	GS-1 R03
Protactinium-233	<112.00	U	NA	pCi/L	04/04/96	GS-1 R03

1.01

ANALYTICAL RESULTS
(continued)

(SECTION I)

Customer ID: 47507
Ticket ID:

Requestor: K. KARP
Sample Matrix: LIQUID
Project Number: WMT3124L3

Date: April 16, 1996
Lab ID: 235801

Case: 14687
Date Received: Mar 29, 1996
Date Collected: Mar 21, 1996

ANALYSIS REQUESTED	RESULTS	QUALI's	ERROR	UNITS	DATE ANALYZED	METHOD OF ANALYSIS
Selenium-75	<56.50	U	NA	pCi/L	04/04/96	GS-1 R03
Tin-113	<58.40	U	NA	pCi/L	04/04/96	GS-1 R03
Strontium-85	<62.20	U	NA	pCi/L	04/04/96	GS-1 R03
Yttrium-88	<48.40	U	NA	pCi/L	04/04/96	GS-1 R03
Zinc-65	<42.30	U	NA	pCi/L	04/04/96	GS-1 R03

(SECTION II) 2

EG&G ORTEC OMNIGAM (191) I3.02X42 05-APR-96 10:18:35 Page 1
Spectrum name: C:\2\WL\235801.SPC

Sample description
235801 250 ML BOTTLE
ANALYZED BY STEVE

Spectrum Filename: 235801.SPC

Acquisition information
Start time 04-Apr-96 17:31:53
Live time 14400
Real time 14408
Dead time .05%
Detector ID 20

Detector system
CANNBERRA GX8024, SERIAL NUMBER 5945021

Calibration
Filename: 2WL.CLB
Created: 04-Apr-96 09:24:07 & 12-Mar-96 13:33:47
APRIL 4, 1996 CONTINUING CALIBRATION, 82-52-2

Zero offset -.812 keV; Gain .249 keV/channel

Library Files
Main analysis library: C:\GAMMA\LIB\NLANL.LIB

Analysis parameters
Start channel 10 for an energy of 1.68keV
Stop channel 8144 for an energy of 2028.37keV
Peak rejection level 10.000%
Activity scaling factor 1.0000E+00/ 2.0000E-01 = 5.0000E+00
Detection limit method:
RISI method
Additional random error: 1.0000000E+00
Additional systematic error: 5.0000000E+00
Background width: best method (based on spectrum).

Corrections	Status	Comments
Decay correct to date	NO	
Decay during acquisition	NO	
Peaked background correction	YES	C:\2\WL\2WL.PBC 05-APR-96 10:15:27
Absorption (Internal)	NO	
Geometry correction	NO	
Random summing	NO	

Energy calibration normalized difference: 1.0000

EG&G ORTEC OMNIGAM (191) I3.02X42 05-APR-96 10:18:35 Page 2
Spectrum name: C:\2\WL\235801.SPC

********** UNIDENTIFIED PEAK SUMMARY **********

PEAK CHANNEL	CENTROID ENERGY	BACKGROUND COUNTS	NET AREA COUNTS	PEAK INTENSITY CTS/SEC	UNCERT 2 SIGMA %	FWHM keV	SUSPECTED NUCLIDE	
137.00	33.31	264.	22.	.002	210.76	1.284	CS-137	D
218.25	53.55	3374.	73.	.005	226.98	1.303	-	D
269.64	66.36	813.	86.	.006	96.32	1.315	-	D
313.55	77.29	4819.	136.	.009	145.73	1.325	-	D
430.57	106.44	931.	86.	.006	102.41	1.352	-	D
500.58	123.88	905.	86.	.006	101.22	1.368	-	D
758.22	188.06	1468.	92.	.006	119.24	1.427	TH-231	D
772.08	191.51	897.	37.	.003	231.19	1.431	-	D
1022.02	253.78	1049.	62.	.004	150.61	1.489	AC-227	D
1968.00	489.44	621.	51.	.004	140.80	1.712	PB-214	D
1985.99	493.92	336.	60.	.004	90.57	1.717	-	D
1996.09	496.43	318.	27.	.002	188.36	1.719	-	D
2290.00	569.66	563.	84.	.006	83.29	1.790	BI-207	D
2310.05	574.65	279.	48.	.003	103.47	1.794	-	D
2373.27	590.40	478.	84.	.006	76.78	1.810	-	D
2390.94	594.80	259.	48.	.003	100.21	1.814	-	D
2921.66	727.03	243.	39.	.003	118.03	1.943	BI-212	D
3447.80	858.11	155.	37.	.003	100.48	2.072	TL-208	D
5331.17	1327.39	222.	26.	.002	167.29	2.547	-	D

s Peak fails shape tests.
D Peak area deconvoluted.

********** IDENTIFIED PEAK SUMMARY **********

NUCLIDE	PEAK CHANNEL	CENTROID ENERGY	BACKGROUND COUNTS	NET AREA COUNTS	INTENSITY CTS/SEC	UNCERT 2 SIGMA %	FWHM keV
I-129	122.81	29.78	114.	16.	.001	190.54	1.281D
PB-210	190.02	46.52	4656.	241.	.017	81.00	1.296D
AM-241	242.27	59.54	2290.	10.	.001	1363.32	1.308D
TH-234	257.34	63.29	1393.	227.	.016	48.40	1.312D
PB-214	303.63	74.82	797.	0.	.000	.00	.256D
PB-214	312.82	77.11	478.	0.	.000	.00	.608D
RA-226	328.72	81.07	800.	0.	.000	.00	.000D
PB-211	337.25	83.20	355.	0.	.000	.00	.000D
NP-237	350.47	86.49	2851.	33.	.002	464.05	1.333D
PB-214	353.73	87.30	254.	0.	.000	.00	.339D
CD-109	356.70	88.04	2473.	35.	.002	404.16	1.335D
BI-214	363.76	89.80	2055.	95.	.007	137.10	1.336D
TH-234	374.12	92.38	1369.	148.	.010	72.57	1.339D
TH-234	375.81	92.80	1097.	358.	.025	28.23	1.339D
AC-228	424.78	105.00	1229.	1.	.000	.00	1.350D
CO-57	493.31	122.07	1394.	33.	.002	321.99	1.366D
CE-144	539.31	133.53	844.	19.	.001	433.23	1.377D
SE-75	549.23	136.00	577.	0.	.000	.00	.202D
CO-57	551.16	136.48	1027.	60.	.004	152.07	1.380D
U-235	580.97	143.91	1158.	248.	.017	65.58	.996s
RA-223	620.18	153.67	382.	12.	.001	442.19	.159s
CE-139	667.44	165.45	667.	71.	.005	119.51	.532s
U-235	748.82	185.72	1875.	357.	.025	35.92	1.425D

EG&G ORTEC OMNIGAM (191) I3.02X42 05-APR-96 10:18:35 Page 3
Spectrum name: C:\2\WL\235801.SPC

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
RA-226	750.79	186.21	2124.	0.	.000	.00	1.426D
TH-227	950.67	236.00	1672.	14.	.001	853.52	1.472D
PB-212	961.22	238.63	1274.	208.	.014	50.45	1.475D
RA-224	970.66	240.98	947.	44.	.003	198.57	1.477D
PB-214	974.67	241.98	314.	0.	.000	.00	.270D
TH-227	1031.75	256.20	813.	42.	.003	195.46	1.491D
SE-75	1074.75	266.91	499.	53.	.004	195.32	.348s
HG-203	1126.84	279.89	581.	128.	.009	101.20	.345s
PB-214	1188.39	295.22	354.	0.	.000	.00	.743D
PA-231	1207.90	300.08	2132.	32.	.002	409.08	1.532D
PA-231	1218.30	302.67	1788.	4.	.000	3107.27	1.535D
PA-233	1255.67	311.98	652.	13.	.001	542.50	1.544D
RA-223	1296.13	322.06	414.	55.	.004	155.59	.387s
AC-228	1359.72	337.90	422.	81.	.006	149.87	.323s
RA-223	1407.49	349.80	697.	0.	.000	.00	1.579D
BI-211	1412.58	351.07	609.	43.	.003	164.67	1.581D
PB-214	1416.00	351.92	519.	60.	.004	110.86	1.581D
SN-113	1577.46	392.14	368.	109.	.008	83.06	.259s
RN-219	1616.26	401.81	403.	43.	.003	135.43	1.629D
PB-211	1628.42	404.84	422.	1.	.000	.00	1.632D
BA-140	1704.08	423.69	105.	53.	.004	82.68	1.191s
LA-140	1958.34	487.03	169.	0.	.000	.00	.291D
AnnRad	2054.56	511.00	811.	661.	.046	14.45	1.733D
SR-85	2066.57	513.99	612.	112.	.008	64.98	1.736D
BA-140	2157.39	536.62	237.	40.	.003	162.18	.343s
TL-208	2344.34	583.19	299.	172.	.012	63.14	.726s
CS-134	2430.54	604.67	212.	0.	.000	.00	.000D
BI-214	2447.67	608.94	428.	132.	.009	95.94	.370s
RU-106	2502.18	622.52	275.	77.	.005	126.41	.304s
CS-137	2658.89	661.56	222.	149.	.010	64.49	.871s
BI-212	2922.24	727.17	213.	0.	.000	.00	.365D
EU-152	3125.20	777.74	73.	50.	.003	78.67	.244s
CS-134	3189.09	793.66	139.	50.	.003	112.46	.402s
MN-54	3355.76	835.18	129.	59.	.004	90.54	.447s
TL-208	3456.86	860.37	189.	41.	.003	99.36	2.074D
Y-88	3605.24	897.34	169.	112.	.008	67.97	.376s
AC-228	3658.29	910.56	216.	127.	.009	83.06	.380s
AC-228	3896.54	969.92	182.	97.	.007	74.57	.400s
PA-234M	4020.58	1000.83	100.	85.	.006	70.00	1.683s
RU-106	4204.01	1046.53	133.	65.	.005	107.86	.915s
ZN-65	4481.00	1115.55	12.	0.	.000	.00	.000s
CO-60	4711.33	1172.94	101.	143.	.010	37.15	.413s
NA-22	5121.95	1275.26	12.	21.	.001	74.38	.309s
CO-60	5351.72	1332.51	110.	101.	.007	35.32	2.552D
EU-152	5654.59	1407.98	59.	56.	.004	81.40	.579s
K-40	5866.35	1460.75	100.	637.	.044	9.08	2.686D
LA-140	6401.25	1594.05	33.	37.	.003	91.17	.366s
BI-212	6497.47	1618.03	42.	22.	.002	137.95	.231s
BI-214	7085.27	1764.51	58.	135.	.009	40.73	1.585s
Y-88	7369.25	1835.28	43.	105.	.007	48.66	1.203s

s Peak fails shape tests.
D Peak area deconvoluted.

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Spectrum name: C:\2\WL\235801.SPC

***** SUMMARY OF LIBRARY PEAK USAGE *****

NUCLIDE	AVERAGE ACTIVITY Picocuries	PEAK ENERGY keV	PEAK ACTIVITY Picocuries	CODE	MDA VALUE Picocuries	COMMENTS
AC-228	0.00000E+00	911.07	0.0000E+00 %	P	4.2927E+01	
		338.32	0.0000E+00 %	P	6.9186E+01	
		969.11	0.0000E+00 %	P	6.5275E+01	
		105.00	0.0000E+00 %	P	4.6236E+02	
AM-241	0.00000E+00	59.54	0.0000E+00 %		2.8553E+01	
AnnRad	0.00000E+00	511.00	0.0000E+00 %	P	1.7760E+01	
BA-140	0.00000E+00	537.38	0.0000E+00 %	P	3.0592E+01	
		423.69	0.0000E+00 %	P	1.3309E+02	
BI-211	0.00000E+00	351.07	0.0000E+00 $	P	7.3510E+01	
BI-212	0.00000E+00	1620.56	0.0000E+00 &		2.3823E+02	
		727.17	0.0000E+00 %		7.3518E+01	
BI-214	0.00000E+00	1764.51	0.0000E+00 %	P	8.0666E+01	
		609.32	0.0000E+00 %	P	3.4651E+01	
		89.80	0.0000E+00 %	P	3.5010E+03	
CD-109	0.00000E+00	88.04	0.0000E+00 %	P	2.7840E+02	
CE-139	0.00000E+00	165.85	0.0000E+00 %		7.5216E+00	
CE-144	0.00000E+00	133.53	0.0000E+00 %	P	5.9025E+01	
CO-57	0.00000E+00	122.07	0.0000E+00 $	P	9.4754E+00	
		136.48	0.0000E+00 %	P	6.6370E+01	
CO-60	0.00000E+00	1173.23	0.0000E+00 %	P	1.0359E+01	
		1332.51	0.0000E+00 %	P	1.1401E+01	
CS-134	0.00000E+00	795.76	0.0000E+00 &	P	8.8006E+00	
		604.67	0.0000E+00 &	P	7.9335E+00	
CS-137	0.00000E+00	661.65	0.0000E+00 %	P	1.0699E+01	
EU-152	0.00000E+00	1408.08	0.0000E+00 %	P	4.1851E+01	
		778.90	0.0000E+00 &	P	4.9052E+01	
HG-203	0.00000E+00	279.17	0.0000E+00 %	P	9.9326E+00	
I-129	0.00000E+00	29.78	0.0000E+00 %		6.3365E+00	
K-40	0.00000E+00	1460.75	0.0000E+00 %	P	1.8996E+02	

(SECTION II)

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EG&G ORTEC OMNIGAM (191) I3.02X42 05-APR-96 10:18:35 Page 5
Spectrum name: C:\2\WL\235801.SPC

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
LA-140	0.00000E+00	1596.20	0.0000E+00	&	6.0420E+00	
		487.03	0.0000E+00	%	1.3048E+01	
MN-54	0.00000E+00	834.83	0.0000E+00	%	7.4177E+00	
NA-22	0.00000E+00	1274.50	0.0000E+00	%	2.9783E+00	
NP-237	0.00000E+00	86.49	0.0000E+00	%	P 8.5231E+01	
PA-231	0.00000E+00	302.67	0.0000E+00	%	P 6.1012E+02	
		300.08	0.0000E+00	%	P 6.6189E+02	
PA-233	0.00000E+00	311.98	0.0000E+00	%	P 2.2356E+01	
PA-234M	0.00000E+00	1001.20	0.0000E+00	%	8.6772E+02	
PB-210	0.00000E+00	46.52	0.0000E+00	%	P 3.7015E+02	
PB-211	2.37676E+00	404.84	2.3768E+00	(	2.8163E+02	
		83.20	0.0000E+00	?	1.3690E+02	
PB-212	0.00000E+00	238.63	0.0000E+00	$	P 2.4474E+01	
PB-214	0.00000E+00	351.92	0.0000E+00	%	P 2.3516E+01	
		295.22	0.0000E+00	?	P 3.3093E+01	
		74.82	0.0000E+00	&	P 9.5539E+01	
		77.11	0.0000E+00	?	P 4.4621E+01	
		87.30	0.0000E+00	?	P 7.2183E+01	
		241.98	0.0000E+00	&	P 6.8981E+01	
RA-223	0.00000E+00	154.21	0.0000E+00	%	7.9716E+01	
		323.87	0.0000E+00	&	1.8140E+02	
		349.80	0.0000E+00	%	3.2076E+03	
RA-224	0.00000E+00	240.98	0.0000E+00	%	P 2.2555E+02	
RA-226	0.00000E+00	186.21	0.0000E+00	%	P 3.4694E+02	
		81.07	0.0000E+00	&	P 2.9406E+03	
RN-219	0.00000E+00	401.81	0.0000E+00	%	P 1.2484E+02	
RU-106	0.00000E+00	621.84	0.0000E+00	%	P 9.3347E+01	
		1050.50	0.0000E+00	&	P 5.0760E+02	
SE-75	0.00000E+00	264.65	0.0000E+00	&	1.1290E+01	
		136.00	0.0000E+00	&	8.8784E+00	
SN-113	0.00000E+00	391.69	0.0000E+00	%	P 1.1678E+01	
SR-85	0.00000E+00	513.99	0.0000E+00	%	P 1.2444E+01	

(SECTION II)

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Spectrum name: C:\2\WL\235801.SPC

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
TH-227	0.00000E+00	236.00	0.0000E+00 %	P	1.0057E+02	
		256.20	0.0000E+00 %	P	1.3478E+02	
TH-234	0.00000E+00	92.38	0.0000E+00 $	P	3.1398E+02	
		92.80	0.0000E+00 %	P	2.9112E+02	
		63.29	0.0000E+00 $	P	2.3644E+02	
TL-208	0.00000E+00	583.14	0.0000E+00 %	P	1.1274E+01	
		860.37	0.0000E+00 %	P	7.4212E+01	
U-235	0.00000E+00	143.76	0.0000E+00 %	P	7.3824E+01	
		185.72	0.0000E+00 %	P	2.1128E+01	
Y-88	0.00000E+00	1836.00	0.0000E+00 %	P	9.6829E+00	
		898.02	0.0000E+00 %	P	1.0797E+01	
ZN-65	0.00000E+00	1115.52	0.0000E+00 %	P	8.4588E+00	

(- 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

***** 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 pCi/L	UNCERTAINTY COUNTING pCi/L	2 SIGMA TOTAL pCi/L	MDA pCi/L
AC-228	<	2.15E+02			2.15E+02
AM-241	<	1.43E+02			1.43E+02
AnnRad	<	8.88E+01			8.88E+01
BA-140	<	1.53E+02			1.53E+02
BI-211	<	3.68E+02			3.68E+02
BI-212	<	1.19E+03			1.19E+03
BI-214	<	4.03E+02			4.03E+02
CD-109	<	1.39E+03			1.39E+03
CE-139	<	3.76E+01			3.76E+01
CE-144	<	2.95E+02			2.95E+02
CO-57	<	4.74E+01			4.74E+01
CO-60	<	5.18E+01			5.18E+01
CS-134	<	4.40E+01			4.40E+01
CS-137	<	5.35E+01			5.35E+01

(SECTION II)

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EU-152	<	2.09E+02	2.09E+02
HG-203	<	4.97E+01	4.97E+01
I-129	<	3.17E+01	3.17E+01
K-40	<	9.50E+02	9.50E+02
LA-140	<	3.02E+01	3.02E+01
MN-54	<	3.71E+01	3.71E+01
NA-22	<	1.49E+01	1.49E+01
NP-237	<	4.26E+02	4.26E+02
PA-231	<	3.05E+03	3.05E+03
PA-233	<	1.12E+02	1.12E+02
PA-234M	<	4.34E+03	4.34E+03
PB-210	<	1.85E+03	1.85E+03
PB-211	<	1.41E+03	1.41E+03
PB-212	<	1.22E+02	1.22E+02
PB-214	<	1.18E+02	1.18E+02
RA-223	<	3.99E+02	3.99E+02
RA-224	<	1.13E+03	1.13E+03
RA-226	<	1.73E+03	1.73E+03
RN-219	<	6.24E+02	6.24E+02
RU-106	<	4.67E+02	4.67E+02
SE-75	<	5.65E+01	5.65E+01
SN-113	<	5.84E+01	5.84E+01
SR-85	<	6.22E+01	6.22E+01
TH-227	<	5.03E+02	5.03E+02
TH-234	<	1.57E+03	1.57E+03
TL-208	<	5.64E+01	5.64E+01
U-235	<	3.69E+02	3.69E+02
Y-88	<	4.84E+01	4.84E+01
ZN-65	<	4.23E+01	4.23E+01

---------- S U M M A R Y ----------

TOTAL ACTIVITY (1.7 to 2028.4 keV) 1.1883780E+01 pCi/L

MDA is at the time of count.

SSD Waste Profile Information – Original Container ID: 91005998

Part 3 – Surface Radiological Surveys (continued)

2 Radiological Surface Surveys

Container or Item Bar Code Number	Survey Date	E600 Meter/Probe Property Number	E600 Alpha (dpm/100cm²) or Total	E600 Beta (dpm/100cm²) or Total	Other: Meter/Probe Property Number	Other: Alpha (dpm/100cm²) or Total	Other: Beta (dpm/100cm²) or Total	Other: Meter/Probe Property Number	Other: Alpha (dpm/100cm²) or Total	Other: Beta (dpm/100cm²) or Total	Contam. (Yes/No)	Comments
91005998	7-27-95	S-15328 S-15334	BKGD	BKGD							No	Drum
47508	↓	↓	↓	↓							No	Sample, Original Container
91005998	8-17-95	S-15328 S-15334	BKGD	BKGD							No	Drum (sample return)
47507	3-21-96	S-15975 S-16300	BKGD	BKGD							No	Original container
47508											NO	
47509												
1035581												
2049698												
91005998												Drum
47507												Subsample
2049698												
1035581												

6/12/96

3 Field Supervisor: Print Name: Steven Myers Signature: Steven Myers Date: 6-20-96

Site Radiological Control Technician: Print Name: Tony L Bishop Signature: [illegible] Date: 6/12/96

Radiological Survey Map (continued)

Item Surveyed	Location Surveyed	Direct Survey: Gross Count Rate (cpm)	Direct Survey: Net Count Rate (cpm)[a]	Direct Survey: Total Activity[b] (dpm/100 cm²)	Smear Survey α/β-γ: Gross Count Rate (cpm)	Smear Survey α/β-γ: Net Count Rate (cpm)[a]	Smear Survey α/β-γ: Total Activity[b] (dpm/100 cm²)	Release (Yes/No) (C/UC)[c]	Inst. No. Used	Remarks (Released to)
Drum # 91005998	1 EXT. TOP DRUM A	See	Remarks	≤BKG	1/45	0/0	≤BKG/≤BKG	YES / C	1# / 2°	LANL
	2 EXT. SIDES DRUM A				0/52	0/7	≤BKG/22			
	3 EXT. TOP DRUM B				0/64	0/19	≤BKG/60			NOT REMOVED FROM DRUM A REPLACED IN DRUM B
47507	4 EXT. SURFACE				0/41	0/0	≤BKG/≤BKG			
47509	5				2/55	1/10	3/32			
1035581	6				0/46	0/1	≤BKG/3			
2049698	7				1/41	0/0	≤BKG/≤BKG			
SAMPLE BOTTLE# 47507	EXT. SURFACE + LSC SMEAR				SEE	ATTACHED	SHEETS			GEOTECH MOBILE LAB
2049698										
1035581										

Remarks E600 Readout is net α,β in DPM/100cm²

SAMPLED

L2929 BKG α= 1 cpm β-γ= 45 cpm

LSC smears counted on Tricarb 2750/LL

L2929 LLD α= 11.64 dpm β-γ=78.71 dpm

N/A

[a]Net count rate = gross count rate minus background count rate. [b]See Table 2.2 of *Health and Safety Manual*, Volume 2. [c]C = conditional release; UC = unconditional release.